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Manassas, VA 20109

February 28, 2019

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

Subject: 2018 Annual Report, Groundwater Monitoring Program
Former IBM Facility, Owego, New York

Reference: 6NYCRR Part 373 Hazardous Waste Management Permit
No. 7-4930-00095/00005

Dear Ms. LaClair:

Attached is the 2018 Annual Report for the Groundwater Monitoring Program at the former IBM facility in Owego, New York. This report is being submitted in accordance with the facility's Part 373 Permit and Groundwater Monitoring Plan. An EDD for the data in this report is also being submitted to NYENVDATA.

Should you have any questions concerning this report, please contact me at 703-257-2582 or by email at brandon.ashby@ibm.com.

Sincerely,

Brandon Ashby, P.G., R.E.M.
Program Manager - Environmental Remediation
IBM Corporate Environmental Affairs

Attachment

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Corporate Environmental Affairs

2018 ANNUAL REPORT
GROUNDWATER MONITORING PROGRAM
FORMER IBM FACILITY
OWEGO, NEW YORK
6NYCRR PART 373 PERMIT NO. 7-4930-00095/00005

Prepared for:

IBM Corporate Environmental Affairs
8976 Wellington Road
Manassas, Virginia 20109

February 28, 2019

Prepared by:

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Professional Geologist Certification
2018 Annual Report
Groundwater Monitoring Program
Former IBM Facility
Owego, New York

6NYCRR Part 373 Permit No. 7-4930-00095/00005
Site #754006

February 28, 2019

As the person with primary responsibility for the performance of the geological services and activities associated with the captioned report, I certify that I have reviewed the document entitled *"2018 Annual Report, Groundwater Monitoring Program, Former IBM Facility, Owego, New York"* prepared pursuant to Modules II.H (Corrective Action Program) and III.D (Reporting Requirements for Groundwater Monitoring) of 6NYCRR Part 373 Hazardous Waste Management Permit No. 7-4930-00095/00005 dated March 30, 2010. This report is dated February 28, 2019 and was prepared for IBM Corporation by Groundwater Sciences Corporation and Groundwater Sciences, P.C.

I certify that the associated geological services and this report have been prepared under my direct supervision. To the best of my knowledge, all such information contained in this report is complete and accurate.

This report bears the seal of a professional geologist. No alterations may be made to the information contained in this report unless made in accordance with Title 8, Article 145, Section 7209 of New York State Education Law.

Signature: Charles A. Rine Date: February 28, 2019

Name: Charles A. Rine

License No: 000704

State: New York



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Third Quarter 2018 groundwater elevations were measured on July 16, 2018 in the Tank Farm Area and Parking Lot 001 Area in the northern part of the Site.

Fourth Quarter 2018 groundwater elevations were measured on November 26, 2018 in the Waste Management Area, Southern and Western Boundary Areas, and Tower View Drive / Mirror Lake Area in the southern part of the Site.

Third Quarter 2018 groundwater sampling occurred in July 2018 in the Tank Farm Area and Parking Lot 001 Area in the northern part of the Site.

Fourth Quarter 2018 groundwater sampling occurred in November and December 2018 in the Waste Management Area, Southern and Western Boundary Areas, and Tower View Drive / Mirror Lake Area in the southern part of the Site.

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1 INTRODUCTION

This report has been prepared by Groundwater Sciences Corporation (GSC) for the International Business Machines Corporation (IBM). Its purpose is to satisfy the annual reporting requirements for IBM's former Owego, New York facility (the "Site"), located approximately one mile southeast of the village of Owego, New York (**Figure 1-1**).

1.1 Regulatory Reference

This annual report is being submitted to the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation in accordance with Modules II.H (Corrective Action Program) and III.D (Reporting Requirements for Groundwater Monitoring) of the Site's 6NYCRR Part 373 Hazardous Waste Management Permit (Part 373 Permit) No. 7-4930-00095/00005, with an effective date of March 30, 2010. Groundwater monitoring data generated from January 1 to December 31, 2018, including groundwater extraction volumes, groundwater elevations, and analytical chemistry data, is presented in this report. Groundwater monitoring data generated between January 1 and June 30, 2018 was also presented in the 2018 Semiannual Data Report previously submitted to NYSDEC on August 30, 2018. In accordance with the Module II.H.3 requirements, contaminant levels and the effectiveness of the corrective measures program are evaluated in this report.

1.2 Organization of Report

This report is organized as follows. Section 1.3 provides background on the Groundwater Monitoring Program and Section 1.4 provides an overview of the Site's hydrogeologic setting. Section 2 discusses the groundwater sampling and related data collected during 2018 for the Groundwater Monitoring Program, including extraction well pumping data and quality control (QC) analytical chemistry data. Section 3 evaluates the groundwater extraction, hydrogeology, and groundwater chemistry in various areas of the Site, including the Tank Farm Area and the Parking Lot 001 Area (P001 Area) in the northern part of the Site, and the former Waste Management Area, Tower View Drive and Mirror Lake Areas, Southern Boundary Area and Western Boundary Area in the southern part of the Site. These areas and all active monitoring and extraction wells are shown on **Plate 1-1**. Section 4 presents the status of vapor intrusion assessment and mitigation-related work that was completed in 2018 at the Site by Sanborn Head, Engineering, PC (SHPC) for IBM.

1.3 Background Information

IBM submitted a Resource Conservation and Recovery Act (RCRA) Post-Closure Permit Application to NYSDEC and the United States Environmental Protection Agency (USEPA) in June 1987 for the former Waste Management Area at the Site. As required by RCRA regulations, IBM established a quarterly Groundwater Monitoring Program for the Site, including the former Waste Management Area. The groundwater monitoring network and its operation, maintenance, and reporting conditions were subsequently incorporated into the Site's Part 373 Permit, which required the preparation of Groundwater Monitoring Plan (GMP). The GMP was approved by NYSDEC in March 1995 and has been revised several times in the past 24 years as extraction wells and monitoring wells have been added or removed, and the site-specific list of analytical parameters has been changed. The GMP describes the corrective action groundwater monitoring network in detail, including the groundwater treatment process, wells, sampling frequencies, analytical parameters, and semiannual and annual reporting requirements.

1.4 Overview of Site Geology and Hydrogeology

The geology underlying the former IBM Owego Site consists of three primary geologic zones or units (from oldest to youngest): (1) bedrock, consisting of shale and siltstone of the Devonian West Falls Group; (2) unconsolidated sediments of glacial origin (till) consisting of a dense mixture of clay, silt, sand, gravel, and boulders; and (3) other unconsolidated sediments of various depositional origins, including alluvium, glaciolacustrine silt, glaciofluvial sands and gravels (outwash) and fill. The bedrock is weathered to varying degrees on its upper surface, and this zone of weathered bedrock is very thin or absent in some areas. The unconsolidated sediments are discontinuous units that vary greatly in thickness and hydraulic conductivity across the Site. The till typically exhibits a very low hydraulic conductivity and is not a significant water-transmitting unit. A shallow unconfined upper water-bearing zone in the alluvium and glaciofluvial deposits is referred to in this report as the alluvial zone. A deeper thin confined water-bearing zone within weathered bedrock along the interface between glacial till and the underlying competent bedrock is referred to in this report as the till/bedrock interface zone or till/bedrock zone.

Groundwater elevation contour maps were constructed for the till/bedrock zone using July 2018 data from the northern part of the Site and November 2018 data from the southern part of the Site

(**Figure 1-2**). Similar maps were published in the 2018 Semiannual Data Report using February and June 2018 data from the till/bedrock zone. Except where influenced by the extraction wells, groundwater flow in the till/bedrock zone is generally from northeast to southwest across the Site toward Barnes Creek, which flows into the Susquehanna River. The Susquehanna River is located approximately 800 feet southwest of the Site's southern boundary, as shown on **Figure 1-1**.

Groundwater elevation contour maps were also constructed for the alluvial zone using July 2018 data from the northern part of the site and November 2018 data from the southern part of the site (**Figure 1-3**). These maps show the discontinuous nature of the alluvial zone, where groundwater flow is strongly influenced by the extraction wells in the P001 Area and former Waste Management Area. The alluvial zone is generally absent in the Tank Farm Area and in the northern portions of the former Waste Management Area and in the Tower View Drive and Mirror Lake Areas.

2 GROUNDWATER MONITORING PROGRAM

Quarterly field activities for the groundwater monitoring program consist of groundwater elevation measurements, groundwater sampling, and well inspections. These activities were performed in accordance with the approved GMP by qualified field personnel from GSC.

2.1 Groundwater Extraction Wells

In 2018, the Site's groundwater extraction and treatment system consisted of as many as six extraction wells and a packed-column air stripping tower designed to remove volatile organic compounds (VOCs) from groundwater. In 2019, the system will include six extraction wells. As shown on **Plate 1-1**, the extraction wells are located in three areas:

1. In the Tank Farm Area (TFA), extraction well 415 pumps from the till/bedrock zone and was installed in 2008, replacing several wells that were ineffective. Well 415 operated throughout 2018.

2. In the Parking Lot 001 Area:

    a. Extraction well 413 pumps from the till/bedrock zone and was installed in 1982. Well 413 operated throughout 2018.

    b. Extraction well 414 pumped from both the alluvial and till/bedrock zones and was a low yield, dual-zone extraction well screened from the till/bedrock interface zone up to the base of the alluvial zone. The well was installed in 1990 and replaced extraction well 402, which was installed in 1981. During the past several years, well 414 experienced intermittent issues associated with a degraded/corroded casing, failing pumps, and fouling, and the steel-cased section of the well was stabilized by relining with a thin fiberglass liner. The lower fiberglass liner apparently failed on August 3, 2018, allowing formation material (rock fragments) to enter and plug the well. Attempts to remove the well pump using a heavy hoist truck were unsuccessful due to binding of the pump with collapsed formation material. Soil boring 418A, which had been drilled five feet northeast of well 414 in April 2018, was used to generate a detailed well log for installing a replacement extraction well screened

solely in the alluvial zone and fill; soil samples collected from boring 418A were used for sieve analysis and selection of a slot size for the replacement well screen. Replacement extraction well 418 was subsequently installed in mid-September 2018 on an accelerated schedule and began pumping on November 15, 2018.

c. Extraction well 416 is a low-yield well that pumps from the till/bedrock zone. Well 416 began pumping in August 2015 as a replacement for extraction well 412, which pumped primarily from the alluvial zone until it was shut down due to internal well damage in October 2014. Although well 416 operated throughout 2018, its poor performance prompted its replacement by well 417, located about 400 feet west of well 416. Well 417 began pumping during the first quarter of 2019.

3. In the Waste Management Area, extraction well 404 is a dual-zone well that pumps from both the alluvial and till/bedrock zones and extraction well 405 pumps primarily from the alluvial zone. Wells 404 and 405 were installed in 1981 and are equipped with multiple screened intervals. Both wells operated throughout 2018.

As noted above, extraction well 418 replaced extraction well 414 during the fourth quarter of 2018, and extraction well 417 replaced extraction well 416 during the first quarter of 2019. Extraction well 417 was installed following a 2018 investigation[1] conducted, in part, to identify a location in the P001 Area with a till/bedrock interface zone of sufficient transmissivity for a new extraction well.

A report on the design, installation and performance testing of extraction well 417 is presented in **Appendix J** and a similar report for extraction well 418 is presented in **Appendix K**.

[1] *Remedial Alternatives Investigation Report for the Northern Plume & Parking Lot 001 Area, Former IBM Facility, Owego, New York, 6NYCRR Part 373 Permit No. 7-4930-00095/00005*, prepared by Groundwater Sciences Corporation for IBM Corporate Environmental Affairs, September 26, 2018.

Except for brief periods of testing and maintenance, the groundwater extraction and treatment system has operated continuously since April 1990. Approximately 4.8 billion gallons of groundwater has been extracted and treated since 1985.

2.1.1 Summary of Significant Maintenance Activities

The following significant maintenance activities were performed on the groundwater monitoring wells, extraction wells, and treatment system in 2018:

1. A new pump was installed in well 414 on January 26.
2. The flow meters for wells 413, 414, 415 and 416 were cleaned on March 1 and March 2.
3. Piping repairs were completed on the blower, Groundwater Treatment Facility (GTF), and conveyance tunnel on March 6, and the power house sump line repair was completed on March 16.
4. A new pump was installed in well 414 on March 29.
5. A new pump was installed in well 416 on April 5.
6. A new pump was installed in well 415 on May 30.
7. New pumps were installed in wells 414 and 416 on June 19.
8. The flow meters for wells 413, 414, 415, and 416 were cleaned on June 19.
9. The conveyance line from the P001 Area well house to the GTF was flushed with approximately 150 gallons of potable water at a rate of 35 gpm on June 19.
10. The pump motor in well 415 was replaced on June 28.
11. The flow meters for wells 413, 414, and 416 were cleaned on August 3.
12. An attempt was made to pull the pump from well 414 on August 15. The pump and discharge line could not be removed.

13. The flow meters for wells 413, 414, and 416 were cleaned on September 26.

14. The discharge lines from wells 413 and 414 and the conveyance line from the AP well house to the GTF were water-jetted on September 26.

15. New pumps were installed in wells 413 and 416 on September 27.

16. The flow meter for well 416 was cleaned on November 12.

17. A well pump, pump motor, discharge line and electrical lines were installed in new extraction well 418 on November 15.

18. The flow meter was cleaned and a new pump was installed in well 415 on November 30.

19. A new pump was installed in well 416 on November 30.

20. The flow meters for wells 413, 415, 416, 417, and 418 were calibrated on December 5.

21. The power house sump meter was calibrated on December 5.

22. The transfer piping for well 414 in the GTF was cleaned on December 6.

23. The flow meters for wells 404 and 405 and for the air stripper feed flow meters were calibrated on December 6.

2.1.2 Pumping Volumes

The pumping volume at each extraction well is recorded electronically. **Table A-1** in **Appendix A** shows metered monthly pumping volumes in 2018 for the extraction wells in the Waste Management Area (wells 404 and 405), Parking Lot 001 Area (wells 413, 414/418, and 416) and Tank Farm Area (well 415). The volume of groundwater extracted in 2018, as measured by flow from the GTF to the permitted NPDES discharge Outfall 999M, was 129.5 million gallons (Mgal), slightly greater than the average annual flow during the previous 17 years (126.4 Mgal).

The flow from the GTF to the outfall is measured on a single effluent meter and is not connected to the individual flow meters at each extraction well. The sum of the flows recorded by the extraction well meters in 2018 was about six percent higher than the total flow recorded by the GTF effluent

meter. There are various reasons for the difference between these two flows, including meter placement, long pipe runs, and intermittent flows from low-yielding extraction wells that might affect meter accuracy. In addition, following flow testing and recalibration of the flow meter for extraction well 404 in December 2018, the flows for the first 11 months of 2018 were restated by a factor of 1.4. Uncertainty in the rate of drift between December 2018 and the previous calibration in 2017 means that the flow measured at well 404 is estimated.

2.1.3 Evaluation of Treatment Efficiency

Treatment efficiency for the groundwater treatment system was calculated by comparing concentrations of VOCs in the GTF influent with the concentrations of VOCs in the treated effluent discharged from the air stripping tower. The influent and effluent were sampled monthly in 2018 in accordance with the Site's National Pollutant Discharge Elimination System (NPDES) Permit Number NY0244597. No EPA Method 624 VOCs were detected in any of the monthly effluent samples collected in 2018, suggesting a VOC removal efficiency of 100 percent.

2.2 Groundwater Monitoring Wells

The Site's Corrective Action Monitoring Program consists of 142 wells. Physical specifications for the monitoring and extraction wells used in 2018 are listed on **Table B-1** of **Appendix B**.

2.2.1 Groundwater Elevation Measurements

Groundwater elevations were measured in 140 of the 142 wells listed on **Table B-2a** of **Appendix B**. (Extraction wells 404 and 405 are not accessible for manual groundwater elevation measurements.) These include 130 on-Site wells, four off-Site wells (540, 541, 542, 543) in the Route 17C interchange area south of the Southern Boundary Area, and six off-Site wells (521, 522, 524, 529, 532, 534) on the Moore Tire property located west of the P001 Area. In addition to these wells, new monitoring wells 700 and 701 were installed in the P001 Area in 2018 and were measured during the second half of 2018.

Groundwater elevations were calculated by subtracting the measured depth to water from the surveyed elevation of the measuring point listed in **Appendix C**. The designated measuring point for most wells is the top of the inner well casing (i.e., "TOC Elevation"). Groundwater elevations

were measured quarterly on February 26, June 4, July 16, and November 26, 2018. Groundwater elevations were also measured in a supplemental event on December 5, 2018 to establish baseline conditions in the P001 Area following the startup of extraction well 418 in November 2018. The tabulated groundwater elevation data for 2018 are presented in **Appendix C**. Groundwater elevation data since 1997 is maintained in an Access database and has been published in previous semiannual and annual reports.

2.2.2 Monitoring Well Inspections and Dedicated Equipment

In addition to the inspection performed when each monitoring well was sampled, a comprehensive annual inspection of the well field was performed during the February and June 2018 sampling events. This inspection included the following items: (1) measurement of depth to well bottom and comparison of this depth to the reference depth to determine the need for redevelopment, (2) assessment of the legibility of the well tag and visibility of the survey mark, (3) determination of whether the well standpipe needs to be painted and whether the location should be cleared of brush/weeds, (4) assessment of the condition of the well seal, and (5) description of dedicated equipment (if any) and the condition of the bailer cable.

The well inspection summary table in **Appendix C** also shows the type of sampling device used in each well. Polyethylene diffusion bag (PDB) sampling devices are used in many monitoring wells and significantly reduce the volume of purge water generated during groundwater sampling. The PDB samplers are typically set at the midpoint of the water column in each well.

2.2.3 Groundwater Sampling

Table B-2b of **Appendix B** lists the wells that are required by the GMP to be sampled and analyzed quarterly, semiannually, or annually. Other wells not listed on **Table B-2b** of the GMP were sampled voluntarily, including the groundwater extraction wells.

The 2018 sampling schedule for the groundwater monitoring program is summarized in **Appendix D**. For wells sampled semiannually, a staggered quarterly sampling arrangement was approved by NYSDEC, whereby the semiannual sampling events in the northern and southern parts of the Site are scheduled in alternating quarters so as to evenly distribute the sampling field work over the course of the year.

The quarterly sampling events for 2018 occurred during the following periods:

1. February 7, February 14 and February 26 to March 1;
2. June 4 to June 8;
3. July 16 to July 19;
4. November 27, November 28, and from December 3 to December 6.

All groundwater samples collected during 2018 were analyzed by Eurofins Lancaster Laboratories Environmental (NYSDOH ELAP #10670). The completed chains of custody (COCs) for 2018 are shown in **Appendix E** of this report.

None of the wells scheduled to be sampled in the northern part of the Site during the second and fourth quarters was dry. (Although well 114 in the Tank Farm Area was dry in February and July, it is not routinely sampled). Of the wells that were scheduled to be sampled in the southern part of the Site during the second and fourth quarters, none was dry.

The remainder of this section discusses the analytical results for samples collected in 2018 from groundwater monitoring wells and extraction wells, and for field QA/QC samples.

2.2.3.1 Groundwater Chemistry Results

Chemistry data generated from groundwater monitoring activities is maintained in a database by GHD, Inc. (GHD). This database contains groundwater analytical chemistry and field quality control (QC) data from 1993 to the present. Analytical chemistry data generated by the laboratory is transmitted to GHD and GSC electronically. The data is periodically reviewed for outliers, new high or low concentrations, and missing data.

A summary printout of the groundwater analytical chemistry data for all samples collected in 2018 from monitoring wells and extraction wells is presented in **Appendix F**. This summary includes results for pH, temperature, turbidity, and specific conductance measured in the field at the time of sampling. The summary data presented in **Appendix F** are shown in alphanumeric ascending order by sample location, and chronologically by sample date for each location.

2.2.3.2 Volatile Organic Compounds in Groundwater

The principal chemicals detected and of concern at the Site are chlorinated ethanes and ethenes. These and other chlorinated volatile organic compounds (CVOCs) are discussed further in Section 3.3.1. Twelve CVOCs were detected in groundwater in 2018 at concentrations greater than the applicable New York State Groundwater Quality Standard (NYSGQS).

Table 2-1 lists the 16 parameters analyzed in groundwater for the Site's Groundwater Monitoring Program together with the NYSGQS for each parameter, the maximum concentration of each parameter measured in 2018, and the monitoring well and extraction well where the maximum concentrations were detected. Dichlorodifluoromethane (Freon 12) has not been detected at concentrations greater than its NYSGQS (5 micrograms per liter (ug/L)) since 2007 and trichloromethane (chloroform) has not been detected at concentrations greater than its NYSGQS (7 ug/L) since 2008. Freon 11 has not been detected in any groundwater sample since January 2006.

Minimum, median, and maximum concentrations for the monitoring wells and extraction wells during the 27-year period from 1993 to 2018 are summarized in **Appendix G**.

Table 2-1. Analytical Parameters for the Groundwater Monitoring Program*			
Parameter	**NYSGQS (ug/L)**	**Maximum Concentration Measured in a Monitoring Well in 2018**	**Maximum Concentration Measured in an Extraction Well in 2018**
Detected at a concentration greater than the NYSGQS:			
1,1,1-Trichloroethane (111-TCA)	5	3,900 ug/L @ 609	1,100 ug/L @ 415
1,1-Dichloroethane (11-DCA)	5	2,200 ug/L @ 609	1,400 ug/L @ 414
1,1-Dichloroethene (11-DCE)	5	1,000 ug/L @ 128	840 ug/L @ 415
Tetrachloroethene (PCE)	5	19 ug/L @ 610	16 ug/L @ 415
Trichloroethene (TCE)	5	660 ug/L @ 612	1,200 ug/L @ 415
cis-1,2-Dichloroethene (c12-DCE)	5	750 ug/L @ 128	2,200 ug/L @ 415
Vinyl chloride	2	31 ug/L @ 625	120 ug/L @ 415
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	450 ug/L @ 609	120 ug/L @ 415
1,2-Dichloro-1,2,2-trifluoroethane (Freon 123a)	5	54 ug/L @ 609	31 ug/L @ 414
Methylene chloride (DCM)	5	9.3 ug/L @ 612	Not detected
1,2-Dichloroethane	0.6	3.3 ug/L @ 128	4.7 ug/L @ 415
1,1,2-Trichloroethane	1	8.7 ug/L @ 128	4.1 ug/L @ 415
Not detected at a concentration greater than the NYSGQS:			
Dichlorodifluoromethane (Freon 12)	5	1.9 ug/L @ 382	Not detected
Chloroethane	5	3.4 ug/L @ 521	1.6 ug/L @ 416
Trichloromethane (Chloroform)	7	1.5 ug/L @ 183	1.2 ug/L @ 404
Trichlorofluoromethane (Freon 11)	5	Not detected	Not detected

*from Table 1-1 of *Groundwater Monitoring Plan, Former IBM Facility, Owego, New York* (December 2006).
NYSGQS = New York State Groundwater Quality Standard (from 6 NYCRR Part 703.5, Table 1, Class GA)
ug/L = micrograms per liter

2.2.3.3 Quality Control Results for Environmental Blanks

Environmental blanks, consisting of equipment rinse blanks and trip blanks, were collected and analyzed in 2018 for quality control purposes. The analytical chemistry data for these environmental blank samples is presented in **Appendix H**.

Trip blanks were prepared by the laboratory for each sampling round using analyte-free deionized (DI) water for each cooler containing samples for CVOC analysis. The purpose of the trip blanks is to detect contamination encountered or generated during sample transportation or storage. A trip blank was the first item placed into each cooler by the laboratory and accompanied the sample containers from the laboratory to the field sampling locations and back to the laboratory. Seventeen trip blanks were collected in 2018 and the analytical results for these trip blanks are presented in **Appendix H**. Groundwater samples associated with each trip blank can be determined by noting the "Sample Date" of the trip blank in **Appendix H** and cross-checking this date with the trip blanks listed on the COCs in **Appendix E**. All trip blank labels begin with the letters "OTB" in the "Sample Identification" section of the COC. Only one CVOC was detected in one of 17 trip blanks: TCE was detected in December 2018 at an estimated concentration (i.e., "J"-qualified) of 0.2 ug/L. This detection is being discussed with the analytical laboratory.

Equipment rinse blanks were collected to confirm the efficiency of decontamination procedures by rinsing non-dedicated equipment such as water level indicators with analyte-free deionized water and collecting the rinse water in sample bottles for analysis. Seventeen equipment rinse blanks were collected in 2018 from water level indicators and the analytical results for these blanks are presented in **Appendix H**. Six CVOCs on the Site's parameter list (**Table 2-1**) were detected in equipment rinse blanks in 2018. Five of these CVOCs were detected at estimated concentrations greater than or equal to the method detection limit (0.1 ug/L) but equal to or less than the limit of quantitation (0.5 ug/L). TCE was detected at concentrations of 1.0 to 1.2 ug/L in four equipment rinse blanks collected in July 2018 from a water level indicator; these detections may be the result of incomplete decontamination of the water level indicator or the possible presence of TCE in the atmosphere of the space where the deionized (DI) rinse water from the laboratory was being stored. In addition to changing the storage location of the DI water, increased attention and improvements to decontamination procedures will be undertaken in 2019. None of the groundwater analytical chemistry results from monitoring wells required qualification based on the detections of CVOCs in environmental blanks.

3 EVALUATION OF HYDROGEOLOGY AND HYDROGEOCHEMISTRY

This section evaluates the groundwater monitoring data collected during 2018. Current data are presented in the form of potentiometric and isoconcentration contour maps and are also evaluated in the context of historical trends. As required by the Site's Part 373 Permit, this evaluation includes a delineation of the limits of hydraulic control in areas with sufficient data for such delineation.

3.1 Groundwater Extraction

As noted in Section 2.1.2, **Table A-1** of **Appendix A** contains a table of volumes pumped in 2018 from the Site's groundwater extraction wells. Details of this pumping data are discussed below.

3.1.1 Northern Part of the Site

Hydraulic control and contaminant removal in the northern part of the Site is accomplished by the operation extraction wells in the Tank Farm Area and P001 Area.

3.1.1.1 Parking Lot 001 Area

Figure 1-2 show the locations of the three extraction wells (413, 414, and 416) in the P001 Area that were operating in July 2018 and **Plate 1-1** shows the locations of the two new extraction wells (417 and 418) that were installed in September 2018. The monthly flows from wells 413, 414, 416, and 418 (which replaced well 414 in November 2018) are shown on **Table A-1** of **Appendix A**. Extraction well 417 was not pumped in 2018. The combined monthly flow from the P001 extraction wells in 2018 ranged from 238,000 to 347,000 gallons.

Well 416 pumped approximately 222,000 gallons in 2018 at an average rate of 0.4 gallons per minute (gpm). With an average total CVOC concentration of 1,600 ug/L from quarterly samples, well 416 removed an estimated 3.0 pounds of CVOCs by groundwater extraction from the till/bedrock zone in 2018.

Extraction well 413 was pumped at an average rate of 4.7 gpm in 2018. With an average total CVOC concentration of 210 ug/L from quarterly samples, well 413 removed an estimated 4.4 pounds of CVOCs by groundwater extraction from the till/bedrock zone in 2018.

Extraction wells 414/418 were pumped at an average rate of 2.2 gpm in 2018. (Neither well 414 nor well 418 operated from mid-August to mid-November, and so the average rate from this well location is based only on whole months of pumping.) With an average total CVOC concentration of 2,000 ug/L from quarterly samples, well 414 (from January through mid-August with three quarterly samples) and well 418 (from mid-November through December with one quarterly sample) removed an estimated 14 pounds of CVOCs by groundwater extraction in 2018, primarily from the alluvial zone.

3.1.1.2 Tank Farm Area

Tank Farm Area extraction well 415 (**Figure 1-2**) pumped from the till/bedrock zone at an average rate of approximately 0.9 gpm in 2018. Compared to the other extraction wells at the Site, the volume extracted from well 415 is low and accounted for about 0.3% of groundwater extraction in 2018, similar to previous years. However, compared to all of the other extraction wells, the concentration of total CVOCs in well 415 was high (ranging from 5,700 to 6,400 ug/L) and, consequently, the total CVOC mass recovered by well 415 (about 24 pounds in 2018) was comparable to the combined CVOC mass recovered by the P001 Area extraction wells.

3.1.2 Southern Part of the Site

Wells 404 and 405 extract groundwater in the southern part of the Site (**Figure 1-3**) and accounted for more than 95% of the groundwater volume pumped in 2018. The monthly flow from each of these wells is shown on **Table A-1** of **Appendix A** and the combined average pumping rate from both wells was approximately 270 gpm in 2018.

3.2 Hydrogeology

As explained in Section 1.2 and shown on **Plate 1-1**, the Tank Farm Area is located in the northeastern part of the Site and the P001 Area is located in the northwestern part of the Site. The former Waste Management Area, Tower View Drive and Mirror Lake Areas, Western Boundary Area, and Southern Boundary Area are all located in the southern part of the Site. The hydrogeology of the northern and southern parts of the Site is discussed separately in the following sections.

3.2.1 Tank Farm Area

The geologic units in the Tank Farm Area consist primarily of till overlying bedrock, with some localized areas of fill. The monitoring wells in this area are screened in the fill, till, till/bedrock zone, or shallow bedrock. The shallow water-bearing "alluvial zone" unit present to the west of the Tank Farm Area appears to be absent in the Tank Farm Area. As a result, the till/bedrock zone is the most significant water-transmitting unit in the Tank Farm Area and extraction well 415 is screened in that unit.

The groundwater flow divide shown on **Figure 1-2** for the till/bedrock zone in the Parking Lot 001 and Tank Farm Areas on July 16, 2018 delineates the area where groundwater is captured by extraction well 415. Outside this area of capture, the direction of groundwater flow in the till/bedrock zone is generally to the west toward the P001 Area and to the southwest toward the Tower View Drive and Mirror Lake Areas.

3.2.2 Parking Lot 001 Area

The P001 Area is underlain by a bedrock valley originating as a closed depression in the bedrock surface with its deepest point situated between till/bedrock zone wells 393 and 395 (**Figure 1-2**). Drilling investigations performed in the early 1990s and a seismic refraction study conducted in 2017 determined that the buried bedrock valley extends westward from this depression, passing through a narrow throat at bedrock well 378 on Lakeview Parkway, and opening up off-Site to the southwest of well 378 beneath the Moore Tire property. In the P001 Area, this bedrock valley contains four hydrogeological units, from lowermost to uppermost: (1) weathered bedrock, (2) till, (3) sand, silt, and gravel, and (4) fill, which is more than 20 feet thick in some places. The primary water-bearing units in the P001 Area are the till/bedrock zone (straddling units 1 and 2) and the alluvial zone (unit 3).

Detailed groundwater elevation contour maps have been constructed semiannually since 1993 for both the till/bedrock zone and the alluvial zone in the P001 Area. **Figure 1-2** shows the groundwater elevation contours for the till/bedrock zone in the P001 Area constructed from groundwater elevation data collected on July 16, 2018. The generalized direction of groundwater flow in the till/bedrock zone is indicated by the flow arrows on this map, and the hydraulic

influence of P001 Area extraction wells 413 and 414 in the till/bedrock zone is apparent. **Figure 1-2** also shows a groundwater flow divide in the vicinity of Lake View Parkway. On the eastern side of this flow divide, groundwater flow in the till/bedrock zone is captured by the P001 Area extraction wells. On the western side of the divide, groundwater flows to the southwest across the Moore Tire property and back onto the Site in the northern part of the former Waste Management Area.

Figure 1-3 shows the groundwater elevation contours for the alluvial zone in the P001 Area on July 16, 2018 when extraction well 414 was the only well affecting groundwater flow in the alluvial zone in the P001 Area. The groundwater flow divide in the alluvial zone during the third quarter of 2018 was situated near or west of Lake View Parkway. Groundwater in the alluvial zone east of the flow divide was being captured by extraction well 414 in July 2018, and has been captured by extraction well 418 since November 2018. Groundwater in the alluvial zone west of the flow divide flows to the southwest through a zone of coarse alluvium extending across the center of the Moore Tire property and back onto the Site north of Building 352.

3.2.3 Southern Areas

Weathered bedrock and till overlie competent bedrock in the southern part of the Site. In the southern and central portions of the southern part of the Site, the till is overlain by relatively permeable outwash sand and gravel and, in some areas, by low-permeability glaciolacustrine silt. The entire area is covered by a surficial layer of post-glacial alluvium. This surficial alluvium is different from the deeper "alluvial zone" discussed elsewhere in this report.

3.2.3.1 Waste Management, Western Boundary, and Southern Boundary Areas

As shown on **Figure 1-2**, groundwater flow in the till/bedrock zone in the northern part of the former Waste Management Area is to the south and southwest toward extraction well 404. Flow in the till/bedrock zone of the Southern Boundary Area is generally to the northeast and north toward extraction well 404. The limits of groundwater capture by extraction well 404 in the till/bedrock zone appear to extend off-Site to the south of the railroad tracks.

An alluvial zone consisting primarily of sand and gravel overlies the till in the Southern Boundary Area. As shown on **Figure 1-3**, horizontal gradients in the alluvial zone of the Southern Boundary

Area are very low (less than 0.01) in the vicinity of the railroad tracks. These low gradients are indicated by groundwater elevations ranging from 801.32 feet to 801.81 feet (a differential of less than 0.5 feet) over an area of several acres at wells 101, 323, 319, 322, 318, 625 and 356. The southern limit of capture by extraction wells 404 and 405 in the alluvial zone is indicated by the groundwater flow divide located north of wells 101 and 323, and passing very close to well 627 on **Figure 1-3**.

3.2.3.2 Tower View Drive and Mirror Lake Areas

The direction of groundwater flow in the till/bedrock zone in the Tower View Drive and Mirror Lake Areas of the Site on November 26, 2018 is shown by the flow arrows on **Figure 1-2**. In these areas, groundwater generally flows to the southwest toward extraction well 404 in the former Waste Management Area. Groundwater flow in the limited alluvial zone through the Tower View Drive Area (**Figure 1-3**) also is generally to the southwest toward extraction well 404 and extraction well 405, which pumps primarily from sand and gravel in the alluvial zone.

3.3 Hydrogeochemistry

This section presents an analysis of the chemical concentration data collected in 2018, including an assessment of trends at specific locations.

3.3.1 Chemicals of Concern

As noted in Section 2.2.3.1.1, the chemicals of concern at the Site include chlorinated ethanes, chlorinated ethenes, and several other CVOCs.

3.3.1.1 Chlorinated Ethanes

The chlorinated ethanes present in groundwater at the Site are 1,1,1-trichloroethane (111-TCA), 1,1-dichloroethane (11-DCA), and chloroethane. 111-TCA is a primary solvent that was used in many industrial applications. 111-TCA degrades to 11-DCA anaerobically by biologically-mediated reductive dechlorination under methanogenic conditions. 111-TCA also degrades to 1,1-dichloroethene (11-DCE, an ethene) by dehydrohalogenation, which is an abiotic elimination reaction common in groundwater. Under conditions favorable to sequential reductive dechlorination, 11-DCE may degrade further to chloroethene (vinyl chloride, VC) and 11-DCA may

degrade to chloroethane (CEA). Biodegradation of 11-DCE to VC requires sulfate-reducing or methanogenic (i.e., anaerobic) conditions that may exist in some areas of the Site. An alternative source of 11-DCA in groundwater is as an impurity in the manufacture of 111-TCA, where 11-DCA was used as an intermediate, rather than from degradation of 111-TCA.

3.3.1.2 Chlorinated Ethenes

The chlorinated ethenes present in groundwater at the Site are trichloroethene (TCE), cis-1,2-dichloroethene (c12-DCE), 11-DCE, and VC. Like 111-TCA, TCE is a primary solvent that was used in various industrial applications. TCE degrades preferentially to c12-DCE or to trans-1,2-dichloroethene under conditions favorable to biologically-mediated reductive dechlorination. As noted in Section 3.3.1.1, 11-DCE (an ethene) is created by abiotic dehydrohalogenation of 111-TCA (an ethane). VC is created by sequential reductive dechlorination of both c12-DCE and 11-DCE.

3.3.1.3 Other Compounds

Other compounds present in groundwater at the Site include methylene chloride (dichloromethane, DCM), Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane), and Freon 123a (1,2-dichloro-1,2,2-trifluoroethane), which is created by the reductive dechlorination of Freon 113 in groundwater. In 2018, Freon 113 and Freon 123a were detected in limited areas of both the alluvial and till/bedrock zones with the highest concentrations in the till/bedrock zone at monitoring well 609 in the central part of the P001 Area and at extraction well 415 in the Tank Farm Area as shown on **Table 2-1**.

In the case of methylene chloride, which degrades both aerobically and anaerobically and is rarely transported beyond the immediate vicinity of a source zone, its distribution is limited to a few wells in the Tank Farm Area and P001 Area, notably wells 610 and 612 with a maximum concentration of 9.3 ug/L.

3.3.1.4 Standardization of Chlorinated Ethane and Ethene Concentrations

As noted above, degradation of 111-TCA and TCE, the principal groundwater contaminants at the Site, can occur biotically or abiotically under either aerobic or anaerobic conditions. Due to the complexity of possible degradation pathways and rates, characterizing the spatial and temporal changes in concentrations of chlorinated ethanes and ethenes is complicated if only individual

chemical species (i.e., 111-TCA, 11-DCA, 11-DCE, etc.) are examined. In an effort to simplify the understanding of chemical degradation and transport, this report presents chemical concentration maps showing a standardized sum of CVOC concentrations for related compounds, adjusted to account for the loss of chlorine ions via mechanisms such as anaerobic biodegradation and abiotic dehydrogenation. This approach is an alternative to preparing separate isoconcentration contour maps and concentration vs. time trend graphs for each chemical species. As explained below, this standardization procedure was performed by expressing the concentrations of CVOCs related through chemical degradation in terms of the parent chemicals 111-TCA and TCE.

The standardized TCA-series concentration was calculated by multiplying concentrations of 11-DCA, 11-DCE, and chloroethane by the ratio of the molecular weight of 111-TCA to the molecular weight of each degradation product, and then summing the products. In this way, all of the dissolved concentrations of 111-TCA, 11-DCA, 11-DCE, and chloroethane in groundwater for a particular sample were expressed as a total TCA-series concentration, thereby approximating the concentration of 111-TCA which theoretically could have been measured if 111-TCA had not been degraded. (Note: Although 11-DCE is an ethene compound, it was included in the TCA-series group of CVOCs because its source at the Site is believed to be primarily from degradation of 111-TCA, an ethane compound).

The same procedure was performed for the ethene compounds such that TCE, c12-DCE, and vinyl chloride concentrations were expressed as a total TCE-series concentration.

The formulas for calculating these series concentrations are shown on **Figures 3-1 through 3-4**, which are sets of isoconcentration contour maps for these standardized TCA-series and TCE-series parameters. The isoconcentration contour limits shown on these maps are based on the NYSGQS, which is 5 ug/L for all of the TCA-series and TCE-series parameters except vinyl chloride, for which the NYSGQS is 2 ug/L. The isoconcentration contour intervals are 5, 50, 500, and 5000 ug/L, in keeping with the order-of-magnitude convention for showing concentrations of CVOC plumes in plan view.

3.3.2 Tank Farm Area and Parking Lot 001 Area

The following discussion focuses on the groundwater chemistry of the alluvial and till/bedrock zones in the Tank Farm Area and Parking Lot 001 Area in the northern part of the Site.

3.3.2.1 Alluvial Zone Chemistry

Figures 3-1 and 3-2 are isoconcentration contour maps showing the distribution of TCA- and TCE-series parameters in the alluvial zone, which includes sand and gravel units of glacial origin, as well as the geologically-more recent alluvium. These figures do not show isoconcentration contours east of the P001 Area and in the Tank Farm Area because the alluvial zone is generally absent or not well-defined in those areas. (As noted in Section 3.2.1, fill and till lie directly on top of bedrock in most of the Tank Farm Area.) **Figures 3-1 and 3-2** show plumes of both TCA- and TCE-series parameters centered on an area of concentrations typically less than 500 ug/L in the vicinity of extraction well 414 and monitoring wells 325 and 613. These same constituents are present in on-Site wells 398, 602, 603, and 608 in the extreme western portion of the P001 Area north of Building 352 and southwest of the Moore Tire property. The TCA- and TCE-series plumes east of the groundwater flow divide shown on **Figures 3-1 and 3-2** were captured by P001 Area extraction well 414 until August 2018, when well 414 was shut down for reasons explained in Section 2.1. Extraction well 418, the replacement for extraction well 414, was installed in September 2018 and started pumping in November 2018 to maintain hydraulic control in the alluvial zone. The groundwater flow divides shown on **Figures 3-1 and 3-2** are the same as the divides shown on the groundwater elevation contour map for the alluvial zone (**Figure 1-3**).

3.3.2.2 Till/Bedrock Zone Chemistry

Figures 3-3 and 3-4 are isoconcentration contour maps showing the distribution of TCA- and TCE-series parameters in the till/bedrock zone.

Both of these figures show CVOC plumes originating from the vicinity of the former Tank Farm Area and the northwestern portion of Building 002. Additional groundwater chemistry data obtained from the temporary monitoring wells installed for the 2018 Remedial Alternatives Investigation allowed for the refinement of existing CVOC plume boundaries, particularly in the

area between extraction well 415 and monitoring well 610, and in the areas around monitoring wells 609 and 612.

Both the TCE- and TCA-series CVOC plumes extend off-Site in the till/bedrock interface zone beneath the Moore Tire property. A comparison of **Figures 3-1 and 3-2** shows that the TCA-series plume is generally higher in concentration than the TCE-series plume, although both plumes are similar in lateral extent. Both plumes narrow as they extend off-Site beneath the Moore Tire property and this off-Site extension corresponds roughly with the base of a buried bedrock valley oriented southwest-to-northeast. The leading edges of both plumes in the till/bedrock interface zone appear to attenuate beneath the Moore Tire property.

Plume concentrations greater than 500 ug/L in the Tank Farm Area are captured by extraction well 415. P001 Area extraction wells 413, 414, and 416 intercept groundwater plumes in the till/bedrock zone between the extraction well 415 capture zone and the western groundwater flow divide near Lake View Parkway. These flow divides are identical to those shown on the groundwater elevation contour map for the till/bedrock zone (**Figure 1-2**). Extraction well 417, which began operating in 2019, was installed to more effectively capture the off-Site portion of the plume in the till/bedrock zone west of the P001 Area.

Figure 3-5 shows the distribution of methylene chloride in July 2018 in the till/bedrock zone. Methylene chloride was detected in only two wells shown on **Figure 3-5**. The maximum concentration of methylene chloride detected in 2018 was 9.3 ug/L at monitoring well 612.

3.3.3 Southern Areas

The following discussion focuses on the groundwater chemistry of the alluvial and till/bedrock zones in the southern part of the Site, including the former Waste Management Area, Southern Boundary and Western Boundary Areas, Tower View Drive and Mirror Lake Area. Methylene chloride was not detected in the southern part of the Site and therefore was not contoured separately.

3.3.3.1 Alluvial Zone Chemistry

Figures 3-1 and 3-2 are isoconcentration contour maps showing the distribution of TCA- and TCE-series parameters in November-December 2018 in the alluvial zone of the former Waste Management Area, Southern Boundary and Western Boundary Areas. East of these areas, **Figures 3-1 and 3-2** show the distribution of TCA- and TCE-series parameters in November-December 2018 in the alluvial zone of the Tower View Drive and Mirror Lake Areas.

Figure 3-1 shows a TCA-series plume in the central part of the former Waste Management Area. Several surface impoundments that were used for treating manufacturing process wastes were located in the area and were removed in the late 1980s. South of the Waste Management Area, TCA-series parameters were detected at concentrations less than the NYSGQS in six monitoring wells in the Southern Boundary Area. TCA-series parameters were not detected or were detected only at trace levels (0.1 ug/L) farther south in off-Site wells 540, 541, 542, and 543 located around the Route 17C interchange.

Figure 3-2 shows a TCE-series plume in the central part of the former Waste Management Area where the former surface impoundments were located. In contrast to the TCA-series plume, **Figure 3-2** shows a plume with TCE-series concentrations ranging from 1.7 ug/L at well 101 to 87 ug/L at well 318 in the Southern Boundary Area. The northern part of this plume is captured by extraction well 404. TCE-series parameters were detected off-Site in alluvial zone wells 541, 542, and 543 south of the Southern Boundary Area in the Route 17C interchange at concentrations less than the NYSGQS, as shown on **Figure 3-2**.

Figure 3-1 shows a TCA-series plume with the highest concentrations in the central Tower View Drive and Mirror Lake Areas. TCA-series concentrations at well 621 (160 ug/L, **Figure 3-1**) on the north side of Tower View Drive and at well 623 on Lake View Parkway (90 ug/L, **Figure 3-1**), together with groundwater flow directions shown on **Figure 1-3**, indicate that this plume is captured by extraction wells 404 and 405 in the former Waste Management Area. The southern limit of the TCA-series plume in the Tower View Drive and Mirror Lake Areas lies north of shallow monitoring well 374 on the north side of Mirror Lake (**Figure 3-1**), where concentrations are typically at or below the limits of detection (0.1 ug/L for individual CVOC species).

Detections of TCE-series constituents in the Tower View Drive and Mirror Lake Areas were limited to two wells, as shown on **Figure 3-2**: well 309 (2.5 ug/L) which monitors the lower part of the till, and well 621 (2.3 ug/L), which is screened in the alluvial zone. These detections are insufficient for inferring a connection to the TCE-series plumes in the former Waste Management Area (**Figure 3-2**).

3.3.3.2 Till/Bedrock Zone Chemistry

Figures 3-3 and 3-4 show the TCA- and TCE-series isoconcentration contours for the till/bedrock zone in the southern areas. With regard to the distribution of TCA-series parameters in the southern part of the Site, **Figure 3-3** shows two apparent CVOC plume source areas: (1) off-Site west of Barnes Creek near wells 160 and 162, and (2) on-Site in the northern part of the former Waste Management Area near well 148 east of Building 352 and northeast of Buildings 350/351 (designated "Old WTP" on the maps). The source of the off-Site plume west of Barnes Creek is the former Robintech/Compudyne site at 1200 Taylor Road (NYSDEC Site Code 754007), now owned by Sanmina-SCI. The presence of 111-TCA, TCE and their degradation products at the Sanmina-SCI site is unrelated to the former IBM Owego site and has been attributed to a former chemical storage area located beneath a portion of Sanmina-SCI's main manufacturing building. A third apparent source area lies on-Site to the east in the Tower View Drive and Mirror Lake Areas. **Figure 3-3** shows this apparent source area near the southern end of Building 002. The TCA-series plumes in the Tower View Drive and Mirror Lake Areas, and in the former Waste Management Area merge south of the Old WTP, and are ultimately captured by extraction well 404 (**Figure 3-3**).

The TCE-series isoconcentration contour map for the till/bedrock zone in the western part of the southern areas is shown on **Figure 3-4**. Consistent with the map showing the distribution of TCA-series parameters (**Figure 3-3**), **Figure 3-4** shows a plume with concentrations greater than 100 ug/L being drawn onto the Site from the west at monitoring wells 160 and 162 and a plume centered on the Old WTP. Detections of TCE-series parameters in the Southern Boundary Area south of extraction well 404 were less than the NYSGQS in 2018. Detections of TCE-series parameters in the Tower View Drive and Mirror Lake Areas (**Figure 3-4**) were also less than the NYSGQS, except at well 619 between Buildings 101 and 201, which is the same apparent source area as the TCA-series plume shown on **Figure 3-3** for the till/bedrock zone.

3.3.4 Graphical and Statistical Evaluations

In addition to evaluating the maximum concentrations of individual CVOCs in groundwater relative to groundwater standards (**Table 2-1**), trends in the concentration of CVOCs in groundwater were evaluated graphically using plots of concentration vs. time, and statistically, using non-parametric tests.

3.3.4.1 Concentration vs. Time

Graphs of TCA- and TCE-series concentrations versus time for key monitoring and extraction wells for the years 2000 through 2018 are shown on **Plate 3-1**. The monitoring wells are located near the boundaries of the Site in the P001 Area, Tank Farm Area, Southern Boundary Area, former Waste Management Area, and off-Site in the Moore Tire Area. They represent wells that are sampled quarterly in accordance with the sampling plan presented in **Appendix D**.

3.3.4.2 Statistical Tests for Trend

Concentration trends in many of the wells shown on **Plate 3-1** are apparent by inspection of the concentration vs. time graphs. To determine whether the observed graphical trends in chemical concentrations over time are statistically significant, groundwater analytical chemistry data was evaluated using a non-parametric statistical test, as specified in Section 7.3.3 of the Groundwater Monitoring Plan. This statistical test for trend, the Mann-Kendall test, is based on the concept that a lack of trend should correspond to a time-series plot fluctuating randomly about a constant mean level, without a visually apparent upward or downward pattern. If an increasing trend really exists, then the sample taken first from any randomly selected pair of measurements should have a lower concentration, on average, than the measurement collected at a later time. The Mann-Kendall test does not require that the data be normally distributed and is valid even where data are missing, tied, or censored at the reporting limit (e.g., “not detected at limit X”).

ProUCL version 5.1, a statistical software package, was used to identify statistically significant trends at a significance level of $\alpha = 0.05$, which corresponds to a confidence limit of 95%. ProUCL was created for USEPA to address statistical issues described in various CERCLA and RCRA guidance documents. The period used for trend analysis was 11 years (as many as 44 quarterly samples) from January 2008 to October 2018. This period was chosen because a change in

analytical laboratory occurred at the beginning of 2008 and the reporting limit in undiluted samples was lowered to 0.5 ug/L.

The test results for concentration trends at 19 wells are summarized on **Table 3-1** and the ProUCL output is shown in **Appendix I**. The TCA-series and TCE-series trends were tested separately for each well. As shown on **Table 3-1**, the concentration trend in 16 of the 38 tests is indeterminate, meaning that a statistically increasing or decreasing trend could not be confirmed.

In the P001 Area, concentrations of TCE-series parameters are increasing over the 11-year test period at till/bedrock monitoring well 393 near Lake View Parkway and at extraction well 413.

In the Tank Farm Area, concentrations of both TCA-series and TCE-series parameters are decreasing at extraction well 415 (based on nearly ten years of data since the well began pumping in March 2009).

In the off-Site Moore Tire Area, concentrations of TCA- and TCE-series parameters are indeterminate at alluvial zone monitoring wells 529 and 534, and are increasing at till/bedrock zone monitoring well 522. Since most of the detections at wells 529 and 534 are less than 1 ug/L, and there are many non-detects, the results reported by the Mann-Kendall test are not meaningful for assessing concentration trends in these wells.

In the Southern Boundary Area, concentrations of both TCA- and TCE-series parameters in the alluvial zone are decreasing at monitoring wells 625 and 322 near the Site's southern property boundary; these trends continue to be confirmed by inspection of the corresponding concentration vs. time graphs on **Plate 3-1**. The TCA-series trend at well 319 is also decreasing. At well 323 farther north of the southern property boundary, the concentration vs. time graph exhibits apparent seasonality, and concentrations of TCA-series and TCE-series parameters are indeterminate over the 11-year period of the statistical test. Concentrations of TCE-series parameters are increasing at well 318 north of well 625 and are also increasing at well 319 northwest of well 625.

In the Waste Management Area, the long-term trends in both TCA-series and TCE-series concentrations are decreasing at extraction wells 404 and 405, and are apparent by inspection of the concentration vs. time graphs.

Table 3-1. Statistical Evaluation of Trends in Water Quality at Quarterly Monitoring Wells (2008-2018)

Site Area	Well	TCA-Series Trend	TCE-Series Trend	Hydrogeologic Zone Monitored
P001 Area (Monitoring)	393	None	Increasing	Till/Bedrock
	399	None**	None**	Alluvial
	606	Decreasing	Decreasing	Alluvial
	607	None	Decreasing	Till/Bedrock
P001 Area (Extraction)	413	None	Increasing	Till/Bedrock
	414/418	Decreasing	None+	Alluvial & Till/Bedrock
	416^	None	None	Till/Bedrock
Tank Farm Area (Extraction)	415*	Decreasing	Decreasing	Till/Bedrock
Moore Tire Area (Off-Site Monitoring)	522	Increasing	Increasing	Till/Bedrock
	529	None**	None**	Alluvial
	532	None	Decreasing	Alluvial
	534	None***	None***	Alluvial
Southern Boundary Area (Monitoring)	318	None	Increasing	Alluvial
	319	Decreasing	Increasing	Alluvial
	322	Decreasing	Decreasing	Alluvial
	323	None	None	Alluvial
	625	Decreasing	Decreasing	Alluvial
Waste Management Area (Extraction)	404	Decreasing	Decreasing	Alluvial & Till/Bedrock
	405	Decreasing	Decreasing	Alluvial

The Mann-Kendall test was used to evaluate concentration trends at a significance level of $\alpha = 0.05$.
"None" means that the concentration trend is indeterminate.
+ Well 418 replaced well 414 in 2018. A significant decrease in concentration occurred in the first quarter of 2016.
^ Thirteen quarters of data was available for extraction well 416, which replaced extraction well 412 in mid-2015.
* Nearly ten years of data (39 quarters) from 2009-2018 was available for extraction well 415.
** The Mann-Kendall test result is not meaningful because most detections are less than 1 ug/L and there are many non-detects relative to the number of detections.
*** A low-level increasing trend is apparent by inspection since 2016 at well 534.

3.3.5 CVOC Mass Removal

Table A-2 in **Appendix A** shows the dissolved mass of CVOCs pumped by the groundwater extraction wells during 2018 and subsequently removed via the Site's packed-column air stripping tower. The total CVOC mass removed was calculated by multiplying the GTF influent concentrations from monthly NPDES compliance sampling by the volume of groundwater pumped monthly through the air stripping tower. Based on these calculations, the total CVOC mass removed from groundwater in 2018 was 328 pounds, with 157 pounds (48 percent) of this total CVOC mass consisting of TCE. The cumulative total CVOC mass removed since 1998 is approximately 7,483 pounds.

3.3.6 Maps of Total CVOCs, 111-TCA, and TCE

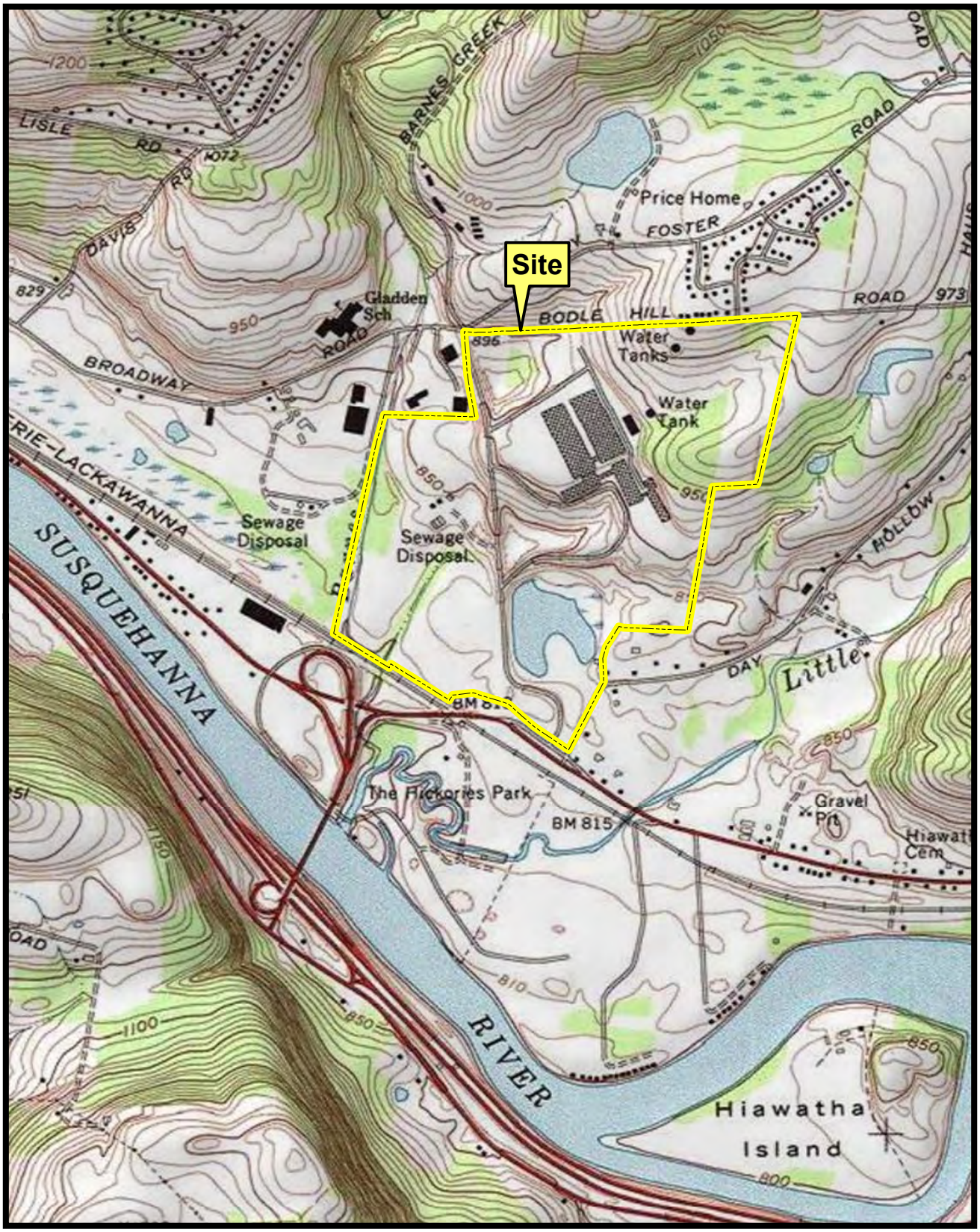
As required by the GMP, **Figure 3-6** shows the total concentration in groundwater for the 17 CVOCs on the Site's parameter list, as specified on Table 1-1 of the GMP and Module II, Table II-3 of the Part 373 Permit. The total CVOC concentration is shown for all wells, regardless of hydrogeologic zone, and CVOC isoconcentration contours are shown for wells in the bedrock and till/bedrock zone, where the CVOC plumes are most extensive relative to the plumes in the alluvial zone. The total CVOC value posted at each well has been rounded to two significant figures (or to one significant figure if less than 1 ug/L).

As required by the GMP, **Figures 3-7 and 3-8** show the distribution of 111-TCA and TCE, respectively, and not the sum of their transformation series component CVOCs. As with **Figure 3-6**, concentrations of 111-TCA (**Figure 3-7**) and TCE (**Figure 3-8**) are shown for all wells, regardless of hydrogeologic zone, and isoconcentration contours at the limit of the NYSGQS (5 ug/L) are shown only for wells in the bedrock and till/bedrock zone, where the 111-TCA and TCE plumes are more extensive relative to the plumes in the alluvial zone. The plumes limits for 111-TCA on **Figure 3-7** and for TCE on **Figure 3-8** are similar to the plume limits shown on the TCA- and TCE-series isoconcentration maps for the till bedrock zone (**Figures 3-3 and 3-4**) because 111-TCA and TCE are significant contributors to the total CVOC concentration at most of the monitoring wells.

4 VAPOR INTRUSION ASSESSMENT

SHPC prepared a report summarizing the status of vapor intrusion (VI) assessment and mitigation-related work at the Site for the calendar year 2018. The report, presented in **Appendix L**, addresses the following items:

1. The status of the buildings that were the focus of the RFI Work Plan.
2. The status of heating, ventilating, and air conditioning (HVAC) operations and occupancy for B001, B002, and B351.
3. The results of indoor air sampling performed in B001.
4. Sub-slab depressurization (SSD) system operation and performance.
5. Activities planned for 2019.



Portion of the Apalachin, NY
USGS 7.5-Minute Quadrangle
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Figure 1-1

IBM
Owego, New York

Site Location Map

N
W E
S

Scale (feet)
0 500 1,000 2,000

GROUNDWATER SCIENCES CORPORATION
Q:\93000\93004\GIS\Projects\2019-02 figs\Fig1-1_SiteLocTopo.mxd • 2/28/2019

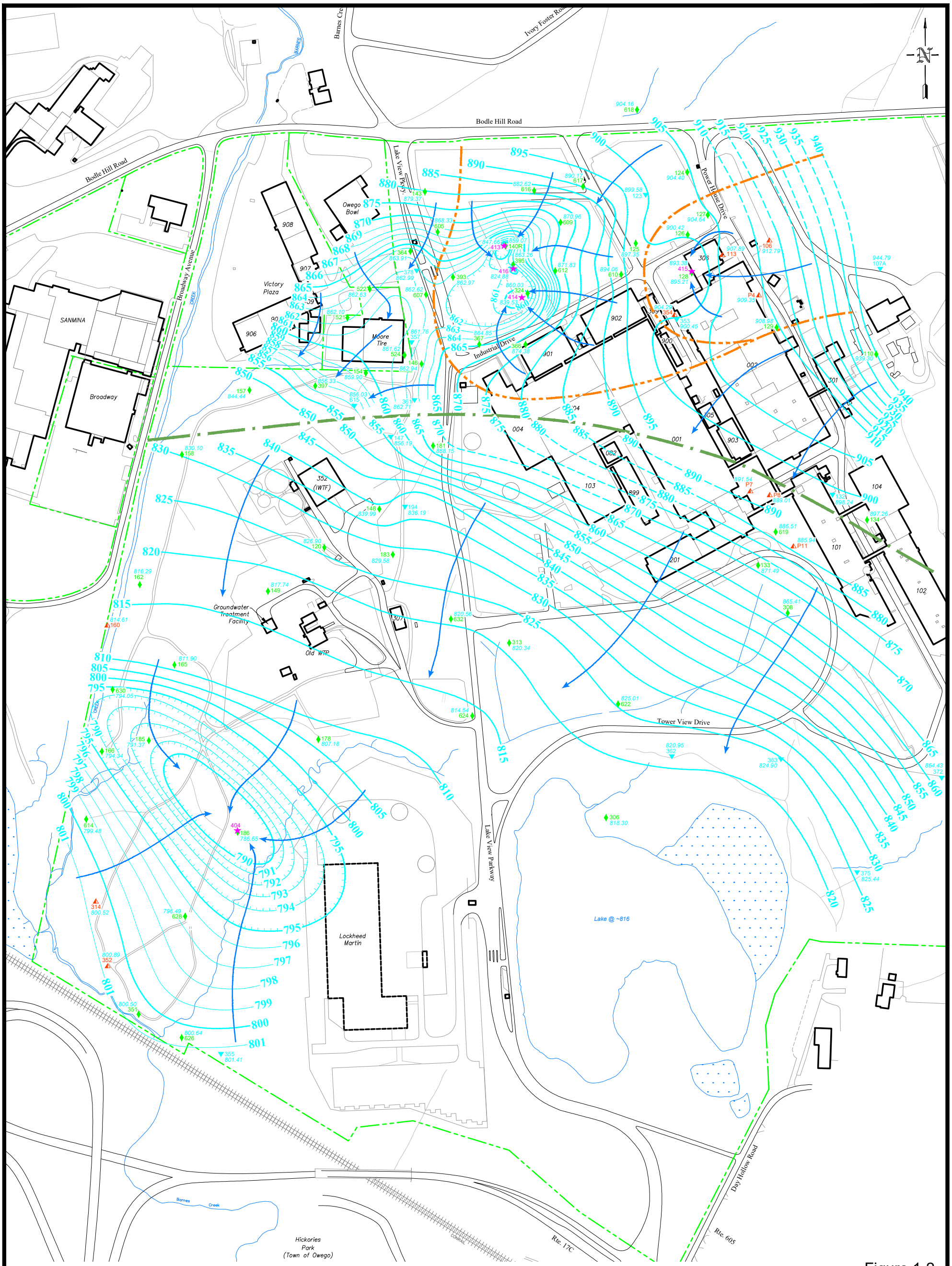


Figure 1-2

LEGEND

- ▼ - Bedrock monitoring well
- ▲ - Till monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ★ - Extraction well
- Property Line
- Wetland
- Direction of Groundwater Flow
- 797.19 - Groundwater Elevation (feet amsl)
- 795 - Groundwater Elevation Contour (feet amsl)
- Inferred Groundwater Elevation Contour
- Groundwater Flow Divide
- Line of Separation Between Northern and Southern Sampling Events

Northern Area wells measured July 16, 2018; Southern Area wells measured November 26, 2018.

Note: Some wells that monitor the lower till were used to construct this map.

Scale
0 175' 350'

IBM
Owego, New York

Groundwater Elevation Contour Map
Till/Bedrock Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-072-X2
CHECKED & APPROVED BY: CAR/SMF		

GROUNDWATER SCIENCES CORPORATION

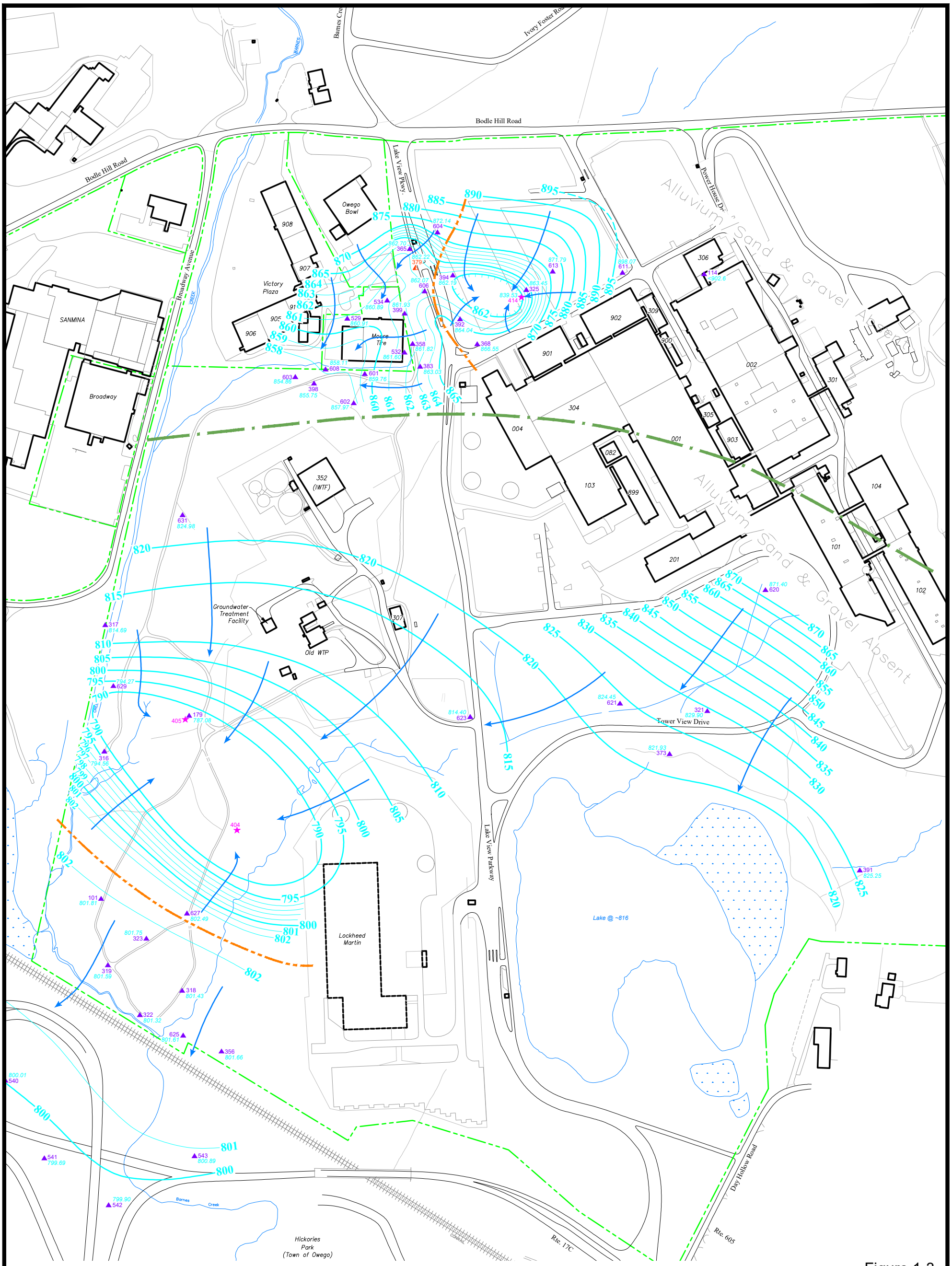


Figure 1-3

LEGEND

- ▲ - Alluvial zone monitoring well
- ◭ - Till monitoring well
- ★ - Extraction well
- - Property Line
- - Line of Separation Between Northern and Southern Sampling Events
- - Wetland
- 796.13 - Groundwater Elevation (feet amsl)
- 800 - Groundwater Elevation Contour (feet amsl)
- - Direction of Groundwater Flow
- - Groundwater Flow Divide

Note: Groundwater elevations for wells P1, P2, 161, 163, 386, 387 and 374 were not used because these wells monitor a shallow alluvial unit that is different from the outwash unit monitored by other wells in the southern areas.

Northern Area wells measured July 16, 2018; Southern Area wells measured November 26, 2018.

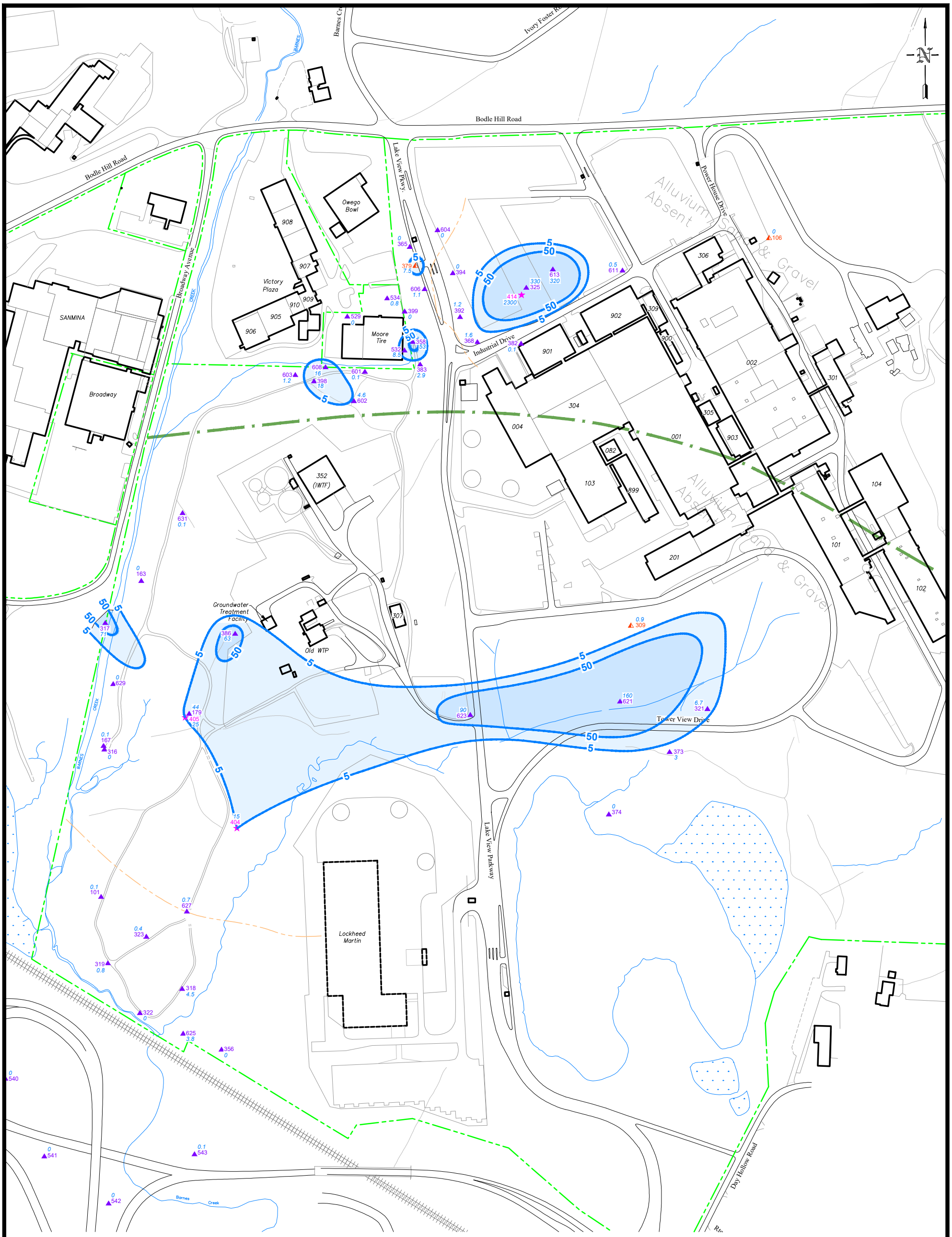
Scale
0 175' 350'

IBM
Owego, New York

Groundwater Elevation Contour Map
Alluvial Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO.
CHECKED & APPROVED BY: CAR/SMF		93004-073-Y2

GROUNDWATER SCIENCES CORPORATION



LEGEND

- ▲ - Alluvial zone monitoring well
- ◭ - Till monitoring well
- ★ - Extraction well
- 170 - TCA-Series Concentration (µg/l)
- (74) - Previous sampling result (for wells sampled annually)
- - Wetland
- 50 - TCA-Series Concentration Contour (ug/l)
- 5-50 µg/l
- 50-500 µg/l
- - Groundwater Flow Divide
- - Property Line
- - Line of Separation Between Northern and Southern Sampling Events

Calculation:

$$\text{TCA Series} = \text{TCA} + \text{1,1-DCA}\left(\frac{133.42}{98.97}\right) + \text{1,1-DCE}\left(\frac{133.42}{96.95}\right) + \text{CEA}\left(\frac{133.42}{64.52}\right)$$

where
TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
CEA = Chloroethane

Scale
0 175' 350'

Northern Area wells sampled July 2018.
Southern Area wells sampled November-December 2018.

Notes: Wells 106, 309 and 379, which monitor the upper till, were also used to construct this map. Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.

Extraction well 414 pumps from the alluvial and till/bedrock zones.

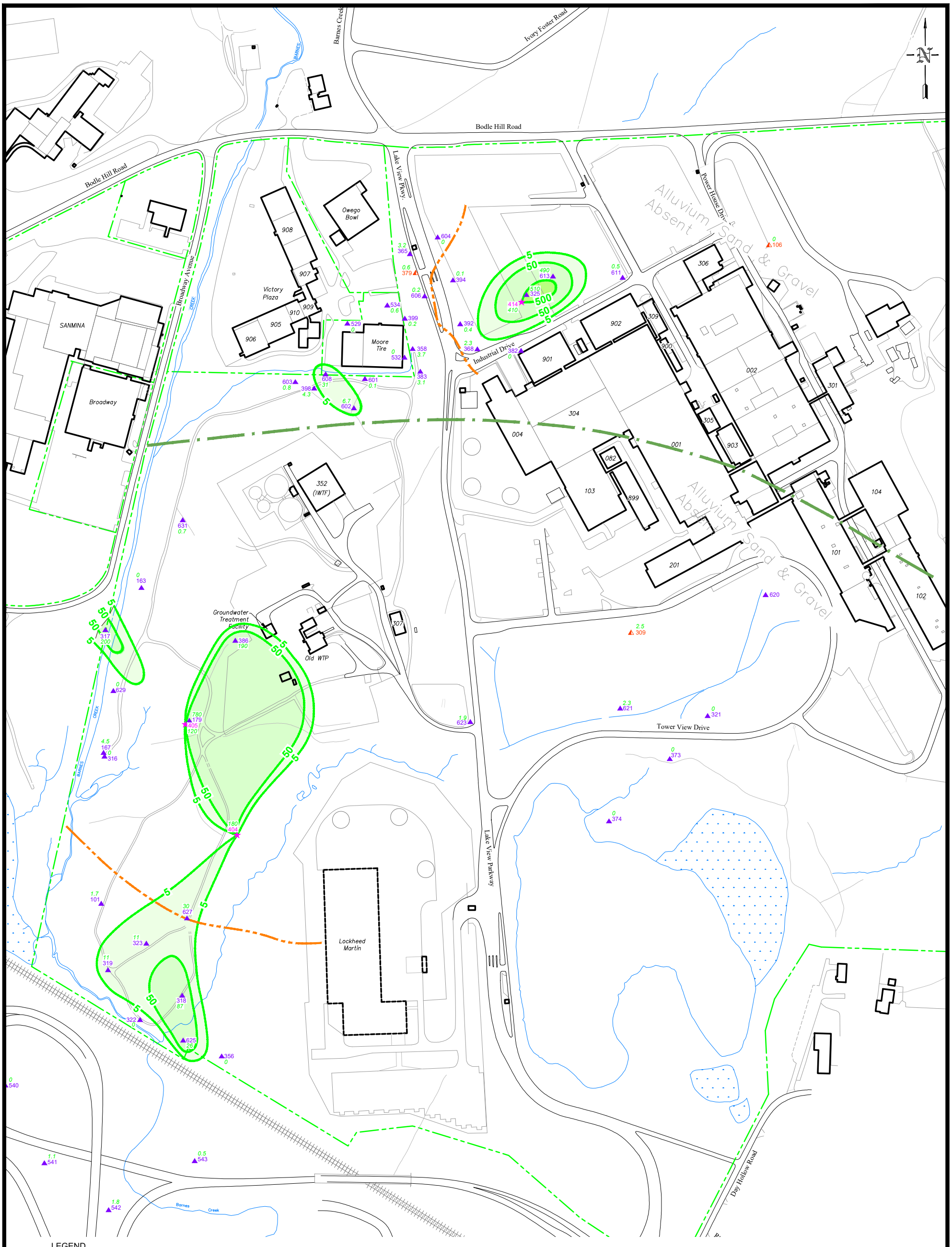
Figure 3-1

IBM
Owego, New York

TCA-Series Isoconcentrations
Alluvial Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO.
CHECKED & APPROVED BY: CAR/SMF		93004-076-X2

GROUNDWATER SCIENCES CORPORATION



LEGEND

- ▲ - Alluvial zone monitoring well
- ◭ - Till monitoring well
- ★ - Extraction well
- Property Line
- Groundwater Flow Divide
- 11 - TCE-Series Concentration (µg/l)
- (3.6) - Previous sampling result (for wells sampled annually)
- 50 - TCE-Series Concentration Contour (µg/l)
- 5-50 µg/l
- 50-500 µg/l
- 500-5000 µg/l

Scale
0 175' 350'

- Line of Separation between Northern and Southern Sampling Events
- Wetland

Calculation:

$$\text{TCE Series} = \text{TCE} + \text{CIS}\left(\frac{131.4}{96.95}\right) + \text{VC}\left(\frac{131.4}{62.5}\right)$$

where
TCE = Trichloroethene
CIS = cis-1,2-Dichloroethene
VC = Vinyl Chloride

Northern Area wells sampled July 2018.
Southern Area wells sampled November-December 2018.

Notes: *Wells 106, 309 and 379, which monitor the upper till, were also used to construct this map. Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.*

Extraction well 414 pumps from the alluvial and till/bedrock zones.

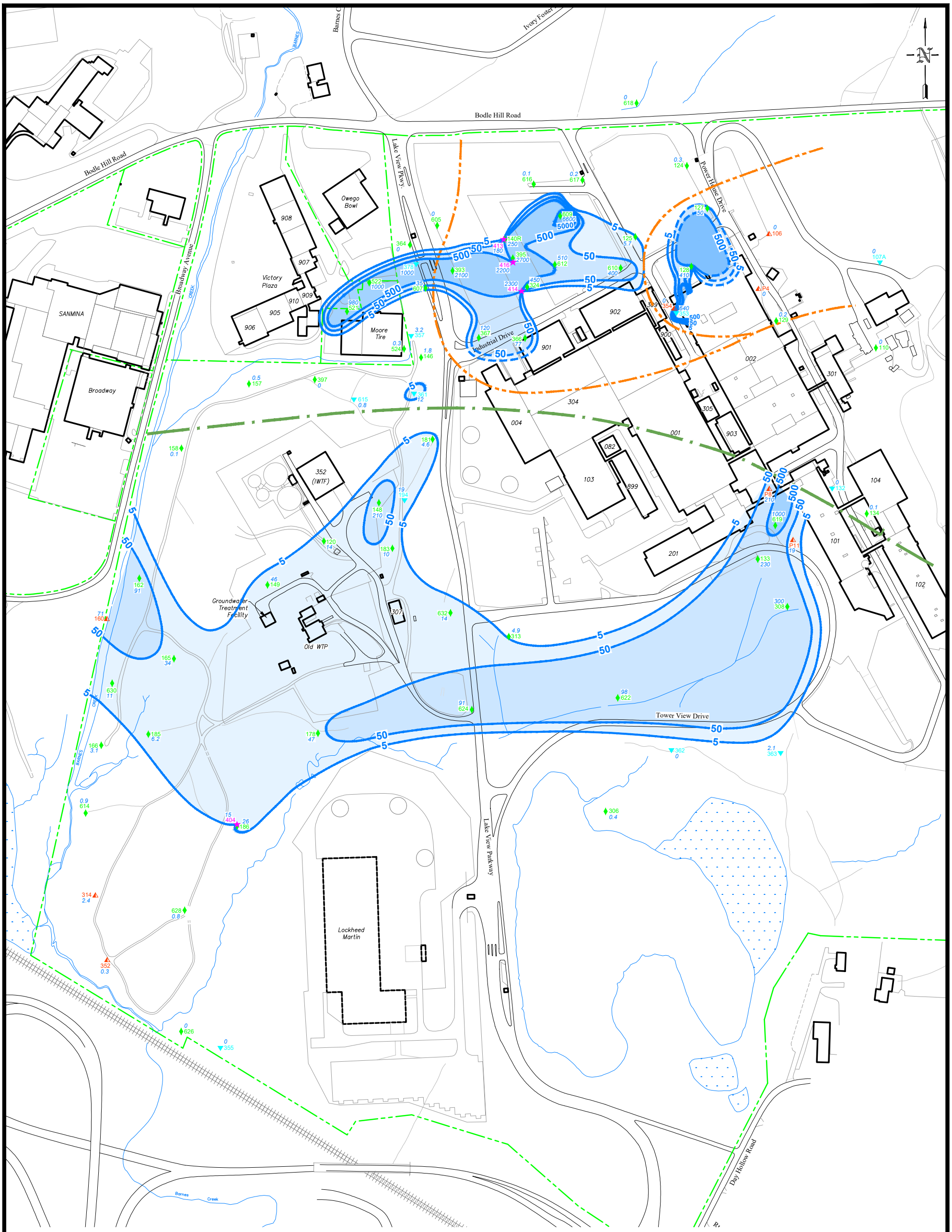
Figure 3-2

IBM
Owego, New York

TCE-Series Isoconcentrations
Alluvial Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO.
CHECKED & APPROVED BY: CAR/SMF		93004-077-X2

GROUNDWATER SCIENCES CORPORATION



LEGEND

- ▼ - Bedrock monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ◭ - Till monitoring well
- ★ - Extraction well
- 57 - TCA-Series Concentration (µg/l)
- (4.7) - Previous sampling result (from wells sampled annually)
- - Wetland

50 - TCA-Series Concentration Contour (ug/l)

- 5-50 µg/l
- 50-500 µg/l
- 500-5000 µg/l
- >5000 µg/l
- - Groundwater Flow Divide
- - Property Line
- - Line of Separation Between Northern and Southern Sampling Events

Northern Area wells sampled July 2018.
Southern Area wells sampled November-December 2018.

Calculation:

$$\text{TCA Series} = \text{TCA} + \text{1,1-DCA}\left(\frac{133.42}{98.97}\right) + \text{1,1-DCE}\left(\frac{133.42}{96.95}\right) + \text{CEA}\left(\frac{133.42}{64.52}\right)$$

where
TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
CEA = Chloroethane

Scale
0 175' 350'

Notes: *Some wells that monitor the lower till or the bedrock were used to construct this map. Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.*

Extraction well 414 pumps from the alluvial and till/bedrock zones.

Figure 3-3

IBM
Owego, New York

TCA-Series Isoconcentrations
Till/Bedrock Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO.
CHECKED & APPROVED BY: CAR/SMF		93004-075-W2

GROUNDWATER SCIENCES CORPORATION

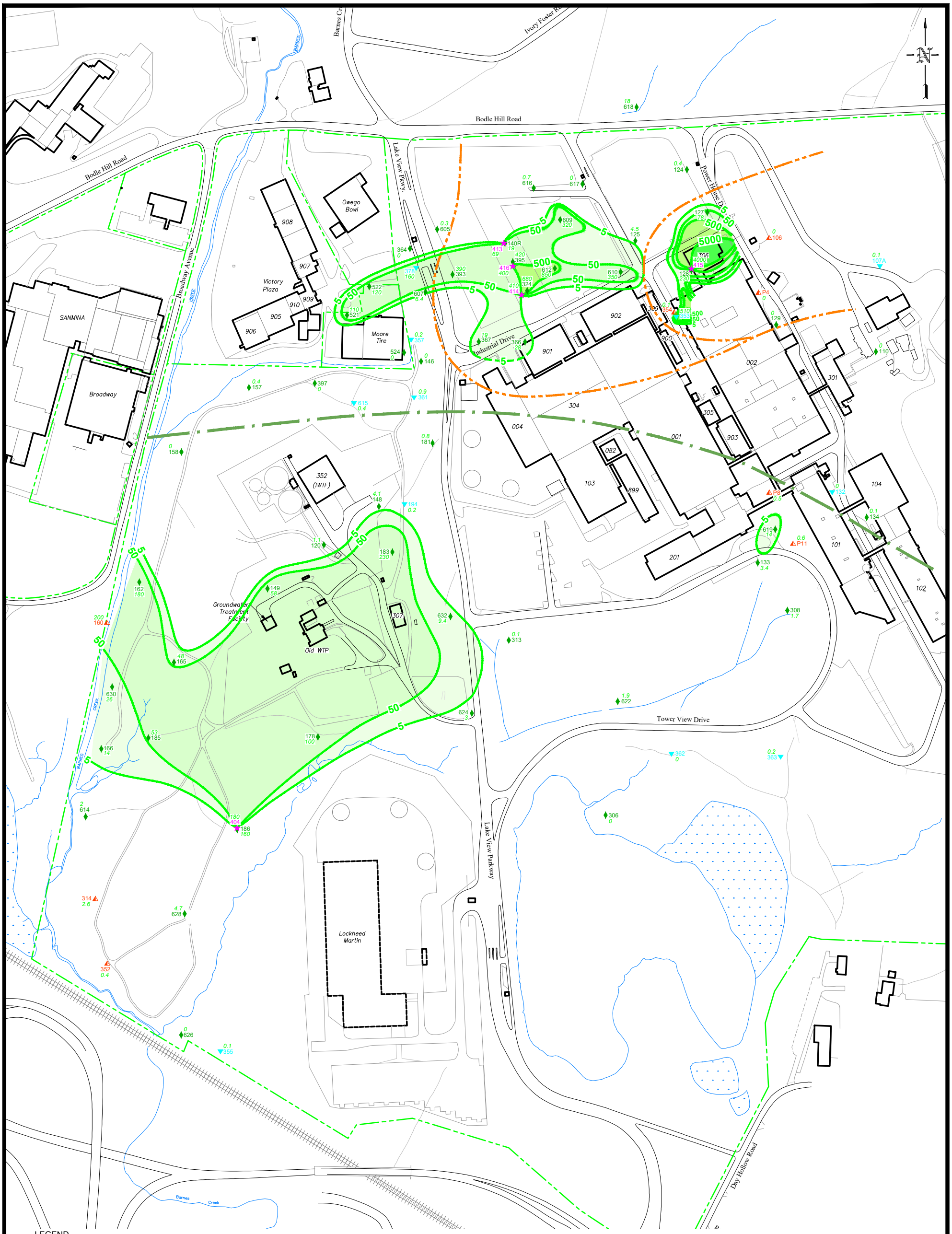


Figure 3-4

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Owego, New York

TCE-Series Isoconcentrations
Till/Bedrock Zone
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-074-W2
CHECKED & APPROVED BY: CAR/SMF		

GROUNDWATER SCIENCES CORPORATION

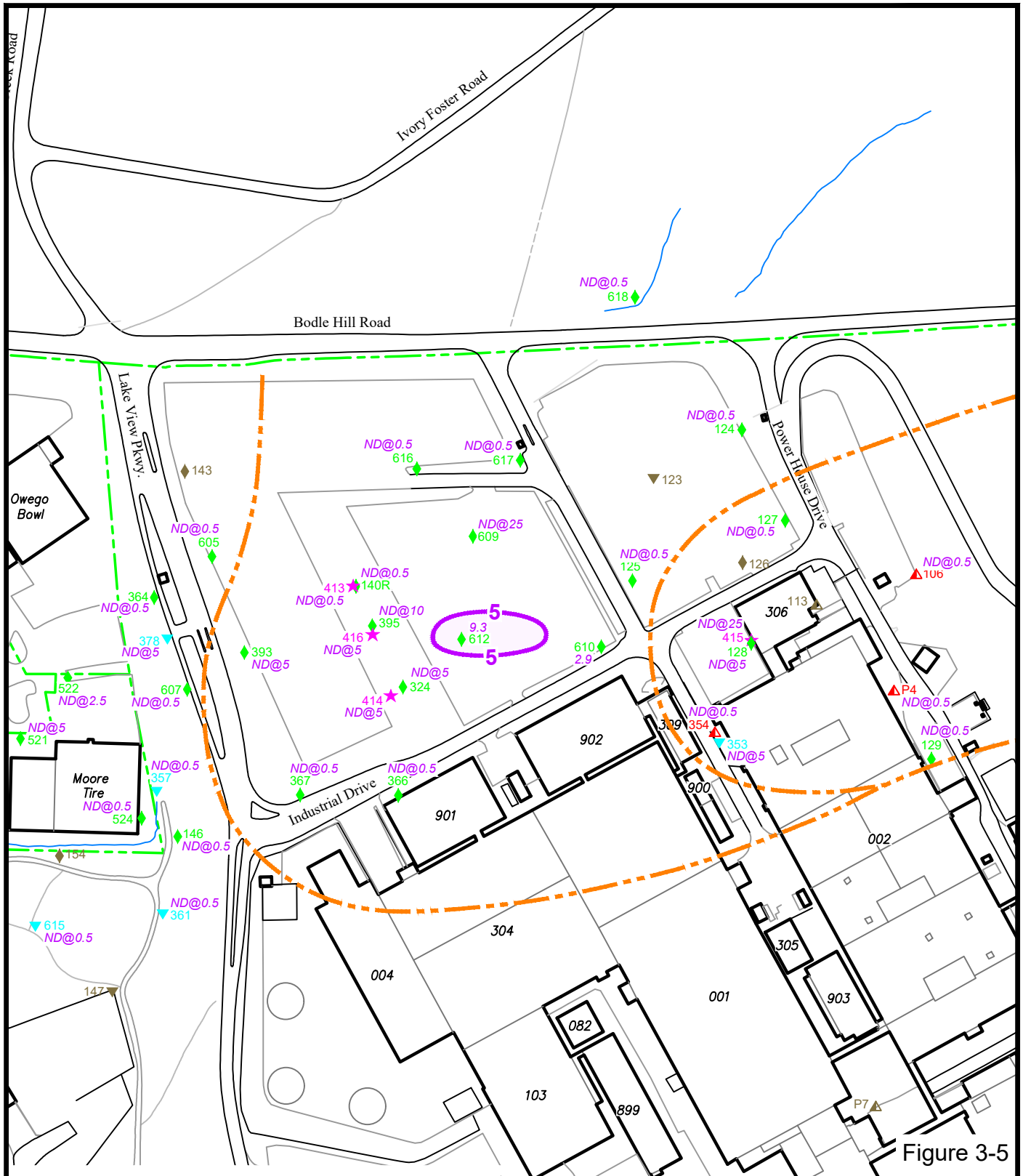


Figure 3-5

LEGEND

- ▼ - Bedrock monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ▲ - Till monitoring well
- ★ - Extraction well
- 5 - DCM Concentration Contour (ug/l)
- 1.6 - DCM Concentration (ug/l)
- ND@"X" - Not Detected at Laboratory Detection Limit "X"
- Groundwater Flow Divide
- Property Line

Northern Area wells sampled July 2018.

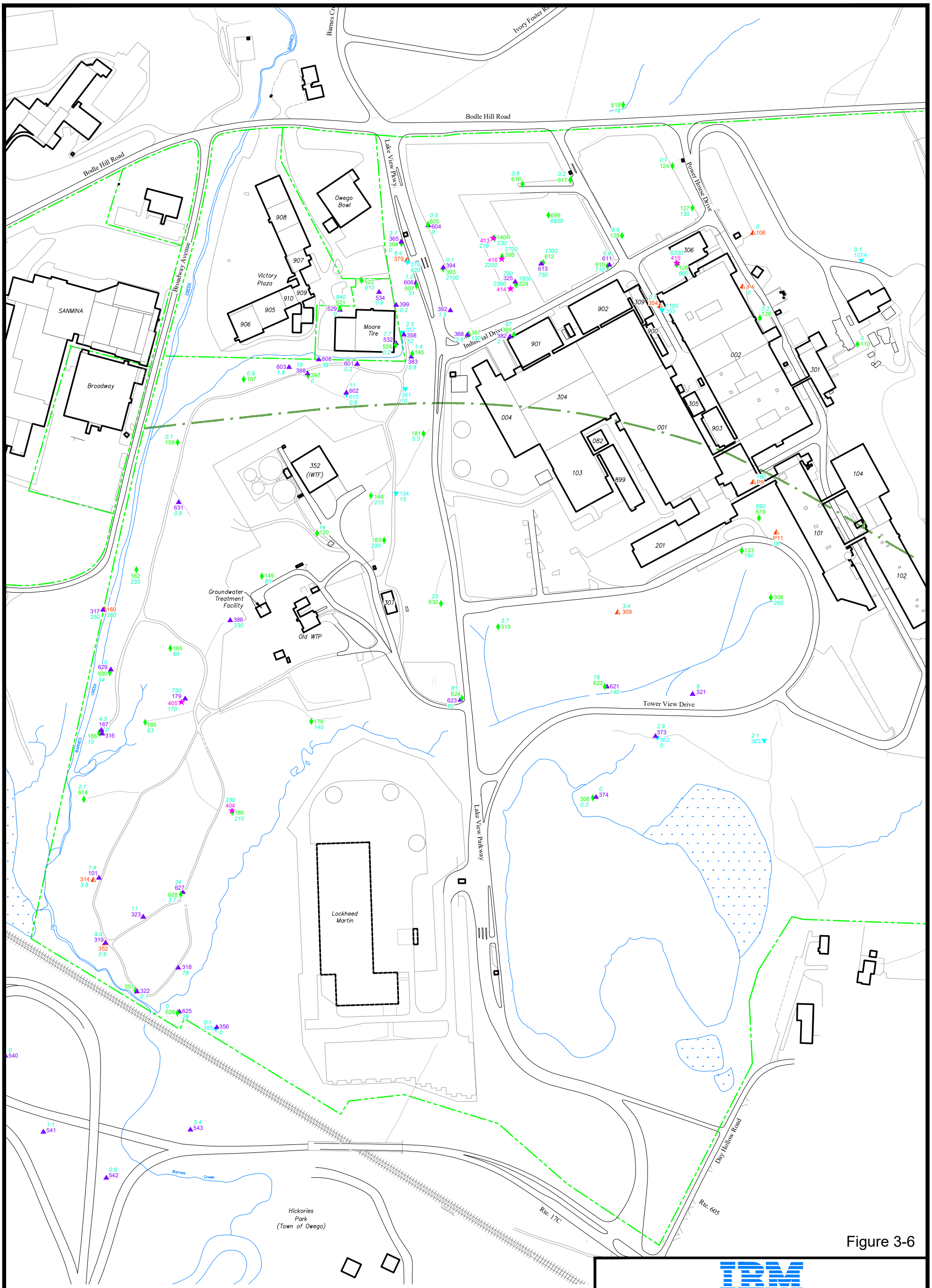
Scale: 0 125' 250'

IBM
Owego, New York

Methylene Chloride Isoconcentrations
Till/Bedrock Zone
Third Quarter 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-081-K1
CHECKED & APPROVED BY: CAR/SMF		

GROUNDWATER SCIENCES CORPORATION



LEGEND

- Bedrock monitoring well
- Alluvial zone monitoring well
- Till/Bedrock zone monitoring well
- Till monitoring well
- Extraction well
- 51 - Total VOCs Concentration (µg/l)
- Property Line
- Wetland Boundary

Northern Area wells sampled July 2018, Southern Area wells sampled November-December 2018.

Note: Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.

Scale 0 175' 350'

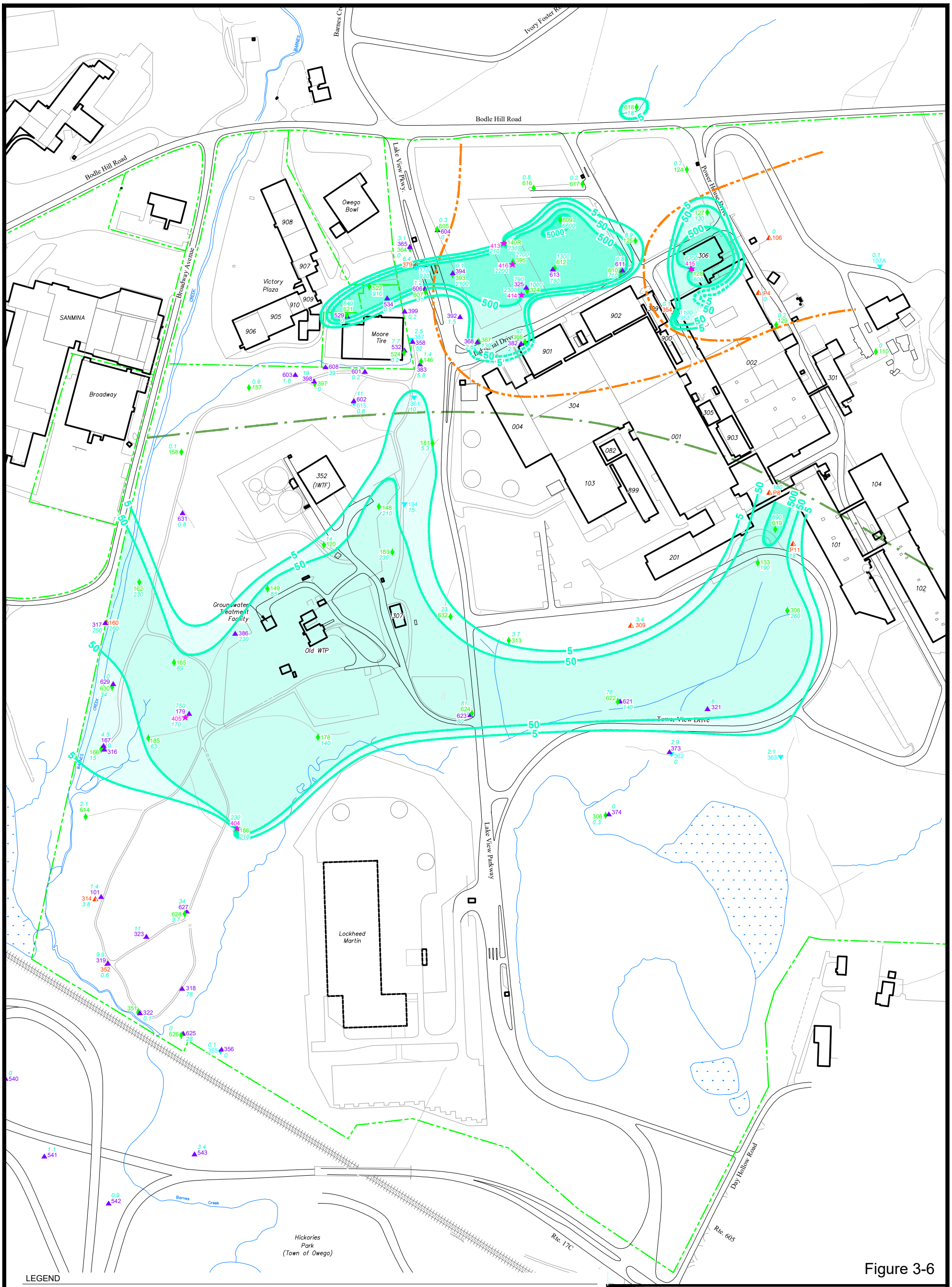
Figure 3-6

IBM
Owego, New York

Total Volatile Organic Compounds (VOCs)
Isoconcentrations (Till/Bedrock Zone)
with Alluvial Zone Concentrations
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-078-U1
CHECKED & APPROVED BY: CAR/SMF		

GROUNDWATER SCIENCES CORPORATION



LEGEND

- ▼ - Bedrock monitoring well
- ▲ - Alluvial zone monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ⚠ - Till monitoring well
- ★ - Extraction well
- 51 - Total VOCs Concentration (µg/l)
- Property Line
- Wetland

- 50 - Total VOCs Concentration Contour (ug/l)
- 5-50 µg/l
- 50-500 µg/l
- 500-5000 µg/l
- >5000 µg/l
- Groundwater Flow Divide
- Site Area Boundary

Scale: 0 175' 350'

Northern Area wells sampled July 2018, Southern Area wells sampled November-December 2018.

Notes: Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.
Isoconcentration contours shown are for wells completed in the bedrock and till/bedrock zones. However, groundwater chemistry data is shown for all wells.

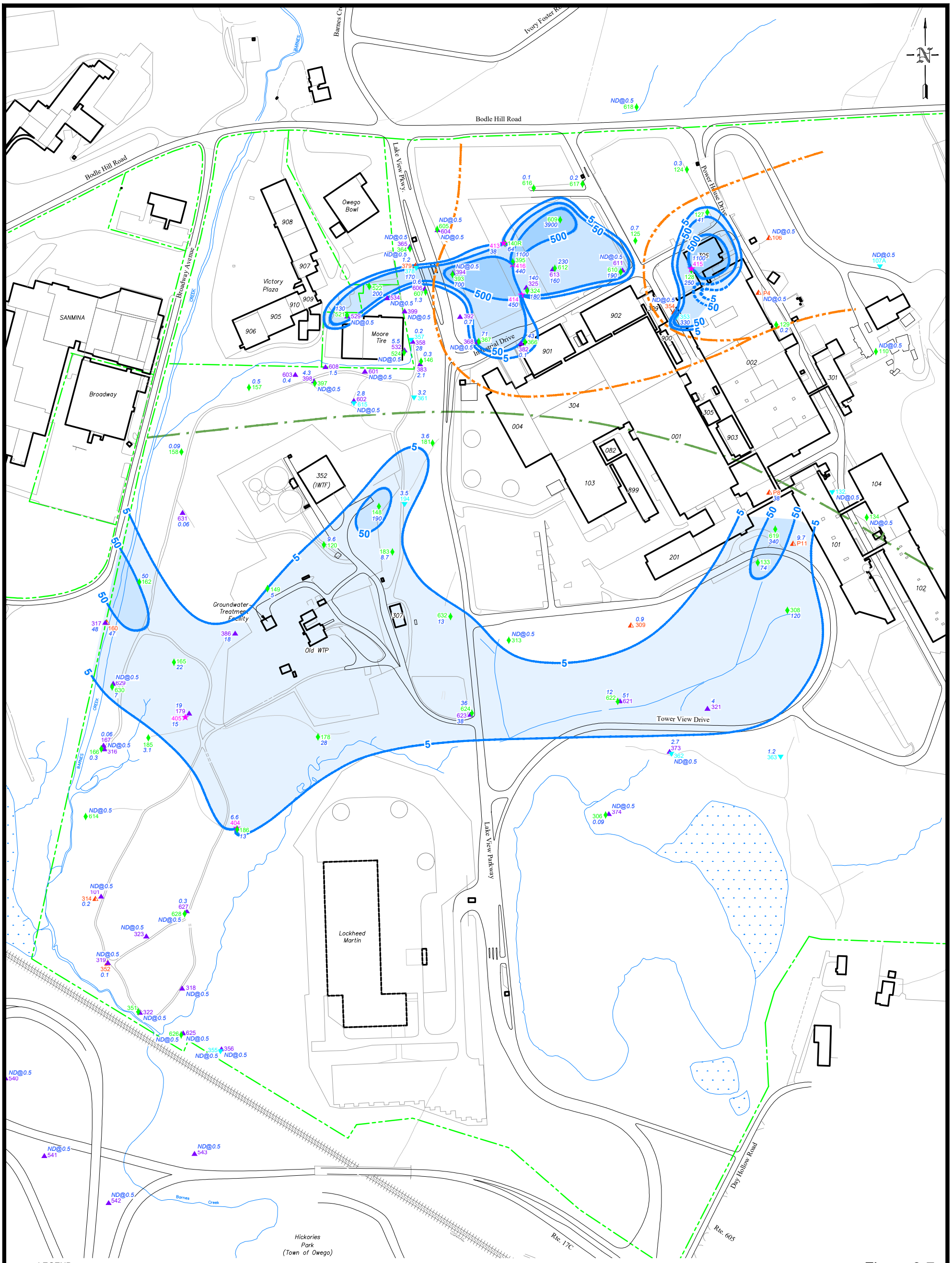
Figure 3-6

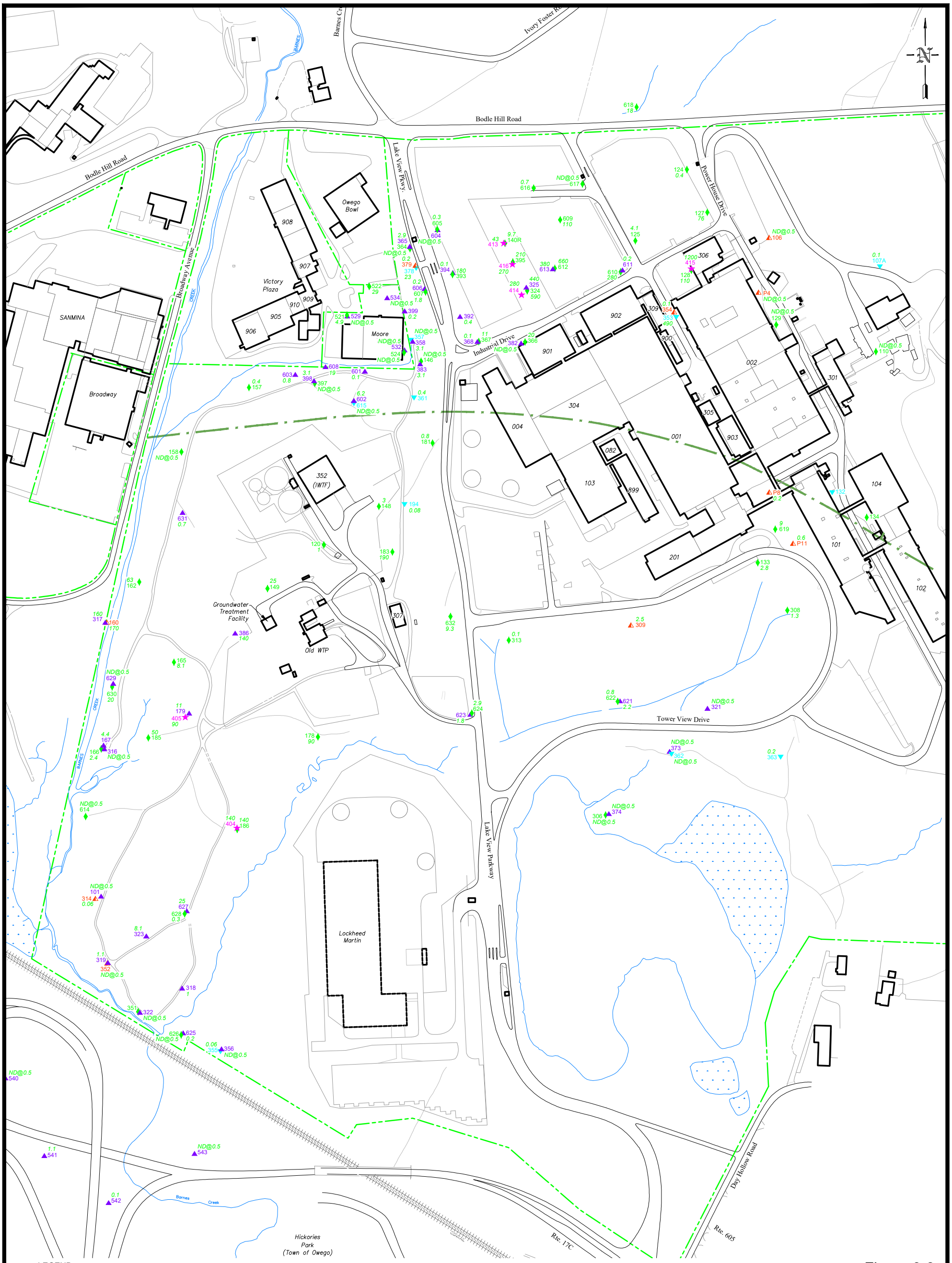
IBM
Owego, New York

Total Volatile Organic Compounds (VOCs) Isoconcentrations (Till/Bedrock Zone) with Alluvial Zone Concentrations Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-078-U2
CHECKED & APPROVED BY: CAR/SMF		

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Bodle Hill Road
Broadway Avenue
Lake View Pkwy.
Power House Drive
Ivory Foster Rd.
Barnes Creek
Owego Bowl
908
907
909
910
905
906
Victory Plaza
SANMINA
Broadway
Moore Tire
902
901
900
Industrial Drive
002
301
304
305
004
001
903
082
103
899
201
104
101
102
352 (IWTF)
Groundwater Treatment Facility
Old WTP
307
Lockheed Martin
Tower View Drive
Lake View Parkway
Day Hollow Road
Rte. 17C
Rte. 605
Hickories Park (Town of Owego)
Barnes Creek
ND@0.5
618
609 3900
604
606
394 393 700
365 364
379 378 170 1.2 0.6
522 200
534
607 1.3
399
529
130 521
608 1.5
603 0.4
4.3 398
397
601
383 2.1
0.2 357
358 28
5.5 532 524
0.3 146
0.5 157
2.8 602 615
3.2 361
0.09 158
631 0.06
3.6 181
3.5 194
148 190
9.6 120
183 8.7
50 162
149 5
317 48
160 47
386 18
632 13
0.9 309
313
308 120
165 22
629 630 7
19 179 405 15
0.06 167
166 0.3
316
185 3.1
178 28
6.6 404
186 13
614
12 622
51 621
4 321
36 624 623 38
2.7 373
362
1.2 363
306 0.09
374
314 0.2
627 0.3
628
323
352 0.1
319
318
322
351
626
625
355
356
540
541
542
543
140R 64
413 38
1100 395 416 440
414 450
140 325
324 180
230 612
613 160
610 611 190
0.7 125
0.1 616
0.2 617
0.3 124
127 41
1100 309 415
128 250
354
353 330
129 0.2
P4 106
107A
110
132
134
P8 38
619 340
9.7 P11
133 74
50
500
5
Figure 3-7
LEGEND
- Bedrock monitoring well
- Alluvial zone monitoring well
- Till/Bedrock zone monitoring well
- Till monitoring well
- Extraction well
13 - 1,1,1-Trichloroethane Concentration (ug/l)
ND@0.5 - Not Detected at Laboratory Detection Limit "X"
- Property Line
- Wetland
50 - 1,1,1-TCA Concentration Contour (ug/l)
5-50 µg/l
50-500 µg/l
500-5000 µg/l
- Groundwater Flow Divide
- Site Area Boundary
Northern Area wells sampled July 2018, Southern Area wells sampled November-December 2018.
Notes: Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.
Isoconcentration contours shown are for wells completed in the bedrock and till/bedrock zones.
However, groundwater chemistry data is shown for all wells.
Scale
0 175' 350'
IBM
Owego, New York
1,1,1-Trichloroethane Isoconcentrations
(Till/Bedrock Zone)
with Alluvial Zone Concentrations
Third and Fourth Quarters 2018
DRAWN BY: MM/JB
DATE: 2/28/19
CHECKED & APPROVED BY: CAR/SMF
DRAWING NO.
93004-027-Y2
GROUNDWATER SCIENCES CORPORATION



LEGEND

- 220 - Trichloroethene Concentration (ug/l)
- ND@0.5 - Not Detected at Laboratory Detection Limit "X"
- ▼ - Bedrock monitoring well
- ▲ - Alluvial zone monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ⚠ - Till monitoring well
- ★ - Extraction well
- — — — - Property Line
- ▬ ▪ ▬ - Site Area Boundary
- - Wetland

Northern Area wells sampled July 2018; Southern Area wells sampled November-December 2018.

Note: Values shown have been rounded to two significant figures or one significant figure if less than 1 ug/l.

Scale
0 175' 350'

Figure 3-8

IBM
Owego, New York

Trichloroethene Isoconcentrations
(Till/Bedrock Zone)
with Alluvial Zone Concentrations
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-028-W1
CHECKED & APPROVED BY: CAR/SMF		

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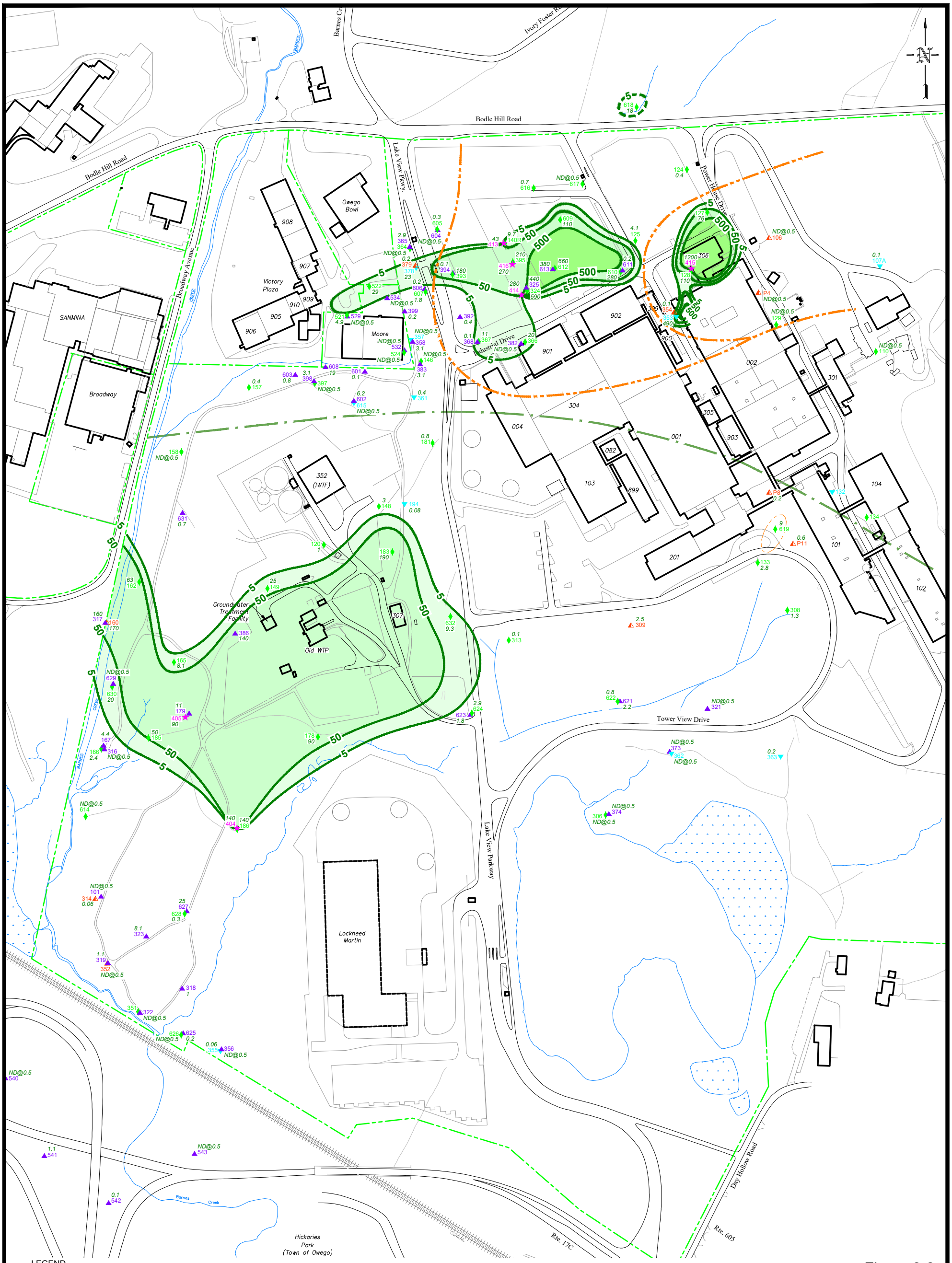


Figure 3-8

Northern Area wells sampled July 2018, Southern Area wells sampled November-December 2018.

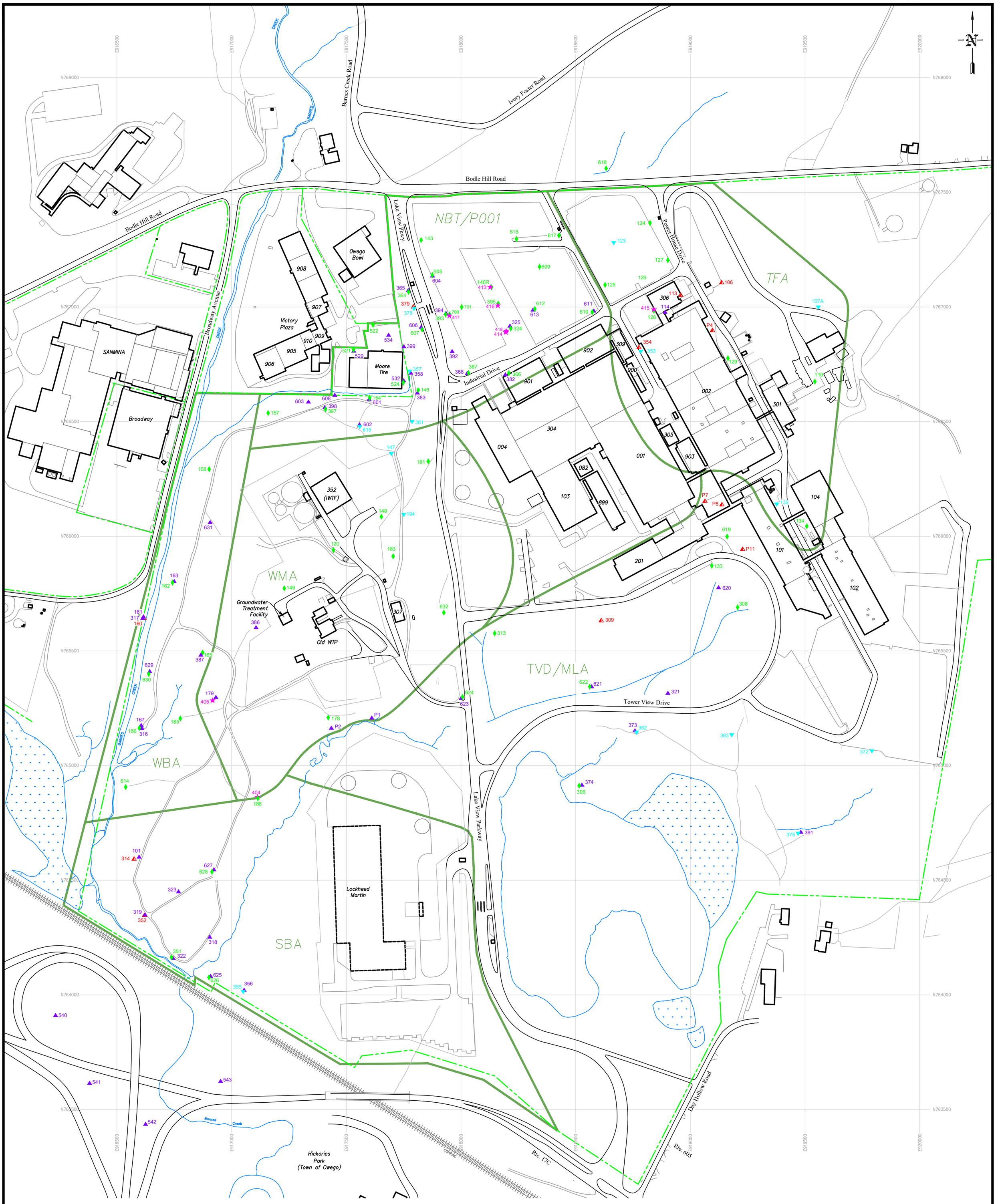
Notes: Values shown have been rounded to two significant figures or one significant figure if less than 1 µg/l.
Isoconcentration contours shown are for wells completed in the bedrock and till/bedrock zones. However, groundwater chemistry data is shown for all wells.

IBM
Owego, New York

Trichloroethene Isoconcentrations
(Till/Bedrock Zone)
with Alluvial Zone Concentrations
Third and Fourth Quarters 2018

DRAWN BY: MM/JB	DATE: 2/28/19	DRAWING NO. 93004-028-W2
CHECKED & APPROVED BY: CAR/SMF		

GROUNDWATER SCIENCES CORPORATION



LEGEND

- ▼ - Bedrock monitoring well
- ▲ - Alluvial zone monitoring well
- ◭ - Till monitoring well
- ♦ - Till/Bedrock zone monitoring well
- ★ - Extraction well
- — — — - Property Line
- Wetland

NORTHERN AREAS

- NBT/P001 - Northwest Bedrock Trough/Parking Lot 001 Area
- TFA - Tank Farm Area
- Site Area Boundary

SOUTHERN AREAS

- WMA - Waste Management Area
- SBA - Southern Boundary Area
- WBA - Western Boundary Area
- TVD/MLA - Tower View Drive/Mirror Lake Area

Photogrammetric digital mapping by L. Robert Kimball & Associates, Inc., Ebensburg, Pennsylvania.
Date of photography: May 8, 1995; field surveying of property lines not performed.

Scale
0 125' 250'

Plate 1-1

IBM
Owego, New York

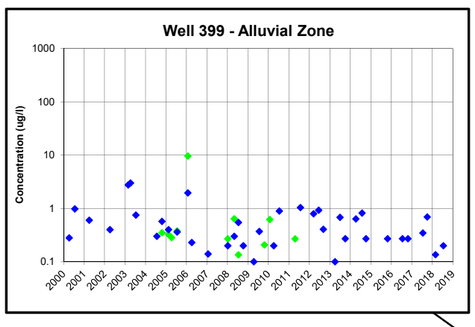
Well Location Map
Corrective Action Monitoring Program

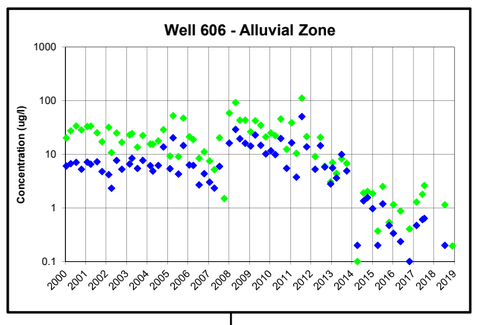
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CHECKED & APPROVED BY: CAR/SMF		93004-016-T1

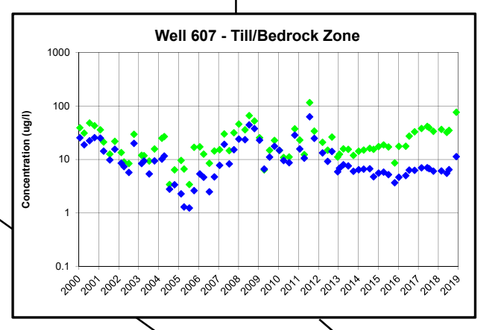
GROUNDWATER SCIENCES CORPORATION

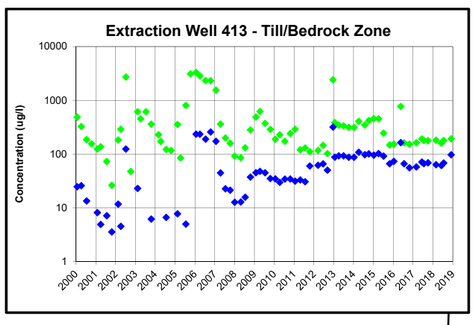
◆ TCA-Series

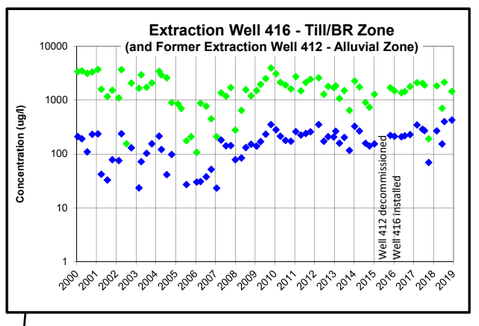
◆ TCE-Series

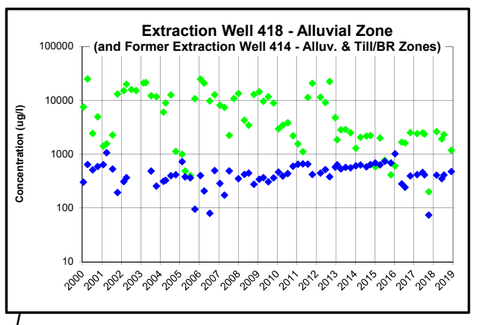


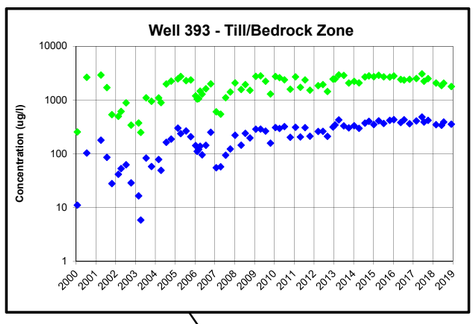


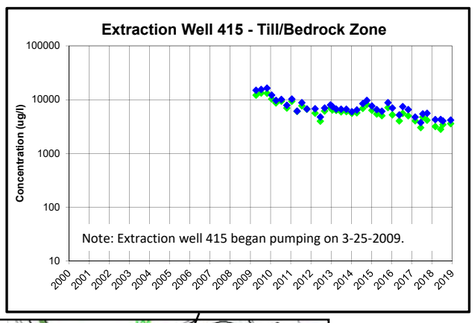


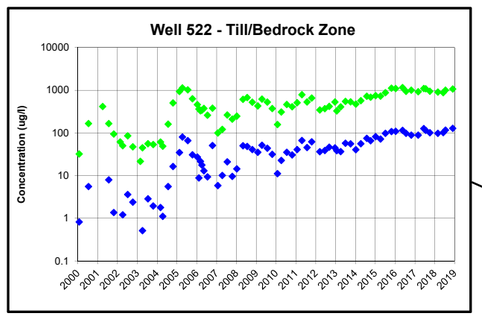


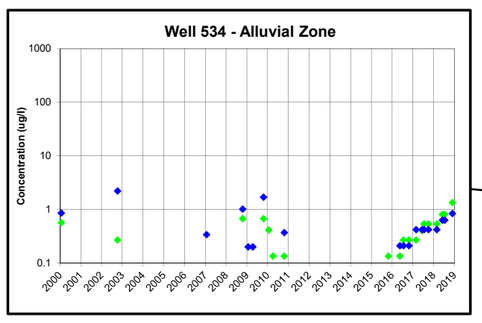


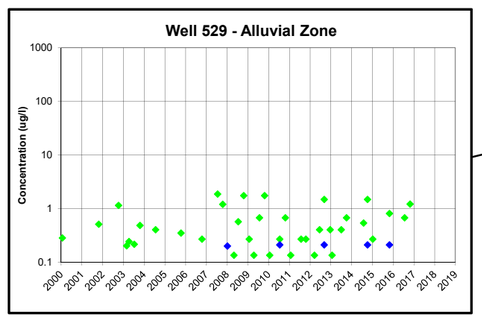


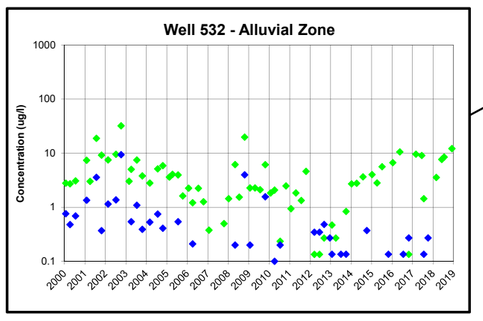


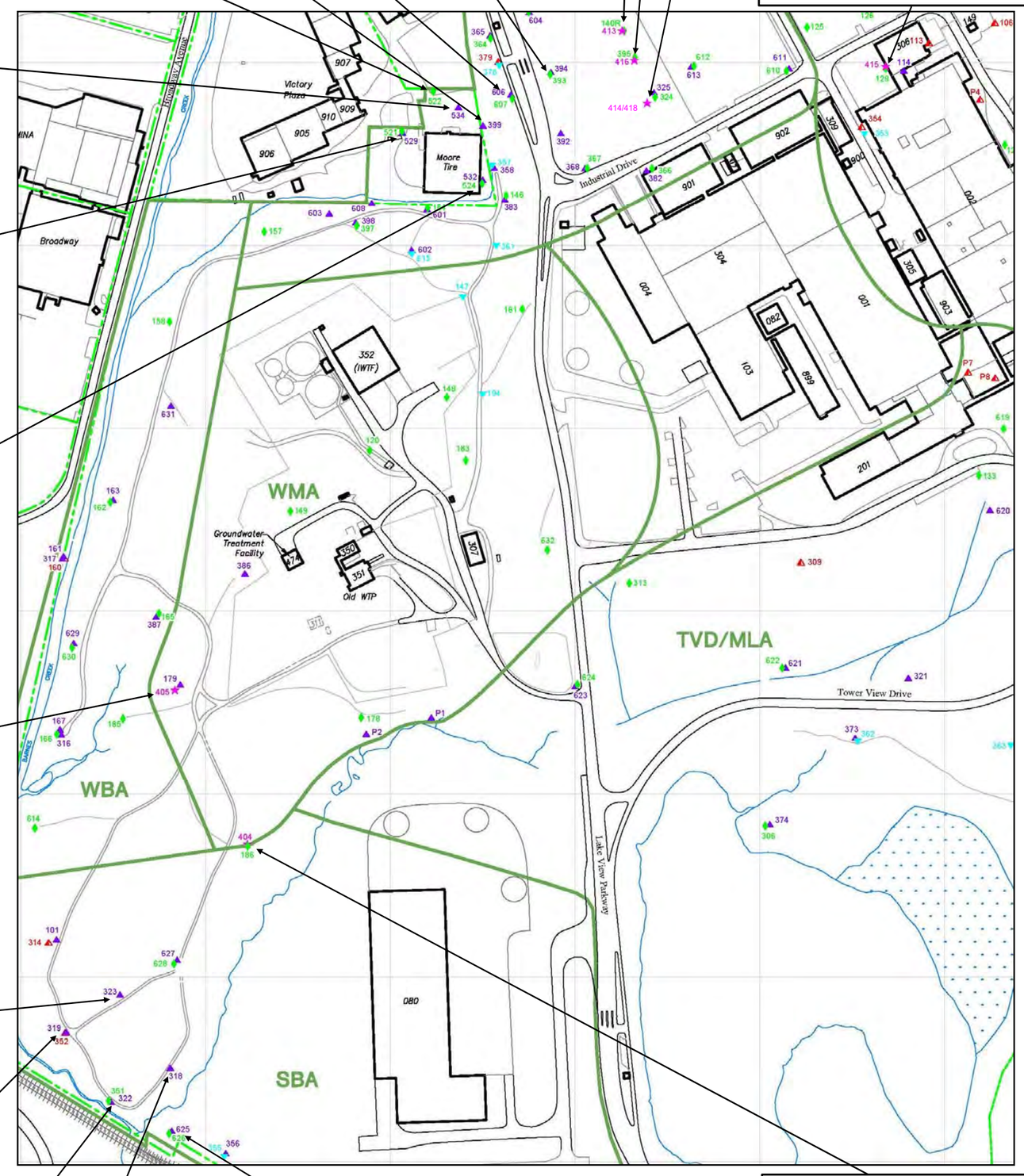


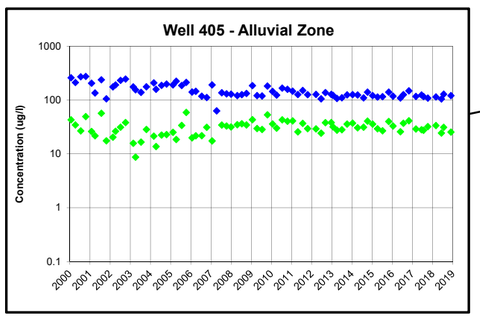


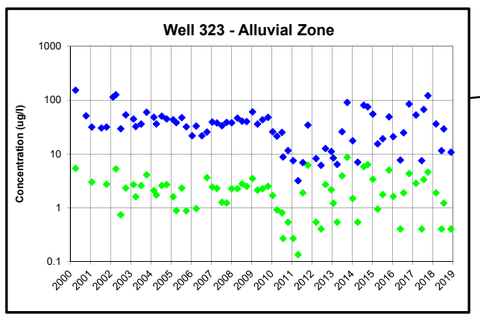


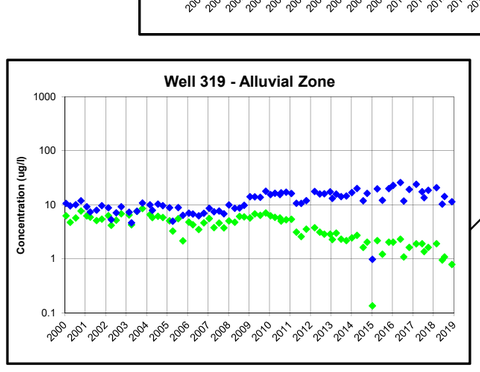


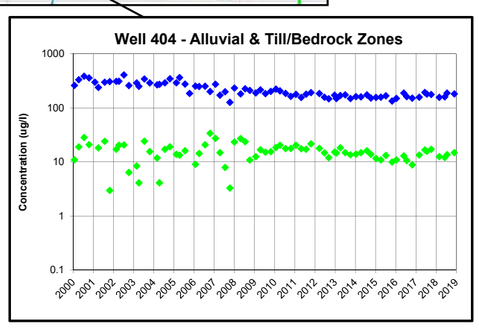












◆ TCA-Series

◆ TCE-Series

Plate 3-1

- Bedrock monitoring well
- Alluvial zone monitoring well
- Till monitoring well
- Till/Bedrock zone monitoring well
- Extraction well

NORTHERN AREAS

NBT/P001 - Northwest Bedrock Trough/Parking Lot 001 Area

TFA - Tank Farm Area

- Site Area Boundary

SOUTHERN AREAS

WMA - Waste Management Area

SBA - Southern Boundary Area

WBA - Western Boundary Area

TVD/MLA - Tower View Drive/Mirror Lake Area

Former IBM Facility
Owego, New York

Concentration vs. Time Graphs
for Quarterly Monitoring Wells

DRAWN BY: CAR	DATE: 2/5/19	DRAWING NO.
CHECKED AND APPROVED BY: CAR		93004-XLSX-2018

GROUNDWATER SCIENCES CORPORATION

APPENDIX A

Table A-1: Extraction Well Pumping Volumes
Table A-2: CVOC Mass Removal Calculations

January 2018 – December 2018

Table A-1: 2018 Extraction Well Pumping Volumes (gallons)
Former IBM Facility, Owego, New York

Month	Waste Management Area		Parking Lot 001 Area			Tank Farm Area	Site Total
	404	405	414/418	413	416	415	
Jan-18	*4,645,000*	6,777,000	82,100	171,600	18,400	26,600	11,720,700
Feb-18	*4,325,000*	6,268,000	68,100	158,400	11,200	28,400	10,859,100
Mar-18	*5,162,000*	6,998,000	122,200	190,800	14,400	55,300	12,542,700
Apr-18	*4,915,000*	6,754,000	85,000	164,400	18,400	46,100	11,982,900
May-18	*4,834,000*	6,850,000	112,100	206,500	22,500	44,600	12,069,700
Jun-18	*4,504,000*	6,720,000	119,600	189,800	14,500	38,000	11,585,900
Jul-18	*4,668,000*	6,947,000	60,600	202,900	22,500	47,500	11,948,500
Aug-18	*5,198,000*	7,023,000	4,500	235,500	24,000	46,500	12,531,500
Sep-18	*5,288,000*	6,745,000	0	244,900	22,200	34,300	12,334,400
Oct-18	*5,525,000*	7,014,000	0	252,900	18,500	25,100	12,835,500
Nov-18	*5,073,000*	6,761,000	52,400	220,700	6,300	26,300	12,139,700
Dec-18	5,111,000	6,903,000	104,800	213,600	28,900	51,700	12,413,000
						Total	**144,963,600**

**Flows in italics are restated by a factor or 1.4 from the original meter readings based on the results of a meter calibration test on 12/6/2018.*

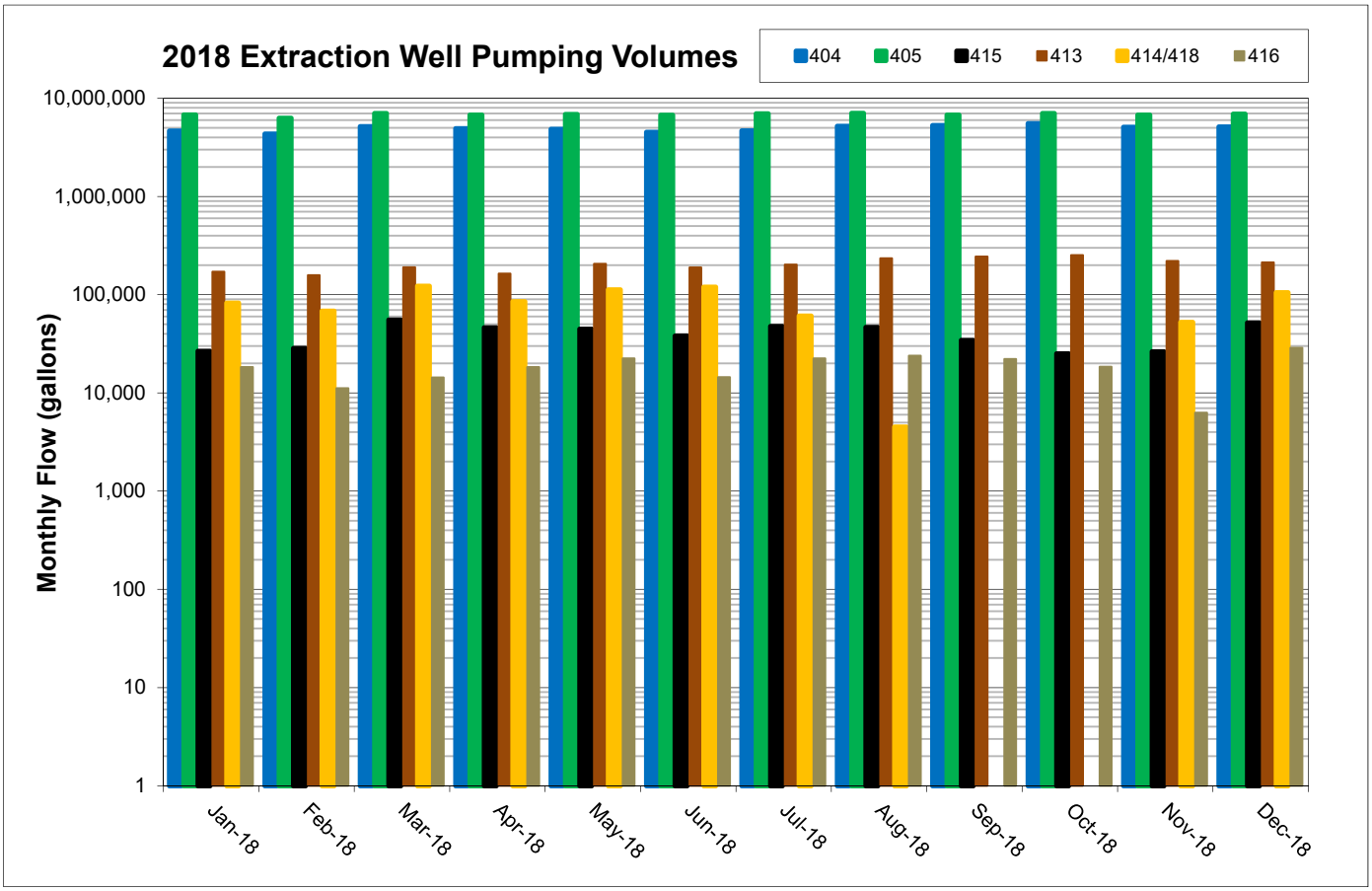


Table A-2: 2018 CVOC Mass Removal Calculations
Former IBM Facility, Owego, New York

Concentrations of CVOCs in Air Stripper Influent (ug/L)

Month	Trichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,2-Dichloro-1,2,2-Trifluoroethane (Freon 123a)	Other VOCs	Volume Pumped through GTF* (gallons)
Jan	140.0	39.0	34.0	36.0	10.0	69.0	5.0	1.2	10,921,300
Feb	150.0	33.0	35.0	37.0	9.0	51.0	5.0	0.7	10,159,100
Mar	120.0	36.0	29.0	32.0	9.0	43.0	3.0	1.2	11,653,800
Apr	130.0	33.0	26.0	27.0	7.0	41.0	4.0	1.0	11,281,900
May	120.0	32.0	23.0	26.0	6.0	37.0	4.0	0.0	11,374,900
Jun	130.0	28.0	25.0	28.0	8.0	45.0	4.0	0.0	10,961,600
Jul	140.0	36.0	33.0	35.0	13.0	47.0	5.0	0.6	11,348,800
Aug	130.0	33.0	26.0	27.0	8.0	45.0	4.0	0.0	11,900,300
Sep	140.0	41.0	18.0	14.0	6.0	38.0	4.0	1.4	11,675,700
Oct	160.0	43.0	23.0	15.0	8.0	48.0	6.0	2.1	12,079,100
Nov	140.0	50.0	20.0	18.0	7.0	39.0	5.0	1.8	11,397,300
Dec	150.0	50.0	24.0	25.0	9.0	47.0	6.0	2.1	11,613,600
								Total	**136,367,400**
									gallons

*The volume pumped through the GTF includes flows from the powerhouse sump, and differs from the sum of the extraction well volumes due to metering differences.

Pounds of CVOCs Removed by Air Stripping

Month	Trichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,2-Dichloro-1,2,2-Trifluoroethane (Freon 123a)	Other VOCs	Total VOCs Removed (pounds)
Jan	12.8	3.6	3.1	3.3	0.9	6.3	0.5	0.1	30.5
Feb	12.7	2.8	3.0	3.1	0.8	4.3	0.4	0.1	27.2
Mar	11.7	3.5	2.8	3.1	0.9	4.2	0.3	0.1	26.6
Apr	12.2	3.1	2.4	2.5	0.7	3.9	0.4	0.1	25.3
May	11.4	3.0	2.2	2.5	0.6	3.5	0.4	0.0	23.6
Jun	11.9	2.6	2.3	2.6	0.7	4.1	0.4	0.0	24.5
Jul	13.3	3.4	3.1	3.3	1.2	4.5	0.5	0.1	29.3
Aug	12.9	3.3	2.6	2.7	0.8	4.5	0.4	0.0	27.1
Sep	13.6	4.0	1.8	1.4	0.6	3.7	0.4	0.1	25.6
Oct	16.1	4.3	2.3	1.5	0.8	4.8	0.6	0.2	30.8
Nov	13.3	4.8	1.9	1.7	0.7	3.7	0.5	0.2	26.7
Dec	14.5	4.8	2.3	2.4	0.9	4.6	0.6	0.2	30.4
Totals	**156.6**	**43.2**	**29.8**	**30.1**	**9.5**	**52.0**	**5.2**	**1.2**	**328**
									pounds

APPENDIX B

Table B-1: Well Specifications, Corrective Action Monitoring Program

Table B-2a: Hydraulic Effectiveness Monitoring Wells for Groundwater Elevation Measurements

Table B-2b: Contaminant Reduction Monitoring Wells for Groundwater Sampling

Table B-1: Well Specifications
Corrective Action Monitoring Program

Well	Northing	Easting	Current M.P. Elevation	Current Ground Surface Elevation	Depth to Bedrock	Bedrock Elevation	Screened Depth Interval			Baseline Depth to Bottom from M.P.	Baseline Elevation of Bottom	Well Diameter	Screen Length	Well Construction Material	Geologic Unit Monitored	Site Area	Up, Down, or Side Gradient
	(grid feet)	(grid feet)	(ft amsl)	(ft amsl)	(ft bgs)	(ft amsl)	(ft bgs)			(ft)	(ft amsl)	(in)	(ft)				
101	764601.1	916596.6	814.01	811.2	NE	NE	30	-	40	41.0	773.1	6	10	S, 25-slot	Outwash Sand	SBA	DG
106	767106.1	919136.5	914.91	912.9	11.6	901.2	6.3	-	11.6	13.1	901.8	4	5.3	PVC	Till*	TFA	UG
107A	767000.3	919557.6	961.80	960.3	NL	NL	NL	-	NL	65.0	896.8	2	NL	PVC	Bedrock	TFA	UG
110	766674.6	919542.5	946.88	947.9	15.5	931.3	14.3	-	19.6	20.1	926.8	4	5.3	PVC	Till/Bedrock	TFA	UG
113	767051.4	918957.9	914.83	912.1	25	887.0	4.9	-	10.2	12.7	902.1	4	5.3	PVC	Till	TFA	DG
114	766976.5	918889.9	916.13	913.4	22	891.6	9.4	-	14.7	16.7	899.5	4	5.3	PVC	Fill	TFA	DG
120	765939.9	917443.6	846.20	844.7	24	820.7	20	-	25	39.6	806.6	6	5	OH	Till/Bedrock	WMA	DG
123	765871.9	919093.3	903.96	904.5	18	886.0	19	-	23	21.9	882.1	4	4	PVC	Bedrock	TFA	DG
124	767366.9	918823.9	911.43	908.5	20	888.4	19	-	23	25.1	886.3	4	4	PVC	Till/Bedrock	TFA	SG
125	767096.6	918627.9	905.36	905.7	24	881.3	22	-	26	24.9	880.5	4	4	PVC	S & G/Bedrock	TFA	DG
126	767128.9	918825.2	908.95	909.4	22	886.9	21	-	25	23.9	885.1	4	4	PVC	Till/Bedrock	TFA	DG
127	767204.2	918901.6	909.65	909.8	18	891.2	17	-	21	19.5	890.1	4	4	PVC	S & G/Bedrock	TFA	DG
128	766984.2	918840.7	914.23	912.5	22	890.5	20	-	24	24.9	889.4	2	4	PVC, 10-slot	Till/Bedrock	TFA	DG
129	766776.9	919163.6	912.10	912.0	7.5	906.4	6	-	10	8.4	903.8	4	4	PVC	Till/Bedrock	TFA	DG
132	766141.1	919376.3	915.31	912.0	14	898.1	14	-	18	21.2	894.1	4	4	PVC	Bedrock	TFA	DG
133	767281.5	918665.9	897.22	894.3	26	867.5	24	-	28	31.5	865.7	4	4	PVC	Till/Bedrock	TVD/MLA	DG
134	766044.5	919507.4	916.46	913.9	36	876.5	35	-	39	42.9	873.6	4	4	PVC	Till/Bedrock	TFA	DG
140R	767086.4	918134.6	889.17	886.9	41.5	845.5	38	-	43	45.1	844.0	2	5	PVC, 20-slot	Till/Bedrock	NBT/P001	DG
143	767292.3	917826.1	884.81	885.5	19.5	866.5	17	-	21	29.1	855.8	4	4	PVC	Till/Bedrock	NBT/P001	DG
146	766637.9	917813.3	868.04	865.6	22	843.6	20	-	24	25.9	842.2	4	4	PVC	Till/Bedrock	NBT/P001	DG
147	766361.6	917695.9	871.57	868.9	20	848.5	20	-	24	27.3	844.3	4	4	PVC	Bedrock	WMA	DG
148	766085.9	917652.8	857.87	854.6	32	823.1	29	-	34	34.9	823.0	4	5	PVC	Till/Bedrock	WMA	DG
149	765773.6	917229.3	834.27	831.6	29	802.5	27	-	31	33.6	800.7	4	4	PVC	Till/Bedrock	WMA	DG
154	766603.6	917601.3	861.70	860.2	21	839.2	14	-	24	25.6	836.1	2	10	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
157	766538.0	917158.9	854.13	852.7	16	836.6	9	-	19	20.0	834.1	4	10	PVC	Till/Bedrock	NBT/P001	DG
158	766293.2	916902.0	838.28	836.2	37	799.1	28	-	38	39.8	798.5	4	10	PVC	Till/Bedrock	WBA	SG
160	765642.6	916618.6	824.31	821.6	60	761.4	49.5	-	59.5	58.5	765.9	4	10	PVC	Basal Till	WBA	SG
161	765648.6	916615.3	824.96	821.8	NE	NE	10	-	20	22.7	802.2	4	10	PVC	Alluvial silt and gravel	WBA	SG
162	765798.6	916741.9	825.50	823.7	47	776.5	39	-	49	50.4	775.1	4	10	PVC	Till/Bedrock	WBA	SG
163	765802.6	916749.6	825.40	823.8	NE	NE	15	-	25	25.5	799.9	4	10	PVC	Alluvial silt and gravel	WBA	SG
165	765493.3	916873.7	817.50	815.6	40	775.4	31	-	41	44.2	773.3	4	10	PVC	Till/Bedrock	WBA	SG
166	765164.2	916597.5	813.71	812.0	87	724.5	78	-	88	90.6	723.2	4	10	PVC	Till/Bedrock	WBA	SG
167	765175.2	916605.7	813.26	811.7	NE	NE	14	-	24	25.5	787.7	4	10	PVC	Silt	WBA	SG
178	765209.7	917421.0	812.22	809.2	32	776.8	30	-	35	36.4	775.8	4	5	PVC, 10-slot	Gravel/Bedrock	WMA	DG
179	765297.4	916931.4	818.32	815.6	NE	NE	66	-	70	71.5	746.8	4	4	PVC, 8-slot	Outwash Sand	WMA	DG
181	766327.2	917857.1	894.65	893.2	37	855.7	34	-	39	40.6	854.1	4	5	PVC	Till/Bedrock	WMA	DG
183	765912.9	917704.1	851.83	848.9	25	823.9	22	-	27	30.5	821.3	4	5	PVC	Till/Bedrock	WMA	DG
185	765206.1	916776.3	815.54	813.0	89	723.9	71	-	91	94.2	721.3	4	20	PVC	S & G/Bedrock	WBA	DG
186	764857.7	917114.0	820.32	817.8	92	725.9	64	-	94	96.3	724.1	4	30	PVC	S & G/Bedrock	SBA	DG
194	766096.0	917750.2	862.70	861.4	36	824.3	48	-	110	113.4	749.3	5	62	S/OH	Bedrock	WMA	DG
306	764912.6	918514.9	821.04	817.8	58	760.1	40	-	60	62.5	758.5	4	20	PVC	S & G/Bedrock	TVD/MLA	DG
308	765690.7	919205.9	876.26	873.1	25	847.9	17	-	27	30.0	846.3	4	10	PVC	Till/Bedrock	TVD/MLA	DG
309	765632.1	918611.4	874.69	872.4	27	845.1	22	-	27	32.2	842.5	4	5	PVC	Till	TVD/MLA	DG
313	765577.1	918146.7	849.79	847.3	35	812.0	31	-	35	39.5	810.3	4	4	PVC	Till/Bedrock*	TVD/MLA	DG
314	764592.4	916575.0	813.82	811.1	98	713.0	93	-	98	100.4	713.4	4	5	PVC	Basal Till	SBA	DG
316	765161.3	916608.8	813.46	812.0	NE	NE	38	-	48	49.0	764.5	4	10	PVC	Glaciolac., vf sand, silt, clay	WBA	DG
317	765642.2	916612.3	823.00	820.6	NE	NE	35	-	45	47.2	775.8	4	10	PVC	Outwash S & G	WBA	DG
318	764251.6	916904.6	814.19	811.9	NE	NE	36	-	46	47.3	766.9	4	10	PVC	Outwash S & G	SBA	DG
319	764348.5	916622.4	806.89	804.3	NE	NE	33	-	43	45.2	761.7	4	10	PVC	Outwash Sand	SBA	DG
321	765315.2	918902.2	853.72	852.1	NE	NE	29	-	39	39.6	814.2	4	10	PVC	S & G/Till	TVD/MLA	DG
322	764159.2	916744.3	806.20	803.8	NE	NE	34	-	44	45.7	760.5	4	10	PVC	Outwash S & G	SBA	DG
323	764450.0	916768.0	813.67	811.6	NE	NE	35	-	45	47.3	766.3	4	10	PVC	Outwash Sand	SBA	DG
324	766906.2	918216.7	892.60	890.8	50.0	840.8	41.5	-	51.5	53.4	839.2	2	10	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
325	766916.7	918213.5	892.08	890.6	NE	NE	35	-	40	42.5	849.5	2	5	PVC, 10-slot	Alluvial Gravel	NBT/P001	DG
351	764164.5	916737.6	805.62	804.1	86	718.1	83.5	-	88.5	90.4	715.2	2	5	PVC	Till/Bedrock	SBA	DG
352	764346.6	916619.9	806.48	804.6	84.8	719.8	80	-	85	87.4	719.1	2	5	PVC	Basal Till	SBA	DG
353	766807.8	918783.5	912.87	913.3	23	890.3	24	-	29	28.6	884.3	2	5	PVC	Bedrock	TFA	DG
354	766823.0	918775.7	912.85	913.4	NE	NE	13	-	18	17.3	895.6	2	5	PVC	Till	TFA	DG
355	764015.2	917050.3	813.42	811.3	89.5	721.8	90.5	-	95.5	97.9	715.5	2	5	PVC	Bedrock	SBA	DG
356	764020.7	917054.5	813.31	811.5	NE	NE	63.2	-	68.2	70.3	743.0	2	5	PVC	Outwash S & G	SBA	DG
357	766720.9	917775.4	863.89	862.0	24.5	837.3	27.5	-	32.5	34.5	829.4	2	5	PVC	Bedrock	NBT/P001	DG
358	766711.3	917781.0	864.08	861.8	NE	NE	9.5	-	14.5	17.6	846.4	2	5	PVC	Alluvial S & G	NBT/P001	DG
361	766501.5	917786.6	868.42	865.8	28	837.8	28	-	33	35.4	833.0	2	5	PVC	Bedrock	NBT/P001	DG
362	765146.5	918765.3	832.69	829.8	58	771.8	58.5	-	63.5	66.6	766.1	2	5	PVC	Bedrock	TVD/MLA	DG

Table B-1: Well Specifications
Corrective Action Monitoring Program

Well	Northing	Easting	Current M.P. Elevation	Current Ground Surface Elevation	Depth to Bedrock	Bedrock Elevation	Screened Depth Interval			Baseline Depth to Bottom from M.P.	Baseline Elevation of Bottom	Well Diameter	Screen Length	Well Construction Material	Geologic Unit Monitored	Site Area	Up, Down, or Side Gradient
	(grid feet)	(grid feet)	(ft amsl)	(ft amsl)	(ft bgs)	(ft amsl)	(ft bgs)			(ft)	(ft amsl)	(in)	(ft)				
363	765135.4	919180.1	855.07	852.5	38.5	814.0	38.5	-	43.5	45.5	809.5	2	5	PVC	Bedrock	TVD/MLA	DG
364	767066.3	917771.0	897.68	896.0	60.5	835.5	58.5	-	63.5	65.2	832.5	2	5	PVC	Till/Bedrock	NBT/P001	SG
365	767072.2	917770.3	898.00	896.2	NE	NE	39	-	44	45.8	852.2	2	5	PVC	Alluvial S & G	NBT/P001	SG
366	766711.7	918208.6	912.48	910.7	37.2	873.5	36	-	41	43.0	869.5	2	5	PVC	Till/Bedrock	NBT/P001	DG
367	766712.8	918032.6	910.08	908.3	67	841.9	66	-	71	72.5	837.6	2	5	PVC	Till/Bedrock	NBT/P001	DG
368	766710.2	918027.1	910.15	908.1	NE	NE	42.5	-	47.5	49.3	860.8	2	5	PVC	Alluvial f. Sand, Slt, G	NBT/P001	DG
372	765064.9	919791.2	904.96	903.5	58	845.5	58.5	-	63.5	65.8	839.1	2	5	PVC	Bedrock	TVD/MLA	SG
373	765151.7	918758.2	832.19	829.5	NE	NE	33	-	43	45.7	786.5	2	10	PVC	Outwash S & G	TVD/MLA	DG
374	764914.9	918527.1	821.25	818.6	NE	NE	8	-	18	20.5	800.7	2	10	PVC	Sand & Gravel	TVD/MLA	DG
375	764705.6	919469.4	833.00	831.4	38	793.4	38.5	-	43.5	45.6	787.4	2	5	PVC	Bedrock	TVD/MLA	SG
378	766993.8	917794.6	900.02	898.0	65.5	832.5	69.5	-	74.5	77.2	822.8	2	5	PVC	Bedrock	NBT/P001	DG
379	767000.4	917792.4	899.66	897.9	NE	NE	45	-	50	51.9	847.8	2	5	PVC	Till	NBT/P001	DG
382	766704.2	918193.3	912.59	910.4	NE	NE	15	-	20	22.6	890.0	2	5	PVC	Fill	NBT/P001	DG
383	766625.0	917810.0	867.39	864.6	NE	NE	9	-	14	17.0	850.4	2	5	PVC	Alluvial Slt & f. Sand	NBT/P001	DG
386	765601.5	917106.5	822.26	819.4	NE	NE	9.5	-	14.5	17.5	804.8	2	5	PVC	Alluvial S & G	WMA	DG
387	765481.8	916866.0	817.59	815.1	NE	NE	7.5	-	12.5	15.5	802.1	2	5	PVC	Alluvial S&G & Silt	WBA	DG
391	764709.2	919481.7	833.75	831.5	NE	NE	18	-	28	30.2	803.6	2	10	PVC	Outwash S & G	TVD/MLA	SG
392	766805.5	917961.4	895.98	893.8	NE	NE	33	-	43	45.0	851.0	2	10	PVC, 10-slot	Alluvial S&G & Silt	NBT/P001	DG
393	766967.9	917932.7	892.55	890.4	59	831.5	58	-	63	65.1	827.5	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
394	766972.3	917934.2	892.29	890.3	NE	NE	35	-	45	46.8	845.5	2	10	PVC, 10-slot	Alluvial S&G & Silt	NBT/P001	DG
395	767015.6	918162.0	890.04	887.7	59.5	828.6	57.5	-	62.5	65.1	825.0	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
397	766554.2	917409.1	865.79	863.6	34	829.6	32.5	-	37.5	39.7	826.1	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
398	766561.0	917406.4	865.37	863.3	NE	NE	6	-	16	18.1	847.3	2	10	PVC, 10-slot	Alluvial S&G & Silt	NBT/P001	DG
399	766826.6	917750.8	867.33	865.6	NE	NE	4	-	14	16.5	850.8	2	10	PVC, 10-slot	Alluvial S&G & Silt	NBT/P001	DG
404	764862.8	917113.2	NA	NA	92	725.8	37	-	42	NA	NA	10	5	S, 6-slot	Alluvial Zone	WMA	DG
							55	-	65				10	S, 6-slot	Alluvial Zone / Till		
							87	-	92				5	S, 10-slot	Till/Bedrock Zone		
405	765284.0	916916.7	NA	NA	86.5	728.5	53	-	63	NA	NA	10	10	S, 8-slot	Alluvial Zone	WMA	DG
							82	-	87				5	S, 10-slot	Till		
413	767086.5	918127.5	889.16	886.7	28.5	843.6	24	-	34	NA	NA	6	10	S, 60-slot	Till/Bedrock Zone	NBT/P001	DG
414	766889.8	918195.1	893.11	891.0	50	841.3	37	-	57	NA	NA	6	20	S, 20-slot	Alluvial & Till/Bedrock Zones	NBT/P001	DG
415	766989.0	918841.0	914.38	912.0	25	887.5	23	-	28	35.4	879.0	6	5	SS, 35-slot	Till/Bedrock Zone	TFA	DG
416	767004.4	918161.1	890.58	888.1	59	829.1	53.5	-	63.5	71.0	819.6	6	10	SS, 50-slot	Till/Bedrock Zone	NBT/P001	DG
417	766961.7	917949.3	891.78	889.4	63	826.4	58	-	64	71.4	820.4	8	6	SS, 20-slot	Till/Bedrock Zone	NBT/P001	DG
418	766895.7	918199.0	893.21	891.0	NE	NE	34	-	39	46.2	847.0	8	5	SS, 20-slot	Alluvial Zone	NBT/P001	DG
521	766813.4	917531.5	863.78	861.6	36	825.6	33.5	-	38.5	41.1	822.7	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
522	766922.5	917616.3	864.46	862.3	28	834.3	26.5	-	31.5	34.1	830.4	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
524	766671.0	917748.5	866.28	864.1	31	833.1	28.5	-	33.5	36.2	830.1	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
529	766807.5	917532.6	863.93	861.8	NE	NE	6	-	12.5	14.9	849.0	2	6.5	PVC, 10-slot	All. Silt, Sand, Gravel	NBT/P001	DG
532	766678.4	917750.1	866.34	864.0	NE	NE	6	-	14	16.6	849.8	2	8	PVC, 10-slot	All. Silt, Sand, Gravel	NBT/P001	DG
534	766876.5	917684.3	862.88	863.4	NE	NE	4	-	14	13.3	849.5	2	10	PVC, 10-slot	All. Silt, Sand, Gravel	NBT/P001	DG
540	763910.4	916233.3	810.55	808.2	>52	<756.2	39	-	49	51.1	759.5	2	10	PVC, 10-slot	Outwash Sand	SBA	DG
541	753614.5	916380.7	812.11	809.6	>56	<753.6	42.5	-	52.5	55.1	757.0	2	10	PVC, 10-slot	Outwash S & G	SBA	DG
542	763435.0	916624.5	806.40	804.0	>80	<724.0	32	-	42	44.7	761.8	2	10	PVC, 10-slot	Outwash S & G	SBA	DG
543	763621.1	916951.9	823.64	820.6	>56	<764.6	41	-	51	54.3	769.3	2	10	PVC, 10-slot	Outwash S & G	SBA	DG
601	766597.3	917599.5	862.08	860.0	NE	NE	3	-	13	15.6	846.5	2	10	PVC, 10-slot	Alluvial S&G/Silt	NBT/P001	DG
602	766485.9	917557.5	862.15	860.1	NE	NE	5	-	17	19.5	842.6	2	12	PVC, 10-slot	Alluvial Silt & Sand	NBT/P001	DG
603	766585.3	917334.9	864.18	861.9	NE	NE	5.75	-	15.75	17.9	846.2	2	10	PVC, 10-slot	Alluvial S&G	NBT/P001	DG
604	767135.5	917876.0	885.48	885.8	NE	NE	14	-	24	21.9	863.6	2	10	PVC, 10-slot	Alluvial Silt & Sand	NBT/P001	DG
605	767139.6	917874.6	885.23	900.6	45.5	842.0	43	-	48	45.7	839.5	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
606	766911.5	917826.6	900.06	900.6	NE	NE	43	-	48	47.4	852.7	2	5	PVC, 10-slot	Alluvial S&G and Silt	NBT/P001	DG
607	766901.8	917830.3	900.46	900.9	58	842.9	55.5	-	60.5	60.1	840.4	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
608	766614.6	917449.8	861.51	859.1	NE	NE	4	-	14	16.8	844.7	2	10	PVC, 10-slot	All. Silt, Sand, Gravel	NBT/P001	DG
609	767176.0	918342.1	895.16	895.5	49.5	846.0	47	-	52	51.7	843.5	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
610	766978.1	918572.3	909.10	909.7	30.5	879.2	28	-	33	32.4	876.7	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
611	766982.3	918579.3	909.11	909.7	NE	NE	4	-	14	13.4	895.7	2	10	PVC, 10-slot	Fill/All. Sand & Silt	NBT/P001	DG
612	766991.4	918321.7	903.93	904.5	56.1	848.4	54	-	59	56.6	847.3	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
613	766986.7	918314.2	903.94	904.5	NE	NE	32	-	42	41.6	862.3	2	10	PVC, 10-slot	All. Sand, Silt, Gravel	NBT/P001	DG
614	764906.7	916538.0	811.80	809.2	101	708.2	97.5	-	102.5	105.4	706.4	2	5	PVC, 10-slot	Till/Bedrock	WBA	DG
615	766479.4	917558.0	862.69	860.5	33	827.5	38	-	43	46.1	816.6	2	5	PVC, 10-slot	Bedrock	NBT/P001	DG
616	767296.7	918241.6	888.18	885.2	26.5	858.7	23.5	-	28.5	31.6	856.6	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
617	767312.2	918427.0	895.77	896.1	35	861.1	32.5	-	37.5	37.3	858.4	2	5	PVC, 10-slot	Till/Bedrock	NBT/P001	DG
618	767604.5	918632.7	909.29	906.2	24	879.4	21	-	26	28.9	880.4	2	5	PVC, 10-slot	Till/Bedrock	TFA	UG
619	765999.4	919160.0	896.45	896.8	13.5	883.3	10	-	15	15.1	881.4	2	5	PVC, 10-slot	Till/Bedrock	TVD/MLA	DG

Table B-1: Well Specifications
Corrective Action Monitoring Program

Well	Northing (grid feet)	Easting (grid feet)	Current M.P. Elevation (ft amsl)	Current Ground Surface Elevation (ft amsl)	Depth to Bedrock (ft bgs)	Bedrock Elevation (ft amsl)	Screened Depth Interval (ft bgs)			Baseline Depth to Bottom from M.P. (ft)	Baseline Elevation of Bottom (ft amsl)	Well Diameter (in)	Screen Length (ft)	Well Construction Material	Geologic Unit Monitored	Site Area	Up, Down, or Side Gradient
620	765775.4	919122.9	887.16	884.2	NE	NE	4.5	-	14.5	17.6	869.6	2	10	PVC, 10-slot	All. Sand, Silt, Gravel	TVD/MLA	DG
621	765343.7	918569.7	841.97	840.0	NE	NE	25	-	35	37.4	804.6	2	10	PVC, 10-slot	Outwash Silt&Gravel	TVD/MLA	DG
622	765344.6	918560.8	842.11	840.0	42	798.0	39	-	44	46.5	795.6	2	5	PVC, 10-slot	Till/Bedrock	TVD/MLA	DG
623	765292.6	918000.3	852.67	850.7	NE	NE	42	-	52	54.6	798.1	2	10	PVC, 10-slot	Outwash Sand&Gravel	TVD/MLA	DG
624	765299.7	918006.4	853.46	851.5	60.5	791.0	52	-	57	64.4	789.1	2	5	PVC, 10-slot	Till/Bedrock	TVD/MLA	DG
625	764081.1	916908.4	808.77	806.8	NE	NE	32	-	42	44.6	764.2	2	10	PVC, 10-slot	Outwash Sand	SBA	DG
626	764076.2	916901.0	808.60	804.5	86.5	718.0	84.5	-	89.5	92.4	716.2	2	5	PVC, 10-slot	Till/Bedrock	SBA	DG
627	764545.6	916922.9	812.96	811.2	NE	NE	38	-	48	50.9	762.1	2	10	PVC, 10-slot	Outwash Sand	SBA	DG
628	764537.3	916914.3	812.43	810.9	95.5	715.4	93	-	98	100.5	711.9	2	5	PVC, 10-slot	Till/Bedrock	SBA	DG
629	765410.2	916642.9	818.39	816.2	NE	NE	38	-	48	51.4	766.9	2	10	PVC, 10-slot	Silt, f. Sand, Gravel	WBA	SG
630	765399.8	916638.6	817.63	815.5	88	727.5	85.5	-	90.5	93.6	724.1	2	5	PVC, 10-slot	Till/Bedrock	WBA	SG
631	766060.3	916906.3	829.38	828.0	NE	NE	24	-	29	31.5	797.9	2	5	PVC, 10-slot	Outwash Sand&Gravel	WBA	UG
632	765667.6	917925.0	853.24	850.8	34	816.8	31	-	36	39.3	813.9	2	5	PVC, 10-slot	Till/Bedrock	WMA	DG
700	766967.5	917950.5	889.06	889.3	63	826.3	57	-	67	66.8	822.3	2	10	PVC, 20-slot	Till/Bedrock	NBT/P001	DG
701	767000.2	918002.8	888.24	888.7	62.5	826.2	60	-	65	64.5	823.7	2	5	PVC, 20-slot	Till/Bedrock	NBT/P001	DG
P01	765207.2	917610.9	810.62	808.7	NE	NE	5	-	10	11.2	799.4	2	5	PVC	S & G	WMA	DG
P02	765162.9	917434.9	809.61	807.8	NE	NE	5	-	10	10.5	799.1	2	5	PVC	S & G	WMA	DG
P04	766897.6	919096.5	914.73	913.6	19.5	894.1	14	-	19	20.3	894.4	2	5	PVC	Till	TFA	DG
P07	766152.6	919063.9	894.47	895.4	6.5	888.8	NL	-	NL	5.6	888.9	2	NL	S	Till*	TVD/MLA	DG
P08	766137.6	919137.3	894.70	895.3	9.5	886.3	NL	-	NL	8.7	886.0	2	NL	S	Till*	TVD/MLA	DG
P11	765943.1	919227.8	895.21	895.5	15.5	879.5	NL	-	NL	14.8	880.4	2	NL	S	Till*	TVD/MLA	DG

Key:

DG: Downgradient from source area
ft amsl: Feet above mean sea level
ft bgs: Feet below ground surface
Glaciolac.: Glaciolacustrine
NBT/P001: Northwest Bedrock Trough/ Parking Lot 001 Area
M.P.: Measurement point
NA: Not available or not accessible
NE: Not encountered
NL: No log available
OH: Open hole completion
PVC: Polyvinyl chloride
S&G: Sand and Gravel
S,SS: Steel, Stainless Steel
SBA: Southern Boundary Area
SG: Side gradient to source area
TFA: Tank Farm Area
TVD/MLA: Tower View Drive/Mirror Lake Area
UG: Upgradient from source area
WBA: Western Boundary Area
WMA: Waste Management Area
* Uncertain

Table B-2a: Hydraulic Effectiveness Monitoring Wells for Groundwater Elevation Measurements

Well	M.P. Elev. (ft amsl)	Planar Coordinates		Site Area	List "A"	List "B"
		Northing	Easting			
101	814.01	764601.1	916596.6	SBA	X	
106	914.91	767106.1	919136.5	TFA		X
107A	961.80	767000.3	919557.6	TFA		X
110	946.88	766674.6	919542.5	TFA		X
113	914.83	767051.4	918957.9	TFA		X
114	916.13	766976.5	918889.9	TFA		X
120	846.20	765939.9	917443.6	WMA	X	
123	903.96	765871.9	919093.3	TFA		X
124	911.43	767366.9	918823.9	TFA		X
125	905.36	767096.6	918627.9	TFA		X
126	908.95	767128.9	918825.2	TFA		X
127	909.65	767204.2	918901.6	TFA		X
128	914.23	766984.2	918840.7	TFA		X
129	912.10	766776.9	919163.6	TFA		X
132	915.31	766141.1	919376.3	TFA		X
133	897.22	767281.5	918665.9	TVD/ML	X	
134	916.46	766044.5	919507.4	TFA		X
140R	889.17	767086.4	918134.6	NBT/P001		X
143	884.81	767292.3	917826.1	NBT/P001		X
146	868.04	766637.9	917813.3	NBT/P001		X
147	871.57	766361.6	917695.9	WMA	X	
148	857.87	766085.9	917652.8	WMA	X	
149	834.27	765773.6	917229.3	WMA	X	
154	861.70	766603.6	917601.3	NBT/P001		X
157	854.13	766538.0	917158.9	NBT/P001		X
158	838.28	766293.2	916902.0	WBA	X	
160	824.31	765642.6	916618.6	WBA	X	
161	824.96	765648.6	916615.3	WBA	X	
162	825.50	765798.6	916741.9	WBA	X	
163	825.40	765802.6	916749.6	WBA	X	
165	817.50	765493.3	916873.7	WBA	X	
166	813.71	765164.2	916597.5	WBA	X	
167	813.26	765175.2	916605.7	WBA	X	
178	812.22	765209.7	917421.0	WMA	X	
179	818.32	765297.4	916931.4	WMA	X	
181	894.65	766327.2	917857.1	WMA	X	
183	851.83	765912.9	917704.1	WMA	X	
185	815.54	765206.1	916776.3	WBA	X	
186	820.32	764857.7	917114.0	SBA	X	
194	862.70	766096.0	917750.2	WMA	X	
306	821.04	764912.6	918514.9	TVD/ML	X	
308	876.26	765690.7	919205.9	TVD/ML	X	
309	874.69	765632.1	918611.4	TVD/ML	X	
313	849.79	765577.1	918146.7	TVD/ML	X	
314	813.82	764592.4	916575.0	SBA	X	
316	813.46	765161.3	916608.8	WBA	X	
317	823.00	765642.2	916612.3	WBA	X	
318	814.19	764251.6	916904.6	SBA	X	
319	806.89	764348.5	916622.4	SBA	X	
321	853.72	765315.2	918902.2	TVD/ML	X	
322	806.20	764159.2	916744.3	SBA	X	
323	813.67	764450.0	916768.0	SBA	X	
324	892.60	766906.2	918216.7	NBT/P001		X
325	892.08	766916.7	918213.5	NBT/P001		X
351	805.62	764164.5	916737.6	SBA	X	
352	806.48	764346.6	916619.9	SBA	X	
353	912.87	766807.8	918783.5	TFA		X
354	912.85	766823.0	918775.7	TFA		X
355	813.42	764015.2	917050.3	SBA	X	
356	813.31	764020.7	917054.5	SBA	X	
357	863.89	766720.9	917775.4	NBT/P001		X
358	864.08	766711.3	917781.0	NBT/P001		X

Table B-2a: Hydraulic Effectiveness Monitoring Wells for Groundwater Elevation Measurements

Well	M.P. Elev. (ft amsl)	Planar Coordinates		Site Area	List "A"	List "B"
		Northing	Easting			
361	868.42	766501.5	917786.6	NBT/P001		X
362	832.69	765146.5	918765.3	TVD/ML	X	
363	855.07	765135.4	919180.1	TVD/ML	X	
364	897.68	767066.3	917771.0	NBT/P001		X
365	898.00	767072.2	917770.3	NBT/P001		X
366	912.48	766711.7	918208.6	NBT/P001		X
367	910.08	766712.8	918032.6	NBT/P001		X
368	910.15	766710.2	918027.1	NBT/P001		X
372	904.96	765064.9	919791.2	TVD/ML	X	
373	832.19	765151.7	918758.2	TVD/ML	X	
374	821.25	764914.9	918527.1	TVD/ML	X	
375	833.00	764705.6	919469.4	TVD/ML	X	
378	900.02	766993.8	917794.6	NBT/P001		X
379	899.66	767000.4	917792.4	NBT/P001		X
382	912.59	766704.2	918193.3	NBT/P001		X
383	867.39	766625.0	917810.0	NBT/P001		X
386	822.26	765601.5	917106.5	WMA	X	
387	817.59	765481.8	916866.0	WBA	X	
391	833.75	764709.2	919481.7	TVD/ML	X	
392	895.98	766805.5	917961.4	NBT/P001		X
393	892.55	766967.9	917932.7	NBT/P001		X
394	892.29	766972.3	917934.2	NBT/P001		X
395	890.04	767015.6	918162.0	NBT/P001		X
397	865.79	766554.2	917409.1	NBT/P001		X
398	865.37	766561.0	917406.4	NBT/P001		X
399	867.33	766826.6	917750.8	NBT/P001		X
413	889.16	767086.5	918127.5	NBT/P001		X
415	914.38	766989.0	918841.0	TFA		X
416	890.58	767004.4	918161.1	NBT/P001		X
417	891.78	766961.7	917949.3	NBT/P001		X
418	893.21	766895.7	918199.0	NBT/P001		X
521	863.78	766813.4	917531.5	MT		X
522	864.46	766922.5	917616.3	MT		X
524	866.28	766671.0	917748.5	MT		X
529	863.93	766807.5	917532.6	MT		X
532	866.34	766678.4	917750.1	MT		X
534	862.88	766876.5	917684.3	MT		X
540	810.55	763910.4	916233.3	SBA	X	
541	812.11	753614.5	916380.7	SBA	X	
542	806.40	763435.0	916624.5	SBA	X	
543	823.64	763621.1	916951.9	SBA	X	
601	862.08	766597.3	917599.5	NBT/P001		X
602	862.15	766485.9	917557.5	NBT/P001		X
603	864.18	766585.3	917334.9	NBT/P001		X
604	885.48	767135.5	917876.0	NBT/P001		X
605	885.23	767139.6	917874.6	NBT/P001		X
606	900.06	766911.5	917826.6	NBT/P001		X
607	900.46	766901.8	917830.3	NBT/P001		X
608	861.51	766614.6	917449.8	NBT/P001		X
609	895.16	767176.0	918342.1	NBT/P001		X
610	909.10	766978.1	918572.3	NBT/P001		X
611	909.11	766982.3	918579.3	NBT/P001		X
612	903.93	766991.4	918321.7	NBT/P001		X
613	903.94	766986.7	918314.2	NBT/P001		X
614	811.80	764906.7	916538.0	WBA	X	
615	862.69	766479.4	917558.0	NBT/P001		X
616	888.18	767296.7	918241.6	NBT/P001		X
617	895.77	767312.2	918427.0	NBT/P001		X
618	909.29	767604.5	918632.7	TFA		X
619	896.45	765999.4	919160.0	TVD/ML	X	
620	887.16	765775.4	919122.9	TVD/ML	X	
621	841.97	765343.7	918569.7	TVD/ML	X	

Table B-2a: Hydraulic Effectiveness Monitoring Wells for Groundwater Elevation Measurements

Well	M.P. Elev. (ft amsl)	Planar Coordinates		Site Area	List "A"	List "B"
		Northing	Easting			
622	842.11	765344.6	918560.8	TVD/ML	X	
623	852.67	765292.6	918000.3	TVD/ML	X	
624	853.46	765299.7	918006.4	TVD/ML	X	
625	808.77	764081.1	916908.4	SBA	X	
626	808.60	764076.2	916901.0	SBA	X	
627	812.96	764545.6	916922.9	SBA	X	
628	812.43	764537.3	916914.3	SBA	X	
629	818.39	765410.2	916642.9	WBA	X	
630	817.63	765399.8	916638.6	WBA	X	
631	829.38	766060.3	916906.3	WBA	X	
632	853.24	765667.6	917925.0	WMA	X	
700	889.06	766967.5	917950.5	NBT/P001		X
701	888.24	767000.2	918002.8	NBT/P001		X
P01	810.62	765207.2	917610.9	WMA	X	
P02	809.61	765162.9	917434.9	WMA	X	
P04	914.73	766897.6	919096.5	TFA		X
P07	894.47	766152.6	919063.9	TVD/ML	X	
P08	894.70	766137.6	919137.3	TVD/ML	X	
P11	895.21	765943.1	919227.8	TVD/ML	X	

Planar coordinates are relative to the New York State grid and are expressed in feet.

Lists "A" and "B" are to be alternated as follows:

In Year 1, List "A" wells shall be measured in the first and third quarters; List "B" wells in the second and fourth quarters. In Year 2, List "A" wells shall be measured in the second and fourth quarters; List "B" wells in the first and third quarters. Years 3, 5, 7, etc. shall be the same as Year 1 and Years 4, 6, 8, etc. shall be the same as Year 2.

Key:

MT = Moore Tire Area (off-site)
NBT/P001 = NW Bedrock Trough/P001 Area
SBA = Southern Boundary Area
TFA = Tank Farm Area
TVD/MLA = Tower View Drive/Mirror Lake Area
WBA = Western Boundary Area
WMA = Waste Management Area

Table B-2b: Contaminant Reduction Monitoring Wells for Groundwater Sampling

Well	Site Area	Site Region	Sampling Frequency	List "A"	List "B"
101	SBA	South	S	X	
107A*	TFA	North	Q	X	X
110	TFA	North	S		X
120	WMA	South	S	X	
124	TFA	North	S		X
125	TFA	North	S		X
127	TFA	North	S		X
128	TFA	North	A		X
129	TFA	North	S		X
132	TFA	North	A		X
133	TVD/MLA	South	S	X	
134	TFA	North	S		X
140R	NBT/P001	North	A		X
146	NBT/P001	North	S		X
148	WMA	South	S	X	
149	WMA	South	S	X	
157	NBT/P001	North	S		X
158	WBA	South	A	X	
160	WBA	South	S	X	
162	WBA	South	S	X	
163	WBA	South	A	X	
165	WBA	South	S	X	
166	WBA	South	S	X	
167	WBA	South	S	X	
178	WMA	South	S	X	
179	WMA	South	S	X	
181	WMA	South	A	X	
183	WMA	South	S	X	
185	WBA	South	S	X	
186	SBA	South	S	X	
194	WMA	South	S	X	
306	TVD/MLA	South	A	X	
308	TVD/MLA	South	S	X	
309	TVD/MLA	South	S	X	
313	TVD/MLA	South	A	X	
314	SBA	South	A	X	
316	WBA	South	S	X	
317	WBA	South	S	X	
318	SBA	South	Q	X	X
319	SBA	South	Q	X	X
321	TVD/MLA	South	S	X	
322	SBA	South	Q	X	X
323	SBA	South	Q	X	X
324	NBT/P001	North	S		X
325	NBT/P001	North	S		X
351	SBA	South	S	X	
352	SBA	South	A	X	
353	TFA	North	A		X
354	TFA	North	A		X
355	SBA	South	A	X	
356	SBA	South	A	X	
357	NBT/P001	North	S		X
358	NBT/P001	North	A		X
361	NBT/P001	North	A (V)		X
362	TVD/MLA	South	A	X	
363	TVD/MLA	South	A	X	
364	NBT/P001	North	A (V)		X

Table B-2b: Contaminant Reduction Monitoring Wells for Groundwater Sampling

Well	Site Area	Site Region	Sampling Frequency	List "A"	List "B"
365	NBT/P001	North	A (V)		X
366	NBT/P001	North	A (V)		X
367	NBT/P001	North	S (V)		X
368	NBT/P001	North	S (V)		X
369	NBT/P001	North	A (V)		X
370	NBT/P001	North	A (V)		X
373	TVD/MLA	South	S	X	
374	TVD/MLA	South	S	X	
378	NBT/P001	North	S		X
379	NBT/P001	North	A (V)		X
380	NBT/P001	North	A (V)		X
381	NBT/P001	North	S (V)		X
382	NBT/P001	North	A (V)		X
383	NBT/P001	North	S		X
386	WMA	South	A (V)	X	
387	WBA	South	A (V)	X	
392	NBT/P001	North	S		X
393	NBT/P001	North	Q	X	X
394	NBT/P001	North	S		X
395	NBT/P001	North	A (V)		X
397	NBT/P001	North	A		X
398	NBT/P001	North	S		X
399	NBT/P001	North	Q	X	X
404	WMA	South	Q (V)	X	X
405	WMA	South	Q (V)	X	X
413	NBT/P001	North	Q (V)	X	X
414	NBT/P001	North	Q (V)	X	X
415	TFA	North	Q (V)	X	X
416	NBT/P001	North	Q (V)	X	X
417	NBT/P001	North	Q (V)	X	X
418	NBT/P001	North	Q (V)	X	X
521	MT	North	S		X
522	MT	North	Q	X	X
524	MT	North	S		X
529	MT	North	Q	X	X
532	MT	North	Q	X	X
534	MT	North	Q	X	X
540	SBA	South	S	X	
541	SBA	South	S	X	
542	SBA	South	S	X	
543	SBA	South	S	X	
601	NBT/P001	North	S (V)		X
602	NBT/P001	North	S (V)		X
603	NBT/P001	North	S		X
604	NBT/P001	North	S		X
605	NBT/P001	North	A		X
606	NBT/P001	North	Q	X	X
607	NBT/P001	North	Q	X	X
608	NBT/P001	North	S		X
609	NBT/P001	North	A		X
610	NBT/P001	North	S		X
611	NBT/P001	North	S		X
612	NBT/P001	North	S		X
613	NBT/P001	North	S		X
614	WBA	South	A	X	
615	NBT/P001	North	A		X
616	NBT/P001	North	S		X

Table B-2b: Contaminant Reduction Monitoring Wells for Groundwater Sampling

Well	Site Area	Site Region	Sampling Frequency	List "A"	List "B"
617	NBT/P001	North	S		X
618	TFA	North	S		X
619	TVD/MLA	South	A	X	
620	TVD/MLA	South	S	X	
621	TVD/MLA	South	S	X	
622	TVD/MLA	South	S	X	
623	TVD/ML	South	A (V)	X	
624	TVD/ML	South	A (V)	X	
625	SBA	South	Q	X	X
626	SBA	South	S	X	
627	SBA	South	S	X	
627	SBA	South	S (V)	X	
628	SBA	South	A (V)	X	
629	WBA	South	A (V)	X	
630	WBA	South	A (V)	X	
631	WBA	South	S	X	
632	WMA	South	S	X	
700	NBT/P001	North	Q	X	X
701	NBT/P001	North	Q	X	X
P04	TFA	North	A		X
P08	TVD/MLA	South	A	X	
P11	TVD/MLA	South	A	X	

Key:

MT = Moore Tire Area (off-site)
NBT/P001 = NW Bedrock Trough/P001 Area
SBA = Southern Boundary Area (partially off-site)
TFA = Tank Farm Area
TVD/MLA = Tower View Drive/Mirror Lake Area
WBA = Western Boundary Area
WMA = Waste Management Area
A = Annual Frequency
S = Semiannual Frequency
Q = Quarterly Frequency
(V) = Voluntary Sampling
* Site-wide upgradient well to be sampled quarterly.

X = Analyze all samples for volatile organic compounds by SW846 Method 8260C.

Lists "A" and "B" are to be alternated as follows:

In Year 1, List "A" wells shall be sampled in the first and third quarters; List "B" wells in the second and fourth quarters. In Year 2, List "A" wells shall be sampled in the second and fourth quarters; List "B" wells in the first and third quarters. Years 3, 5, 7, etc. shall be the same as Year 1 and Years 4, 6, 8, etc. shall be the same as Year 2.

All listed monitoring wells are hydraulic effectiveness monitoring wells. Refer to Table B-2a for a complete list and schedule of groundwater elevation measurements.

APPENDIX C

Groundwater Elevation Data
January 1, 2018 - December 31, 2018

2018 Well Inspection Summary with
Dedicated Equipment Assignments

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
106	2/26/2018	914.91	2.11	912.80
107A	2/26/2018	961.80	16.60	945.20
110	2/26/2018	946.88	7.40	939.48
113	2/26/2018	914.83	6.27	908.56
114	2/26/2018	916.13	Dry	<902.6
123	2/26/2018	903.96	4.04	899.92
124	2/26/2018	911.43	5.02	906.41
125	2/26/2018	905.36	4.45	900.91
126	2/26/2018	908.95	7.94	901.01
127	2/26/2018	909.65	3.70	905.95
128	2/26/2018	914.23	19.37	894.86
129	2/26/2018	912.10	2.70	909.40
132	2/26/2018	915.31	15.62	899.69
134	2/26/2018	916.46	17.92	898.54
140R	2/26/2018	889.17	30.74	858.43
143	2/26/2018	884.81	NA	NA
146	2/26/2018	868.04	4.48	863.56
154	2/26/2018	861.70	1.66	860.04
157	2/26/2018	854.13	4.88	849.25
324	2/26/2018	892.60	33.26	859.34
325	2/26/2018	892.08	29.93	862.15
353	2/26/2018	912.87	17.70	895.17
354	2/26/2018	912.85	11.35	901.50
357	2/26/2018	863.89	2.12	861.77
358	2/26/2018	864.08	2.25	861.83
361	2/26/2018	868.42	4.43	863.99
364	2/26/2018	897.68	33.90	863.78
365	2/26/2018	898.00	35.47	862.53
366	2/26/2018	912.48	37.98	874.50
367	2/26/2018	910.08	45.75	864.33

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
368	2/26/2018	910.15	44.32	865.83
378	2/26/2018	900.02	37.37	862.65
379	2/26/2018	899.66	37.65	862.01
382	2/26/2018	912.59	11.76	900.83
383	2/26/2018	867.39	3.60	863.79
392	2/26/2018	895.98	31.43	864.55
393	2/26/2018	892.55	29.92	862.63
394	2/26/2018	892.29	30.54	861.75
395	2/26/2018	890.04	27.66	862.38
397	2/26/2018	865.79	7.73	858.06
398	2/26/2018	865.37	5.99	859.38
399	2/26/2018	867.33	4.96	862.37
413	2/26/2018	889.16	41.53	847.63
414	2/26/2018	893.11	53.65	839.46
415	2/26/2018	914.38	21.10	893.28
416	2/26/2018	890.58	65.97	824.61
521	2/26/2018	863.78	1.50	862.28
522	2/26/2018	864.46	2.13	862.33
524	2/26/2018	866.28	4.55	861.73
529	2/26/2018	863.93	2.84	861.09
532	2/26/2018	866.34	4.62	861.72
534	2/26/2018	862.88	2.61	860.27
540	2/26/2018	810.55	10.79	799.76
541	2/26/2018	812.11	12.46	799.65
542	2/26/2018	806.40	7.77	798.63
543	2/26/2018	823.64	23.86	799.78
601	2/26/2018	862.08	2.00	860.08
602	2/26/2018	862.15	2.44	859.71
603	2/26/2018	864.18	5.65	858.53
604	2/26/2018	885.48	12.76	872.72

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
605	2/26/2018	885.23	16.44	868.79
606	2/26/2018	900.06	38.25	861.81
607	2/26/2018	900.46	38.12	862.34
608	2/26/2018	861.51	2.23	859.28
609	2/26/2018	895.16	25.11	870.05
610	2/26/2018	909.10	15.70	893.40
611	2/26/2018	909.11	10.48	898.63
612	2/26/2018	903.93	32.65	871.28
613	2/26/2018	903.94	32.90	871.04
615	2/26/2018	862.69	4.93	857.76
616	2/26/2018	888.18	6.05	882.13
617	2/26/2018	895.77	5.77	890.00
618	2/26/2018	909.29	3.14	906.15
P04	2/26/2018	914.73	5.37	909.36
101	6/4/2018	814.01	15.95	798.06
120	6/4/2018	846.20	21.38	824.82
133	6/4/2018	897.22	26.48	870.74
147	6/4/2018	871.57	17.09	854.48
148	6/4/2018	857.87	19.11	838.76
149	6/4/2018	834.27	19.07	815.20
158	6/4/2018	838.28	10.57	827.71
160	6/4/2018	824.31	11.15	813.16
161	6/4/2018	824.96	11.69	813.27
162	6/4/2018	825.50	8.78	816.72
163	6/4/2018	825.40	9.44	815.96
165	6/4/2018	817.50	7.65	809.85
166	6/4/2018	813.71	22.90	790.81
167	6/4/2018	813.26	7.47	805.79
178	6/4/2018	812.22	6.97	805.25
179	6/4/2018	818.32	35.93	782.39

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
181	6/4/2018	894.65	30.30	864.35
183	6/4/2018	851.83	24.87	826.96
185	6/4/2018	815.54	27.84	787.70
186	6/4/2018	820.32	36.56	783.76
194	6/4/2018	862.70	28.28	834.42
306	6/4/2018	821.04	4.55	816.49
308	6/4/2018	876.26	14.80	861.46
309	6/4/2018	874.69	27.69	847.00
313	6/4/2018	849.79	32.22	817.57
314	6/4/2018	813.82	17.65	796.17
316	6/4/2018	813.46	22.68	790.78
317	6/4/2018	823.00	9.74	813.26
318	6/4/2018	814.19	16.88	797.31
319	6/4/2018	806.89	9.22	797.67
321	6/4/2018	853.72	34.13	819.59
322	6/4/2018	806.20	8.99	797.21
323	6/4/2018	813.67	15.70	797.97
351	6/4/2018	805.62	9.47	796.15
352	6/4/2018	806.48	10.00	796.48
355	6/4/2018	813.42	16.23	797.19
356	6/4/2018	813.31	15.78	797.53
362	6/4/2018	832.69	13.81	818.88
363	6/4/2018	855.07	32.18	822.89
372	6/4/2018	904.96	43.63	861.33
373	6/4/2018	832.19	12.40	819.79
374	6/4/2018	821.25	5.01	816.24
375	6/4/2018	833.00	10.74	822.26
386	6/4/2018	822.26	10.06	812.20
387	6/4/2018	817.59	6.89	810.70
391	6/4/2018	833.75	11.58	822.17

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
540	6/4/2018	810.55	15.68	794.87
541	6/4/2018	812.11	17.88	794.23
542	6/4/2018	806.40	11.87	794.53
543	6/4/2018	823.64	27.51	796.13
614	6/4/2018	811.80	16.94	794.86
619	6/4/2018	896.45	10.20	886.25
620	6/4/2018	887.16	17.40	869.76
621	6/4/2018	841.97	20.83	821.14
622	6/4/2018	842.11	20.23	821.88
623	6/4/2018	852.67	40.53	812.14
624	6/4/2018	853.46	41.20	812.26
625	6/4/2018	808.77	11.30	797.47
626	6/4/2018	808.60	12.44	796.16
627	6/4/2018	812.96	13.51	799.45
628	6/4/2018	812.43	19.40	793.03
629	6/4/2018	818.39	27.34	791.05
630	6/4/2018	817.63	26.78	790.85
631	6/4/2018	829.38	6.78	822.60
632	6/4/2018	853.24	33.30	819.94
P01	6/4/2018	810.62	2.26	808.36
P02	6/4/2018	809.61	4.46	805.15
P07	6/4/2018	894.47	3.17	891.30
P08	6/4/2018	894.70	6.13	888.57
P11	6/4/2018	895.21	10.33	884.88
106	7/16/2018	914.91	2.12	912.79
107A	7/16/2018	961.80	17.01	944.79
110	7/16/2018	946.88	7.58	939.30
113	7/16/2018	914.83	6.94	907.89
114	7/16/2018	916.13	DRY	<902.6
123	7/16/2018	903.96	4.38	899.58

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
124	7/16/2018	911.43	7.03	904.40
125	7/16/2018	905.36	8.01	897.35
126	7/16/2018	908.95	8.53	900.42
127	7/16/2018	909.65	5.01	904.64
128	7/16/2018	914.23	19.02	895.21
129	7/16/2018	912.10	3.12	908.98
132	7/16/2018	915.31	17.07	898.24
134	7/16/2018	916.46	19.20	897.26
140R	7/16/2018	889.17	30.10	859.07
143	7/16/2018	884.81	5.44	879.37
146	7/16/2018	868.04	5.10	862.94
154	7/16/2018	861.70	1.80	859.90
157	7/16/2018	854.13	9.69	844.44
324	7/16/2018	892.60	32.57	860.03
325	7/16/2018	892.08	28.63	863.45
353	7/16/2018	912.87	12.42	900.45
354	7/16/2018	912.85	8.56	904.29
357	7/16/2018	863.89	2.13	861.76
358	7/16/2018	864.08	2.26	861.82
361	7/16/2018	868.42	5.71	862.71
364	7/16/2018	897.68	33.77	863.91
365	7/16/2018	898.00	35.30	862.70
366	7/16/2018	912.48	38.10	874.38
367	7/16/2018	910.08	45.23	864.85
368	7/16/2018	910.15	43.60	866.55
378	7/16/2018	900.02	37.03	862.99
379	7/16/2018	899.66	37.44	862.22
382	7/16/2018	912.59	10.57	902.02
383	7/16/2018	867.39	4.36	863.03
392	7/16/2018	895.98	31.94	864.04

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
393	7/16/2018	892.55	29.58	862.97
394	7/16/2018	892.29	30.10	862.19
395	7/16/2018	890.04	26.78	863.26
397	7/16/2018	865.79	9.46	856.33
398	7/16/2018	865.37	9.62	855.75
399	7/16/2018	867.33	5.40	861.93
413	7/16/2018	889.16	41.50	847.66
414	7/16/2018	893.11	53.58	839.53
415	7/16/2018	914.38	21.00	893.38
416	7/16/2018	890.58	65.70	824.88
521	7/16/2018	863.78	1.68	862.10
522	7/16/2018	864.46	1.83	862.63
524	7/16/2018	866.28	4.66	861.62
529	7/16/2018	863.93	3.02	860.91
532	7/16/2018	866.34	4.74	861.60
534	7/16/2018	862.88	1.99	860.89
540	7/16/2018	810.55	17.03	793.52
541	7/16/2018	812.11	19.37	792.74
542	7/16/2018	806.40	13.14	793.26
543	7/16/2018	823.64	28.23	795.41
601	7/16/2018	862.08	2.32	859.76
602	7/16/2018	862.15	4.18	857.97
603	7/16/2018	864.18	9.32	854.86
604	7/16/2018	885.48	13.34	872.14
605	7/16/2018	885.23	16.90	868.33
606	7/16/2018	900.06	37.99	862.07
607	7/16/2018	900.46	37.84	862.62
608	7/16/2018	861.51	3.40	858.11
609	7/16/2018	895.16	24.20	870.96
610	7/16/2018	909.10	15.04	894.06

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
611	7/16/2018	909.11	11.04	898.07
612	7/16/2018	903.93	32.10	871.83
613	7/16/2018	903.94	32.15	871.79
615	7/16/2018	862.69	6.66	856.03
616	7/16/2018	888.18	5.56	882.62
617	7/16/2018	895.77	5.60	890.17
618	7/16/2018	909.29	5.13	904.16
P04	7/16/2018	914.73	5.38	909.35
101	11/26/2018	814.01	12.20	801.81
120	11/26/2018	846.20	19.30	826.90
133	11/26/2018	897.22	25.73	871.49
147	11/26/2018	871.57	15.38	856.19
148	11/26/2018	857.87	17.88	839.99
149	11/26/2018	834.27	16.53	817.74
158	11/26/2018	838.28	8.18	830.10
160	11/26/2018	824.31	9.70	814.61
161	11/26/2018	824.96	20.00	804.96
162	11/26/2018	825.50	9.21	816.29
163	11/26/2018	825.40	10.30	815.10
165	11/26/2018	817.50	5.60	811.90
166	11/26/2018	813.71	19.37	794.34
167	11/26/2018	813.26	5.95	807.31
178	11/26/2018	812.22	5.04	807.18
179	11/26/2018	818.32	31.24	787.08
181	11/26/2018	894.65	26.50	868.15
183	11/26/2018	851.83	22.25	829.58
185	11/26/2018	815.54	24.17	791.37
186	11/26/2018	820.32	33.67	786.65
194	11/26/2018	862.70	26.51	836.19
306	11/26/2018	821.04	2.74	818.30

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
308	11/26/2018	876.26	10.85	865.41
309	11/26/2018	874.69	26.76	847.93
313	11/26/2018	849.79	29.45	820.34
314	11/26/2018	813.82	13.30	800.52
316	11/26/2018	813.46	18.90	794.56
317	11/26/2018	823.00	8.31	814.69
318	11/26/2018	814.19	12.76	801.43
319	11/26/2018	806.89	5.30	801.59
321	11/26/2018	853.72	23.82	829.90
322	11/26/2018	806.20	4.88	801.32
323	11/26/2018	813.67	11.92	801.75
351	11/26/2018	805.62	5.12	800.50
352	11/26/2018	806.48	5.59	800.89
355	11/26/2018	813.42	12.01	801.41
356	11/26/2018	813.31	11.65	801.66
362	11/26/2018	832.69	11.74	820.95
363	11/26/2018	855.07	30.17	824.90
372	11/26/2018	904.96	40.53	864.43
373	11/26/2018	832.19	10.26	821.93
374	11/26/2018	821.25	3.62	817.63
375	11/26/2018	833.00	7.56	825.44
386	11/26/2018	822.26	6.87	815.39
387	11/26/2018	817.59	5.08	812.51
391	11/26/2018	833.75	8.50	825.25
540	11/26/2018	810.55	10.54	800.01
541	11/26/2018	812.11	12.42	799.69
542	11/26/2018	806.40	6.50	799.90
543	11/26/2018	823.64	22.75	800.89
614	11/26/2018	811.80	12.32	799.48
619	11/26/2018	896.45	9.94	886.51

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
620	11/26/2018	887.16	15.76	871.40
621	11/26/2018	841.97	17.52	824.45
622	11/26/2018	842.11	17.10	825.01
623	11/26/2018	852.67	38.27	814.40
624	11/26/2018	853.46	38.92	814.54
625	11/26/2018	808.77	7.16	801.61
626	11/26/2018	808.60	7.96	800.64
627	11/26/2018	812.96	10.47	802.49
628	11/26/2018	812.43	15.94	796.49
629	11/26/2018	818.39	24.12	794.27
630	11/26/2018	817.63	23.58	794.05
631	11/26/2018	829.38	4.40	824.98
632	11/26/2018	853.24	32.68	820.56
P01	11/26/2018	810.62	1.32	809.30
P02	11/26/2018	809.61	2.55	807.06
P07	11/26/2018	894.47	2.93	891.54
P08	11/26/2018	894.70	5.69	889.01
P11	11/26/2018	895.21	9.27	885.94
113	12/5/2018	914.83	6.98	907.85
114	12/5/2018	916.13	Dry	<899.5
123	12/5/2018	903.96	3.14	900.82
124	12/5/2018	911.43	4.24	907.19
125	12/5/2018	905.36	6.92	898.44
126	12/5/2018	908.95	6.81	902.14
127	12/5/2018	909.65	3.02	906.63
128	12/5/2018	914.23	17.67	896.56
140R	12/5/2018	889.17	30.79	858.38
143	12/5/2018	884.81	3.11	881.70
146	12/5/2018	868.04	4.46	863.58
154	12/5/2018	861.70	1.70	860.00

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
157	12/5/2018	854.13	6.03	848.10
324	12/5/2018	892.60	29.32	863.28
325	12/5/2018	892.08	27.58	864.50
353	12/5/2018	912.87	12.42	900.45
354	12/5/2018	912.85	10.81	902.04
357	12/5/2018	863.89	1.66	862.23
358	12/5/2018	864.08	1.84	862.24
361	12/5/2018	868.42	4.65	863.77
364	12/5/2018	897.68	33.24	864.44
365	12/5/2018	898.00	34.92	863.08
366	12/5/2018	912.48	38.42	874.06
367	12/5/2018	910.08	44.41	865.67
368	12/5/2018	910.15	42.71	867.44
378	12/5/2018	900.02	36.38	863.64
379	12/5/2018	899.66	37.12	862.54
382	12/5/2018	912.59	10.52	902.07
383	12/5/2018	867.39	3.72	863.67
392	12/5/2018	895.98	22.21	873.77
393	12/5/2018	892.55	28.71	863.84
394	12/5/2018	892.29	29.88	862.41
395	12/5/2018	890.04	25.87	864.17
397	12/5/2018	865.79	8.13	857.66
398	12/5/2018	865.37	7.02	858.35
399	12/5/2018	867.33	4.57	862.76
413	12/5/2018	889.16	41.44	847.72
415	12/5/2018	914.38	20.03	894.35
416	12/5/2018	890.58	65.88	824.70
418	12/5/2018	893.21	39.89	853.32
521	12/5/2018	863.78	1.07	862.71
522	12/5/2018	864.46	1.19	863.27

Former Owego, New York Facility
Groundwater Elevation Data

Well ID	Date of Measurement	Top of Casing Elevation (ft amsl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft amsl)
524	12/5/2018	866.28	4.27	862.01
529	12/5/2018	863.93	2.88	861.05
532	12/5/2018	866.34	4.47	861.87
534	12/5/2018	862.88	1.20	861.68
601	12/5/2018	862.08	1.98	860.10
602	12/5/2018	862.15	2.84	859.31
603	12/5/2018	864.18	6.64	857.54
604	12/5/2018	885.48	12.61	872.87
605	12/5/2018	885.23	16.13	869.10
606	12/5/2018	900.06	37.61	862.45
607	12/5/2018	900.46	37.04	863.42
608	12/5/2018	861.51	2.54	858.97
609	12/5/2018	895.16	23.37	871.79
610	12/5/2018	909.10	13.98	895.12
611	12/5/2018	909.11	11.13	897.98
612	12/5/2018	903.93	30.86	873.07
613	12/5/2018	903.94	30.97	872.97
615	12/5/2018	862.69	5.41	857.28
616	12/5/2018	888.18	5.70	882.48
617	12/5/2018	895.77	4.53	891.24
618	12/5/2018	909.29	3.87	905.42
700	12/5/2018	889.06	25.23	863.83
701	12/5/2018	888.24	23.18	865.06

2018 Well Inspection Summary with Dedicated Equipment Assignments

Well ID	2018 Depth to Bottom (ft)**	Well Tag Condition	Reference Point Visible?	Standpipe Paint Condition	Sanitary Seal Condition	Sampling Equipment Type
101	41.00	Good	Yes	Re-Paint	Good	PDB
106	13.19	Good	Yes	Good	Good	PDB
107A	64.62	Good	Yes	Good	Good	PDB
110	21.20	Good	Yes	Manhole	Good	PDB
113	12.65	Good	Yes	Good	Good	*
114	12.00	Good	Yes	Good	Good	*
120	39.22	Good	Yes	Good	Good	PDB
123	21.90	Good	Yes	Manhole	Good	*
124	25.30	Good	Yes	Good	Good	PDB
125	24.18	Good	Yes	Manhole	Good	PDB
126	23.98	Good	Yes	Manhole	Good	*
127	19.02	Good	Yes	Manhole	Good	PDB
128	24.48	Good	Yes	Good	Good	PDB
129	7.44	Good	Yes	Manhole	Good	PDB
132	21.20	Good	Yes	Good	Good	PDB
133	31.44	Good	Yes	Good	Good	PDB
134	42.85	Good	Yes	Good	Good	PDB
140R	45.03	Good	Yes	Good	Godd	PDB
143	28.91	Good	Yes	Manhole	Good	*
146	25.85	Good	Yes	Good	Good	PDB
147	27.24	Good	Yes	Good	Good	*
148	34.97	Good	Yes	Good	Good	PDB
149	33.05	Good	Yes	Good	Good	PDB
154	25.40	Good	Yes	Good	Good	
157	19.78	Good	Yes	Re-Paint	Good	PDB
158	39.46	Good	Yes	Re-Paint	Good	PDB
160	58.46	Good	Yes	Re-Paint	Good	PDB
161	22.66	Good	Yes	Re-Paint	Good	*
162	50.47	Good	Yes	Re-Paint	Good	PDB
163	25.31	Good	Yes	Re-Paint	Good	PDB
165	43.88	Good	Yes	Re-Paint	Good	PDB
166	90.52	Good	Yes	Re-Paint	Good	PDB
167	25.33	Good	Yes	Re-Paint	Good	PDB
178	36.28	Good	Yes	Re-Paint	Good	PDB
179	71.41	Good	Yes	Re-Paint	Good	PDB
181	40.62	Good	Yes	Good	Good	PDB
183	30.76	Good	Yes	Good	Good	PDB
185	94.13	Good	Yes	Re-Paint	Good	2" SP/Line
186	95.60	Good	Yes	Re-Paint	Good	2" SP/Line

2018 Well Inspection Summary with Dedicated Equipment Assignments

Well ID	2018 Depth to Bottom (ft)**	Well Tag Condition	Reference Point Visible?	Standpipe Paint Condition	Sanitary Seal Condition	Sampling Equipment Type
194	111.10	Good	Yes	Good	Good	2" SP/Line
306	62.35	Good	Yes	Good	Good	2" SP/Line
308	30.00	Good	Yes	Good	Good	PDB
309	32.17	Good	Yes	Good	Good	PDB
313	39.94	Good	Yes	Good	Good	PDB
314	100.12	Good	Yes	Re-Paint	Good	PDB
316	48.95	Good	Yes	Re-Paint	Good	PDB
317	47.01	Good	Yes	Re-Paint	Good	PDB
318	47.21	Good	Yes	Re-Paint	Good	PDB
319	44.57	Good	Yes	Re-Paint	Good	PDB
321	39.45	Good	Yes	Good	Good	PDB
322	45.06	Good	Yes	Re-Paint	Good	PDB
323	40.96	Good	Yes	Re-Paint	Good	PDB
324	53.64	Good	Yes	Good	Good	PDB
325	42.55	Good	Yes	Good	Good	PDB
351	90.15	Good	Yes	Re-Paint	Good	Ded. 2" SP
352	87.19	Good	Yes	Re-Paint	Good	Ded. 2" SP
353	28.43	Good	Yes	Manhole	Good	PDB
354	17.15	Good	Yes	Manhole	Good	Bailer-3'
355	97.95	Good	Yes	Good	Good	PDB
356	70.15	Good	Yes	Good	Good	PDB
357	34.40	Good	Yes	Re-Paint	Good	PDB
358	17.10	Good	Yes	Re-Paint	Good	PDB
361	35.25	Good	Yes	Good	Good	PDB
362	66.50	Good	Yes	Good	Good	PDB
363	45.29	Good	Yes	Good	Good	PDB
364	65.13	Good	Yes	Good	Good	PDB
365	45.68	Good	Yes	Good	Good	PDB
366	42.87	Good	Yes	Good	Good	Bailer-3'
367	72.32	Good	Yes	Good	Good	PDB
368	48.72	Good	Yes	Good	Good	Bailer-3'
372	65.43	Good	Yes	Good	Good	*
373	45.63	Good	Yes	Good	Good	PDB
374	20.87	Good	Yes	Good	Good	PDB
375	45.65	Good	Yes	Re-Paint	Good	*
378	77.17	Good	Yes	Good	Good	PDB
379	52.57	Good	Yes	Good	Good	PDB
382	22.37	Good	Yes	Good	Good	PDB
383	16.70	Good	Yes	Good	Good	PDB

2018 Well Inspection Summary with Dedicated Equipment Assignments

Well ID	2018 Depth to Bottom (ft)**	Well Tag Condition	Reference Point Visible?	Standpipe Paint Condition	Sanitary Seal Condition	Sampling Equipment Type
386	17.33	Good	Yes	Good	Good	PDB
387	15.38	Good	Yes	Re-Paint	Good	PDB
391	30.19	Good	Yes	Good	Good	*
392	46.13	Good	Yes	Good	Good	PDB
393	64.91	Good	Yes	Good	Good	Ded. 2" SP
394	47.30	Good	Yes	Good	Good	PDB
395	64.44	Good	Yes	Good	Good	PDB
397	39.84	Good	Yes	Good	Good	PDB
398	18.55	Good	Yes	Good	Good	PDB
399	16.54	Good	Yes	Good	Good	PDB
404	NM	Good	Yes	Good	NA	Tap
405	NM	Good	Yes	Good	NA	Tap
413	NM	Good	Yes	Good	NA	Tap
414	NM	Good	Yes	Good	NA	Tap
415	NM	Good	Yes	Good	NA	Tap
416	NM	Good	Yes	Good	NA	Tap
417	~71	New	Yes	New	New	Tap
418	~46	New	Yes	New	New	Tap
521	39.52	Good	Yes	Manhole	Good	PDB
522	33.95	Replace	Yes	Good	Good	PDB
524	36.11	Good	Yes	Good	Good	PDB
529	13.78	Good	Yes	Manhole	Good	PDB
532	17.16	Good	Yes	Good	Good	PDB
534	12.90	Good	Yes	Manhole	Good	PDB
540	50.85	Good	Yes	Good	None	PDB
541	54.93	Good	Yes	Good	None	PDB
542	43.90	Good	Yes	Good	None	PDB
543	54.15	Good	Yes	Re-Paint	None	PDB
601	15.40	Good	Yes	Good	Good	PDB
602	19.35	Good	Yes	Re-Paint	Good	PDB
603	17.78	Good	Yes	Good	Good	PDB
604	22.02	Good	Yes	Manhole	Good	PDB
605	46.35	Good	Yes	Manhole	Good	PDB
606	47.39	Good	Yes	Manhole	Good	PDB
607	59.68	Good	Yes	Manhole	Good	PDB
608	16.62	No	Yes	Re-Paint	Good	PDB
609	52.36	Good	Yes	Manhole	Good	PDB
610	32.05	Good	Yes	Manhole	Good	PDB
611	13.34	Good	Yes	Manhole	Good	Peristaltic

2018 Well Inspection Summary with Dedicated Equipment Assignments

Well ID	2018 Depth to Bottom (ft)**	Well Tag Condition	Reference Point Visible?	Standpipe Paint Condition	Sanitary Seal Condition	Sampling Equipment Type
612	56.92	Good	Yes	Manhole	Good	PDB
613	41.47	Good	Yes	Manhole	Good	PDB
614	104.60	Good	Yes	Re-Paint	Good	PDB
615	45.94	Good	Yes	Re-Paint	Good	PDB
616	31.41	Good	Yes	Good	Good	PDB
617	37.17	Good	Yes	Manhole	Good	PDB
618	28.71	Good	Yes	Good	Good	PDB
619	14.92	Good	Yes	Manhole	Good	PDB
620	17.42	Good	Yes	Good	Good	Peristaltic
621	37.15	Good	Yes	Good	Good	PDB
622	46.42	Good	Yes	Good	Good	PDB
623	54.45	Good	Yes	Good	Good	PDB
624	64.25	Replace	Yes	Re-Paint	Good	PDB
625	44.25	Good	Yes	Good	Good	PDB
626	92.26	Good	Yes	Good	Good	PDB
627	50.82	Good	Yes	Re-Paint	Good	PDB
628	100.58	Good	Yes	Re-Paint	Good	PDB
629	51.27	Good	Yes	Re-Paint	Good	PDB
630	93.41	Good	Yes	Re-Paint	Good	PDB
631	31.38	Good	Yes	Re-Paint	Good	PDB
632	39.18	Good	Yes	Good	Good	PDB
700	~67	New	Yes	New	New	2" SP/Bailer
701	~65	New	Yes	New	New	2" SP/Bailer
P01	11.13	Good	Yes	Re-Paint	Good	*
P02	10.34	Good	Yes	Re-Paint	Good	*
P04	20.47	Good	Yes	Good	Good	PDB
P07	5.15	Good	Yes	Manhole	Good	*
P08	8.70	Good	Yes	Manhole	Good	PDB
P11	14.52	Good	Yes	Manhole	Good	PDB

Key:

* Not sampled (water level measurement only)

** Depth to bottom from top of reference point

Ded. 2" SP = Dedicated 2-inch diameter submersible pump

Length of bailer in feet is indicated where a bailer is used

PDB = Polyethylene diffusion bag sampling device

NM = Not measured (well bottom not accessible)

APPENDIX D

2018 Sampling Plan
Groundwater Monitoring Program

Former Owego, New York Facility
2018 Groundwater Sampling Plan

Well	Site Area	Site Region	*Northern Area Focus* First Quarter*	*Southern Area Focus* Second Quarter*	*Northern Area Focus* Third Quarter	*Southern Area Focus* Fourth Quarter	Sampling Frequency	Program	Unit Monitored
101	SBA	South		X		X	S	GMP	Outwash Sand
106	TFA	North			X		A	V	Till?
107A	TFA	North	X	X	X	X	Q	GMP	Bedrock
110	TFA	North	X		X		S	GMP	Till/Bedrock
120	WMA	South		X		X	S	GMP	Till/Bedrock
124	TFA	North	X		X		S	GMP	Till/Bedrock
125	TFA	North	X		X		S	GMP	Sand & Gravel/Bedrock
127	TFA	North	X		X		S	GMP	Sand & Gravel/Bedrock
128	TFA	North			X		A	GMP	Till/Bedrock
129	TFA	North	X		X		S	GMP	Till/Bedrock
132	TFA	North			X		A	GMP	Bedrock
133	TVD/MLA	South		X		X	S	GMP	Till/Bedrock
134	TFA	North	X		X		S	GMP	Till/Bedrock
140R	NBT/P001	North			X		A	GMP	Till/Bedrock
146	NBT/P001	North	X		X		S	GMP	Till/Bedrock
148	WMA	South		X		X	S	GMP	Till/Bedrock
149	WMA	South		X		X	S	GMP	Till/Bedrock
157	NBT/P001	North	X		X		S	GMP	Till/Bedrock
158	WBA	South				X	A	GMP	Till/Bedrock
160	WBA	South		X		X	S	GMP	Basal Till
162	WBA	South		X		X	S	GMP	Till/Bedrock
163	WBA	South				X	A	GMP	Alluvial Silt and Gravel
165	WBA	South		X		X	S	GMP	Till/Bedrock
166	WBA	South		X		X	S	GMP	Till/Bedrock
167	WBA	South		X		X	S	GMP	Silt
178	WMA	South		X		X	S	GMP	Gravel/Bedrock
179	WMA	South		X		X	S	GMP	Outwash Sand
181	WMA	South				X	A	GMP	Till/Bedrock
183	WMA	South		X		X	S	GMP	Till/Bedrock
185	WBA	South		X		X	S	GMP	Sand & Gravel/Bedrock
186	SBA	South		X		X	S	GMP	Sand & Gravel/Bedrock
194	WMA	South		X		X	S	GMP	Bedrock
306	TVD/MLA	South				X	A	GMP	Sand & Gravel/Bedrock
308	TVD/MLA	South		X		X	S	GMP	Till/Bedrock
309	TVD/MLA	South		X		X	S	GMP	Till
313	TVD/MLA	South				X	A	GMP	Till/Bedrock?
314	SBA	South				X	A	GMP	Basal Till
316	WBA	South		X		X	S	GMP	Glaciolac., vf sand, silt, clay
317	WBA	South		X		X	S	GMP	Outwash Sand & Gravel
318	SBA	South	X	X	X	X	Q	GMP	Outwash Sand & Gravel
319	SBA	South	X	X	X	X	Q	GMP	Outwash Sand
321	TVD/MLA	South		X		X	S	GMP	Sand & Gravel/Till
322	SBA	South	X	X	X	X	Q	GMP	Outwash Sand & Gravel
323	SBA	South	X	X	X	X	Q	GMP	Outwash Sand
324	NBT/P001	North	X		X		S	GMP	Till/Bedrock
325	NBT/P001	North	X		X		S	GMP	Alluvial Gravel
351	SBA	South		X		X	S	GMP	Till/Bedrock
352	SBA	South				X	A	GMP	Basal Till
353	TFA	North			X		A	GMP	Bedrock
354	TFA	North			X		A	GMP	Till
355	SBA	South				X	A	GMP	Bedrock
356	SBA	South				X	A	GMP	Outwash Sand & Gravel
357	NBT/P001	North	X		X		S	GMP	Bedrock
358	NBT/P001	North			X		A	GMP	Alluvial Sand & Gravel
361	NBT/P001	North			X		A	V	Bedrock
362	TVD/MLA	South				X	A	GMP	Bedrock

Former Owego, New York Facility
2018 Groundwater Sampling Plan

			Northern Area Focus	*Southern Area Focus*	*Northern Area Focus*	*Southern Area Focus*			
Well	**Site Area**	**Site Region**	**First Quarter***	**Second Quarter***	**Third Quarter**	**Fourth Quarter**	**Sampling Frequency**	**Program**	**Unit Monitored**
363	TVD/MLA	South				X	A	GMP	Bedrock
364	NBT/P001	North			X		A	V	Till/Bedrock
365	NBT/P001	North			X		A	V	Alluvial Sand & Gravel
366	NBT/P001	North			X		A	V	Till/Bedrock
367	NBT/P001	North	X		X		S	V	Till/Bedrock
368	NBT/P001	North	X		X		S	V	Alluvial Silt, Sand, Gravel
373	TVD/MLA	South		X		X	S	GMP	Outwash Sand & Gravel
374	TVD/MLA	South		X		X	S	GMP	Sand & Gravel
378	NBT/P001	North	X	X	X	X	Q	GMP	Bedrock
379	NBT/P001	North			X		A	V	Till
382	NBT/P001	North			X		A	V	Fill
383	NBT/P001	North	X		X		S	GMP	Alluvial Silt & f. Sand
386	WMA	South				X	A	V	Alluvial Sand & Gravel
387	WBA	South				X	A	V	Alluvial Silt, Sand, Gravel
392	NBT/P001	North	X		X		S	GMP	Alluvial Silt, Sand, Gravel
393	NBT/P001	North	X	X	X	X	Q	GMP	Till/Bedrock
394	NBT/P001	North	X		X		S	GMP	Alluvial Silt, Sand, Gravel
395	NBT/P001	North			X		A	V	Till/Bedrock
397	NBT/P001	North			X		A	GMP	Till/Bedrock
398	NBT/P001	North	X		X		S	GMP	Alluvial Silt, Sand, Gravel
399	NBT/P001	North	X	X	X	X	Q	GMP	Alluvial Silt, Sand, Gravel
404	WMA	South	X	X	X	X	Q	V	Silt, Sand & Gravel
405	WMA	South	X	X	X	X	Q	V	Sand & Gravel/Till/Bedrock
413	NBT/P001	North	X	X	X	X	Q	V	Till/Bedrock
414	NBT/P001	North	X	X	X	X	Q	V	lluvial Sand & Gravel/Till/Bedroc
415	TFA	North	X	X	X	X	Q	V	Till/Bedrock
416	NBT/P001	North	X	X	X	X	Q	V	Till/Bedrock
418	NBT/P001	North	NA	NA	NA	X	Q	V	Alluvial Zone
521	MT	North	X	X	X	X	Q	GMP	Till/Bedrock
522	MT	North	X	X	X	X	Q	GMP	Till/Bedrock
524	MT	North	X	X	X	X	Q	GMP	Till/Bedrock
529	MT	North	X	X	X	X	Q	GMP	Alluvial Silt, Sand, Gravel
532	MT	North	X	X	X	X	Q	GMP	Alluvial Silt, Sand, Gravel
534	MT	North	X	X	X	X	Q	GMP	Alluvial Silt, Sand, Gravel
540	SBA	South		X		X	S	GMP	Outwash Sand & Gravel
541	SBA	South		X		X	S	GMP	Outwash Sand & Gravel
542	SBA	South		X		X	S	GMP	Outwash Sand & Gravel
543	SBA	South		X		X	S	GMP	Outwash Sand & Gravel
601	NBT/P001	North	X		X		S	V	Alluvial Silt, Sand, Gravel
602	NBT/P001	North	X		X		S	V	Alluvial Silt & Sand
603	NBT/P001	North	X		X		S	GMP	Alluvial Sand & Gravel
604	NBT/P001	North	X		X		S	GMP	Alluvial Silt & Sand
605	NBT/P001	North			X		A	GMP	Till/Bedrock
606	NBT/P001	North	X	X	X	X	Q	GMP	Alluvial Silt, Sand, Gravel
607	NBT/P001	North	X	X	X	X	Q	GMP	Till/Bedrock
608	NBT/P001	North	X		X		S	GMP	Alluvial Silt, Sand, Gravel
609	NBT/P001	North	X		X		S	GMP	Till/Bedrock
610	NBT/P001	North	X		X		S	GMP	Till/Bedrock
611	NBT/P001	North	X		X		S	GMP	Fill/Alluvial Sand & Silt
612	NBT/P001	North	X		X		S	GMP	Till/Bedrock
613	NBT/P001	North	X		X		S	GMP	Alluvial Silt, Sand, Gravel
614	WBA	South				X	A	GMP	Till/Bedrock
615	NBT/P001	North			X		A	GMP	Bedrock
616	NBT/P001	North	X		X		S	GMP	Till/Bedrock
617	NBT/P001	North	X		X		S	GMP	Till/Bedrock
618	TFA	North	X		X		S	GMP	Till/Bedrock

Former Owego, New York Facility
2018 Groundwater Sampling Plan

Well	Site Area	Site Region	*Northern Area Focus* First Quarter*	*Southern Area Focus* Second Quarter*	*Northern Area Focus* Third Quarter	*Southern Area Focus* Fourth Quarter	Sampling Frequency	Program	Unit Monitored
619	TVD/MLA	South				X	A	GMP	Till/Bedrock
620	TVD/MLA	South		X		X	S	GMP	Alluvial Sand & Gravel/Till
621	TVD/MLA	South		X		X	S	GMP	Outwash Sand & Gravel
622	TVD/MLA	South		X		X	S	GMP	Till/Bedrock
623	TVD/MLA	South				X	A	V	Fill/Alluvial Sand & Silt
624	TVD/MLA	South				X	A	V	Till/Bedrock
625	SBA	South	X	X	X	X	Q	GMP	Outwash Sand & Gravel
626	SBA	South		X		X	S	GMP	Till/Bedrock
627	SBA	South		X		X	S	GMP	Outwash Sand & Gravel
628	SBA	South				X	A	V	Till/Bedrock
629	WBA	South				X	A	V	Outwash Silt, Sand, Gravel
630	WBA	South				X	A	V	Till/Bedrock
631	WBA	South		X		X	S	GMP	Outwash Sand & Gravel
632	WMA	South		X		X	S	GMP	Till/Bedrock
700	NBT/P001	North	NA	X		X	TBA	V	Till/Bedrock
701	NBT/P001	North	NA	X		X	TBA	V	Till/Bedrock
P04	TFA	North			X		A	GMP	Till
P08	TVD/MLA	South				X	A	GMP	Till?
P11	TVD/MLA	South				X	A	GMP	Till?
	Sample Count:		**53**	**60**	**71**	**83**	**Total:**	**267**	

Key:

Northern Area wells are shaded gray.

* Designates a semiannual (partial) sampling event without the annual wells.

X = Collect sample
NA = Well not available
Q = Quarterly frequency
S = Semiannual frequency
A = Annual frequency
GMP = Groundwater Monitoring Program Well
V = Voluntary Sampling Well

MT = Moore Tire Area (off-site)
NBT/P001 = NW Bedrock Trough/P001 Area
SBA = Southern Boundary Area (some off-site)
TFA = Tank Farm Area
TVD/MLA = Tower View Drive/Mirror Lake Area
WBA = Western Boundary Area
WMA = Waste Management Area

APPENDIX E

Chains of Custody

2018

IBM Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 206911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1401457 — Sample # 9449405 -10

Instructions on reverse side correspond with circled numbers.

COC # 018959

Client Information		Matrix										Analyses Requested / Preservation Code												For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface								#												SCR#
Project Name/#: Pre PFAS Sampling	SSOW #: 9300H.30																							
IBM PM: Brandon Ashby	Project State: NY		Potable	NPDES																				
P.O.#: CAR9300H.30	Sampler: JTRonis	Soil	Water	Oil	Air	Composite	Grab	Total # of Containers	8260C Plus Freon 113/123a															

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Sample Identification	Collected Date	Collected Time
CO138180307P	2/7/18	937
CO181180307P	"	957
CO183180307P	"	1009

Turnaround Time Requested (TAT) (please circle)
Standard Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes No

Relinquished by	Date	Time	Received by	Date	Time
[signature]	2/8/18	1700			
			[signature]	2-9-18	1000

Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.9 °C

* NYSDEC B

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IBM Chain of Custody

eurofins | Lancaster Laboratories Environmental

Grp # 1401457 Acct. # 206911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1401457 — Sample # 9449377 8-90

Instructions on reverse side correspond with circled numbers.

NM 2/22/18

COC # 018972

Client Information		Matrix										Analyses Requested / Preservation Code												For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface								#												SCR#
Project Name/#: Pre PFAS Sampling	SSOW #: 9300H.30																							
IBM PM: Brandon Ashby	Project State: NY		Potable	NPDES																				
P.O.#: CAR9300H.30	Sampler: JTRonis	Soil	Water	Oil	Air	Composite	Grab	Total # of Containers	8260C Plus Freon 113/123a															

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Sample Identification	Collected Date	Collected Time
CO313180714P	2/14/18	1503
CO363180714P	"	1557
CO1628180714P	"	1623

Turnaround Time Requested (TAT) (please circle)
Standard Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: _____
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes No

Relinquished by	Date	Time	Received by	Date	Time
[signature]	2/16/18	1190			
			[signature]	2/17/18	1000

Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.0/1.5 °C

* NYSDEC B

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IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1914556 Sample # 9483431-60

Instructions on reverse side correspond with circled numbers.

COC # 018973

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: 1st Qt GW Sampling — SSOW #: 9300H.30

Sampler: Brandon Ashby — Project State: NY

P.O.#: CAR9300H.29 — Sampler: J Konis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil [ ] Composite [ ] Grab

Water: Sediment [ ] Ground [X] Potable [ ] Surface [ ] NPDES

Oil [ ] Air [ ]

Analyses Requested

Preservation Code: H

Total # of Containers: 3

8260C Plus Freon 113/123a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/123a	Remarks
OTB180336JNR	2/26/18	1600	X			GW		3	X	Trip Blank
OP318180336P		1613								
OP320180336P		1637								
OP319180336P		1644								
OP323180336P		1701								
OER180336WL1D		1718								Equip Blank
OP532180337P	2/27/18	647								
OP331180337P		703								
OP534180337P		715								
OP535180337P		725								

Turnaround Time Requested (TAT) (please circle)

Standard — Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	2/28/18	1700			
			[signature]	3/1/18	0955

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.5 °C

* X/YSDEC B

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IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1914556 Sample # 9483431-60

Instructions on reverse side correspond with circled numbers.

COC # 018961

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: 1st Qt GW Sampling — SSOW #: 9300H.30

Sampler: Brandon Ashby — Project State: NY

P.O.#: CAR9300H.29 — Sampler: J Konis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil [ ] Composite [ ] Grab

Water: Sediment [ ] Ground [X] Potable [ ] Surface [ ] NPDES

Oil [ ] Air [ ]

Analyses Requested

Preservation Code: H

Total # of Containers: 3

8260C Plus Freon 113/123a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/123a	Remarks
OP321180337P	2/27/18	741	X			GW		3	X	
OP323180337P		817								
OP326180337P		839								
OP327180337P		852								
OP328180337P		906								
OP367180337P		931								
OP368180337P		945								
OP610180337P		1000								
OP611180337P		1021								
OP612180337P		1040								

Turnaround Time Requested (TAT) (please circle)

Standard — Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	2/28/18	1700			
			[signature]	3/1/18	0955

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.5 °C

* X/YSDEC B

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IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1914556 Sample # 948331-60
Instructions on reverse side correspond with circled numbers.

COC # 018974

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 1st Qt Gw Sampling — SSOW #: 9300430
IBM PM: Brendan Ashby — Project State: NY
P.O.#: CAR 9300H.39 — Sampler: J Tronis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix

Sediment | Ground Water | Surface Water | Potable Water | NPDES | Air | Soil | Composite | Grab | Oil | Total # of Containers

Analyses Requested — Preservation Code

H — 8260C Plus Freon 113/1233c

For Lab Use Only

SCR#

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Ground Water	Surface Water	Potable Water	NPDES	Air	Oil	Total # of Containers	8260C Plus Freon 113/1233c	Remarks
OQ013 180227P	3/1/18	1054	X			GW						3	X	
OTB180227.TAR		1115												Trip Blank
OQ384 180227P		1133												
OEQ180227WLD	3/1	1149												Equip Blank
OQ134 180227P		1240												
OSQQ1 180227	3/2	1257												
OQ139 180227P		1311												
OQ107A 180227P		1328												
OQ 110 180227P		1347												
OQ 125 180227P		1410												

Turnaround Time Requested (TAT) (please circle)
Standard / Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	3/28/18	1700			
			[signature]	3/1/18	0955

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A
Type III (Reduced NJ) — MA MCP — NY ASP B
Type VI (Raw Data Only) — CT RCP
SDG Complete? Yes / (No)

Site-specific QC (MS/MSD/Dup)? Yes / (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.5 °C

* NYSDEC B

IBM Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1914495 Sample # 948578-01
Instructions on reverse side correspond with circled numbers.

COC # 018975

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 1st Qt Gw Sampling — SSOW #: 9300430
IBM PM: Brendan Ashby — Project State: NY
P.O.#: CAR 9300H.39 — Sampler: J Tronis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix

Sediment | Ground Water | Surface Water | Potable Water | NPDES | Air | Soil | Composite | Grab | Oil | Total # of Containers

Analyses Requested — Preservation Code

8260C Plus Freon 113/1233c

For Lab Use Only

SCR#

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Ground Water	Surface Water	Potable Water	NPDES	Air	Oil	Total # of Containers	8260C Plus Freon 113/1233c	Remarks
OQ383 180228P	3/1/18	930	X			GW						3	X	
OQ601 180228P		949												
OTB180228.TAR		1010												Trip Blank
OQ601 180228P		1034												
OQ608 180228P	3/1	1042												
OQ398 180228P		1055												
OQ603 180228P		1107												
OQ 157 180228P		1119												
OQ635 180228P		1229												
OQ604 180228P		1245												

Turnaround Time Requested (TAT) (please circle)
Standard / Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	3/1/18	1700			
			[signature]	3/2/18	1025

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A
Type III (Reduced NJ) — MA MCP — NY ASP B
Type VI (Raw Data Only) — CT RCP
SDG Complete? Yes / (No)

Site-specific QC (MS/MSD/Dup)? Yes / (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.5 °C

* NYSDEC B

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7052 1215

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 191495 Sample # 948587-217

Instructions on reverse side correspond with circled numbers.

COC # 018962

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: 1st Qt GW Sampling — SSOW #: 9300 4.30

RM PM: Brandon Ashby — Project State: NY

PO: CAR9300 4.29 — Sampler: J Tonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil: [ ] Sediment: [ ] Water: [X] Ground [ ] Surface [ ] Potable [ ] NPDES [ ] Oil: [ ] Air: [ ] Composite

Analyses Requested

Preservation Code: H

Total # of Containers: 3

8260C Plus Freon 113/1336

For Lab Use Only

SCR#

Preservation Codes

H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/1336	Remarks
OP124 1800 227P	2/27/18	1539	X			GW		3	X	
OP127 1800 227P		1556								
OP609 1800 227P		1618								
OP617 1800 228P	2/28	733								
OP618 1800 228P		737								
OEQ 1800 28 WL 1D		751								Equp Blank
OP534 1800 228P		826								
OP530 1800 228P		839								
OP146 1800 228P		854								
OP357 1800 228P		907								

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
	3/1/18	1700			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	3/2/18	1025

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.5 °C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 191495 Sample # 948587-217

Instructions on reverse side correspond with circled numbers.

COC # 019402

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: 1st Qt GW Sampling — SSOW #: 9300 4.30

RM PM: Brandon Ashby — Project State: NY

PO: CAR9300 4.29 — Sampler: J Tonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil: [ ] Sediment: [ ] Water: [X] Ground [ ] Surface [ ] Potable [ ] NPDES [ ] Oil: [ ] Air: [ ] Composite

Analyses Requested

Preservation Code: H

Total # of Containers: 3

8260C Plus Freon 113/1336

For Lab Use Only

SCR#

Preservation Codes

H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/1336	Remarks
OP392 1800 228P	2/28/18	1312	X			GW		3	X	
OP324 1800 228P		1340								
OP325 1800 228P		1353								
OP616 1800 228P		1409								
OP H04 1800 301	3/1/18	900								
OP H05 1800 301		911								
OEQ 1800 301 WL 1D		920								Equp Blank
OP H15 1800 301		947								
OP H13 1800 301		1003								
OP H14 1800 301		1016								

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
	3/1/18	1700			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	3/2/18	1025

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.5 °C

* NYSDEC B

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7052 0417

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 191495 7 Sample # 94485-157-217

Instructions on reverse side correspond with circled numbers.

COC # 019403

Client Information		Matrix												Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface	Soil	Potable	NPDES	Air	Oil	Water	Total # of Containers			H	SCR#
Project Name/#: 1st Qt GW Sampling	SSOW #: 93004.39		X							GW	3			8260C Plus Freon 113/123c	
Project RM: Brendan Ashby	Project State: NY														
P.O.#: CAR93004.39	Sampler: Denis														

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Sample Identification	Collected Date	Collected Time	Grab	Composite
CQ416 180301	3/1/18	1018	X	

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	3/1/18				
				3/2/18	1025

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.5 °C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 195299 7 Sample # 94485-157-219

Instructions on reverse side correspond with circled numbers.

COC # 019419

Client Information		Matrix												Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface	Soil	Potable	NPDES	Air	Oil	Water	Total # of Containers			H	SCR#
Project Name/#: 2nd Qt GW Sampling	SSOW #: 93004.39		X							GW	3			8260C + Freon 113/123c	
Project RM: Brendan Ashby	Project State: NY														
P.O.#: CAR93004.39	Sampler: Denis														

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Sample Identification	Collected Date	Collected Time	Grab	Composite
QTB180604 JW2	6/4/18	1545	X	
003741806042 P		1603		
EQB180604 W2 D		1613		
003731806042 P		1631		
006351806042 P		1648		
006961806042 P		1658		
005431806042 P		1712		
005401806042 P		1723		
005411806042 P		1737		
005421806042 P		1755		

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks: Trip Blank; Equip Blank

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	6/7/18	1745			
				6/8/18	1032

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.2 °C

* NYSDEC B

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Acct. # 6911 For Eurofins Lancaster Laboratories Environmental use only Group # 1952982 Sample # 964999 40-69
Instructions on reverse side correspond with circled numbers.

COC # 019420

Client Information

Client: IBM CEP Owego — Acct.#: 6911
Project Name/#: 2nd Gw Sampling — SSOW #: 93004.30
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR93004.19 — Sampler: J Romis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Surface [ ] Potable [ ] NPDES [ ] Air [ ] Oil [ ] Water

Analyses Requested / Preservation Code: Total # of Containers: 3 | SOC + Freon 113/133c

For Lab Use Only: SCR#

Preservation Codes: H = HCl (circled) | T = Thiosulfate | N = HNO_3 | B = NaOH | S = H_2SO_4 | O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite
005341806066P	6/6/18	1210	X	
005331806066P		1222		
003161806066P		1243		
001661806066P		1253		
001671806066P		1303		
005391806066P		1318		
005311806066P		1340		
005321806066P		1354		
003991806066P		1408		
005341806066P		1434		

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	6/7/18	1745	[signature]		
[signature]			[signature]		
[signature]			[signature]		
[signature]			[signature]	6/8/18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.2 °C

* NYSDEC B

IBM Chain of Custody

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Acct. # 6911 For Eurofins Lancaster Laboratories Environmental use only Group # 1952982 Sample # 964999 40-69
Instructions on reverse side correspond with circled numbers.

COC # 019421

Client Information

Client: IBM CEP Owego — Acct.#: 6911
Project Name/#: 2nd Gw Sampling — SSOW #: 93004.30
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR93004.19 — Sampler: J Romis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Surface [ ] Potable [ ] NPDES [ ] Air [ ] Oil [ ] Water

Analyses Requested / Preservation Code: Total # of Containers: 3 | SOC + Freon 113/133c

For Lab Use Only: SCR#

Preservation Codes: H = HCl (circled) | T = Thiosulfate | N = HNO_3 | B = NaOH | S = H_2SO_4 | O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Remarks
OEQ180606WL1D	6/6/18	1444	X		Equip Blank
003171806073P	6/7/18	0643			
001661806073P		0658			
003311806073P		0723			
001331806073P		0738			
003081806073P		0752			
003091806073P		0809			
006211806073P		0826			
006221806073P		0835			
OEQ180607WL1D		0847			Equip Blank

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	6/7/18	1745	[signature]		
[signature]			[signature]		
[signature]			[signature]		
[signature]			[signature]	6/8/18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.2 °C

* NYSDEC B

IBM Chain of Custody

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Acct. # 06911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1953268 Sample # 965249-56

Instructions on reverse side correspond with circled numbers.

COC # 019425

Client Information		Matrix												Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 06911	Soil	Sediment	Potable Water	Ground	NPDES	Surface	Air	Oil	Total # of Containers	Composite	Grab	Collected Date	Collected Time	SCR#
Project Name/#: 2nd Qt Gw Sampling	SSOW #: 93004.30				X										
IBM PM: Brendan Ashley	Project State: NY														
PO #: CAR93004.29	Sampler: JRomis														
For Compliance: X Yes ☐ No															
Check One: X Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs															
OU: _____ (Endicott Non-Routine only)															
Sample Identification															
05001 18Q60Q8					Gw					3		X	6/8/18	1045	
00415 18Q60Q8														1301	
00416 18Q60Q8														1318	
QTB 18Q60Q8 JMR														1330	Trip Blank
00413 18Q60Q8														1343	
00412 18Q60Q8														1351	
00405 18Q60Q8														1424	
00404 18Q60Q8														1416	

Analyses Requested: 8260C + Fremil 13/123a

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required):

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	6/8/18	1600			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	6-9-18	1010

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.9-1.5 °C

*NYSDEC B

IBM Chain of Custody

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Acct. # 06911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1953275 Sample # 965136-39

Instructions on reverse side correspond with circled numbers.

COC # 019422

Client Information		Matrix												Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 06911	Soil	Sediment	Potable Water	Ground	NPDES	Surface	Air	Oil	Total # of Containers	Composite	Grab	Collected Date	Collected Time	SCR#
Project Name/#: 2nd Qt Gw Sampling	SSOW #: 93004.30				X										
IBM PM: Brendan Ashley	Project State: NY														
PO #: CAR93004.29	Sampler: JRomis														
For Compliance: X Yes ☐ No															
Check One: X Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs															
OU: _____ (Endicott Non-Routine only)															
Sample Identification															
QTB 18Q60Q8 JMR					Gw					3		X	6/6/18	1500	Trip Blank
00606 18Q60Q7P													6/7/18	922	
00607 18Q60Q7P	MS/MSD													933	
00378 18Q60Q7P														907	
00627 18Q60Q7P														1000	
00318 18Q60Q7P														1000	
00320 18Q60Q7P														1034	
00319 18Q60Q7P														1049	
00101 18Q60Q7P														1103	
00323 18Q60Q7P														118	

Analyses Requested: 8260C + Fremil 13/123a

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; O = Other

Remarks

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required):

Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A

Type III (Reduced NJ) MA MCP NY ASP B

Type VI (Raw Data Only) CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	6/8/18	1600			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	6-9-18	1010

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.9-1.5 °C

*NYSDEC B

IBM Chain of Custody

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Acct. # 06911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1953275 Sample # 465310-39
Instructions on reverse side correspond with circled numbers.

COC # 019423

Client Information		Matrix												Analyses Requested / Preservation Code		For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface	Soil	Potable	NPDES	Air	Oil	Water	Total # of Containers			H		SCR#
Project Name/#: Ind GW Sampling	SSOW #: 930004,30	☐	☒	☐	☐	☐	☐	☐	☐	GW	3			SOGC + Freon 113/123a		
IBM PM: Brandon Ashby	Project State: NY															Preservation Codes: H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other
P.O.#: CAR93004,39	Sampler: J Ronis															Remarks

For Compliance: ☒ Yes ☐ No

Check One: ☒ Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Sample Identification	Collected Date	Collected Time	Grab	Composite														
OP179 18 06 07P	6/7/18	1134	X							GW		3	X					
OP178 18 06 07P		1150																
OTB 18 06 07 JMS		1300														Trip Blank		
OP165 18 06 07P		1247																
OP162 18 06 07P		1300																
OP631 18 06 07P		1316																
OP639 18 06 07P		1335																
OP148 18 06 07P		1356																
OP183 18 06 07P		1413																
OP120 18 06 07P		1428																

Turnaround Time Requested (TAT) (please circle)	Relinquished by	Date	Time	Received by	Date	Time
Standard Rush		6/8/18	1600			
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)	Relinquished by	Date	Time	Received by	Date	Time
Date results are needed: 10 Days	Relinquished by	Date	Time	Received by	Date	Time
E-mail:	Relinquished by	Date	Time	Received by	Date	Time
					6-9-18	1010

Data Package Options (please circle if required)

Type I (Validation/NJ Reg)	TX TRRP-13	NY ASP A
Type III (Reduced NJ)	MA MCP	NY ASP B
Type VI (Raw Data Only)	CT RCP	

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.9-1.5 °C

* NYSDEC B

IBM Chain of Custody

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Acct. # 06911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1953275 Sample # 465310-34
Instructions on reverse side correspond with circled numbers.

COC # 019424

Client Information		Matrix												Analyses Requested / Preservation Code		For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Sediment	Ground	Surface	Soil	Potable	NPDES	Air	Oil	Water	Total # of Containers			H		SCR#
Project Name/#: Ind GW Sampling	SSOW #: 930004,30	☐	☒	☐	☐	☐	☐	☐	☐	GW	3			SOGC + Freon 113/123a		
IBM PM: Brandon Ashby	Project State: NY															Preservation Codes: H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other
P.O.#: CAR93004,39	Sampler: J Ronis															Remarks

For Compliance: ☒ Yes ☐ No

Check One: ☒ Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Sample Identification	Collected Date	Collected Time	Grab	Composite														
OP149 18 06 07P	6/7/18	1440	X							GW		3	X					
OP107A 18 06 07P	6/7	1520																
OTB 18 06 08 SWL ID	6/8/18	745														Equip Blank		
OP701 18 06 08		752																
OP704 18 06 08		819																
OP1941 18 06 08		1040																
OP185 18 06 08		1034																
OP186 18 06 08		1128																
OP343 18 06 08		832																
OP357 18 06 08		1228																

Turnaround Time Requested (TAT) (please circle)	Relinquished by	Date	Time	Received by	Date	Time
Standard Rush		6/8/18	1600			
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)	Relinquished by	Date	Time	Received by	Date	Time
Date results are needed: 10 Days	Relinquished by	Date	Time	Received by	Date	Time
E-mail:	Relinquished by	Date	Time	Received by	Date	Time
					6-9-18	1010

Data Package Options (please circle if required)

Type I (Validation/NJ Reg)	TX TRRP-13	NY ASP A
Type III (Reduced NJ)	MA MCP	NY ASP B
Type VI (Raw Data Only)	CT RCP	

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.9-1.5 °C

* NYSDEC B

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7052 0417

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1968162 Sample # 9714834-53
Instructions on reverse side correspond with circled numbers.

COC # 019606

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qtr GW Sampling — SSOW #: 93004.30
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR9300M.39 — Sampler: J Konis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Water [X] Ground [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air [ ] Composite [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes
H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	8260C Plus Freon 113/132c	Remarks
OTB1S07 18.24R	7/18/18	830	X		3	X	Trip Blank
OP6615 18071SP		1137					
OP6615 18071SP		1141					
OTB1807 19.24R	7/19	700					Trip Blank
OP6611 18071 9P		733					
OP352 18071 9P		745					
OP355 18071 9P		755					
OP594 18071 9P		814					
OP539 18071 9P		829					
OP 1146 18071 9P		902					

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	7/20/18	1000			
			L Semenova	7/20/18	1000

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

* NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1968167 Sample # 9714834-53
Instructions on reverse side correspond with circled numbers.

COC # 019608

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qtr GW Sampling — SSOW #: 93004.30
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR9300M.39 — Sampler: J Konis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Water [X] Ground [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air [ ] Composite [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes
H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	8260C Plus Freon 113/132c	Remarks
OP383 18071 9P	7/19/18	916	X		3	X	
OEQ18071 9W2 1D		935					Equipment Blank
OP361 18071 9P		954					
OP415 18071 9		1017					
OP001 18071 9		1038					
OP413 18071 9		1101					
OP414 18071 9		1116					
OP 416 18071 9		1125					
OP MOH 18071 9		1138					
OP405 18071 9		1241					

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	7/20/18	1000			
			L Semenova	7/20/18	1000

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1968259 Sample # 9715253-82

Instructions on reverse side correspond with circled numbers.

COC # 019426

Client Information	
Client: IBM CEP Owego	Acct #: 6911
Project Name/#: 3rdQtrGW Sampling	SSOW #: 93004.30
IBM PM: Brendan Ashby	Project State: NY
P.O.#: CAR93004.29	Sampler: J Ronis

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: ______ (Endicott Non-Routine only)

Matrix: Sediment [ ] Ground [X] Surface [ ] / Soil [ ] Potable [ ] NPDES [ ] Air [ ] / Water / Oil

Analyses Requested — Preservation Code: H — 8260C Plus Freon 113/123a

For Lab Use Only — SCR#:

Preservation Codes: (H = HCl) T = Thiosulfate; N = HNO_3 B = NaOH; S = H_2SO_4 O = Other

Sample Identification	Date	Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/123a	Remarks
OTB180716TRR	7/16/18	1530	X			GW		3	X	Trip Blank
00134180716P	↓	1550	↓			↓		↓	↓	
00132180716P	↓	1604	↓			↓		↓	↓	
000PH180716P	↓	1618	↓			↓		↓	↓	
00189180716P	↓	1634	↓			↓		↓	↓	
OEB180716WLID	↓	1643	↓			↓		↓	↓	Equipment Blank
00106180716P	↓	1709	↓			↓		↓	↓	
00107A180716P	↓	1722	↓			↓		↓	↓	
00110180717P	7/17	644	↓			↓		↓	↓	
00134180717P	7/17	700	↓			↓		↓	↓	

7/23/22

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail:

Relinquished by	Date	Time	Received by	Date	Time
[signature]	7/18/18	1730			
			L Semenova	7/20/18	1000

Data Package Options (please circle if required): Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A; Type III (Reduced NJ) MA MCP NY ASP B; Type VI (Raw Data Only) CT RCP; SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No) (If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

*NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1968259 Sample # 9715253-92

Instructions on reverse side correspond with circled numbers.

COC # 019602

Client Information	
Client: IBM CEP Owego	Acct #: 6911
Project Name/#: 3rdQtrGW Sampling	SSOW #: 93004.30
IBM PM: Brendan Ashby	Project State: NY
P.O.#: CAR93004.29	Sampler: J Ronis

For Compliance: [X] Yes [ ] No

Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: ______ (Endicott Non-Routine only)

Matrix: Sediment [ ] Ground [X] Surface [ ] / Soil [ ] Potable [ ] NPDES [ ] Air [ ] / Water / Oil

Analyses Requested — Preservation Code: H — 8260C Plus Freon 113/123a

For Lab Use Only — SCR#:

Preservation Codes: (H = HCl) T = Thiosulfate; N = HNO_3 B = NaOH; S = H_2SO_4 O = Other

Sample Identification	Date	Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/123a	Remarks
00127180717P	7/17/18	716	X			GW		3	X	
00125180717P	↓	728	↓			↓		↓	↓	
00610180717P	↓	746	↓			↓		↓	↓	
00611180717	↓	804	↓			↓		↓	↓	
00612180717P	↓	839	↓			↓		↓	↓	
00613180717P	↓	851	↓			↓		↓	↓	
00353180717P	↓	913	↓			↓		↓	↓	
00354180717	↓	930	↓			↓		↓	↓	
00128180717P	↓	948	↓			↓		↓	↓	
00609180717P	↓	1004	↓			↓		↓	↓	

7/23/22

Turnaround Time Requested (TAT) (please circle): (Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail:

Relinquished by	Date	Time	Received by	Date	Time
[signature]	7/18/18	1730			
			L Semenova	7/20/18	1000

Data Package Options (please circle if required): Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A; Type III (Reduced NJ) MA MCP NY ASP B; Type VI (Raw Data Only) CT RCP; SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No) (If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

*NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 196825 Sample # 971253-32 — Instructions on reverse side correspond with circled numbers.

COC # 019603

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qt GW Sampling — SSOW #: 93004, 39
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR93004.39 — Sampler: JTRonis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Surface [ ] Potable [ ] NPDES [ ] Air [ ] Oil [ ] Water

Analyses Requested — Preservation Code: H

For Lab Use Only: SCR#

Preservation Codes: H = HCl, N = HNO_3, S = H_2SO_4, T = Thiosulfate, B = NaOH, O = Other

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/1634	Remarks
OP0617180717TP	7/17/18	1020	X			GW		3	X	
OP0618180717TP		1053								
OPEQ180717WATD		1105								Equipment Blk
OP0534180717TP		1133								
OP0533180717		1159								
OP0539180717TP		1250								
OP0538180717TP		1306								
OP0591180717TP		1316								
OP0535180717TP		1331								
OP0364180717TP		1440								

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	7/18/18	1730			
			[signature]	7/20/18	1000

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

*NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 196828 Sample # 971241-320 — Instructions on reverse side correspond with circled numbers.

COC # 019604

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qt GW Sampling — SSOW #: 93004, 30
IBM PM: Brandon Ashby — Project State: NY
P.O. #: CAR93004.29 — Sampler: JTRonis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Surface [ ] Potable [ ] NPDES [ ] Air [ ] Oil [ ] Water

Analyses Requested — Preservation Code: H

For Lab Use Only: SCR#

Preservation Codes: H = HCl, N = HNO_3, S = H_2SO_4, T = Thiosulfate, B = NaOH, O = Other

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/1634	Remarks
OTB180717JTR	7/17/18	1035	X			GW		3	X	Trip Blank
OP0365180717TP		1451								
OP0378180717TP		1508								
OP0379180717TP		1520								
OP0606180717TP		1535								
OP0607180717TP		1557								
OP0367180717TP		1614								
OP0368180717		1636								
OP0366180718	7/18	724								
OP0369180718TP	7/18	738								

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	7/19/18	1600			
			[signature]	7/20/18	1000

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

*NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1963258 Sample # 9715291-320
Instructions on reverse side correspond with circled numbers.

COC # 019605

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qtr Gw Sampling — SSOW #: 93 0004.30
IBM PM: Brendan Ashley — Project State: NY
P.O.#: CNR93004.39 — Sampler: J Ronis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Water [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes: H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	8260C Plus Freon 113/1634
CEQ1807181WLID	9/18/18	951	X		3	X
CQ6041807181P		812				
CQ6051807181P		846				
CQ3941807181P		857				
CQ2921807181P		918				
CQ3041807181P		952				
CQ3051807181P		1001				
CQ3951807181P		1029				
CQ1401R1807181P		1034				
CQ6161807181P		1049				

Equipment Blank

Relinquished by: [signature] Date: 9/19/18 Time: 1600 — Received by:

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
			[signature]	9/20/18	1000

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

X NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 1963258 Sample # 9715291-320
Instructions on reverse side correspond with circled numbers.

COC # 019607

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: 3rd Qtr Gw Sampling — SSOW #: 93 0004.30
IBM PM: Brendan Ashley — Project State: NY
P.O.#: CNR93004.39 — Sampler: J Ronis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Soil [ ] Sediment [ ] Ground [X] Water [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes: H = HCl; N = HNO_3; S = H_2SO_4; T = Thiosulfate; B = NaOH; O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	8260C Plus Freon 113/1634
CQ3181807181P	9/18/18	1117	X		3	X
CQ3291807181P		1139				
CQ3191807181P		1146				
CQ3931807181P		1209				
CQ6251807181P		1300				
CQ1591807181P		1307				
CQ6031807181P		1341				
CQ3971807181P		1354				
CQ3981807181P		1406				
CQ6201807181P		1418				

Relinquished by: [signature] Date: 9/19 Time: 1600 — Received by:

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
			[signature]	9/20/18	1000

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.7-1.5 °C

X NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 2013492 Sample # 9917433-02

Instructions on reverse side correspond with circled numbers.

COC # 020222

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: HHQT GW Sampling — SSOW #: 93004.30

IBM PM: Brenden Ashby — Project State: NY

P.O. #: CAR 93004.29 — Sampler: J Ronis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil [ ] Sediment [ ] Water [X] Ground [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air

Analyses Requested — Preservation Code

H

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Analyses (Preservation Code)	Remarks
OTB1811d7JMS	11/07/18	0630	X		3	X	Trip Blank
OP0637 1811d7P		703					
OP0638 1811d7P		717					
OP0318 1811d7P		734					
OP0329 1811d7P		751					
OP0393 1811d7P		904					
OP0319 1811d7P		933					
OP0401 1811d7P		945					
OP0314 1811d7P		953					
OP0179 1811d7P		1005					

SVOCC Plus Freon 113/123a

Turnaround Time Requested (TAT) (please circle)

Standard — Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
	11/08/18	1500			
				11-29-18	1030

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.7 °C

* NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 2013492 Sample # 9917433-02

Instructions on reverse side correspond with circled numbers.

COC # 020223

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: HHQT GW Sampling — SSOW #: 93004.30

IBM PM: Brenden Ashby — Project State: NY

P.O. #: CAR 93004.29 — Sampler: J Ronis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil [ ] Sediment [ ] Water [X] Ground [ ] Potable [ ] Surface [ ] NPDES [ ] Oil [ ] Air

Analyses Requested — Preservation Code

H

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Analyses (Preservation Code)	Remarks
OP0178 1811d7P	11/07/18	1019	X		3	X	
OP0326 1811d7P		1038					
OP0389 1811d7P		1056					
OP0165 1811d7P		1109					
OP0163 1811d7P		1138					
OP0163 1811d7P		1141					
OP0131 1811d7P		1155					
OP0158 1811d7P		1316					
OP0183 1811d7P		1303					
OP0339 1811d7P		1319					

SVOCC Plus Freon 113/123a

Turnaround Time Requested (TAT) (please circle)

Standard — Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
	11/08/18	1500			
				11-29-18	1030

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.7 °C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 2013492 Sample # 9917433-02 — Instructions on reverse side correspond with circled numbers.

COC # 020224

Client Information		Matrix											Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Soil	Sediment	Potable Water	Ground Water	NPDES	Surface	Oil	Air	Total # of Containers				SCR#
Project Name/#: HK Qt Gw Sampling	SSOW #: 93004.30				X					3				
IBM PM: Brenden Ashby	Project State: NY													Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other
P.O.#: CAR93004.39	Sampler: TRonis													Remarks
For Compliance: X Yes ☐ No														
Check One: X Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs														
OU: _____ (Endicott Non-Routine only)														

Sample Identification	Collected Date	Collected Time	Grab	Composite
OQ1811J27P	11/27/18	1338	X	
OEQ1811J27WL1D		1407		
OQ5341811J27P		1439		
OQ3991811J27P		1443		
OQ5291811J27P		1501		
OQ5311811J27P		1514		
OQ5331811J27P		1530		
OEQ1811J28WL1D	11/28	645		
OQ3171811J28P		717		
OQ1661811J28P		735		

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail:

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	11/28/18	1500			
				11-29-18	1020

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.7 °C

NYSDEC B

IBM Chain of Custody

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Acct. # 10911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 2013502 Sample # 9917502-17 — Instructions on reverse side correspond with circled numbers.

COC # 020225

Client Information		Matrix											Analyses Requested / Preservation Code	For Lab Use Only
Client: IBM CEP Owego	Acct #: 6911	Soil	Sediment	Potable Water	Ground Water	NPDES	Surface	Oil	Air	Total # of Containers				SCR#
Project Name/#: HK Qt Gw Sampling	SSOW #: 93004.30				X					3				
IBM PM: Brenden Ashby	Project State: NY													Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other
P.O.#: CAR93004.39	Sampler: TRonis													Remarks
For Compliance: X Yes ☐ No														
Check One: X Routine Lab GW ☐ Routine GTF O&M ☐ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs														
OU: _____ (Endicott Non-Routine only)														

Sample Identification	Collected Date	Collected Time	Grab	Composite
OTB1811J27MP	11/27/18	1400	X	
OQ1661811J28P	11/28	517		
OQ6071811J28P		839		
OQ3781811J28P		859		
OQ1671811J28P		943		
OQ6031811J28P		1007		
OQ6241811J28P		1022		
OQ1481811J28P		1038		
OQ1501811J28P		1047		
OQ1491811J28P		1103		

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail:

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
	11/28/18	1500			
				11-29-18	1020

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.7 °C

NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 20135202 — Sample # 9917806-17

Instructions on reverse side correspond with circled numbers.

COC # 019377

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: HRGH GW Sampling — SSOW #: 93004.30

Project Manager: Brandon Ashby — Project State: NY

P.O. #: CAR93004.39 — Sampler: JRonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Sediment | Ground | Surface | Soil | Potable | NPDES | Air | Water | Oil

Analyses Requested — Preservation Code

Total # of Containers | 8260C Plus Freon 113/133a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Matrix	Total # of Containers	8260C Plus Freon 113/133a	Remarks
OOP40418 1128	11/28	1127	X		GW	3	X	
OOP40518 1128	11/28	1138	X		GW	3	X	

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	11/28/18	1500	[signature]		
			[signature]	11-29-18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 1.7 °C

NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 20160916 — Sample # 9928606-24

Instructions on reverse side correspond with circled numbers.

COC # 019381

Client Information

Client: IBM CEP Owego — Acct #: 6911

Project Name/#: HRGH GW Sampling — SSOW #: 93004.30

Project Manager: Brandon Ashby — Project State: NY

P.O. #: CAR93004.39 — Sampler: JRonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Sediment | Ground | Surface | Soil | Potable | NPDES | Air | Water | Oil

Analyses Requested — Preservation Code

Total # of Containers | 8260C Plus Freon 113/133a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Matrix	Total # of Containers	8260C Plus Freon 113/133a	Remarks
OTB 1812 04 JR	12/4/18	900	X		GW	3	X	Trip Blank
OOP63018 12 04P		1123						
OOP 16618 12 04P		1138						
OOP316 1812 04P		1155						
OOP167 1812 04P		1202						
OOP624 1812 04P		1347						
OOP357 1812 04		1314						
OOP35 1812 04		1344						
OOP186 1812 04		1423						
OOP185 1812 04		1523						

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/5/18	1730			
			[signature]	12/6/18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.3-0.5c

NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 2016096 Sample # 997-8606-24 — Instructions on reverse side correspond with circled numbers.

COC # 019382

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: HHRA Gw Sampling — SSOW #: 93004.39
IBM PM: Brendan Ashby — Project State: NY
P.O.#: CAR93004.39 — Sampler: JRonis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Sediment [ ] Ground [X] Surface [ ] Soil [ ] Potable [ ] NPDES [ ] Air [ ] Water [ ] Oil [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes
H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus Freon 113/134a	Remarks
OP194181205	12/5/18	1202	X			GW		3	X	
OP393181205		1147								
OEQ181205WL1D		1207								Equip Blank.
OTB181205TNR		1230								Trip Blank
OP418181205		1238								
OP416S1205		1233								
OP413S181205		1239								
OP415S181205		1245								
OSW01181205		1254								

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/5/18	1730			
			[signature]	12/6/18	1030

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 03.0°C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only — Group # 2016120 Sample # 997-8697-706 — Instructions on reverse side correspond with circled numbers.

COC # 019378

Client Information

Client: IBM CEP Owego — Acct #: 6911
Project Name/#: HHRA GwSampling — SSOW #: 93004.39
IBM PM: Brendan Ashby — Project State: NY
P.O.#: CAR93004.39 — Sampler: JRonis
For Compliance: [X] Yes [ ] No
Check One: [X] Routine Lab GW [ ] Routine GTF O&M [ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs
OU: _____ (Endicott Non-Routine only)

Matrix: Sediment [ ] Ground [X] Surface [ ] Soil [ ] Potable [ ] NPDES [ ] Air [ ] Water [ ] Oil [ ]

Analyses Requested — Preservation Code: H

For Lab Use Only
SCR#

Preservation Codes
H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Oil	Total # of Containers	8260C Plus 1,1,2-TCA 113/134a	Remarks
OTB181203TNR	12/3/18	1300	X			GW		3	X	Trip Blank.
OP374181203P		1259								
OP396181203		1307								
OP360181203P		1317								
OP373181203P		1329								
OP363181203P		1347								
OP425181203P		1403								
OP436181203P		1411								
OP355181203P		1436								
OP356181203P		1425								

Turnaround Time Requested (TAT) (please circle): (Standard) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/5/18	1730			
			[signature]	12/6/18	1030

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) TX TRRP-13 NY ASP A
Type III (Reduced NJ) MA MCP NY ASP B
Type VI (Raw Data Only) CT RCP
SDG Complete? Yes (No)

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 03.0°C

* NYSDEC B

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 201820 Sample # 9988677-706

Instructions on reverse side correspond with circled numbers.

COC # 019379

Client Information

Client: IBM CEP Owego — Acct.# 6911

Project Name/#: HKGH Gw Sampling — SSOW #: 93004.30

ISM PM: Brendan Ashby — Project State: NY

P.O.#: CAR93004.39 — Sampler: JRonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil: [ ] Sediment: [ ] Water: [X] Ground: [ ] Potable: [ ] Surface: [ ] NPDES: [ ] Air: [ ] Oil: [ ]

Grab / Composite

Analyses Requested

Preservation Code: H

Total # of Containers: 3

Exact Plus Freon 113/123a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Remarks
GW543181203P	12/3/18	1454	X		
OEQ181203WL1D		1500			Equip. Blank
GW540181203P		1530			
GW541181203P		1538			
GW542181203P		1557			
OEQ181204WL1D	12/4	705			Equip. Blank
GW301181204P		737			
GW611181204P		800			
GW620181204P		811			
GW313181204P		830			

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/5/18	1730			
			[signature]	12/6/18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 03-05c

* NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 201820 Sample # 9988677-706

Instructions on reverse side correspond with circled numbers.

COC # 019380

Client Information

Client: IBM CEP Owego — Acct.# 6911

Project Name/#: HKGH Gw Sampling — SSOW #: 93004.30

ISM PM: Brendan Ashby — Project State: NY

P.O.#: CAR93004.39 — Sampler: JRonis

For Compliance: [X] Yes [ ] No

Check One:

[X] Routine Lab GW [ ] Routine GTF O&M

[ ] Non-Routine Investigation [ ] Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix

Soil: [ ] Sediment: [ ] Water: [X] Ground: [ ] Potable: [ ] Surface: [ ] NPDES: [ ] Air: [ ] Oil: [ ]

Grab / Composite

Analyses Requested

Preservation Code: H

Total # of Containers: 3

Exact Plus Freon 113/123a

For Lab Use Only

SCR#

Preservation Codes

H = HCl — T = Thiosulfate

N = HNO_3 — B = NaOH

S = H_2SO_4 — O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Remarks
GW309181204P	12/4/18	849	X		
GW133181204P		908			
GW630181204		923			
GW308181204P		934			
GWP11181204P		950			
GW619181204P		1000			
GWP08181204P		1003			
GW524181204P		1047			
GW532181204P		1059			
GW629181204P		1113			

Turnaround Time Requested (TAT) (please circle)

(Standard) Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 10 Days

E-mail: _____

Data Package Options (please circle if required)

Type I (Validation/NJ Reg) — TX TRRP-13 — NY ASP A

Type III (Reduced NJ) — MA MCP — NY ASP B

Type VI (Raw Data Only) — CT RCP

SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/5/18	1730			
			[signature]	12/6/18	1030

Site-specific QC (MS/MSD/Dup)? Yes (No)

(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 03-05

* NYSDEC B

IBM Chain of Custody

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Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 201613 Sample # 993017-28

Instructions on reverse side correspond with circled numbers.

COC # 019383

Client Information

Client: IBM CEP Owego — Acct.#: 6911

Project Name/#: P001 Study — SSOW #: 93004.30

IBM PM: Brandon Ashby — Project State: NY

P.O.#: CAR93004.29 — Sampler: JRonis

For Compliance: ☐ Yes ☒ No

Check One:
☐ Routine Lab GW ☐ Routine GTF O&M
☒ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix: Soil ☐ | Sediment ☐ | Ground Water ☒ | Potable Water ☐ | Surface ☐ | NPDES ☐ | Oil ☐ | Air ☐ | Composite ☐

Analyses Requested — Preservation Code: H

For Lab Use Only

SCR#

Preservation Codes
H = HCl | T = Thiosulfate
N = HNO_3 | B = NaOH
S = H_2SO_4 | O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Analyses (SVOC Plus Freon 113)	Remarks
OTB1812Q5DUP	12/5/18	1315	X		3	X	Trip Blank
007011812Q5		1348					
007001812Q5		1436					
003971812Q6P	12/6	731					
003981812Q6P		738					
006081812Q6P		744					
003791812Q6P		757					
003941812Q6P		809					
003951812Q6P		821					
006091812Q6P		847					

Turnaround Time Requested (TAT) (please circle)
Standard Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) | TX TRRP-13 | NY ASP A
Type III (Reduced NJ) | MA MCP | NY ASP B
Type VI (Raw Data Only) | CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/6/18	1100	[signature]		
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	12-7-18	1020

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.5 °C (3) 0.7

* NYSDEC B

IBM Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 6911 — For Eurofins Lancaster Laboratories Environmental use only: Group # 201613 Sample # 993017-28

Instructions on reverse side correspond with circled numbers.

COC # 019384

Client Information

Client: IBM CEP Owego — Acct.#: 6911

Project Name/#: P001 Study — SSOW #: 93004.30

IBM PM: Brandon Ashby — Project State: NY

P.O.#: CAR93004.29 — Sampler: JRonis

For Compliance: ☐ Yes ☒ No

Check One:
☐ Routine Lab GW ☐ Routine GTF O&M
☒ Non-Routine Investigation ☐ Non-Routine Upgrades/Installs

OU: _____ (Endicott Non-Routine only)

Matrix: Soil ☐ | Sediment ☐ | Ground Water ☒ | Potable Water ☐ | Surface ☐ | NPDES ☐ | Oil ☐ | Air ☐ | Composite ☐

Analyses Requested — Preservation Code: H

For Lab Use Only

SCR#

Preservation Codes
H = HCl | T = Thiosulfate
N = HNO_3 | B = NaOH
S = H_2SO_4 | O = Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Analyses (SVOC Plus Freon 113)	Remarks
OQ612 1812Q6P	12/6/18	854	X		3	X	
006013 1812Q6P		903					
006101812Q6P		909					
006111812Q6		938					

Turnaround Time Requested (TAT) (please circle)
Standard Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharges.)
Date results are needed: 10 Days
E-mail: _____

Data Package Options (please circle if required)
Type I (Validation/NJ Reg) | TX TRRP-13 | NY ASP A
Type III (Reduced NJ) | MA MCP | NY ASP B
Type VI (Raw Data Only) | CT RCP
SDG Complete? Yes (No)

Relinquished by	Date	Time	Received by	Date	Time
[signature]	12/6/18	1100	[signature]		
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	12-7-18	1020

Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)

Temperature upon receipt 0.5 °C (3) 0.7

* NYSDEC B

APPENDIX F

Groundwater Analytical Chemistry Data for Extraction and Monitoring Wells

January 1, 2018 – December 31, 2018

Groundwater Analytical Chemistry Data
Owego, New York
January 1, 2018 - December 31, 2018

Sample Location		101	101	106	107A	107A	107A
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/07/2018	11/27/2018	07/16/2018	02/27/2018	06/07/2018	07/16/2018
Laboratory Sample I.D.		9651318	9917440	9715259	9483458	9651331	9715260
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.59	8.17	7.37	6.82	8.42	7.87
SPECIFIC CONDUCTANCE	umhos/cm	355	319	640	331	316	299
TEMPERATURE	C	9.8	9.3	19.8	11.1	11.6	13.1
TURBIDITY	NTU	0.38	0.89	0.26	0.39	0.88	0.25
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	0.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	0.3 J	0.8	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	0.3 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		107A	110	110	120	120	124
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/28/2018	02/27/2018	07/17/2018	06/07/2018	11/28/2018	02/27/2018
Laboratory Sample I.D.		9917510	9483459	9715261	9651329	9917514	9485197
Sample Comment Codes			P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.56	7.41	6.98	7.12	6.73	7.73
SPECIFIC CONDUCTANCE	umhos/cm	360	11240	4934	1165	1457	1380
TEMPERATURE	C	10.4	10.2	17.2	13.1	10	7.2
TURBIDITY	NTU	0.64	0.63	0.52	0.17	0.65	1.07
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	2	9.6	0.1 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	1.7	2.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.8	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.05 J	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	0.08 J	ND@0.5	ND@0.5	0.5	1	0.8
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		124	125	125	127	127	128
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	02/27/2018	07/17/2018	02/27/2018	07/17/2018	02/07/2018
Laboratory Sample I.D.		9715262	9483460	9715264	9485198	9715263	9449908
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.83	8.04	7.9	6.93	7.35	6.63
SPECIFIC CONDUCTANCE	umhos/cm	1221	7630	128	4110	4633	5382
TEMPERATURE	C	21.1	10.3	19.1	6.6	19.2	13
TURBIDITY	NTU	0.36	0.62	1	0.49	0.61	1.04
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.3 J	1	0.7	46	41	3000
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	280
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	8.7 J
1,1-DICHLOROETHANE	ug/L	ND@0.5	14	3.5	2.5	2.7	420
1,1-DICHLOROETHENE	ug/L	ND@0.5	0.2 J	0.2 J	3	4	1000
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	0.3 J	ND@0.5	ND@0.5	ND@0.5	ND@10
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	3.3 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@10
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@10
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	0.9	0.3 J	0.7	1.2	750
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@10
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@10
TETRACHLOROETHENE	ug/L	ND@0.5	0.2 J	0.1 J	0.3 J	0.3 J	8.5 J
TRICHLOROETHENE	ug/L	0.4 J	3.7	4.1	59	76	620
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@10
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	9.3 J

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Sample Location		128	129	129	132	133	133
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	02/27/2018	07/16/2018	07/16/2018	06/07/2018	12/04/2018
Laboratory Sample I.D.		9715271	9483457	9715257	9715255	9649964	9928698
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.15	8.14	7.73	7.57	6.83	6.45
SPECIFIC CONDUCTANCE	umhos/cm	2441	30150	748	339	6527	3999
TEMPERATURE	C	18	5.7	25.8	17.7	13.4	13.2
TURBIDITY	NTU	0.94	17.9	0.83	0.55	0.12	2.99
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	250	0.5 J	0.2 J	ND@0.5	79	74
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	24	ND@0.5	ND@0.5	ND@0.5	2	1.5
1,1,2-TRICHLOROETHANE	ug/L	1.6 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	45	ND@0.5	ND@0.5	ND@0.5	100	99
1,1-DICHLOROETHENE	ug/L	74	ND@0.5	ND@0.5	ND@0.5	17	15
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	1.7	1.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	0.3 J	0.4 J
CHLOROETHANE	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.2 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	0.1 J	0.1 J
CIS-1,2-DICHLOROETHENE	ug/L	88	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.1 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	5.3	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	110	ND@0.5	ND@0.5	ND@0.5	3	2.8
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@5	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.2 J

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Sample Location		134	134	140R	146	146	148
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/27/2018	07/16/2018	07/18/2018	02/28/2018	07/19/2018	06/07/2018
Laboratory Sample I.D.		9483455	9715254	9715309	9485205	9714843	9651327
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	8.08	7.95	6.55	7.93	7.06	6.68
SPECIFIC CONDUCTANCE	umhos/cm	452	393	1514	2990	2522	780
TEMPERATURE	C	17.1	20.7	14.1	7.7	16.7	13.8
TURBIDITY	NTU	0.78	0.67	4.44	0.87	0.97	0.34
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	64	0.2 J	0.3 J	110
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	15	ND@0.5	ND@0.5	1 J
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.8 J
1,1-DICHLOROETHANE	ug/L	0.1 J	0.1 J	120	0.4 J	1.1	1.4 J
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	14	ND@0.5	ND@0.5	8.7
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	3	ND@0.5	ND@0.5	ND@2.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@2.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	6.6	ND@0.5	ND@0.5	0.5 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
TRICHLOROETHENE	ug/L	0.2 J	0.1 J	9.7	ND@0.5	ND@0.5	2.1 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5

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Sample Location		148	149	149	157	157	158
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/28/2018	06/07/2018	11/28/2018	02/28/2018	07/18/2018	11/27/2018
Laboratory Sample I.D.		9917513	9651330	9917515	9485194	9715316	9917450
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.42	7.14	6.82	6.84	7.25	6.19
SPECIFIC CONDUCTANCE	umhos/cm	889	1035	1323	134	505	143
TEMPERATURE	C	11.6	12.2	11.1	6.4	12.2	10.7
TURBIDITY	NTU	0.82	0.44	0.5	0.7	0.94	0.9
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	190	2.2	5	0.2 J	0.5 J	0.09 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	2.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	1.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	2 J	12	23	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	13	3	7.1	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	0.3 J	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	0.8 J	12	24	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	3	15	25	ND@0.5	0.4 J	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@2.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@2.5	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@0.5

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Sample Location		160	160	162	162	163	165
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/07/2018	11/28/2018	06/07/2018	11/27/2018	11/27/2018	06/07/2018
Laboratory Sample I.D.		9649962	9917462	9651324	9917447	9917448	9651323
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.88	7.52	7.38	7.54	7	7.62
SPECIFIC CONDUCTANCE	umhos/cm	557	657	440	548	356	259
TEMPERATURE	C	13.4	5.4	14.7	8.6	10.9	15.7
TURBIDITY	NTU	0.29	0.75	0.15	0.85	0.94	0.22
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	38	47	18	50	ND@0.5	38
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@1	0.4 J	ND@0.5	0.5	ND@0.5	ND@2.5
1,1,2-TRICHLOROETHANE	ug/L	ND@1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
1,1-DICHLOROETHANE	ug/L	3.7	4.7	2.3	12	ND@0.5	4.4
1,1-DICHLOROETHENE	ug/L	10	13	5.7	18	ND@0.5	14
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@1	ND@0.5	ND@0.5	0.09 J	ND@0.5	ND@2.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@1	0.09 J	ND@0.5	0.07 J	ND@0.5	ND@2.5
CHLOROETHANE	ug/L	ND@1	ND@0.5	ND@0.5	0.2 J	ND@0.5	ND@2.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
CIS-1,2-DICHLOROETHENE	ug/L	23	25	13	85	ND@0.5	28
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
TETRACHLOROETHENE	ug/L	ND@1	0.3 J	0.3 J	0.3 J	ND@0.5	ND@2.5
TRICHLOROETHENE	ug/L	160	170	93	63	ND@0.5	140
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@2.5
VINYL CHLORIDE	ug/L	ND@1	ND@0.5	ND@0.5	0.4 J	ND@0.5	ND@2.5

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Sample Location		165	166	166	167	167	178
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/27/2018	06/06/2018	12/04/2018	06/06/2018	12/04/2018	06/07/2018
Laboratory Sample I.D.		9917446	9649953	9928608	9649954	9928610	9651321
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.76	7.62	7.54	7.69	6.72	6.17
SPECIFIC CONDUCTANCE	umhos/cm	214	540	492	352	384	2383
TEMPERATURE	C	5.5	11.4	10.8	9.4	9.6	12.7
TURBIDITY	NTU	0.82	0.45	3.2	0.53	1.48	0.44
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	22	0.2 J	0.3 J	ND@0.5	0.06 J	23
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.3 J	0.5	0.9	ND@0.5	ND@0.5	0.5 J
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	7	1.6	1.8	ND@0.5	ND@0.5	14
1,1-DICHLOROETHENE	ug/L	2.1	0.2 J	0.3 J	ND@0.5	ND@0.5	3.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.07 J	1.2	1.3	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	0.07 J	ND@0.5	0.1 J	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2 J
CIS-1,2-DICHLOROETHENE	ug/L	29	7.4	7.9	ND@0.5	0.08 J	6.9
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.4 J
TRICHLOROETHENE	ug/L	8.1	1.2	2.4	3.6	4.4	73
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.3 J	0.7	0.3 J	ND@0.5	ND@0.5	ND@0.5

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Sample Location		178	179	179	181	181	183
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/27/2018	06/07/2018	11/27/2018	02/07/2018	11/27/2018	02/07/2018
Laboratory Sample I.D.		9917443	9651320	9917442	9449909	9917453	9449910
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.44	6.99	6.73	7.88	6.79	7.24
SPECIFIC CONDUCTANCE	umhos/cm	1616	398	455	745	541	588
TEMPERATURE	C	7.9	9.1	10.7	7.7	11.3	10.4
TURBIDITY	NTU	0.66	0.18	0.77	1.44	1.01	0.55
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	28	16	19	5.8	3.6	7.9
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.5 J	3.5	110	ND@0.5	0.06 J	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@1.0	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	11	3	11	1.2	0.7	2.5
1,1-DICHLOROETHENE	ug/L	3.3	6	7.3	ND@0.5	0.06 J	0.5 J
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.1 J	0.3 J	27	ND@0.5	0.1 J	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	0.07 J	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@1.0	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	0.2 J	0.2 J	0.3 J	ND@0.5	ND@0.5	0.9
CIS-1,2-DICHLOROETHENE	ug/L	7.5	11	560	ND@0.5	ND@0.5	70
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@1.0	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@1.0	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	0.4 J	0.1 J	ND@1.0	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	90	61	11	0.9	0.8	160
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@1.0	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	5.9	ND@0.5	ND@0.5	0.3 J

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Sample Location		183	183	185	185	186	186
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/07/2018	11/27/2018	06/08/2018	12/04/2018	06/08/2018	12/04/2018
Laboratory Sample I.D.		9651328	9917451	9651336	9928615	9651337	9928614
Sample Comment Codes		P	P				
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.99	6.25	7.42	7.1	7.01	6.6
SPECIFIC CONDUCTANCE	umhos/cm	474	537	817	1095	1852	2304
TEMPERATURE	C	13.7	11.9	11.7	10.6	12.1	10.3
TURBIDITY	NTU	0.72	0.89	0.95	2.47	0.98	7.83
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	6	8.7	1.8	3.1	7.9	13
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@2.5	ND@2.5	1.2	4.3	18	27
1,1,2-TRICHLOROETHANE	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0
1,1-DICHLOROETHANE	ug/L	0.8 J	1.2 J	0.7	1.9	5.8	8.6
1,1-DICHLOROETHENE	ug/L	ND@2.5	ND@2.5	0.1 J	0.4 J	0.9 J	1.3
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@2.5	ND@2.5	ND@0.5	0.9	2	2.9
1,2-DICHLOROETHANE (EDC)	ug/L	ND@2.5	ND@2.5	ND@0.5	0.2 J	ND@1	0.2 J
CHLOROETHANE	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0
CHLOROFORM (TRICHLOROMETHANE)	ug/L	1 J	1.5 J	ND@0.5	0.2 J	0.4 J	0.6 J
CIS-1,2-DICHLOROETHENE	ug/L	30	32	2.5	2.3	8.3	13
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0
TETRACHLOROETHENE	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	0.3 J
TRICHLOROETHENE	ug/L	130	190	20	50	110	140
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0
VINYL CHLORIDE	ug/L	ND@2.5	ND@2.5	ND@0.5	ND@0.5	ND@1	ND@1.0

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Sample Location		194	194	306	308	308	309
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/08/2018	12/05/2018	12/03/2018	06/07/2018	12/04/2018	06/07/2018
Laboratory Sample I.D.		9651335	9928616	9928679	9649965	9928700	9649966
Sample Comment Codes					P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.42	7.26	6.5	6.95	6.52	6.41
SPECIFIC CONDUCTANCE	umhos/cm	897	972	1456	2504	2812	4573
TEMPERATURE	C	13	12	9	11.8	11.3	11.9
TURBIDITY	NTU	104	324	2.48	0.13	12.7	0.15
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	3.5	0.09 J	45	120	2.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	0.06 J	ND@0.5	1.1	2.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	1.5	8.8	0.2 J	37	120	ND@0.5
1,1-DICHLOROETHENE	ug/L	2.4	2.2	ND@0.5	4.5	14	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.5	1.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	0.3 J	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	0.2 J	ND@0.5	ND@0.5	0.1 J	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2 J	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	0.06 J	ND@0.5	ND@0.5	0.3 J	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	0.08 J	ND@0.5	0.3 J	1.3	9.9
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		309	313	313	314	316	316
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/04/2018	02/14/2018	12/04/2018	11/27/2018	06/06/2018	12/04/2018
Laboratory Sample I.D.		9928697	9463778	9928696	9917441	9649952	9928609
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.54	7.23	6.92	7.46	7.8	7.96
SPECIFIC CONDUCTANCE	umhos/cm	1462	1520	1344	371	450	486
TEMPERATURE	C	11.3	10.9	10.4	10	12.2	10.7
TURBIDITY	NTU	3.47	1	1.32	1.11	0.64	2.21
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.9	0.4 J	ND@0.5	0.2 J	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	2.4	2.9	1.1	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	0.6	0.7	0.5 J	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	0.07 J	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	1.9	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	2.5	1.5	0.1 J	0.06 J	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		317	317	318	318	318	318
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/07/2018	11/28/2018	02/26/2018	06/07/2018	07/18/2018	11/27/2018
Laboratory Sample I.D.		9649961	9917461	9483432	9651315	9715311	9917436
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.64	7.84	7.72	7.28	7.21	8.26
SPECIFIC CONDUCTANCE	umhos/cm	562	558	414	378	398	424
TEMPERATURE	C	13.7	6.1	9.7	9.6	10.1	10.6
TURBIDITY	NTU	0.56	0.54	0.52	0.42	0.71	0.59
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	38	48	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@1	0.2 J	2.5	2.4	2.7	2.6
1,1,2-TRICHLOROETHANE	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	3.7	4.7	3.2	2.8	2.9	2.6
1,1-DICHLOROETHENE	ug/L	12	12	0.9	0.7	0.9	0.7
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@1	ND@1.0	10	9	8.7	7.8
1,2-DICHLOROETHANE (EDC)	ug/L	ND@1	0.1 J	0.1 J	ND@0.5	ND@0.5	0.1 J
CHLOROETHANE	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	26	28	70	69	81	63
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	0.3 J	0.3 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	170	160	1.2	1.1	1.2	1
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@1	ND@1.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@1	ND@1.0	0.6	0.2 J	0.3 J	0.5

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Sample Location		319	319	319	319	321	321
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/26/2018	06/07/2018	07/18/2018	11/27/2018	06/07/2018	12/04/2018
Laboratory Sample I.D.		9483434	9651317	9715313	9917439	9649963	9928693
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.59	7.48	7.34	8.94	6.82	6.8
SPECIFIC CONDUCTANCE	umhos/cm	421	445	418	230	918	281
TEMPERATURE	C	7.6	9.3	11.3	8.7	11.3	14
TURBIDITY	NTU	0.97	0.33	0.48	0.88	0.27	1
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	2.5	4
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.5	0.4 J	0.6	0.3 J	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	1.2	0.6	0.7	0.5	1.3	1.9
1,1-DICHLOROETHENE	ug/L	0.2 J	0.1 J	0.1 J	0.08 J	ND@0.5	0.1 J
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.8	1	0.9	0.6	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	12	6.6	9.2	6.8	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	0.6	0.9	1.3	1.1	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	1.8	0.2 J	0.2 J	0.5 J	ND@0.5	ND@0.5

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Sample Location		322	322	322	322	323	323
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/26/2018	06/07/2018	07/18/2018	11/27/2018	02/26/2018	06/07/2018
Laboratory Sample I.D.		9483433	9651316	9715312	9917437	9483435	9651319
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.09	7.49	7.22	7.45	6.95	6.81
SPECIFIC CONDUCTANCE	umhos/cm	429	382	387	354	246	211
TEMPERATURE	C	6.7	9.8	11.7	9.6	9.6	9.5
TURBIDITY	NTU	0.46	0.49	0.21	0.42	0.63	0.5
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.1	0.3 J
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.1	0.3 J
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.3 J	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	1	0.6
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	10	1.3
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	22	8.9
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.3 J	0.4 J

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Sample Location		323	323	324	324	325	325
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/18/2018	11/27/2018	02/28/2018	07/18/2018	02/28/2018	07/18/2018
Laboratory Sample I.D.		9715314	9917438	9485208	9715306	9485209	9715307
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.41	6.05	6.66	6.42	5.72	5.71
SPECIFIC CONDUCTANCE	umhos/cm	218	270	6240	5837	6010	5298
TEMPERATURE	C	9.9	10.3	11.9	13.5	12.7	12.8
TURBIDITY	NTU	0.8	0.47	0.73	6.11	0.69	15.9
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	180	180	120	140 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.6	0.4 J	6.5	8.5	4.8	7.9
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	1.3 J	1.2 J	0.9 J	0.9 J
1,1-DICHLOROETHANE	ug/L	0.7	0.3 J	83	90	62	65
1,1-DICHLOROETHENE	ug/L	0.2 J	ND@0.5	99	110	69	74
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.8	0.6	ND@5	ND@5	1.2 J	1.4 J
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	0.6 J	0.5 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	ND@2.5	0.5 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	ND@2.5	ND@2.5
CIS-1,2-DICHLOROETHENE	ug/L	5.3	1.2	49	61	39	48
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	ND@2.5	ND@2.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	1.6 J	1.7 J
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	1.8 J	1.9 J	6.2	6.4
TRICHLOROETHENE	ug/L	22	8.1	460	590 J	330	440 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@5	ND@5	ND@2.5	ND@2.5
VINYL CHLORIDE	ug/L	ND@0.5	0.5	1.9 J	2.3 J	1.6 J	1.8 J

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Sample Location		351	351	352	353	354	355
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/08/2018	12/04/2018	12/04/2018	07/17/2018	07/17/2018	12/03/2018
Laboratory Sample I.D.		9651339	9928612	9928613	9715269	9715270	9928685
Sample Comment Codes					P		P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.34	6.84	6.84	7.94	7.71	7.68
SPECIFIC CONDUCTANCE	umhos/cm	663	652	652	191	105	276
TEMPERATURE	C	10.8	9.1	9.1	20.5	18.9	11.9
TURBIDITY	NTU	71.4	136	136	0.4	407	1.47
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.2 J	0.3 J	0.1 J	330	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	0.2 J	0.3 J	0.1 J	120	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	0.1 J	0.2 J	0.07 J	110	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	0.06 J	ND@0.5	ND@5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	0.6	0.8	0.3 J	12	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	0.07 J	ND@0.5	490	0.1 J	0.06 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.1 J	ND@0.5	ND@0.5	ND@5	ND@0.5	ND@0.5

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Sample Location		356	357	357	358	361	362
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/03/2018	02/28/2018	07/19/2018	07/19/2018	07/19/2018	12/03/2018
Laboratory Sample I.D.		9928686	9485206	9714839	9714840	9714846	9928680
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.82	8.11	7.41	6.78	7.3	6.92
SPECIFIC CONDUCTANCE	umhos/cm	483	2090	1953	2405	980	314
TEMPERATURE	C	12.1	7.7	15.2	17.1	16	10.9
TURBIDITY	NTU	1.32	0.5	0.81	2.01	0.56	0.78
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	0.4 J	0.2 J	28	3.2	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.9	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	3.4	2.1	14	5.4	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	0.1 J	0.1 J	4.6	0.8	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.7	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.3 J	0.4 J	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	3.1	0.4 J	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	0.1 J	0.1 J	ND@0.5	ND@0.5

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Sample Location		363	363	364	365	366	367
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/14/2018	12/03/2018	07/17/2018	07/17/2018	07/18/2018	02/27/2018
Laboratory Sample I.D.		9463779	9928682	9715282	9715292	9715299	9483446
Sample Comment Codes		P	P	P	P		P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.37	6.04	7.27	6.39	6.51	6.85
SPECIFIC CONDUCTANCE	umhos/cm	4930	4115	1600	1696	1270	2320
TEMPERATURE	C	11.1	11.3	13.7	13.2	14.9	13.2
TURBIDITY	NTU	0.79	1.13	0.25	0.3	41.4	0.7
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	1	1.2	ND@0.5	ND@0.5	43	73
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.7	3.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J
1,1-DICHLOROETHANE	ug/L	0.7	0.7	ND@0.5	ND@0.5	14	13
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	11	24
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.4	1.2
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.5 J	0.6
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.2 J	6	5.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	0.2 J	0.2 J	ND@0.5	2.9	20	11
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.6

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Sample Location		367	368	368	373	373	374
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	02/27/2018	07/17/2018	06/04/2018	12/03/2018	06/04/2018
Laboratory Sample I.D.		9715297	9483447	9715298	9649943	9928681	9649941
Sample Comment Codes		P			P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.41	7.84	6.37	6.22	6.22	7.47
SPECIFIC CONDUCTANCE	umhos/cm	2135	3300	2911	1056	954	437
TEMPERATURE	C	14.2	13.7	14.3	10.5	11	9.8
TURBIDITY	NTU	2.51	0.54	20	0.46	0.83	0.77
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	71	ND@0.5	ND@0.5	3.1	2.7	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	3.3	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	0.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	12	5.5	1	0.6	0.2 J	ND@0.5
1,1-DICHLOROETHENE	ug/L	23	0.3 J	0.2 J	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.2	0.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	0.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	0.6	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	5	1.7	0.7	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	11	0.7	0.1 J	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.7	0.8	0.6	ND@0.5	ND@0.5	ND@0.5

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Sample Location		374	378	378	378	378	379
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/03/2018	02/27/2018	06/07/2018	07/17/2018	11/28/2018	07/17/2018
Laboratory Sample I.D.		9928678	9483445	9651313	9715293	9917509	9715294
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.22	7.46	6.51	6.91	6.38	6.8
SPECIFIC CONDUCTANCE	umhos/cm	733	1990	1761	1693	2045	1709
TEMPERATURE	C	9.3	12.2	12.7	13.2	10.2	13.2
TURBIDITY	NTU	1.02	0.87	0.34	0.26	0.67	0.85
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	480	240	170	620	1.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	50	9.7 J	5.9	57	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	840	670	590	920	4.3
1,1-DICHLOROETHENE	ug/L	ND@0.5	76	41	28	81	0.4 J
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	19	12	11	16	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@10	ND@10	ND@5	0.7 J	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@10	ND@10	1.2 J	1.1 J	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	95	75	60	120	0.3 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	93	43	23	140	0.2 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@10	ND@10	ND@5	ND@5.0	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	28	18	27	21	ND@0.5

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Sample Location		379	382	383	383	386	387
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/06/2018	07/18/2018	02/28/2018	07/19/2018	11/27/2018	11/27/2018
Laboratory Sample I.D.		9930022	9715300	9485187	9714844	9917444	9917445
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.48	7.29	6.81	7.18	6.15	6.85
SPECIFIC CONDUCTANCE	umhos/cm	2149	366	2560	2196	509	240
TEMPERATURE	C	10	15.7	6.3	15.2	9.8	6
TURBIDITY	NTU	1.33	11.8	0.38	0.63	0.68	0.86
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	4.8	0.1 J	2	2.1	18	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.6	ND@0.5	ND@0.5	ND@0.5	0.3 J	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	10	ND@0.5	0.4 J	0.4 J	21	ND@0.5
1,1-DICHLOROETHENE	ug/L	0.8	ND@0.5	0.2 J	0.2 J	12	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	1.1	ND@0.5	ND@0.5	ND@0.5	35	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	1.9	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.06 J	ND@0.5
TRICHLOROETHENE	ug/L	0.3 J	ND@0.5	2.8	3.1	140	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		392	392	393	393	393	393
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/28/2018	07/18/2018	02/27/2018	06/08/2018	07/17/2018	12/05/2018
Laboratory Sample I.D.		9485207	9715305	9483442	9651338	9715277	9928617
Sample Comment Codes		P	P				
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.47	7.26	7.59	7.11	7.23	6.63
SPECIFIC CONDUCTANCE	umhos/cm	3170	1623	3060	2714	2531	2836
TEMPERATURE	C	11.6	13.1	12.6	14	16.6	12.3
TURBIDITY	NTU	0.6	10	0.62	2.78	8.2	391
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.6	0.7	690	590	700	560
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	71	55	87	70
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
1,1-DICHLOROETHANE	ug/L	0.6	0.4 J	940	860	910	820
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	80	76	92	80
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	15	15	18	14
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	0.6 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	1 J	ND@10	1.5 J	1.1 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	120	120	130	120
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
TRICHLOROETHENE	ug/L	0.7	0.4 J	160	150	180	160
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@5.0
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	12	13	16	16

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Sample Location		394	394	394	395	395	397
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/27/2018	07/18/2018	12/06/2018	07/18/2018	12/06/2018	07/18/2018
Laboratory Sample I.D.		9483453	9715304	9930023	9715308	9930024	9715318
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.6	6.42	6.26	7.12	6.89	7.23
SPECIFIC CONDUCTANCE	umhos/cm	4110	3300	4052	2427	3010	586
TEMPERATURE	C	12.4	12.9	10.4	13.1	11.7	12.5
TURBIDITY	NTU	0.8	12.2	1.19	4.81	1.24	0.83
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	1100	780	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	78	120	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	1100	1,000	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	84	100	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	18	21	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	2.4 J	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	130	120	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	0.1 J	0.07 J	210	190	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@10	ND@10	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	14	19	ND@0.5

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Sample Location		397	398	398	398	399	399
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/06/2018	02/28/2018	07/18/2018	12/06/2018	02/27/2018	06/06/2018
Laboratory Sample I.D.		9930020	9485192	9715319	9930021	9483438	9649958
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.01	7.1	6.97	6.37	6.77	6.91
SPECIFIC CONDUCTANCE	umhos/cm	740	359	893	333	2640	1821
TEMPERATURE	C	8.7	6.5	12	8.6	5.7	14.3
TURBIDITY	NTU	4.09	0.47	1.99	3.53	1.3	0.62
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	5.3	4.3	0.5 J	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.2 J	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	4.3	6.8	13	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	1.4	3.2	4.1	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	0.3 J	0.5	0.6	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	0.06 J	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.5 J	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	0.5	0.9	1.3	0.1 J	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	4	3.1	3.3	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		399	399	404	404	404	404
Sample Description		GW MON WELL	GW MON WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL
Sample Date		07/17/2018	11/27/2018	03/01/2018	06/08/2018	07/19/2018	11/28/2018
Laboratory Sample I.D.		9715278	9917456	9485211	9651256	9714852	9917516
Sample Comment Codes		P	P				
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.54	6.78	7.1	7.54	7.22	7.22
SPECIFIC CONDUCTANCE	umhos/cm	1898	1463	1250	1238	1290	1424
TEMPERATURE	C	17	8.2	12.1	14.5	13	9
TURBIDITY	NTU	0.74	0.83	11.7	9.13	3.85	0.61
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	5.4	5	5.6	6.6
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	19	19	29	40
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	4.2	4.2	4.7	4.9
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	1.1	1	1.2	1.2
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	5.5	5.8	6.8	6.9
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	0.7	0.7	0.8	1.2
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	27	29	35	30
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	0.1 J	0.2 J	0.1 J	0.2 J
TRICHLOROETHENE	ug/L	0.2 J	ND@0.5	120	120	140	140
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	0.2 J	0.2 J	0.3 J	0.2 J

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Sample Location		405	405	405	405	413	413
Sample Description		GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL
Sample Date		03/01/2018	06/08/2018	07/19/2018	11/28/2018	03/01/2018	06/08/2018
Laboratory Sample I.D.		9485212	9651255	9714853	9917517	9485215	9651253
Sample Comment Codes							
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.86	7.42	7.36	6.73	7.03	6.91
SPECIFIC CONDUCTANCE	umhos/cm	880	757	743	631	2820	2842
TEMPERATURE	C	9.9	9.9	11.6	11.7	12.7	14.9
TURBIDITY	NTU	7.3	6.37	1.97	0.61	7.97	2.81
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	19	13	17	15	42	33
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	35	30	45	31	5.3	4.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	6	4.7	5.5	4.1	88	78
1,1-DICHLOROETHENE	ug/L	4.7	3.7	4.9	3.5	15	15
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	2.8	2.7	3.1	2.5	1.7	1.6
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	0.06 J	0.1 J	0.1 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.2 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	0.2 J	0.1 J	0.2 J	0.1 J	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	21	20	24	23	14	15
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	0.4 J	0.3 J	0.3 J	0.4 J	0.2 J	0.1 J
TRICHLOROETHENE	ug/L	86	78	96	90	43	39
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.8	1

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Sample Location		413	413	414	414	414	415
Sample Description		GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL
Sample Date		07/19/2018	12/05/2018	03/01/2018	06/08/2018	07/19/2018	03/01/2018
Laboratory Sample I.D.		9714849	9928622	9485216	9651254	9714850	9485214
Sample Comment Codes							
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.51	6.25	7.19	6.9	6.5	7.47
SPECIFIC CONDUCTANCE	umhos/cm	2790	3285	3640	3611	3522	5050
TEMPERATURE	C	14	12.4	11.7	14.7	13.6	15.1
TURBIDITY	NTU	1.89	31.8	27.7	138	37.9	17.2
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	38	41	620	350	450	940
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	4.7	4.5	81	42	67	64
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	0.1 J	ND@5	ND@10	ND@5	ND@25
1,1-DICHLOROETHANE	ug/L	87	93	1400	1100	1300	910
1,1-DICHLOROETHENE	ug/L	17	19	79	57	68	720
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.8	1.9	31	21	28	ND@25
1,2-DICHLOROETHANE (EDC)	ug/L	0.1 J	0.2 J	ND@5	ND@10	ND@5	ND@25
CHLOROETHANE	ug/L	0.3 J	0.3 J	1.3 J	ND@10	1.6 J	ND@25
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	0.1 J	ND@5	ND@10	ND@5	ND@25
CIS-1,2-DICHLOROETHENE	ug/L	17	24	79	76	78	2200
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@25
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@25
TETRACHLOROETHENE	ug/L	0.1 J	0.3 J	1.7 J	ND@10	1.6 J	11 J
TRICHLOROETHENE	ug/L	43	63	280	230	280	1100
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@5	ND@10	ND@5	ND@25
VINYL CHLORIDE	ug/L	1.2	0.8	9.6	7.9 J	11	84

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Sample Location		415	415	415	416	416	416
Sample Description		GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL	GW EXTR WELL
Sample Date		06/08/2018	07/19/2018	12/05/2018	03/01/2018	06/08/2018	07/19/2018
Laboratory Sample I.D.		9651250	9714847	9928623	9485217	9651251	9714851
Sample Comment Codes							
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.05	6.9	6.58	7.55	6.82	6.62
SPECIFIC CONDUCTANCE	umhos/cm	5348	4981	5162	3010	3010	3543
TEMPERATURE	C	16.4	15.7	14.2	12.4	14.7	13.9
TURBIDITY	NTU	3.15	1.17	9.89	437	510	99.3
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	800	1100	1,200	560	150	440
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	60	120	110	39	18	68
1,1,2-TRICHLOROETHANE	ug/L	ND@25	ND@25	4.1 J	ND@5	ND@5	ND@5
1,1-DICHLOROETHANE	ug/L	800	870	920	880	380	1200
1,1-DICHLOROETHENE	ug/L	680	840	830	63	30	69
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@25	ND@25	6.7 J	11	7.4	27
1,2-DICHLOROETHANE (EDC)	ug/L	ND@25	ND@25	4.7 J	ND@5	ND@5	ND@5
CHLOROETHANE	ug/L	ND@25	ND@25	ND@25	1.5 J	ND@5	1.6 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@25	ND@25	ND@25	ND@5	ND@5	ND@5
CIS-1,2-DICHLOROETHENE	ug/L	2200	1900	2,000	93	36	78
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@25	ND@25	ND@25	ND@5	ND@5	ND@5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@25	ND@25	ND@25	ND@5	ND@5	ND@5
TETRACHLOROETHENE	ug/L	11 J	14 J	16 J	ND@5	ND@5	1.4 J
TRICHLOROETHENE	ug/L	1100	1200	1,200	130	98	270
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@25	ND@25	ND@25	ND@5	ND@5	ND@5
VINYL CHLORIDE	ug/L	91	120	120	6.2	3.1 J	11

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Sample Location		416	418	521	521	521	521
Sample Description		GW EXTR WELL	GW EXTR WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/05/2018	12/05/2018	02/27/2018	06/06/2018	07/17/2018	11/27/2018
Laboratory Sample I.D.		9928621	9928620	9483441	9649956	9715280	9917458
Sample Comment Codes				P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.5	6.29	7.41	7.07	6.81	6.88
SPECIFIC CONDUCTANCE	umhos/cm	3439	3208	2780	1932	2060	3048
TEMPERATURE	C	11.9	11.4	7.3	14.5	20.9	11
TURBIDITY	NTU	53.6	178	0.73	0.48	0.34	0.71
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	370	270	85	92	130	140
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	41	36	7	7.6	8.2	11
1,1,2-TRICHLOROETHANE	ug/L	ND@5.0	ND@5.0	ND@2.5	ND@5	ND@5	ND@5.0
1,1-DICHLOROETHANE	ug/L	720	610	370	460	600	560
1,1-DICHLOROETHENE	ug/L	80	63	15	8.4	23	33
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	12	14	6.1	8.4	11	8.4
1,2-DICHLOROETHANE (EDC)	ug/L	0.7 J	0.6 J	ND@2.5	ND@5	ND@5	ND@5.0
CHLOROETHANE	ug/L	1.3 J	1 J	1 J	1.6 J	3.4 J	2 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@5.0	ND@5.0	ND@2.5	ND@5	ND@5	ND@5.0
CIS-1,2-DICHLOROETHENE	ug/L	97	83	22	34	40	42
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@5.0	ND@5.0	ND@2.5	ND@5	ND@5	ND@5.0
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@5.0	ND@5.0	ND@2.5	ND@5	ND@5	ND@5.0
TETRACHLOROETHENE	ug/L	1.4 J	2.7 J	ND@2.5	ND@5	ND@5	ND@5.0
TRICHLOROETHENE	ug/L	280	350	2.3 J	ND@5	4.9 J	7.4
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@5.0	ND@5.0	ND@2.5	ND@5	ND@5	ND@5.0
VINYL CHLORIDE	ug/L	7.9	5.5	7.6	23	23	14

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Sample Location		522	522	522	522	524	524
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/27/2018	06/06/2018	07/17/2018	11/27/2018	02/28/2018	06/06/2018
Laboratory Sample I.D.		9483437	9649957	9715281	9917459	9485203	9649950
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.13	7.08	6.94	7.48	7.17	6.84
SPECIFIC CONDUCTANCE	umhos/cm	2800	2741	2485	3104	2070	2077
TEMPERATURE	C	7	18	21.4	7	8	13.5
TURBIDITY	NTU	0.48	0.47	0.37	0.93	0.73	0.73
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	180	160	200	240	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	17	21	24	26	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	500	490	550	570	0.1 J	0.2 J
1,1-DICHLOROETHENE	ug/L	35	38	41	42	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	8.6	9.4	10	9.8	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	0.9 J	1.3 J	1.4 J	1.2 J	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	43	45	49	55	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	25	22	29	33	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@2.5	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	7	8.9	10	10	ND@0.5	ND@0.5

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Sample Location		524	524	529	529	529	529
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/19/2018	12/04/2018	02/27/2018	06/06/2018	07/17/2018	11/27/2018
Laboratory Sample I.D.		9714841	9928704	9483440	9649955	9715279	9917457
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.45	7.24	7.49	6.97	6.95	6.86
SPECIFIC CONDUCTANCE	umhos/cm	1949	2331	1710	1751	1544	2417
TEMPERATURE	C	16.5	8.5	6.5	14.8	19.5	10.1
TURBIDITY	NTU	1.1	98.1	0.54	0.55	0.81	1.85
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	0.2 J	0.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		532	532	532	532	534	534
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/28/2018	06/06/2018	07/19/2018	12/04/2018	02/27/2018	06/06/2018
Laboratory Sample I.D.		9485204	9649951	9714842	9928705	9483439	9649959
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	8.06	6.66	6.92	6.84	7.46	6.94
SPECIFIC CONDUCTANCE	umhos/cm	1530	1623	1245	1947	2730	2417
TEMPERATURE	C	7.8	12.6	17	9	7.9	17.5
TURBIDITY	NTU	0.27	0.92	1.1	1.71	0.52	1.02
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	1.8	4.7	5.5	7.2	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	1.3	2.2	2.2	3.6	0.4 J	0.6
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.09 J	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2 J	0.3 J

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Sample Location		534	534	540	540	541	541
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	11/27/2018	06/04/2018	12/03/2018	06/04/2018	12/03/2018
Laboratory Sample I.D.		9715276	9917455	9649947	9928689	9649948	9928690
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.3	6.9	7.39	7.24	7.31	7.29
SPECIFIC CONDUCTANCE	umhos/cm	2349	2810	758	900	792	961
TEMPERATURE	C	22.7	11.4	10.3	10.9	11.2	12.3
TURBIDITY	NTU	0.88	1.06	0.17	1.13	0.32	1.98
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	0.6	1	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.2	1.1
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.3 J	0.4 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		542	542	543	543	601	601
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/04/2018	12/03/2018	06/04/2018	12/03/2018	02/28/2018	07/19/2018
Laboratory Sample I.D.		9649949	9928691	9649946	9928687	9485188	9714838
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.84	7.68	6.76	6.47	7.67	6.9
SPECIFIC CONDUCTANCE	umhos/cm	1261	189	1446	1439	2310	1915
TEMPERATURE	C	11.5	10.1	11.4	11.8	5.7	19.4
TURBIDITY	NTU	0.86	1.24	0.19	1.06	0.59	1.88
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	1.1	1.4	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.07 J	0.3 J	0.1 J
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	1.3	1.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	0.8	0.4 J	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	0.1 J	ND@0.5	ND@0.5	ND@0.5	0.1 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	0.7	0.8	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		602	602	603	603	604	604
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		02/28/2018	07/18/2018	02/28/2018	07/18/2018	02/28/2018	07/18/2018
Laboratory Sample I.D.		9485190	9715320	9485193	9715317	9485196	9715302
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.71	7.08	7.04	6.88	7.1	6.11
SPECIFIC CONDUCTANCE	umhos/cm	657	843	189	963	2870	3082
TEMPERATURE	C	7.2	16.3	5.9	12.9	10.8	14.4
TURBIDITY	NTU	0.66	1.58	0.93	0.79	0.89	7.13
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	1	2.8	0.1 J	0.4 J	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	0.4 J	0.8	0.2 J	0.6	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	0.3 J	0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	0.4 J	0.4 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	4.8	6.2	0.2 J	0.8	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

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Sample Location		605	606	606	606	606	607
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/18/2018	02/27/2018	06/07/2018	07/17/2018	11/28/2018	02/27/2018
Laboratory Sample I.D.		9715303	9483443	9651311	9715295	9917507	9483444
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.03	7.6	7.15	7.79	7.72	7.24
SPECIFIC CONDUCTANCE	umhos/cm	252	1040	195	82	148	1370
TEMPERATURE	C	13.2	12.2	13.2	14.1	9.6	11.9
TURBIDITY	NTU	14.6	0.44	0.35	3.07	0.47	0.49
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.6	0.06 J	2.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.3 J	0.1 J	23
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.1 J	ND@0.5	2.2
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.3 J
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.1
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	0.3 J	ND@0.5	ND@0.5	0.2 J	ND@0.5	2.3
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1.1

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Sample Location		607	607	607	608	608	609
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/07/2018	07/17/2018	11/28/2018	02/28/2018	07/18/2018	02/27/2018
Laboratory Sample I.D.		9651312	9715296	9917508	9485191	9714836	9485199
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.87	6.97	6.8	7.57	6.57	7.52
SPECIFIC CONDUCTANCE	umhos/cm	1412	1350	232	2000	1863	523
TEMPERATURE	C	13.2	13.1	10.8	5.5	16.3	13.5
TURBIDITY	NTU	0.46	9.82	0.65	0.72	0.83	0.79
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	1.3	1.3	3.5	0.8	1.5	3300
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	0.4 J	ND@0.5	0.2 J	450
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
1,1-DICHLOROETHANE	ug/L	21	23	50	5.3	7.8	2200
1,1-DICHLOROETHENE	ug/L	1.7	1.9	3.4	1.3	2.8	110
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	0.3 J	0.4 J	0.8	0.4 J	0.5 J	54
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	0.1 J	ND@0.5	ND@0.5	ND@25
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
CIS-1,2-DICHLOROETHENE	ug/L	1.1	1.1	2.8	3.7	4.4	120
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
TRICHLOROETHENE	ug/L	1.7	1.8	2	4.1	19	150
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@25
VINYL CHLORIDE	ug/L	1.1	1.5	2.6	1	3	11 J

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Sample Location		609	610	610	610	611	611
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	02/27/2018	07/17/2018	12/06/2018	02/27/2018	07/17/2018
Laboratory Sample I.D.		9715272	9483448	9715265	9930027	9483449	9715266
Sample Comment Codes		P	P	P	P		
Parameter	**Units**						
Indicator Parameters							
PH	SU	8.41	6.51	7.3	5.51	7.04	6.58
SPECIFIC CONDUCTANCE	umhos/cm	135	25560	794	17734	35390	25513
TEMPERATURE	C	15.3	13.3	17.6	13.6	10.6	20.8
TURBIDITY	NTU	3.77	0.92	13.2	1.18	NA	130
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	3900	180	190	160	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	390	4.3	5.8	5.4	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@25	1.7 J	1.9 J	1.9 J	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	1900	46	54	39	0.2 J	0.4 J
1,1-DICHLOROETHENE	ug/L	100	75	97	63	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	43	ND@2.5	ND@2.5	0.3 J	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@25	ND@2.5	0.6 J	0.5 J	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@25	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@25	0.5 J	0.6 J	0.5 J	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	130	43	54	36	ND@0.5	0.2 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@25	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@25	1.7 J	2.9	1.4 J	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@25	18	19	19	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	110	240	280	220	0.2 J	0.2 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@25	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	14 J	ND@2.5	ND@2.5	ND@2.5	ND@0.5	ND@0.5

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Sample Location		611	612	612	612	613	613
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/06/2018	02/27/2018	07/17/2018	12/06/2018	02/27/2018	07/17/2018
Laboratory Sample I.D.		9930028	9483450	9715267	9930025	9483451	9715268
Sample Comment Codes			P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	5.99	6.55	7.15	6.2	5.65	5.21
SPECIFIC CONDUCTANCE	umhos/cm	29694	10110	914	3477	11420	10020
TEMPERATURE	C	13.9	13.9	15.8	11.6	14.4	15.1
TURBIDITY	NTU	4.64	1.71	0.97	1.27	0.97	0.71
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	220	230	240	150	160
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	4.3 J	5.5	6.9	2.8	3
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	1.6 J	2 J	2 J	1 J	1.2 J
1,1-DICHLOROETHANE	ug/L	0.6	93	100	99	51	58
1,1-DICHLOROETHENE	ug/L	ND@0.5	83	100	99	52	60
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@5	ND@5	1.3 J	ND@2.5	ND@2.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	1.9 J	2.1 J	2 J	1 J	1.1 J
CHLOROETHANE	ug/L	ND@0.5	1.1 J	1.3 J	2 J	0.7 J	1 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@5	ND@5	ND@5.0	ND@2.5	ND@2.5
CIS-1,2-DICHLOROETHENE	ug/L	0.3 J	110	130	110	59	70
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@5	ND@5	ND@5.0	ND@2.5	ND@2.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	7.2	9.3	8.4	2.4 J	2.3 J
TETRACHLOROETHENE	ug/L	ND@0.5	3.1 J	3 J	2.8 J	9	9.4
TRICHLOROETHENE	ug/L	0.1 J	550	660	570	340	380
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@5	ND@5	ND@5.0	ND@2.5	ND@2.5
VINYL CHLORIDE	ug/L	ND@0.5	4.8 J	7.3	8.1	3.4	5.2

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Sample Location		613	614	615	616	616	617
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/06/2018	12/04/2018	07/18/2018	02/28/2018	07/18/2018	02/28/2018
Laboratory Sample I.D.		9930026	9928611	9714835	9485210	9715310	9485200
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	4.96	7.14	6.89	6.35	6.66	6.85
SPECIFIC CONDUCTANCE	umhos/cm	12114	107	1858	1010	568	629
TEMPERATURE	C	12.4	11.7	16.7	9.4	18.8	8.1
TURBIDITY	NTU	1.04	1.04	0.63	1.09	4.43	0.97
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	140	ND@0.5	ND@0.5	0.1 J	0.1 J	0.2 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	2.8 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	1.3 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	47	0.6	0.6	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	46	0.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@5.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	1.2 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@5.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@5.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	53	1.3	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@5.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	1.5 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	10	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	330	ND@0.5	ND@0.5	0.3 J	0.7	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@5.0	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	4.9 J	0.1 J	0.2 J	ND@0.5	ND@0.5	ND@0.5

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Sample Location		617	618	618	619	620	621
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		07/17/2018	02/28/2018	07/17/2018	12/04/2018	12/04/2018	06/07/2018
Laboratory Sample I.D.		9715273	9485201	9715274	9928702	9928699	9649967
Sample Comment Codes		P	P	P	P		P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.62	6.65	7.44	6.94	6.6	6.42
SPECIFIC CONDUCTANCE	umhos/cm	644	522	474	2028	449	3045
TEMPERATURE	C	18.8	6	17.6	12.2	13.2	11.9
TURBIDITY	NTU	0.79	0.52	2.22	4.15	120	0.42
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.2 J	ND@0.5	ND@0.5	340	0.2 J	51
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	29	ND@0.5	3.1
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	420	0.07 J	80
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	83	ND@0.5	7.9
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	4 J	ND@0.5	1.9
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	2.3 J	ND@0.5	0.2 J
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	0.1 J
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	0.1 J	0.1 J
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	1.5 J	ND@0.5	0.1 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	18	18	9	ND@0.5	2.1
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5.0	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	1.6 J	ND@0.5	ND@0.5

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Sample Location		621	622	622	623	624	625
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/04/2018	06/07/2018	12/04/2018	11/28/2018	11/28/2018	02/28/2018
Laboratory Sample I.D.		9928694	9649968	9928695	9917511	9917512	9485195
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.04	6.7	6.11	6.21	6.02	6.27
SPECIFIC CONDUCTANCE	umhos/cm	662	2161	1917	2043	1909	753
TEMPERATURE	C	13.4	11.6	13.6	9.2	10.3	6.8
TURBIDITY	NTU	0.98	0.15	1.45	0.62	0.61	0.61
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	51	16	12	38	36	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	3.1	0.3 J	0.2 J	0.8	1	0.6
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	70	60	58	36	37	2.5
1,1-DICHLOROETHENE	ug/L	7.4	3.4	2.7	2.4	3.6	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.7	2	2	0.7	0.6	7.1
1,2-DICHLOROETHANE (EDC)	ug/L	0.2 J	0.1 J	0.1 J	0.1 J	0.1 J	ND@0.5
CHLOROETHANE	ug/L	0.1 J	1.1	2	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	0.1 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	0.06 J	0.2 J	0.2 J	0.08 J	0.06 J	1.2
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	2.2	1.2	0.8	1.8	2.9	0.2 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	0.3 J	0.4 J	ND@0.5	ND@0.5	4

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Sample Location		625	625	625	626	626	627
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		06/04/2018	07/18/2018	12/03/2018	06/04/2018	12/03/2018	06/07/2018
Laboratory Sample I.D.		9649944	9715315	9928683	9649945	9928684	9651314
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.24	6.84	7.02	7.27	7.1	6.56
SPECIFIC CONDUCTANCE	umhos/cm	695	651	278	590	373	250
TEMPERATURE	C	9.8	11.4	10.1	9.5	10.8	9.3
TURBIDITY	NTU	0.4	1.28	0.97	0.33	1.36	0.24
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.3 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.8	3.8	0.3 J	ND@0.5	ND@0.5	1.9
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	2.7	3.2	2.8	ND@0.5	ND@0.5	0.1 J
1,1-DICHLOROETHENE	ug/L	0.1 J	0.3 J	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	12	15	12	ND@0.5	ND@0.5	0.8
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	0.05 J	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	1
CIS-1,2-DICHLOROETHENE	ug/L	14	34 J	1.8	ND@0.5	ND@0.5	4.1
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.8
TRICHLOROETHENE	ug/L	0.4 J	0.6	0.2 J	ND@0.5	ND@0.5	24
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	20	31 J	11	ND@0.5	ND@0.5	ND@0.5

Groundwater Analytical Chemistry Data
Owego, New York
January 1, 2018 - December 31, 2018

Sample Location		627	628	628	629	630	631
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/27/2018	02/14/2018	11/27/2018	12/04/2018	12/04/2018	06/07/2018
Laboratory Sample I.D.		9917434	9463780	9917435	9928706	9928607	9651325
Sample Comment Codes		P	P	P	P	P	P
Parameter	**Units**						
Indicator Parameters							
PH	SU	6.94	7.71	6.96	7.63	7.67	7.09
SPECIFIC CONDUCTANCE	umhos/cm	296	690	761	461	772	371
TEMPERATURE	C	10.7	9.4	10.8	11.3	6.4	13
TURBIDITY	NTU	0.48	0.81	1.27	2.22	3.42	0.19
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.3 J	ND@0.5	ND@0.5	ND@0.5	7	0.2 J
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.9	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	0.2 J	0.4 J	0.5 J	ND@0.5	0.9	ND@0.5
1,1-DICHLOROETHENE	ug/L	0.08 J	ND@0.5	0.1 J	ND@0.5	2.2	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	1.4	ND@0.5	0.2 J	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	1.1	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	3.5	0.7	1.4	ND@0.5	4.2	0.4 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	0.9	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	25	ND@0.5	0.3 J	ND@0.5	20	1.8
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	1.2	1.2	ND@0.5	ND@0.5	ND@0.5

Groundwater Analytical Chemistry Data
Owego, New York
January 1, 2018 - December 31, 2018

Sample Location		631	632	632	700	700	701
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		11/27/2018	06/07/2018	11/27/2018	06/08/2018	12/05/2018	06/08/2018
Laboratory Sample I.D.		9917449	9651326	9917452	9651334	9930019	9651333
Sample Comment Codes		P	P	P			
Parameter	**Units**						
Indicator Parameters							
PH	SU	7.01	6.29	6.22	6.82	6.73	6.62
SPECIFIC CONDUCTANCE	umhos/cm	431	2811	1821	2552	2641	2665
TEMPERATURE	C	9.8	14.4	9.7	12.7	12	13.8
TURBIDITY	NTU	1.28	0.53	1.07	7.2	29.8	770
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	0.06 J	3.4	13	260	310	470
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	0.3 J	29	37	47
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
1,1-DICHLOROETHANE	ug/L	ND@0.5	0.1 J	0.5 J	420	480	770
1,1-DICHLOROETHENE	ug/L	ND@0.5	0.1 J	0.3 J	37	42	72
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	8.5	7.9	15
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	0.8 J	ND@10
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	0.06 J	55	64	110
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
TRICHLOROETHENE	ug/L	0.7	4.1	9.3	60	71	130
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@5	ND@5.0	ND@10
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	7.2	9.9	12

Groundwater Analytical Chemistry Data
Owego, New York
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Sample Location		701	P04	P08	P11
Sample Description		GW MON WELL	GW MON WELL	GW MON WELL	GW MON WELL
Sample Date		12/05/2018	07/16/2018	12/04/2018	12/04/2018
Laboratory Sample I.D.		9930018	9715256	9928703	9928701
Sample Comment Codes			P	P	P
Parameter	**Units**				
Indicator Parameters					
PH	SU	6.57	6.66	7.9	7.03
SPECIFIC CONDUCTANCE	umhos/cm	2825	798	1765	715
TEMPERATURE	C	11.4	20.5	9.5	11.1
TURBIDITY	NTU	172	0.57	2.84	3.87
Volatile Organics					
1,1,1-TRICHLOROETHANE	ug/L	700	ND@0.5	38	9.7
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	83	ND@0.5	9.1	0.3 J
1,1,2-TRICHLOROETHANE	ug/L	ND@10	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	980	ND@0.5	120	6.6
1,1-DICHLOROETHENE	ug/L	86	ND@0.5	8.3	0.3 J
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	17	ND@0.5	2.5	0.1 J
1,2-DICHLOROETHANE (EDC)	ug/L	ND@10	ND@0.5	0.2 J	ND@0.5
CHLOROETHANE	ug/L	ND@10	ND@0.5	0.4 J	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@10	ND@0.5	0.1 J	0.3 J
CIS-1,2-DICHLOROETHENE	ug/L	130	ND@0.5	0.1 J	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@10	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@10	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@10	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	150	ND@0.5	0.2 J	0.6
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@10	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	17	ND@0.5	0.1 J	ND@0.5

Groundwater Analytical Chemistry Data
Owego, New York
January 1, 2018 - December 31, 2018

Reporting Conventions

NA	Not Analyzed
ND@X	Not Detected at Detection Limit X

Code	Explanation
J	The value is estimated. In most cases, the result either (1) is greater than the method detection limit (MDL) and less than the limit of quantitation (LOQ), or (2) exceeds the upper limit of the calibration range of the analytical instrument.

APPENDIX G

Statistical Summary of Groundwater Chemistry Data

1993 - 2018

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
101	COUNT	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
101	MAX	ND	7.9	1.1	0.1	ND	140	65	0.6	1.5	0.8	ND	14	ND	0.06	ND	ND
101	MEDIAN	ND	ND	ND	ND	ND	0.67	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
101	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
106	COUNT	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
106	MAX	0.41	0.55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
106	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
106	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
110	COUNT	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
110	MAX	ND	ND	ND	ND	ND	0.1	ND	0.18	ND	ND	ND	ND	ND	ND	ND	ND
110	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
110	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
120	COUNT	56	56	56	56	56	56	56	56	56	55	56	56	56	56	56	56
120	MAX	75	4.9	12	ND	ND	3.3	0.15	ND	ND	ND	ND	ND	ND	ND	0.2	ND
120	MEDIAN	14.9	1.015	0.4	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
120	MIN	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
124	COUNT	53	53	53	53	53	53	53	53	53	52	53	53	53	53	53	53
124	MAX	16	8	4	ND	ND	1.1	12	ND	ND	ND	19	ND	ND	ND	ND	ND
124	MEDIAN	0.34	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
124	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
125	COUNT	68	68	68	68	68	68	68	68	67	67	68	68	68	68	68	68
125	MAX	4100	490	650	0.1	19	2600	290	3.7	50	2.3	25	ND	ND	ND	2.9	ND
125	MEDIAN	233	99.75	66.05	ND	0.2	245	50.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
125	MIN	0.5	0.7	ND	ND	ND	2.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
127	COUNT	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
127	MAX	2000	300	240	0.1	2.6	2015	141.6	18	4.3	ND	230	2.3	ND	ND	0.71	ND
127	MEDIAN	67.5	3.95	5.5	ND	ND	107	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
127	MIN	ND	ND	ND	ND	ND	28.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
128	COUNT	42	42	42	42	42	42	42	42	41	40	42	42	42	42	42	42
128	MAX	30822	11199	6903	ND	40	620	22204	564	1895	283	19000	3.3	ND	ND	160	200
128	MEDIAN	14295	4823.5	2990.5	ND	ND	ND	10814	ND	388	ND	ND	ND	ND	ND	ND	ND
128	MIN	180	45	74	ND	ND	ND	88	ND	ND	ND	ND	ND	ND	ND	ND	ND
129	COUNT	53	53	53	53	53	53	53	53	53	52	53	53	53	53	53	53
129	MAX	18	26	8	1	ND	25	0.32	0.2	ND	ND	0.37	ND	ND	ND	ND	0.21
129	MEDIAN	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
129	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
132	COUNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
132	MAX	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND
132	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
132	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
133	COUNT	69	69	69	69	69	69	69	69	68	67	69	69	69	69	69	69
133	MAX	1106	350	56	0.4	ND	8.68	0.2	0.2	41	2.62	5.3	0.2	ND	ND	0.1	0.5
133	MEDIAN	179	96	14.5	ND	ND	ND	ND	ND	3.15	ND	ND	ND	ND	ND	ND	ND
133	MIN	49	26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
134	COUNT	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
134	MAX	0.2	0.2	ND	ND	ND	0.3	ND	ND	1.9	ND	ND	0.58	0.2	ND	ND	ND
134	MEDIAN	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
134	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
146	COUNT	65	65	65	65	65	65	65	65	65	64	65	65	65	65	65	65
146	MAX	14	5.3	2.22	0.6	ND	27	1.6	ND	1.9	2.4	0.34	ND	0.43	ND	ND	ND
146	MEDIAN	5	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
146	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
148	COUNT	54	54	54	54	54	54	54	54	54	53	54	54	54	54	54	54
148	MAX	980	8.9	190	ND	ND	4.52	0.9	ND	7	ND	ND	0.2	ND	ND	1.4	0.3
148	MEDIAN	271.5	0.7	15	ND	ND	0.895	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
148	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
149	COUNT	70	70	70	70	70	70	70	70	69	68	70	70	70	70	70	70
149	MAX	146	70	24	0.2	ND	353	85	0.4	ND	ND	0.59	ND	ND	ND	ND	0.2
149	MEDIAN	13.4	22.7	5.75	ND	ND	30.5	22	ND	ND	ND	ND	ND	ND	ND	ND	ND
149	MIN	2.05	6.6	ND	ND	ND	8.5	6.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
157	COUNT	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
157	MAX	1.6	0.7	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
157	MEDIAN	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
157	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158	COUNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
158	MAX	1.4	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158	MEDIAN	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
160	COUNT	69	69	69	69	69	69	69	69	68	67	69	69	69	69	69	69
160	MAX	170	17.8	42.1	ND	1.2	540	59	0.1	8.8	12	2.1	0.58	ND	ND	ND	0.2
160	MEDIAN	53	1.2	12	ND	ND	180	15	ND	ND	ND	ND	ND	ND	ND	ND	ND
160	MIN	0.34	ND	ND	ND	ND	12.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
162	COUNT	69	69	69	69	69	69	69	69	69	67	69	69	69	69	69	69
162	MAX	500	33	200	0.2	15.7	1790	180	1	2.7	0.09	7.2	1	ND	ND	0.1	0.4
162	MEDIAN	85	0.7	20	ND	ND	296	25.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
162	MIN	ND	ND	ND	ND	ND	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
163	COUNT	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
163	MAX	0.8	ND	0.2	ND	ND	5.3	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
163	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
163	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
165	COUNT	64	64	64	64	64	64	64	64	63	63	64	64	64	64	64	64
165	MAX	122	25	31.4	0.3	0.4	370	100	2.6	3.96	0.2	3.8	0.2	0.51	ND	ND	0.2
165	MEDIAN	47	1.64	10.5	ND	ND	152.5	12	ND	ND	ND	ND	ND	ND	ND	ND	ND
165	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
166	COUNT	54	54	54	54	54	54	54	54	53	52	54	54	54	54	54	54
166	MAX	1.2	2.1	0.3	ND	ND	14.8	9.4	1.2	2.3	3.57	ND	ND	0.2	ND	ND	1.19
166	MEDIAN	0.475	0.945	ND	ND	ND	4.165	1.7	ND	0.68	0.595	ND	ND	ND	ND	ND	ND
166	MIN	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
167	COUNT	56	56	56	56	56	56	56	56	55	54	56	56	56	56	56	56
167	MAX	1.5	ND	ND	ND	ND	17	0.08	ND	ND	ND	ND	ND	0.33	ND	ND	ND
167	MEDIAN	ND	ND	ND	ND	ND	5.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
167	MIN	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
178	COUNT	68	68	68	68	68	68	68	68	68	67	68	68	68	68	68	68
178	MAX	120	20	19	ND	0.6	340	18	ND	1.1	0.2	1.2	0.4	ND	ND	ND	0.07
178	MEDIAN	45.05	13	1.85	ND	ND	148	6.95	ND	ND	ND	ND	ND	ND	ND	ND	ND
178	MIN	23	ND	ND	ND	ND	68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
179	COUNT	84	84	84	84	84	84	84	84	84	83	84	84	84	84	84	84
179	MAX	58.6	12	10	ND	0.7	440	560	5.9	140	27	ND	0.3	5.5	1	ND	0.2
179	MEDIAN	20.65	1.43	4.845	ND	ND	85.65	9.95	ND	3.21	ND	ND	ND	ND	ND	ND	ND
179	MIN	8	ND	ND	ND	ND	11	1.99	ND	ND	ND	ND	ND	ND	ND	ND	ND
181	COUNT	35	35	35	35	35	35	35	35	35	34	35	35	35	35	35	35
181	MAX	22	3.8	2	0.39	ND	1.21	0.32	ND	0.41	0.66	ND	ND	ND	ND	ND	ND
181	MEDIAN	7	0.19	ND	ND	ND	0.65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
181	MIN	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
183	COUNT	61	61	61	61	61	61	61	61	61	60	61	61	61	61	61	61
183	MAX	25	2.5	0.8	ND	0.1	710	77	0.3	0.3	ND	0.5	2.39	ND	ND	ND	ND
183	MEDIAN	10	ND	ND	ND	ND	260	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
183	MIN	ND	ND	ND	ND	ND	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
185	COUNT	77	77	77	77	77	77	77	77	77	76	77	77	77	77	77	77
185	MAX	8.8	3.5	0.81	ND	ND	180	35.1	0.1	6.9	2.1	ND	2.2	0.7	ND	ND	0.89
185	MEDIAN	2.9	0.8	ND	ND	ND	52.9	2.2	ND	2.57	0.3	ND	ND	ND	ND	ND	ND
185	MIN	ND	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
186	COUNT	68	68	68	68	68	68	68	68	68	67	68	68	68	68	68	68
186	MAX	19	77	7.3	ND	0.3	351	108	0.51	128	222	1	6.2	4.44	ND	ND	0.45
186	MEDIAN	5.045	2.1	0.2	ND	ND	88	9.7	ND	15	1.4	ND	ND	ND	ND	ND	ND
186	MIN	ND	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
194	COUNT	70	70	70	70	70	70	70	70	68	67	70	70	70	70	70	70
194	MAX	100	33	22	5.6	ND	0.3	0.41	0.2	0.98	0.2	0.3	ND	ND	ND	ND	ND
194	MEDIAN	23.3	20.4	2.715	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
194	MIN	ND	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
306	COUNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
306	MAX	0.67	0.2	ND	ND	0.2	0.6	ND	ND	ND	ND	ND	ND	0.5	ND	ND	ND
306	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
306	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
308	COUNT	69	69	69	69	69	69	69	69	67	66	69	69	69	69	69	69
308	MAX	611	198	99	0.8	ND	4.43	1.3	0.1	8.2	1.5	0.5	0.2	ND	ND	ND	0.5
308	MEDIAN	315	84	8.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
308	MIN	45	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
309	COUNT	63	63	63	63	63	63	63	63	63	62	63	63	63	63	63	63
309	MAX	24	15	2.5	ND	ND	19	0.13	ND	0.65	ND	0.1	0.2	1.1	ND	ND	ND
309	MEDIAN	2.6	ND	ND	ND	ND	9.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
309	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
313	COUNT	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
313	MAX	15.5	2.9	0.93	ND	ND	51.6	ND	ND	0.33	ND	ND	0.5	ND	ND	ND	ND
313	MEDIAN	4.06	1.015	0.22	ND	ND	17.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
313	MIN	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
314	COUNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
314	MAX	0.77	1.1	0.5	ND	ND	0.06	1.9	ND	ND	ND	ND	ND	ND	ND	ND	0.07
314	MEDIAN	ND	ND	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND
314	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
316	COUNT	51	51	51	51	51	51	51	51	50	50	51	51	51	51	51	51
316	MAX	2.9	0.25	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
316	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
316	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
317	COUNT	83	83	83	83	83	83	83	83	81	80	83	83	83	83	83	83
317	MAX	77.2	4.9	19	ND	0.3	244	28	ND	0.5	ND	0.61	0.1	ND	ND	ND	0.1
317	MEDIAN	22	0.33	4.1	ND	ND	79	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
317	MIN	1.3	ND	ND	ND	ND	5.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
318	COUNT	106	106	106	106	106	106	106	106	105	104	106	106	106	106	106	106
318	MAX	3.6	7	2	ND	ND	48	90	0.8	17	37	ND	0.92	3.01	15	ND	0.22
318	MEDIAN	ND	3.4	0.67	ND	ND	14.85	13.05	0.13	5	10.9	ND	ND	ND	ND	ND	ND
318	MIN	ND	0.32	ND	ND	ND	1	0.62	ND	0.7	ND	ND	ND	ND	ND	ND	ND
319	COUNT	111	111	111	111	111	111	111	111	110	109	111	111	111	111	111	111
319	MAX	9.7	5.1	4.2	ND	ND	30	14	3.1	3.6	3.7	ND	0.27	0.36	2	ND	0.2
319	MEDIAN	ND	2.47	0.3	ND	ND	4.24	2.89	ND	1.2	1.34	ND	ND	ND	ND	ND	ND
319	MIN	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
321	COUNT	70	70	70	70	70	70	70	70	68	67	70	70	70	70	70	70
321	MAX	9	3.5	0.68	ND	ND	17	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
321	MEDIAN	2.705	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
321	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
322	COUNT	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111
322	MAX	ND	4.3	0.41	ND	0.18	0.92	13	1.05	9.7	18	ND	ND	2.6	4.5	ND	ND
322	MEDIAN	ND	1.8	ND	ND	ND	ND	2.6	ND	3.25	4.92	ND	ND	ND	ND	ND	ND
322	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
323	COUNT	103	103	103	103	103	103	103	103	103	102	103	103	103	103	103	103
323	MAX	0.2	5.3	1.1	ND	0.1	142	66	0.9	5.5	17.7	ND	0.3	2.14	1	ND	0.21
323	MEDIAN	ND	1.3	ND	ND	ND	30	1.76	ND	1	1.64	ND	ND	ND	ND	ND	ND
323	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
324	COUNT	72	72	72	72	72	72	72	72	71	71	72	72	72	72	72	72
324	MAX	8800	6919	1400	1.5	2.1	825	215	5.8	370	127	92	1	ND	ND	1.8	0.8
324	MEDIAN	418	205.5	120	ND	ND	500	45.25	ND	13.4	ND	ND	ND	ND	ND	ND	ND
324	MIN	150	79	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
325	COUNT	56	56	56	56	56	56	56	56	56	55	56	56	56	56	56	56
325	MAX	1100	162	330	1	16	1400	122	4.3	19.1	1.7	15	0.6	ND	ND	1.3	0.7
325	MEDIAN	180	69	74	ND	4.67	410	38	ND	3.6	ND	1.95	ND	ND	ND	ND	ND
325	MIN	85.9	41.3	26.7	ND	ND	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
351	COUNT	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
351	MAX	0.3	0.57	0.2	ND	ND	0.2	1.1	0.68	0.89	1.9	ND	ND	0.2	ND	ND	0.06
351	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
351	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
352	COUNT	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
352	MAX	0.2	0.1	0.07	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
352	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
352	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
353	COUNT	36	36	36	36	36	36	36	36	36	35	36	36	36	36	36	36
353	MAX	31000	5900	8500	ND	ND	4683	349	15	147	ND	368	2.8	ND	ND	8.4	ND
353	MEDIAN	17734.5	3026	2349	ND	ND	3368	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
353	MIN	ND	120	110	ND	ND	490	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
354	COUNT	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28
354	MAX	7300	190	2000	ND	50	2900	15.6	ND	3.7	ND	14	1	ND	ND	4.9	ND
354	MEDIAN	583.5	ND	76.4	ND	ND	121	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
354	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
355	COUNT	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
355	MAX	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
355	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
355	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
356	COUNT	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
356	MAX	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
356	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
356	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
357	COUNT	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
357	MAX	0.7	4.3	0.2	ND	ND	ND	ND	0.3	0.23	ND	0.29	ND	0.62	ND	ND	ND
357	MEDIAN	ND	0.195	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
357	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
358	COUNT	48	48	48	48	48	48	48	48	48	47	48	48	48	48	48	48
358	MAX	72	37	15	2	ND	35	3.36	1.1	2	3	0.27	0.2	0.33	2	ND	0.06
358	MEDIAN	13.5	17	5.55	ND	ND	10	0.975	0.05	0.225	0.9	ND	ND	ND	ND	ND	ND
358	MIN	5.9	6.3	0.87	ND	ND	1.56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
361	COUNT	35	35	35	35	35	35	35	35	35	34	35	35	35	35	35	35
361	MAX	6.4	7.4	0.8	0.16	ND	4.1	1.3	ND	0.2	ND	0.13	0.1	ND	ND	ND	ND
361	MEDIAN	2.1	1.4	ND	ND	ND	0.85	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
361	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
362	COUNT	33	33	33	33	33	33	33	33	33	32	33	33	33	33	33	33
362	MAX	0.54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND
362	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
362	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
363	COUNT	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
363	MAX	8.6	5	1	ND	ND	0.69	ND	ND	ND	ND	ND	ND	0.84	ND	ND	ND
363	MEDIAN	1.7	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
363	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
364	COUNT	35	35	35	35	35	35	35	35	35	34	35	35	35	35	35	35
364	MAX	ND	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
364	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
364	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
365	COUNT	39	39	39	39	39	39	39	39	39	38	39	39	39	39	39	39
365	MAX	ND	ND	ND	ND	ND	14	0.51	ND	ND	ND	ND	ND	ND	ND	ND	ND
365	MEDIAN	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
365	MIN	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
366	COUNT	36	36	36	36	36	36	36	36	34	33	36	36	36	36	36	36
366	MAX	180	39	37	ND	0.92	138	16	0.54	6.8	4	1.6	1	ND	0.38	ND	ND
366	MEDIAN	28.45	8.85	5.6	ND	ND	21.5	2.7	ND	0.29	0.92	ND	ND	ND	ND	ND	ND
366	MIN	ND	3.61	ND	ND	ND	5.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
367	COUNT	56	56	56	56	56	56	56	56	56	54	56	56	56	56	56	56
367	MAX	144	13	24	0.1	ND	12	5.8	1.4	4.4	1.4	1.46	0.7	2.5	ND	0.2	0.1
367	MEDIAN	80	4.88	9.75	ND	ND	3.35	ND	ND	2.365	ND	ND	ND	ND	ND	ND	ND
367	MIN	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
368	COUNT	50	50	50	50	50	50	50	50	49	49	50	50	50	50	50	50
368	MAX	31	53	15	4.6	0.2	71	32.2	7.5	0.6	2.1	0.45	0.81	0.84	ND	ND	ND
368	MEDIAN	ND	11.5	0.815	ND	ND	1.9	8.25	1	ND	0.4	ND	ND	ND	ND	ND	ND
368	MIN	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
373	COUNT	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
373	MAX	22	3	0.77	ND	ND	0.9	0.1	ND	0.16	ND	ND	ND	ND	ND	ND	ND
373	MEDIAN	5.1	0.925	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
373	MIN	2.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
374	COUNT	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
374	MAX	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7	ND	ND	ND
374	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
374	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
378	COUNT	98	98	98	98	98	98	98	98	97	96	98	98	98	98	98	98
378	MAX	989	1200	110	2.3	ND	150	120	36	95	30	1.4	1	0.62	25	0.1	0.7
378	MEDIAN	47.4	68.3	2.96	ND	ND	2.48	3.32	ND	1.06	ND	ND	ND	ND	ND	ND	ND
378	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
379	COUNT	38	38	38	38	38	38	38	38	38	37	38	38	38	38	38	38
379	MAX	117	32	1.8	ND	ND	0.3	2.97	1.1	2.8	2.8	ND	ND	ND	ND	ND	ND
379	MEDIAN	ND	0.025	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND
379	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
382	COUNT	33	33	33	33	33	33	33	33	33	32	33	33	33	33	33	33
382	MAX	0.7	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND
382	MEDIAN	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.78	ND	ND	ND
382	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
383	COUNT	65	65	65	65	65	65	65	65	65	64	65	65	65	65	65	65
383	MAX	15	4.4	3	0.4	ND	23	1.1	ND	0.53	0.2	0.22	ND	0.69	ND	ND	ND
383	MEDIAN	5.8	1.81	0.71	ND	ND	5.7	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
383	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
386	COUNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
386	MAX	87	29	19	ND	0.1	207	269	0.8	6.9	4.08	ND	0.1	ND	ND	ND	0.2
386	MEDIAN	31.5	16.5	7.1	ND	ND	124.5	35.05	ND	0.3	ND	ND	ND	ND	ND	ND	ND
386	MIN	14.9	6	ND	ND	ND	69.9	14	ND	ND	ND	ND	ND	ND	ND	ND	ND
387	COUNT	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
387	MAX	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
387	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
387	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
392	COUNT	69	69	69	69	69	69	69	69	69	68	69	69	69	69	69	69
392	MAX	138	48	47	1.9	ND	280	25	1.7	4.5	3.2	1.2	0.6	ND	ND	0.4	ND
392	MEDIAN	14	5.7	2.3	ND	ND	30	1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
392	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
393	COUNT	103	103	103	103	103	103	103	103	103	102	103	103	103	103	103	103
393	MAX	1857	1400	120	2.7	ND	230	150	23	130	26	38.9	ND	0.2	ND	ND	0.6
393	MEDIAN	463	750	52.6	ND	ND	71.2	54	1.96	45.3	4.4	ND	ND	ND	ND	ND	ND
393	MIN	ND	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
394	COUNT	68	68	68	68	68	68	68	68	68	66	68	68	68	68	68	68
394	MAX	13	6.5	1.3	ND	ND	2.3	0.33	ND	0.31	ND	ND	ND	0.45	ND	ND	ND
394	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
394	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
395	COUNT	38	38	38	38	38	38	38	38	38	37	38	38	38	38	38	38
395	MAX	9514	10002	1665	2.7	ND	1307	507	20	314	42	683	ND	ND	ND	ND	ND
395	MEDIAN	1835.5	1412	110	ND	ND	190	120	ND	126.5	ND	ND	ND	ND	ND	ND	ND
395	MIN	780	770	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
397	COUNT	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28
397	MAX	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
397	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
397	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
398	COUNT	67	67	67	67	67	67	67	67	67	66	67	67	67	67	67	67
398	MAX	73	13	12	0.5	ND	17.6	2.2	0.6	1.6	0.99	0.55	0.14	0.12	ND	ND	0.06
398	MEDIAN	12.8	7.2	3.9	ND	ND	3.9	0.45	ND	0.3	0.465	ND	ND	ND	ND	ND	ND
398	MIN	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
399	COUNT	105	105	105	105	105	105	105	105	105	104	105	105	105	105	105	105
399	MAX	35	12	11	1.2	ND	14	1.1	0.3	1	1	0.51	ND	ND	ND	ND	0.2
399	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
399	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
404	COUNT	112	112	112	112	112	112	112	112	110	109	112	112	112	112	112	112
404	MIN	ND	ND	ND	ND	ND	98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
404	MAX	24	13	3.5	1.5	0.2	440	35	0.7	96	24	ND	41	16.5	13.6	ND	0.1
404	MEDIAN	7.3	4.84	ND	ND	ND	220.5	20.4	ND	44.5	8.9	ND	1.6	ND	ND	ND	ND
405	COUNT	113	113	113	113	113	113	113	113	113	111	113	113	113	113	113	113
405	MIN	ND	ND	ND	ND	ND	56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
405	MAX	50	8.2	24	ND	0.8	395	50	0.3	220	14	87	17	9.8	ND	ND	0.1
405	MEDIAN	21	4.1	3.2	ND	ND	124	23	ND	71	3.3	ND	0.1	ND	ND	ND	ND
413	COUNT	115	115	115	115	115	115	115	115	113	112	115	115	115	115	115	115
413	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
413	MAX	1385	1521	69.6	11	1.7	220	101	5.1	86.7	22	22	9285	55	ND	19	2.2
413	MEDIAN	62	80	10	ND	ND	25	4	ND	2.4	0.3	ND	0.7	ND	ND	ND	ND
418	COUNT	112	112	112	112	112	112	112	112	111	110	112	112	112	112	112	112
418	MIN	4.57	1.98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
418	MAX	12724	14000	520	11	6.5	810	580	38	911	330	28	2394	1.1	36	2.3	2.3
418	MEDIAN	1505	1250	110	ND	ND	270	81.55	ND	67	6.2	ND	ND	ND	ND	ND	ND
415	COUNT	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
415	MIN	800	800	640	ND	9.7	700	1800	84	60	ND	ND	ND	ND	ND	ND	ND
415	MAX	4300	4200	2500	1	65	2700	10000	510	490	42	50	1.5	ND	ND	32	4.7
415	MEDIAN	2100	1500	1300	ND	31	1500	3500	190	180	ND	ND	ND	ND	ND	6.5	ND
416	COUNT	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
416	MIN	48	100	5.1	ND	ND	46	16	0.8	4.6	1.6	ND	ND	ND	ND	ND	ND
416	MAX	600	1200	110	4.2	1.4	280	97	11	68	27	ND	0.2	ND	ND	0.3	0.7
416	MEDIAN	400	850	69	1.6	ND	130	78	7.9	41	12	ND	ND	ND	ND	ND	ND

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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
521	COUNT	80	80	80	80	80	80	80	80	78	77	80	80	80	80	80	80
521	MAX	160	740	36	51	ND	7.4	42	30	16	13	0.3	2.6	0.33	ND	ND	ND
521	MEDIAN	13.25	43.1	2.23	0.68	ND	ND	1.2	0.98	ND	ND	ND	ND	ND	ND	ND	ND
521	MIN	ND	0.18	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
522	COUNT	111	111	111	111	111	111	111	111	111	110	111	111	111	111	111	111
522	MAX	381	630	48	1.6	ND	33	55	18	36	12	0.4	ND	0.3	11	ND	ND
522	MEDIAN	59.4	167	9.7	0.24	ND	1.94	7.8	0.84	2.87	0.105	ND	ND	ND	ND	ND	ND
522	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
524	COUNT	64	64	64	64	64	64	64	64	64	63	64	64	64	64	64	64
524	MAX	ND	0.2	ND	ND	ND	0.2	ND	ND	0.58	ND	ND	ND	ND	ND	ND	ND
524	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
524	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
529	COUNT	99	99	99	99	99	99	99	99	99	98	99	99	99	99	99	99
529	MAX	1.06	4.9	0.36	0.43	ND	0.2	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
529	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
529	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
532	COUNT	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104
532	MAX	15	16.7	3.56	0.12	ND	8	1.04	0.3	0.46	0.96	0.23	ND	ND	ND	ND	ND
532	MEDIAN	1.15	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
532	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
534	COUNT	100	100	100	100	100	100	100	100	97	97	100	100	100	100	100	100
534	MAX	1.2	1.6	0.09	0.2	ND	2	1	0.4	ND	ND	0.37	ND	0.85	ND	ND	ND
534	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
534	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
540	COUNT	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
540	MAX	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
540	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
540	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
541	COUNT	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
541	MAX	0.1	ND	ND	ND	ND	2.7	0.3	0.1	ND	ND	ND	ND	ND	ND	ND	ND
541	MEDIAN	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
541	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
542	COUNT	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
542	MAX	ND	ND	ND	ND	ND	0.2	ND	1.2	1.8	ND	ND	ND	ND	ND	ND	ND
542	MEDIAN	ND	ND	ND	ND	ND	ND	ND	0.47	ND	ND	ND	ND	ND	ND	ND	ND
542	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
543	COUNT	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
543	MAX	1.8	1.36	1.8	ND	ND	8.5	17.4	ND	5.9	10	ND	0.94	1.18	1.8	ND	ND
543	MEDIAN	ND	0.2	ND	ND	ND	ND	3.69	ND	1.42	2.44	ND	ND	ND	ND	ND	ND
543	MIN	ND	ND	ND	ND	ND	ND	0.4	ND	0.3	ND	ND	ND	ND	ND	ND	ND
601	COUNT	66	66	66	66	66	66	66	66	62	62	66	66	66	66	66	66
601	MAX	2.1	6.3	0.42	0.54	ND	0.86	0.15	ND	ND	0.57	0.4	ND	0.94	ND	ND	ND
601	MEDIAN	ND	1.115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
601	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
602	COUNT	69	69	69	69	69	69	69	69	63	63	69	69	69	69	69	69
602	MAX	41	9.5	7.8	0.16	ND	90	6.1	ND	2.6	0.67	1.3	0.45	0.67	ND	ND	ND
602	MEDIAN	15	4.2	2.2	ND	ND	33	3.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
602	MIN	0.2	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
603	COUNT	64	64	64	64	64	64	64	64	61	61	64	64	64	64	64	64
603	MAX	3.9	3.8	0.17	ND	ND	2.7	0.32	ND	ND	ND	ND	ND	ND	ND	ND	ND
603	MEDIAN	0.445	0.6	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
603	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
604	COUNT	54	54	54	54	54	54	54	54	51	51	54	54	54	54	54	54
604	MAX	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	0.11	0.14	ND	ND	ND	ND
604	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
604	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
605	COUNT	46	46	46	46	46	46	46	46	43	43	46	46	46	46	46	46
605	MAX	0.1	ND	ND	ND	ND	1.8	0.1	ND	ND	ND	ND	ND	0.63	ND	ND	ND
605	MEDIAN	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
605	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
606	COUNT	113	113	113	113	113	113	113	113	105	105	113	113	113	113	113	113
606	MAX	50	23	22	0.35	ND	35	9.5	3.4	2.2	1.1	0.48	0.3	ND	ND	0.2	ND
606	MEDIAN	13	1.5	2.1	ND	ND	2.8	0.62	0.2	ND	ND	ND	ND	ND	ND	ND	ND
606	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
607	COUNT	111	111	111	111	111	111	111	111	106	106	111	111	111	111	111	111
607	MAX	71	50	21	0.2	ND	46	9.9	2.6	2.3	1	0.48	0.3	ND	ND	1.3	ND
607	MEDIAN	8.6	2.61	3.4	ND	ND	8	0.6	0.4	0.2	ND	ND	ND	ND	ND	ND	ND
607	MIN	ND	ND	0.4	ND	ND	1.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
608	COUNT	70	70	70	70	70	70	70	70	64	64	70	70	70	70	70	70
608	MAX	220	21	44	2.4	ND	140	7.32	6.6	3.2	1.46	0.51	0.2	ND	ND	ND	ND
608	MEDIAN	12.5	8.4	4.89	ND	ND	24.65	1.65	0.24	0.3	0.5	ND	ND	ND	ND	ND	ND
608	MIN	0.6	2	1.3	ND	ND	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
609	COUNT	49	49	49	49	49	49	49	49	43	43	49	49	49	49	49	49
609	MAX	25949	4664	319	2.3	28	480	356	16	1144	150	ND	ND	166	ND	0.65	16
609	MEDIAN	6700	2736	110	ND	ND	140	95	ND	470	ND	ND	ND	ND	ND	ND	ND
609	MIN	226	186	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
610	COUNT	61	61	61	61	61	61	61	61	53	53	61	61	59	59	61	61
610	MAX	1200	182	250	0.3	68	1300	139.6	0.7	29	2	16	2.2	ND	ND	9.3	1.5
610	MEDIAN	211	65	99	ND	21	340	48	ND	7.8	ND	2.4	ND	ND	ND	ND	ND
610	MIN	38	9.7	19	ND	ND	54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
611	COUNT	55	55	55	55	55	55	55	55	52	52	55	55	55	55	55	55
611	MAX	9.9	23	1.3	0.12	0.26	6.5	5.1	0.4	ND	ND	0.14	ND	0.45	ND	ND	ND
611	MEDIAN	ND	2.3	ND	ND	ND	0.6	0.38	ND	ND	ND	ND	ND	ND	ND	ND	ND
611	MIN	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
612	COUNT	70	70	70	70	70	70	70	70	62	62	70	70	70	70	70	70
612	MAX	2900	350	710	150	4.4	2700	310	120	33	2.4	86	2.1	ND	ND	4	3.3
612	MEDIAN	532.5	150	153.5	ND	ND	874	140	3.95	ND	ND	9.95	ND	ND	ND	ND	ND
612	MIN	4.66	ND	1.5	ND	ND	9.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
613	COUNT	73	73	73	73	73	73	73	73	65	65	73	73	73	73	73	73
613	MAX	2200	250	480	18	25	2200	220	29	39	2	44	1.2	32	ND	6.2	2
613	MEDIAN	499	140	136	ND	8.1	670	119	4.2	4.3	ND	5.2	ND	ND	ND	ND	ND
613	MIN	101	47	46	ND	ND	259	53	ND	ND	ND	ND	ND	ND	ND	ND	ND
614	COUNT	35	35	35	35	35	35	35	35	34	34	35	35	35	35	35	35
614	MAX	0.85	0.95	0.2	ND	ND	0.54	1.3	0.1	ND	ND	ND	ND	0.34	ND	ND	ND
614	MEDIAN	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND
614	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
615	COUNT	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
615	MAX	3.9	1.7	0.3	0.1	ND	0.2	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND
615	MEDIAN	0.39	0.385	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
615	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
616	COUNT	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
616	MAX	0.54	0.1	ND	ND	ND	18	ND	ND	1.7	ND	ND	ND	1.5	ND	ND	ND
616	MEDIAN	0.1	ND	ND	ND	ND	0.38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
616	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
617	COUNT	53	53	53	53	53	53	53	53	52	52	53	53	53	53	53	53
617	MAX	4.5	0.45	0.13	ND	6.6	2.97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
617	MEDIAN	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
617	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
618	COUNT	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
618	MAX	0.2	6.1	0.2	ND	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
618	MEDIAN	ND	ND	ND	ND	ND	14.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
618	MIN	ND	ND	ND	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
619	COUNT	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31
619	MAX	9489	4040	623	3.3	ND	9.1	3	4.4	1659	17	193	0.1	68	ND	0.1	6.5
619	MEDIAN	1043	855	100	ND	ND	ND	ND	ND	54.55	ND	ND	ND	ND	ND	ND	ND
619	MIN	320	380	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
620	COUNT	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
620	MAX	76	40	ND	ND	ND	ND	ND	ND	0.26	0.28	ND	0.1	ND	ND	ND	ND
620	MEDIAN	3.125	0.135	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
620	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
621	COUNT	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
621	MAX	452	242	36	0.3	ND	296	81	ND	42	42	ND	7.5	ND	0.79	ND	0.3
621	MEDIAN	100	100	8.3	ND	ND	2.1	ND	ND	3.2	0.79	ND	ND	ND	ND	ND	ND
621	MIN	5.4	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
622	COUNT	63	63	63	63	63	63	63	63	62	62	63	63	63	63	63	63
622	MAX	438	242	35	2	ND	4.7	0.2	0.4	13	2.2	ND	0.3	ND	ND	ND	1
622	MEDIAN	102	93.4	6.78	ND	ND	1.57	ND	ND	1.55	ND	ND	ND	ND	ND	ND	ND
622	MIN	12	42.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
623	COUNT	29	29	29	29	29	29	29	29	28	28	29	29	29	29	29	29
623	MAX	180	78	12	ND	ND	2.57	0.08	0.97	2.9	1.3	ND	0.2	2.4	ND	ND	0.1
623	MEDIAN	52.9	36	2.5	ND	ND	1.4	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND
623	MIN	26	18	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
624	COUNT	30	30	30	30	30	30	30	30	28	28	30	30	30	30	30	30
624	MAX	273	94	19	0.1	0.52	4.8	0.06	ND	5.7	2.7	ND	0.8	3.3	ND	ND	0.2
624	MEDIAN	76.3	46.5	4.68	ND	ND	2.925	ND	ND	1.15	0.305	ND	ND	ND	ND	ND	ND
624	MIN	23	19	2.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
625	COUNT	118	118	118	118	118	118	118	118	117	116	118	118	118	118	118	118
625	MAX	75.2	7.8	3.53	ND	0.17	72	194	63	22	28	4.86	0.73	13.8	11	ND	0.1
625	MEDIAN	ND	3.47	ND	ND	ND	8.2	31.1	0.54	6.9	13	ND	ND	ND	ND	ND	ND
625	MIN	ND	ND	ND	ND	ND	ND	0.1	ND	ND	0.24	ND	ND	ND	ND	ND	ND
626	COUNT	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
626	MAX	1.1	0.2	ND	ND	ND	2.6	0.8	ND	ND	0.7	ND	0.2	ND	ND	ND	ND
626	MEDIAN	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
626	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	Statistical Measure	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Chloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride	Freon 113	Freon 123a	Methylene Chloride	Chloroform	Dichlorodifluoromethane (Freon 12)	Trichlorofluoromethane (Freon 11)	1,1,2-Trichloroethane	1,2-Dichloroethane
627	COUNT	55	55	55	55	55	55	55	55	53	53	55	55	55	55	55	55
627	MAX	2.3	7.8	1.9	ND	1.23	68	16	0.5	15	28	ND	2.6	0.23	ND	ND	2.9
627	MEDIAN	0.3	0.31	ND	ND	0.6	32	7.3	ND	3	2.38	ND	1	ND	ND	ND	ND
627	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
628	COUNT	38	38	38	38	38	38	38	38	36	36	38	38	38	38	38	38
628	MAX	1.4	1.24	0.63	ND	ND	6.9	9.2	1.7	0.51	1.58	0.13	ND	0.45	ND	ND	ND
628	MEDIAN	ND	0.165	ND	ND	ND	0.9	1.85	ND	ND	ND	ND	ND	ND	ND	ND	ND
628	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
629	COUNT	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
629	MAX	ND	ND	ND	ND	ND	0.28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
629	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
629	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
630	COUNT	36	36	36	36	36	36	36	36	35	35	36	36	36	36	36	36
630	MAX	15	1.4	4.2	ND	ND	32	11.3	ND	ND	ND	0.48	ND	ND	ND	ND	ND
630	MEDIAN	6.5	0.645	1.215	ND	ND	13.15	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND
630	MIN	0.8	ND	ND	ND	ND	1.4	0.65	ND	ND	ND	ND	ND	ND	ND	ND	ND
631	COUNT	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
631	MAX	1.1	0.26	ND	ND	ND	7.2	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
631	MEDIAN	0.2	ND	ND	ND	ND	2.435	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
631	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
632	COUNT	49	49	49	49	49	49	49	49	47	47	49	49	49	49	49	49
632	MAX	119	2.4	5	ND	ND	51.7	0.2	ND	0.79	ND	0.9	0.2	ND	ND	ND	ND
632	MEDIAN	29.7	0.5	0.59	ND	ND	24.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
632	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
107A	COUNT	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
107A	MAX	1.14	0.48	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
107A	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
107A	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
140R	COUNT	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
140R	MAX	220	830	65	4.1	ND	9.7	30	8.4	26	12	3.11	ND	ND	ND	ND	0.1
140R	MEDIAN	78	130	14	1.05	ND	4.815	5.2	1.05	12	2.7	ND	ND	ND	ND	ND	ND
140R	MIN	32.3	41.5	3.83	ND	ND	3.4	1.45	ND	ND	ND	ND	ND	ND	ND	ND	ND
P04	COUNT	28	28	28	28	28	28	28	28	28	26	28	28	28	28	28	28
P04	MAX	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P04	MEDIAN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P04	MIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Statistical Summary of Groundwater Chemistry Data
Former IBM Owego Site, 1993-2018

		Concentrations in micrograms per liter (ug/L)															
Well Identifier	**Statistical Measure**	**1,1,1-Trichloroethane**	**1,1-Dichloroethane**	**1,1-Dichloroethene**	**Chloroethane**	**Tetrachloroethene**	**Trichloroethene**	**cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Freon 113**	**Freon 123a**	**Methylene Chloride**	**Chloroform**	**Dichlorodifluoromethane (Freon 12)**	**Trichlorofluoromethane (Freon 11)**	**1,1,2-Trichloroethane**	**1,2-Dichloroethane**
P08	COUNT	36	36	36	36	36	36	36	36	34	34	36	36	36	36	36	36
P08	MAX	12000	2200	2300	1.5	0.6	0.9	0.6	0.2	530	30	ND	1	0.1	6.7	ND	1
P08	MEDIAN	606.5	690.5	13	ND	ND	ND	ND	ND	15	2.45	ND	ND	ND	ND	ND	ND
P08	MIN	31	96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P11	COUNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
P11	MAX	3500	900	97	0.5	0.55	0.65	ND	ND	53	8.8	1.3	0.5	28	ND	ND	0.1
P11	MEDIAN	71.5	74.7	2.1	ND	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND
P11	MIN	9.7	6.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key:

COUNT = Sample Count (including duplicate samples)
MAXIMUM = Maximum Concentration (micrograms per liter)
MEDIAN = Median Concentration (micrograms per liter)
MINIMUM = Minimum Concentration (micrograms per liter)
ND = Not Detected

APPENDIX H

Quality Control Analytical Chemistry Data for Environmental Blanks

January 1, 2018 – December 31, 2018

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK
Sample Description		WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND
Sample Date		02/26/2018	02/27/2018	02/28/2018	03/01/2018	06/04/2018	06/06/2018
Laboratory Sample I.D.		9483436	9483454	9485202	9485213	9649942	9649960
Parameter	**Units**						
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	0.3 J	0.3 J	0.3 J	0.2 J	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	0.2 J	0.2 J	0.2 J	0.2 J	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK
Sample Description		WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND
Sample Date		06/07/2018	06/08/2018	07/16/2018	07/17/2018	07/18/2018	07/19/2018
Laboratory Sample I.D.		9649969	9651332	9715258	9715275	9715301	9714845
Parameter	**Units**						
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	0.2 J	0.1 J	0.1 J	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	0.2 J	0.2 J	0.2 J	0.1 J
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	0.4 J	0.3 J	0.3 J	0.2 J
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	0.1 J	1.2	1	1	1.1
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	EQ RINSE BLK	TRIP BLANK
Sample Description		WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	WTR LVL IND	2/26-3/1
Sample Date		11/27/2018	11/28/2018	12/03/2018	12/04/2018	12/05/2018	02/26/2018
Laboratory Sample I.D.		9917454	9917460	9928688	9928692	9928618	9483431
Parameter	**Units**						
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	0.5 J	0.4 J	0.4 J	0.4 J	0.4 J	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	0.09 J	0.08 J	0.2 J	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK
Sample Description		2/27-3/1	2/28-3/2	6/4-6/8	6/6-6/9	6/7-6/9	6/8-6/9
Sample Date		02/27/2018	02/28/2018	06/04/2018	06/06/2018	06/07/2018	06/08/2018
Laboratory Sample I.D.		9483452	9485189	9649940	9651310	9651322	9651252
Parameter	**Units**						
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK
Sample Description		7/16-7/20	7/17-7/20	7/18-7/20	7/19-7/20	11/27-11/29	11/27-11/29
Sample Date		07/16/2018	07/17/2018	07/18/2018	07/19/2018	11/27/2018	11/27/2018
Laboratory Sample I.D.		9715253	9715291	9714834	9714837	9917433	9917506
Parameter	**Units**						
Volatile Organics							
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks

Owego, New York

January 1, 2018 - December 31, 2018

Sample Location		TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK
Sample Description		12/3-12/6	12/4-12/6	12/5-12/6	12/5-12/7
Sample Date		12/03/2018	12/04/2018	12/05/2018	12/05/2018
Laboratory Sample I.D.		9928677	9928606	9928619	9930017
Parameter	**Units**				
Volatile Organics					
1,1,1-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROETHANE (EDC)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROETHANE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CHLOROFORM (TRICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (FREON 12)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
METHYLENE CHLORIDE (DICHLOROMETHANE)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHENE	ug/L	ND@0.5	ND@0.5	ND@0.5	0.2 J
TRICHLOROFLUOROMETHANE (FREON 11)	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE	ug/L	ND@0.5	ND@0.5	ND@0.5	ND@0.5

Quality Control Analytical Data for Environmental Blanks
Owego, New York
January 1, 2018 - December 31, 2018

Reporting Conventions

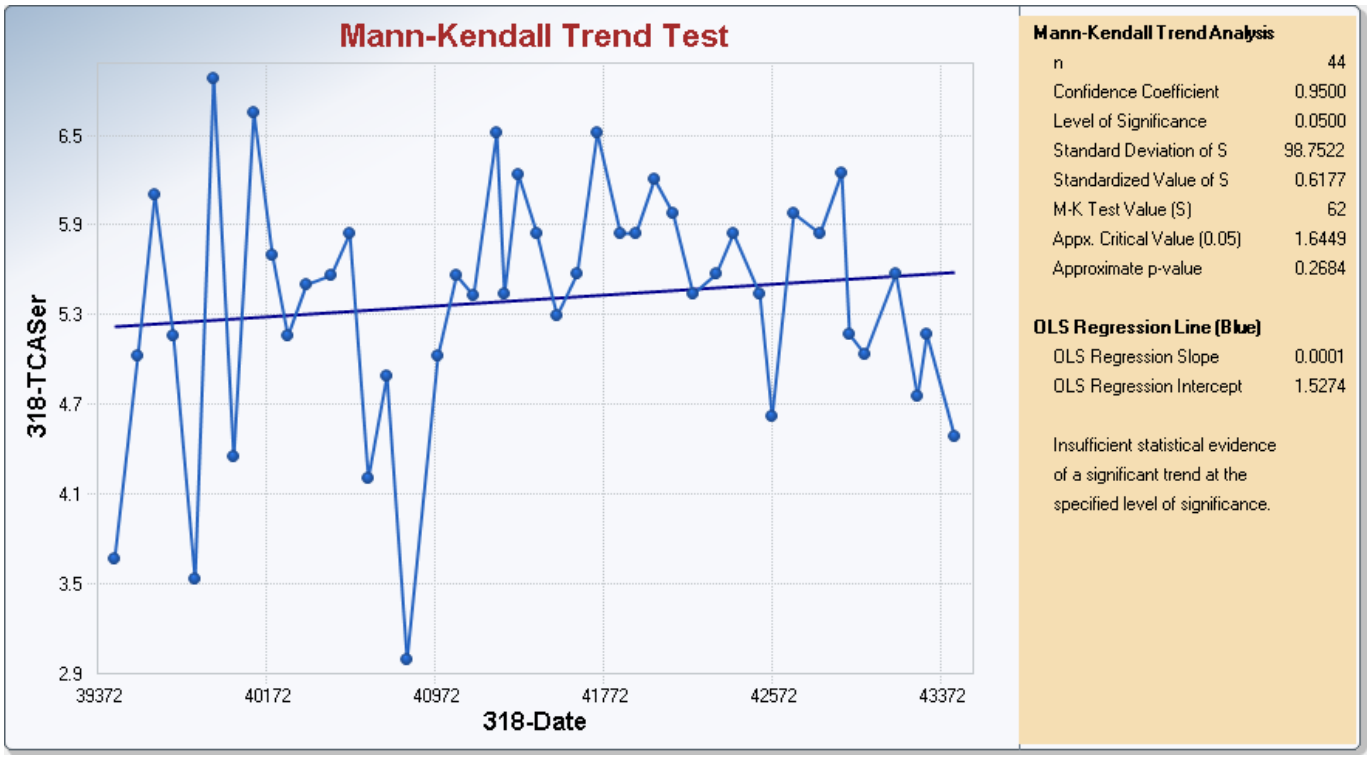
NA	Not Analyzed
ND@X	Not Detected at Detection Limit X

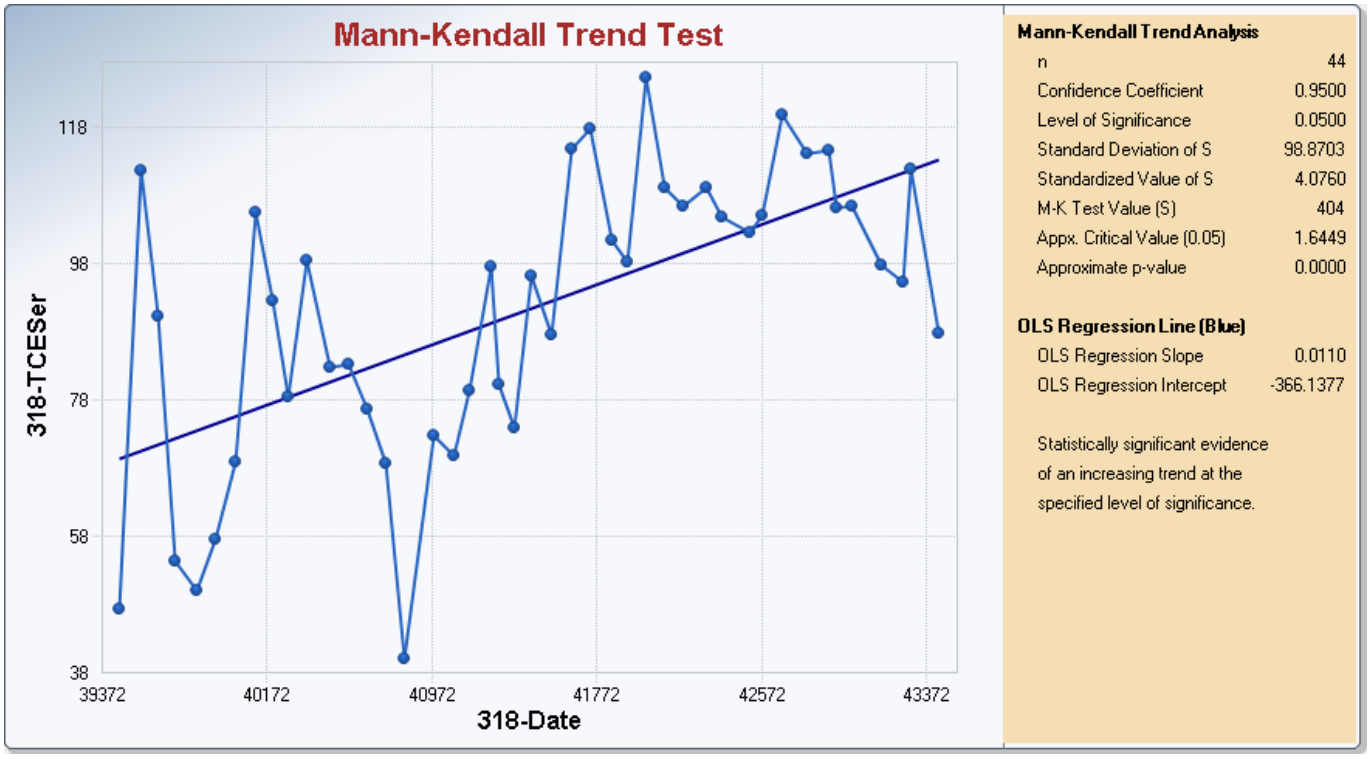
Code	Explanation
J	The value is estimated. In most cases, the result either (1) is greater than the method detection limit (MDL) and less than the limit of quantitation (LOQ), or (2) exceeds the upper limit of the calibration range of the analytical instrument.

APPENDIX I

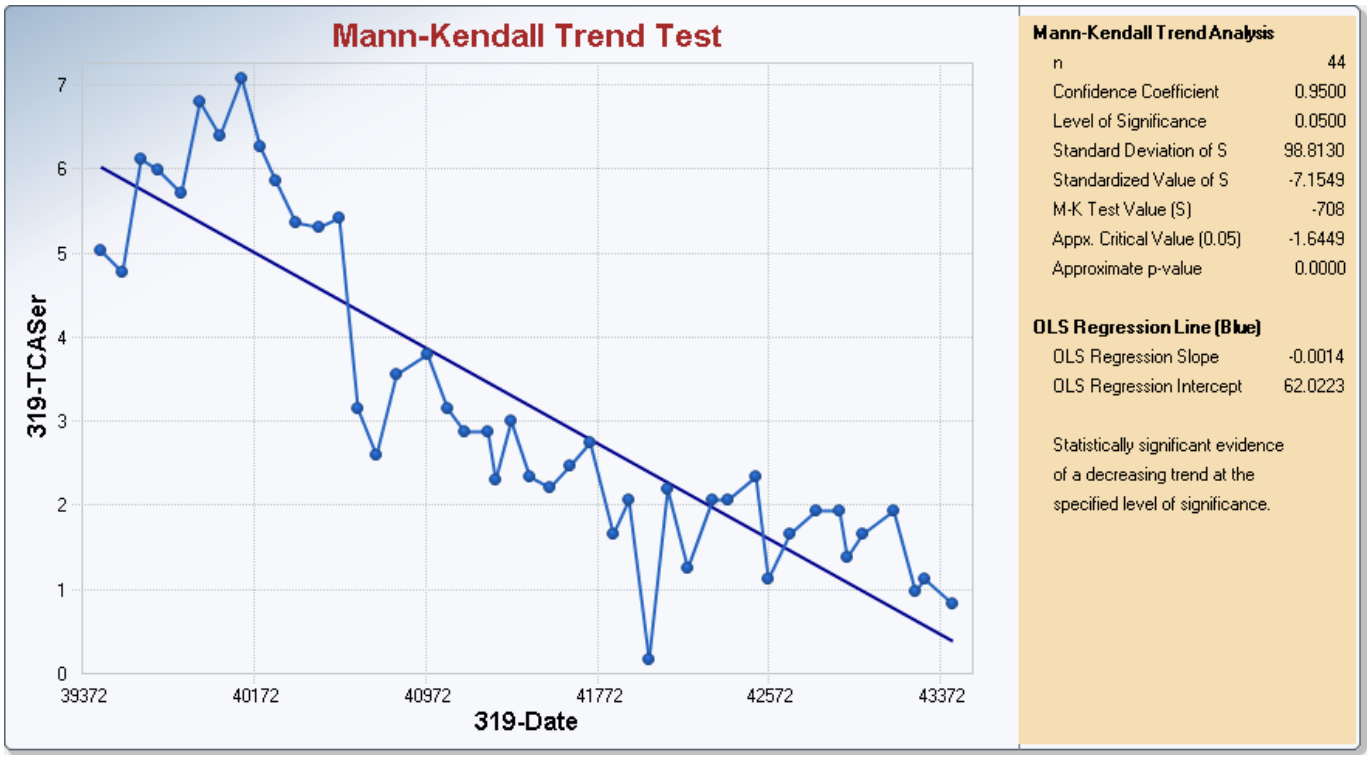
Mann-Kendall Trend Test Results from ProUCL v. 5.1

Well 318


Mann-Kendall Trend Test
318-TCASer
6.5
5.9
5.3
4.7
4.1
3.5
2.9
39372
40172
40972
41772
42572
43372
318-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.7522
Standardized Value of S 0.6177
M-K Test Value (S) 62
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.2684
OLS Regression Line (Blue)
OLS Regression Slope 0.0001
OLS Regression Intercept 1.5274
Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test
318-TCESer
118
98
78
58
38
39372
40172
40972
41772
42572
43372
318-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 4.0760
M-K Test Value (S) 404
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope 0.0110
OLS Regression Intercept -366.1377
Statistically significant evidence of an increasing trend at the specified level of significance.

Well 319



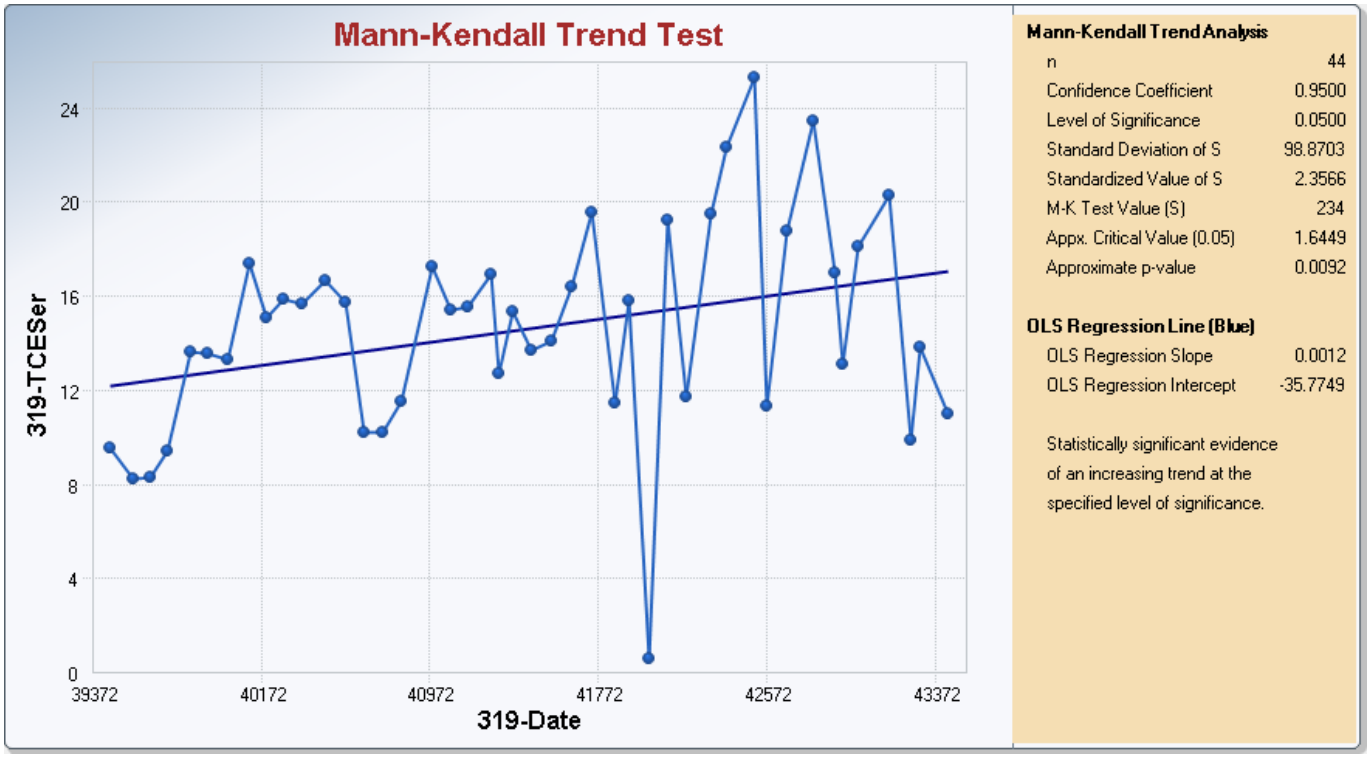
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8130
Standardized Value of S	-7.1549
M-K Test Value (S)	-708
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-0.0014
OLS Regression Intercept	62.0223

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

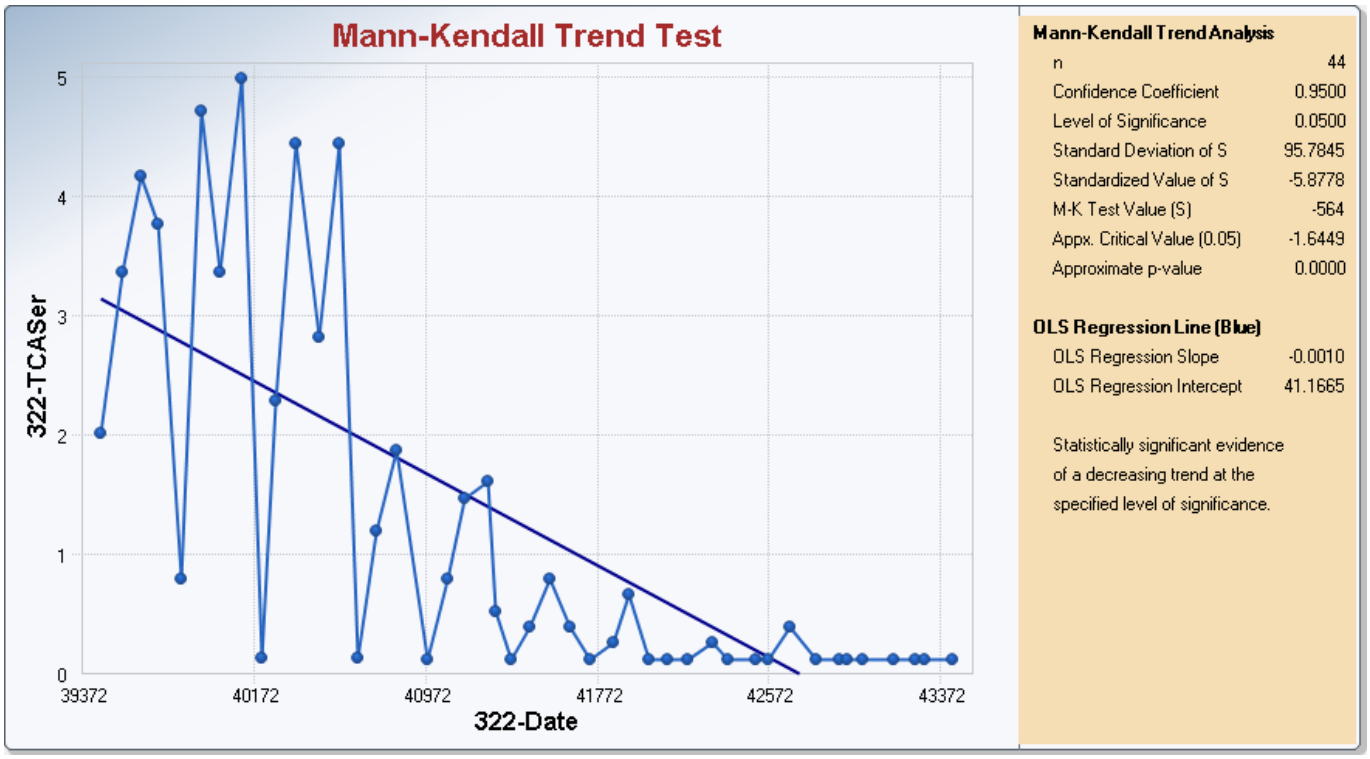
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8703
Standardized Value of S	2.3566
M-K Test Value (S)	234
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0092

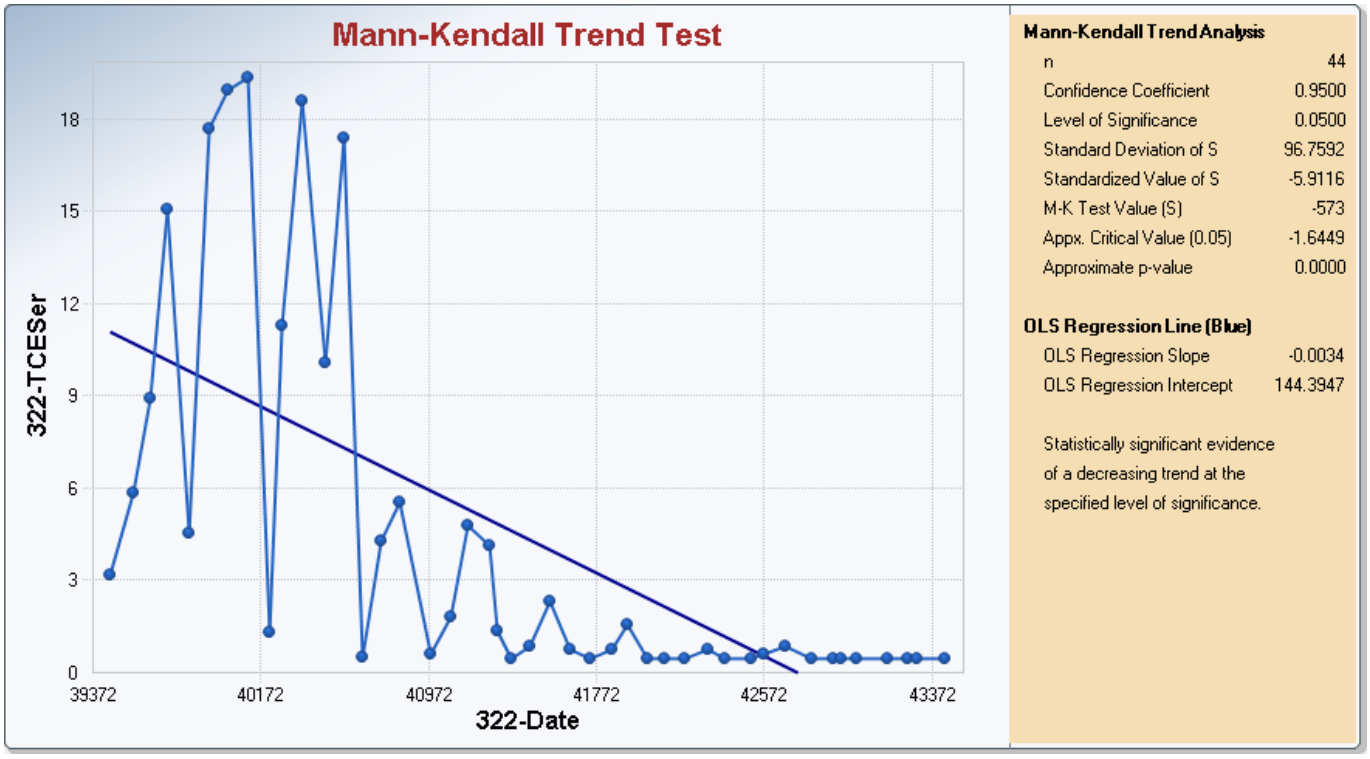
OLS Regression Line (Blue)

OLS Regression Slope	0.0012
OLS Regression Intercept	-35.7749

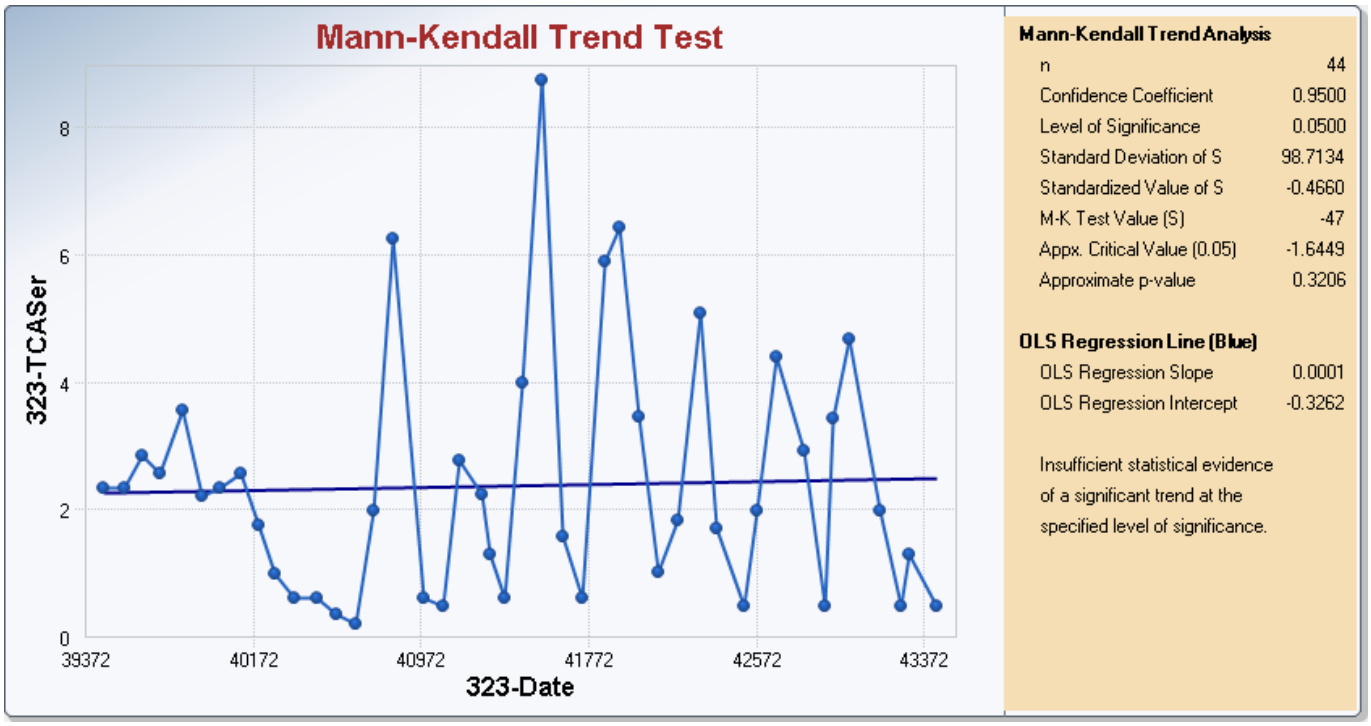
Statistically significant evidence of an increasing trend at the specified level of significance.

Well 322


Mann-Kendall Trend Test
322-TCASer
322-Date
0
1
2
3
4
5
39372
40172
40972
41772
42572
43372
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 95.7845
Standardized Value of S -5.8778
M-K Test Value (S) -564
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0010
OLS Regression Intercept 41.1665
Statistically significant evidence of a decreasing trend at the specified level of significance.


Mann-Kendall Trend Test
322-TCESer
322-Date
0
3
6
9
12
15
18
39372
40172
40972
41772
42572
43372
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 96.7592
Standardized Value of S -5.9116
M-K Test Value (S) -573
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0034
OLS Regression Intercept 144.3947
Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 323



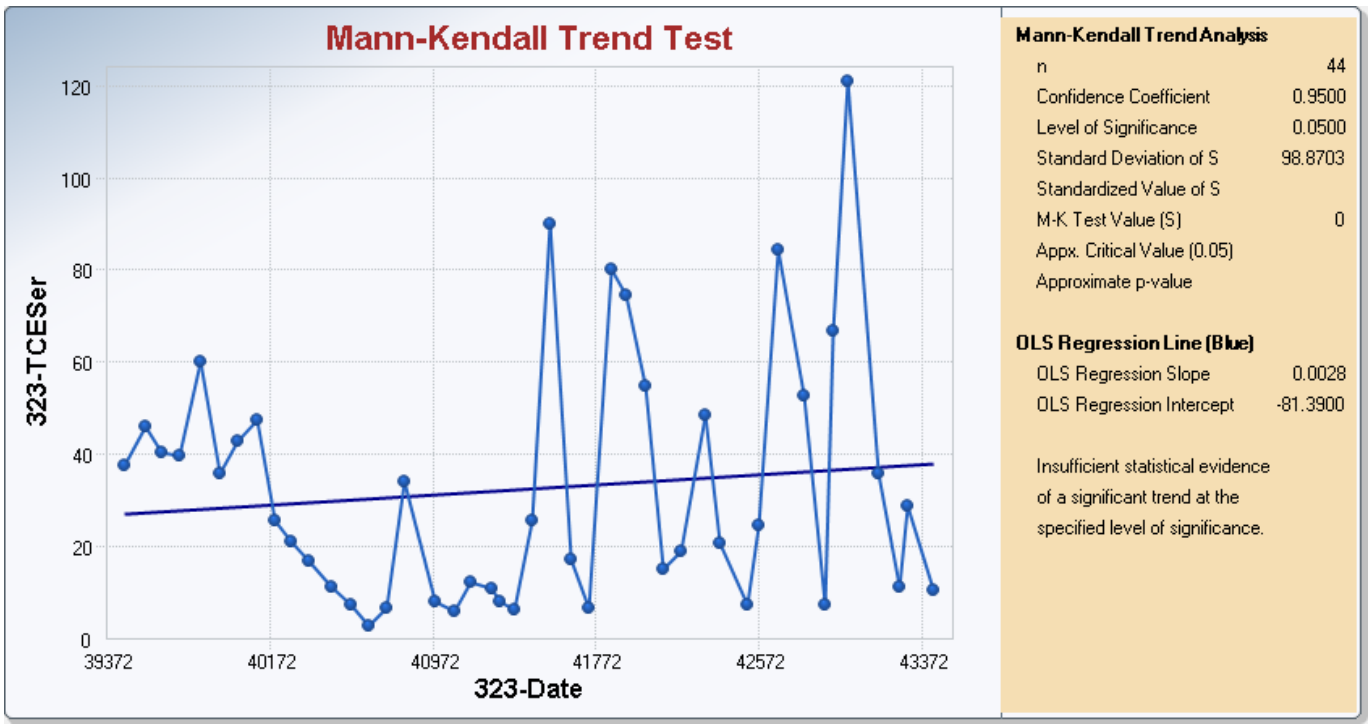
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.7134
Standardized Value of S	-0.4660
M-K Test Value (S)	-47
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.3206

OLS Regression Line (Blue)

OLS Regression Slope	0.0001
OLS Regression Intercept	-0.3262

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

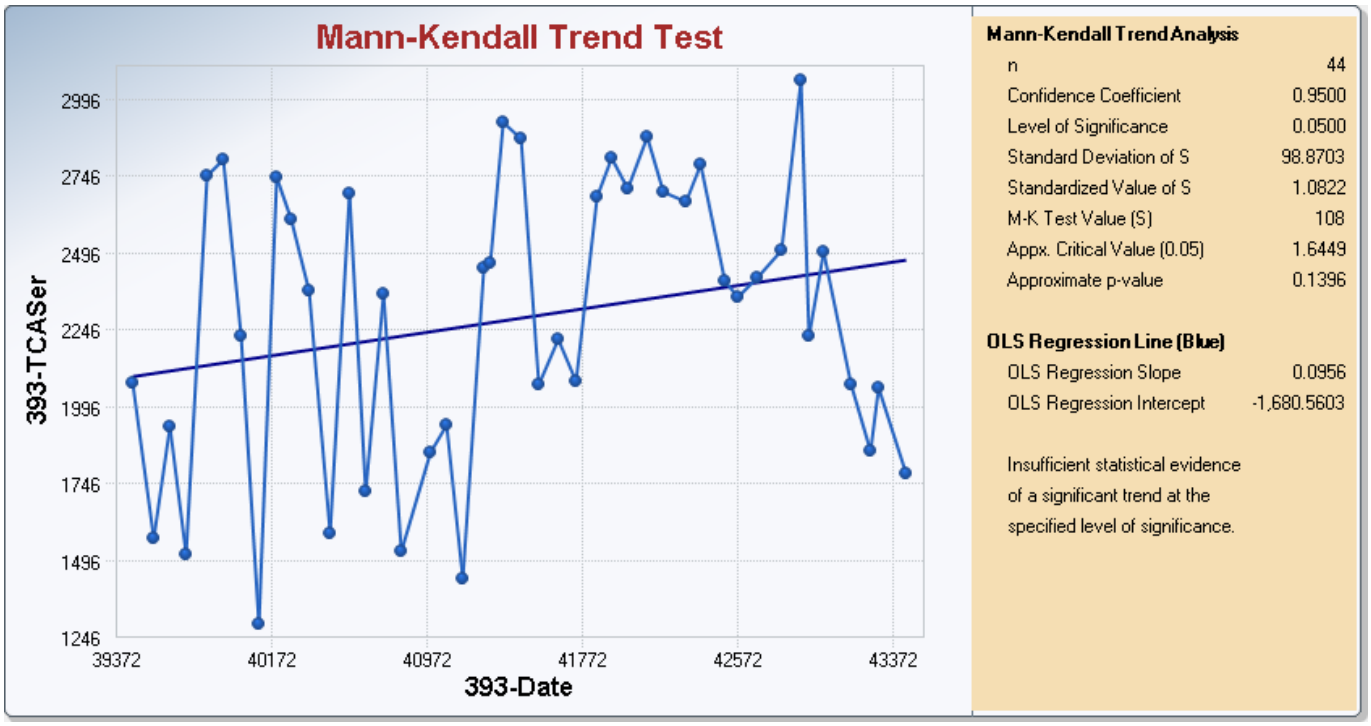
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8703
Standardized Value of S	
M-K Test Value (S)	0
Appx. Critical Value (0.05)	
Approximate p-value	

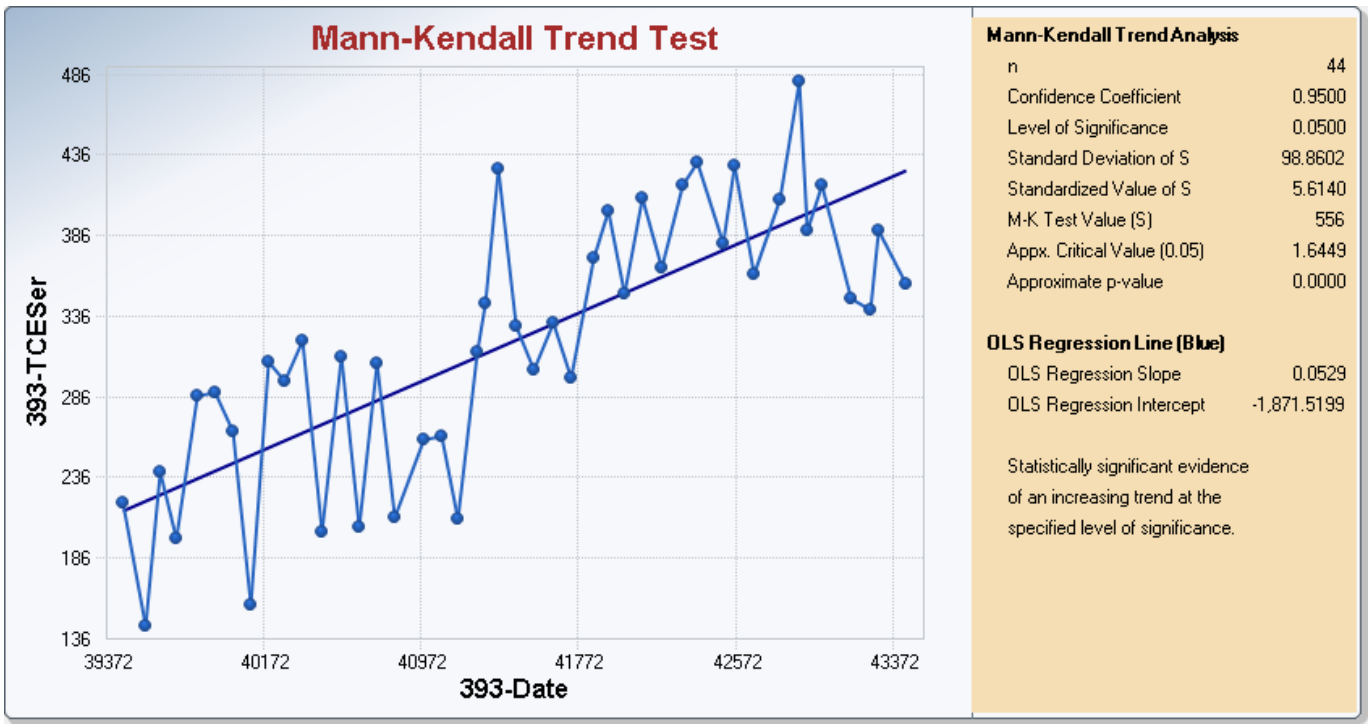
OLS Regression Line (Blue)

OLS Regression Slope	0.0028
OLS Regression Intercept	-81.3900

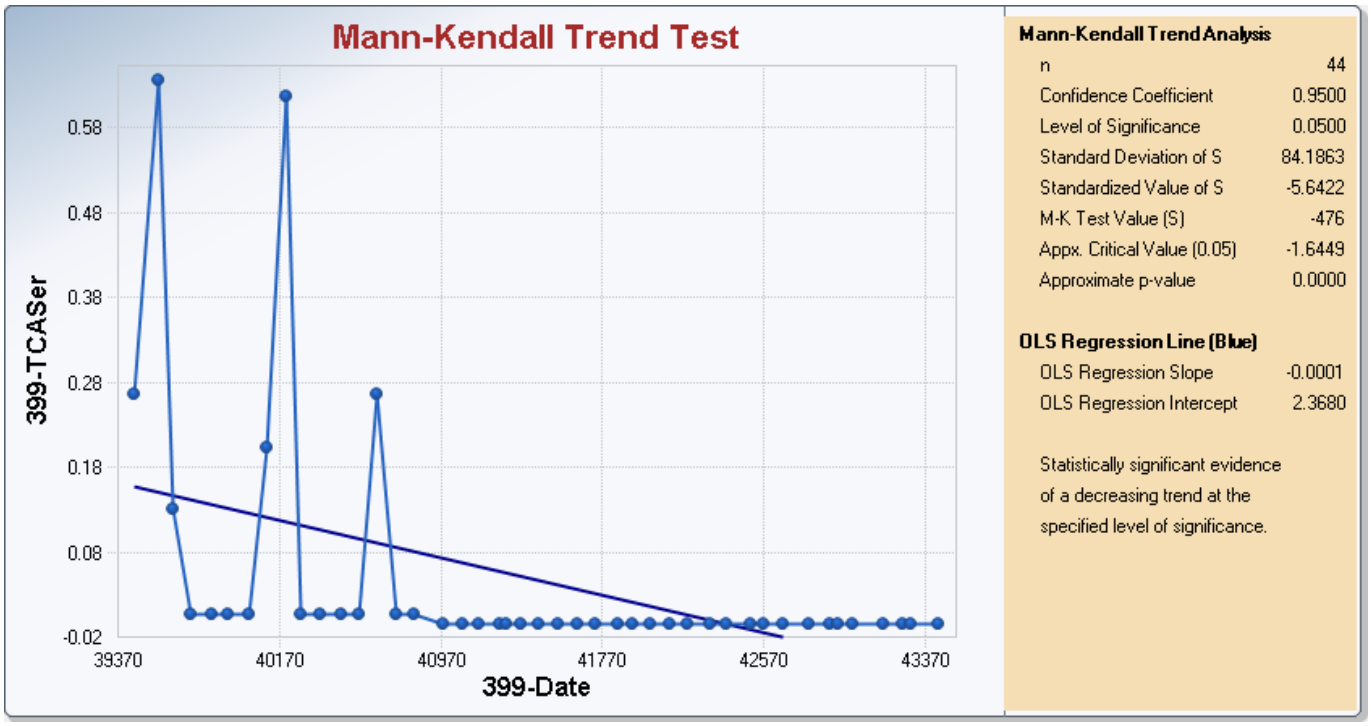
Insufficient statistical evidence of a significant trend at the specified level of significance.

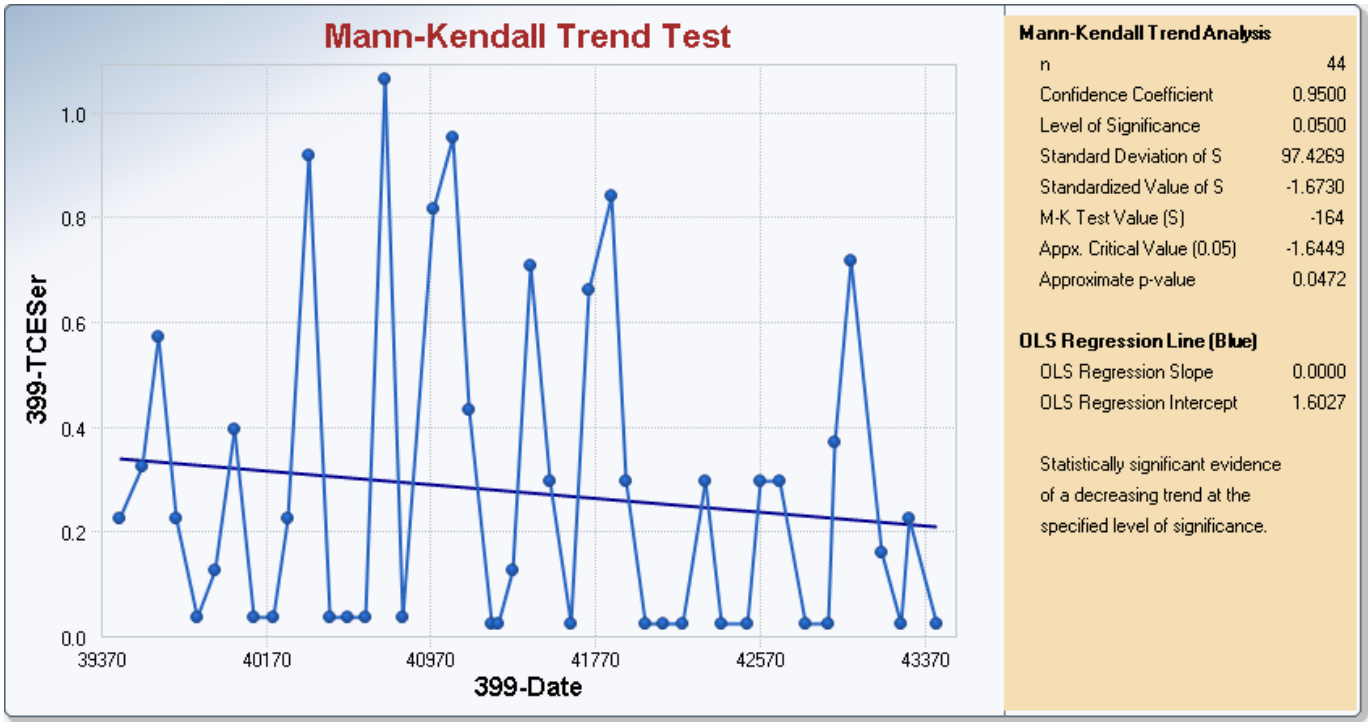
Well 393


Mann-Kendall Trend Test
393-TCASer
2996
2746
2496
2246
1996
1746
1496
1246
39372
40172
40972
41772
42572
43372
393-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 1.0822
M-K Test Value (S) 108
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.1396
OLS Regression Line (Blue)
OLS Regression Slope 0.0956
OLS Regression Intercept -1,680.5603
Insufficient statistical evidence of a significant trend at the specified level of significance.

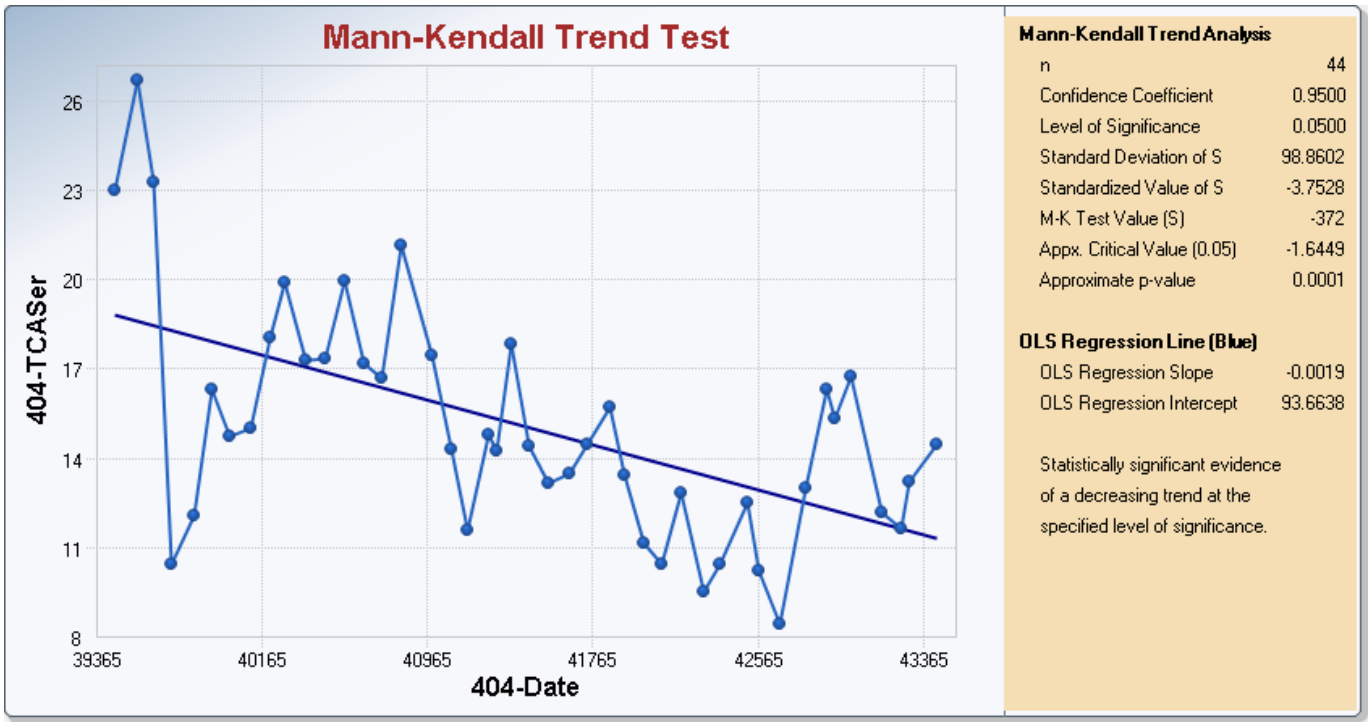

Mann-Kendall Trend Test
393-TCESer
486
436
386
336
286
236
186
136
39372
40172
40972
41772
42572
43372
393-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8602
Standardized Value of S 5.6140
M-K Test Value (S) 556
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope 0.0529
OLS Regression Intercept -1,871.5199
Statistically significant evidence of an increasing trend at the specified level of significance.

Well 399


Mann-Kendall Trend Test
399-TCASer
0.58
0.48
0.38
0.28
0.18
0.08
-0.02
39370
40170
40970
41770
42570
43370
399-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 84.1863
Standardized Value of S -5.6422
M-K Test Value (S) -476
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0001
OLS Regression Intercept 2.3680
Statistically significant evidence of a decreasing trend at the specified level of significance.


Mann-Kendall Trend Test
399-TCESer
1.0
0.8
0.6
0.4
0.2
0.0
39370
40170
40970
41770
42570
43370
399-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 97.4269
Standardized Value of S -1.6730
M-K Test Value (S) -164
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0472
OLS Regression Line (Blue)
OLS Regression Slope 0.0000
OLS Regression Intercept 1.6027
Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 404



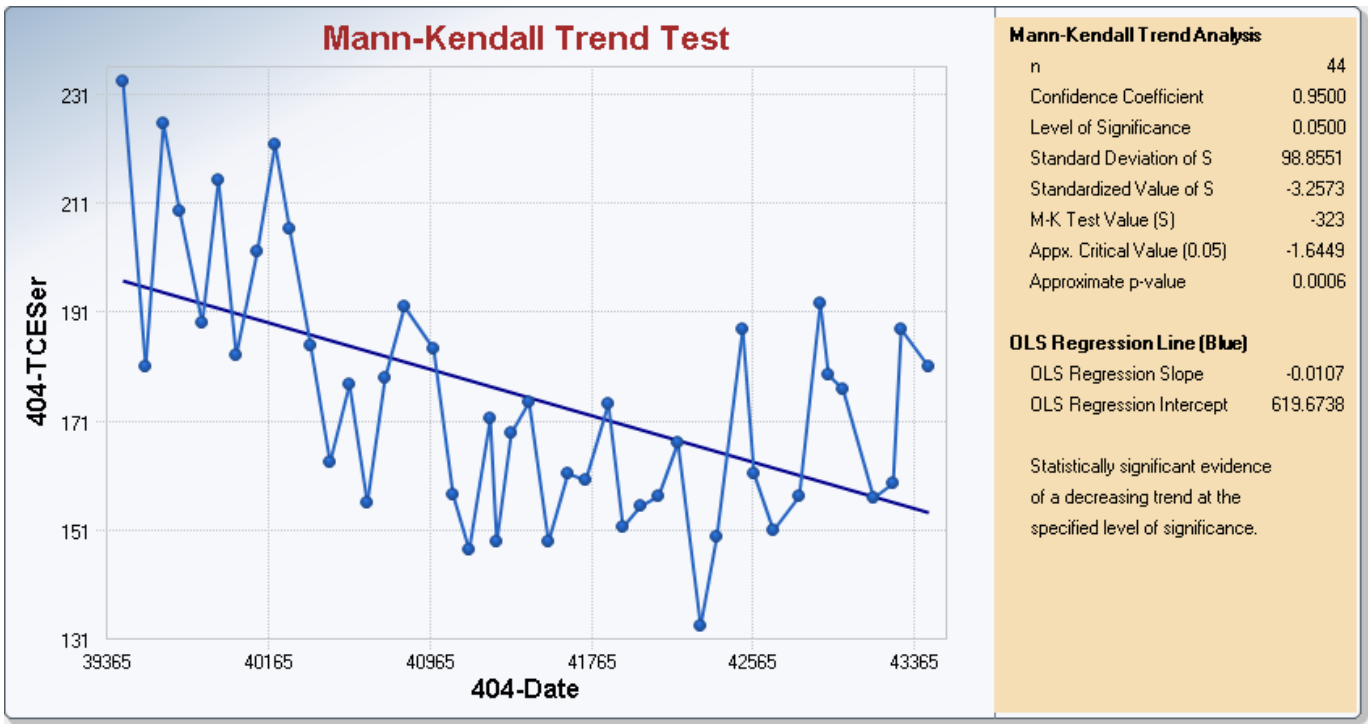
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8602
Standardized Value of S	-3.7528
M-K Test Value (S)	-372
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-0.0019
OLS Regression Intercept	93.6638

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

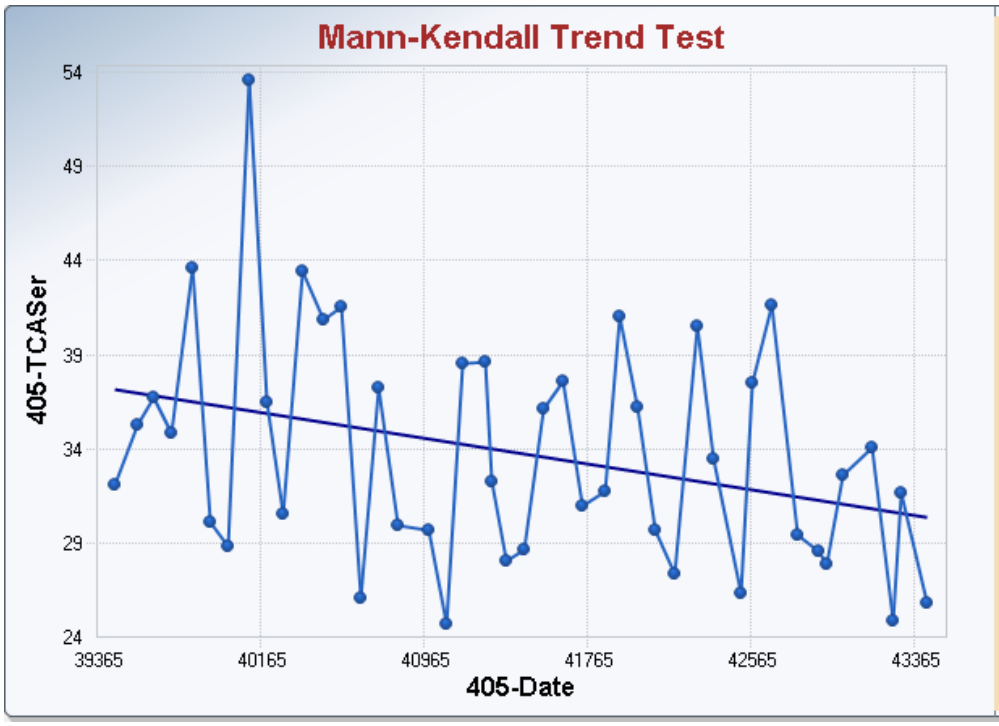
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8551
Standardized Value of S	-3.2573
M-K Test Value (S)	-323
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0006

OLS Regression Line (Blue)

OLS Regression Slope	-0.0107
OLS Regression Intercept	619.6738

Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 405



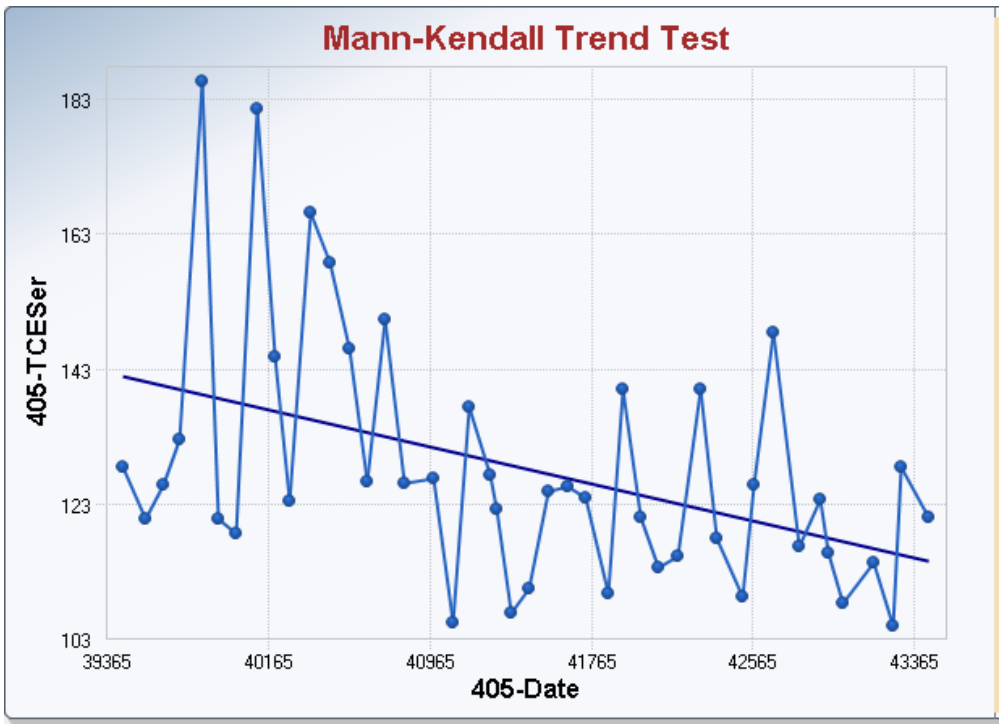
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8703
Standardized Value of S	-2.0734
M-K Test Value (S)	-206
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0191

OLS Regression Line (Blue)

OLS Regression Slope	-0.0017
OLS Regression Intercept	103.6912

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

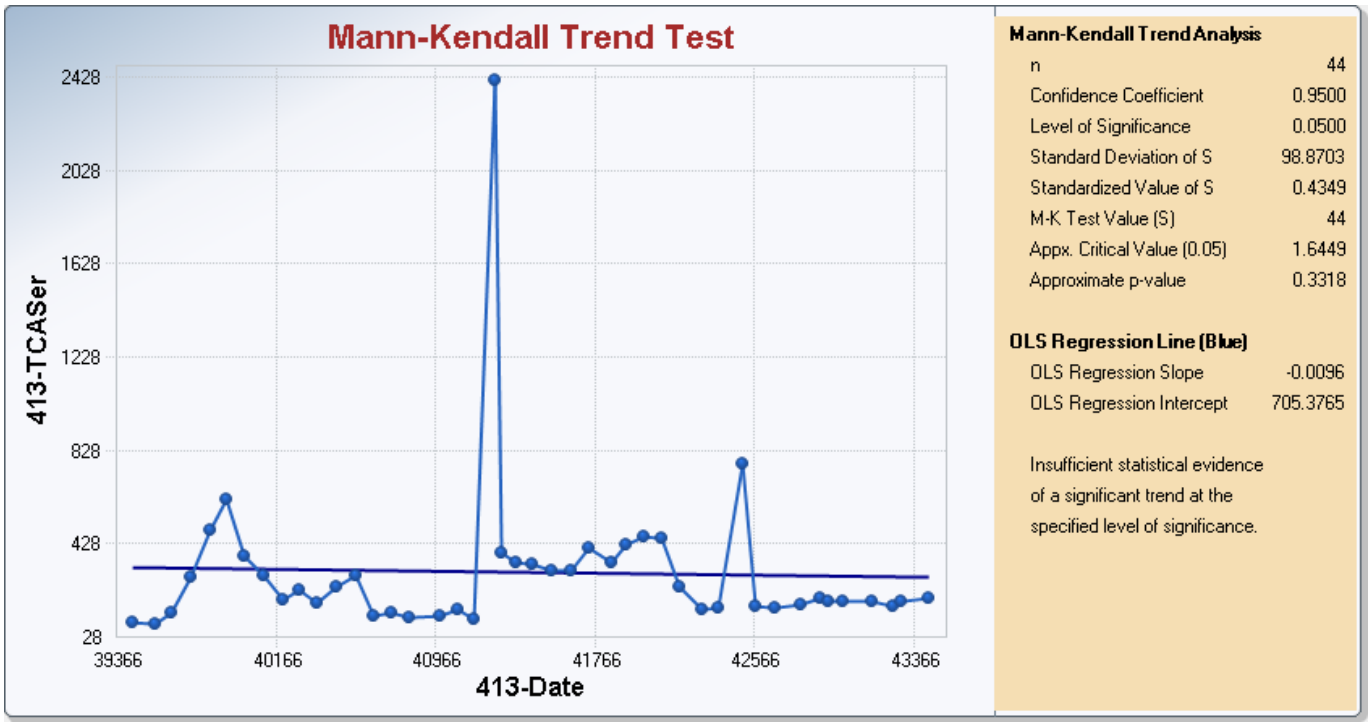
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8602
Standardized Value of S	-2.9436
M-K Test Value (S)	-292
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0016

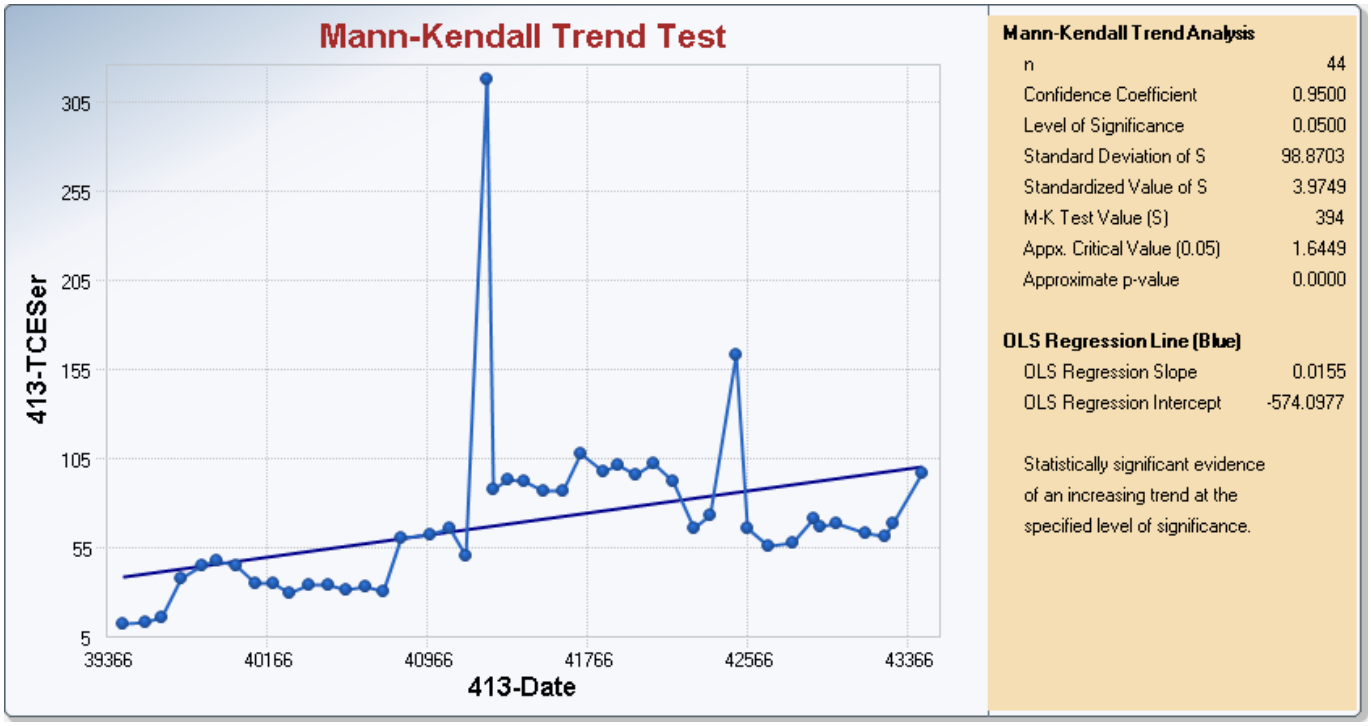
OLS Regression Line (Blue)

OLS Regression Slope	-0.0069
OLS Regression Intercept	412.3703

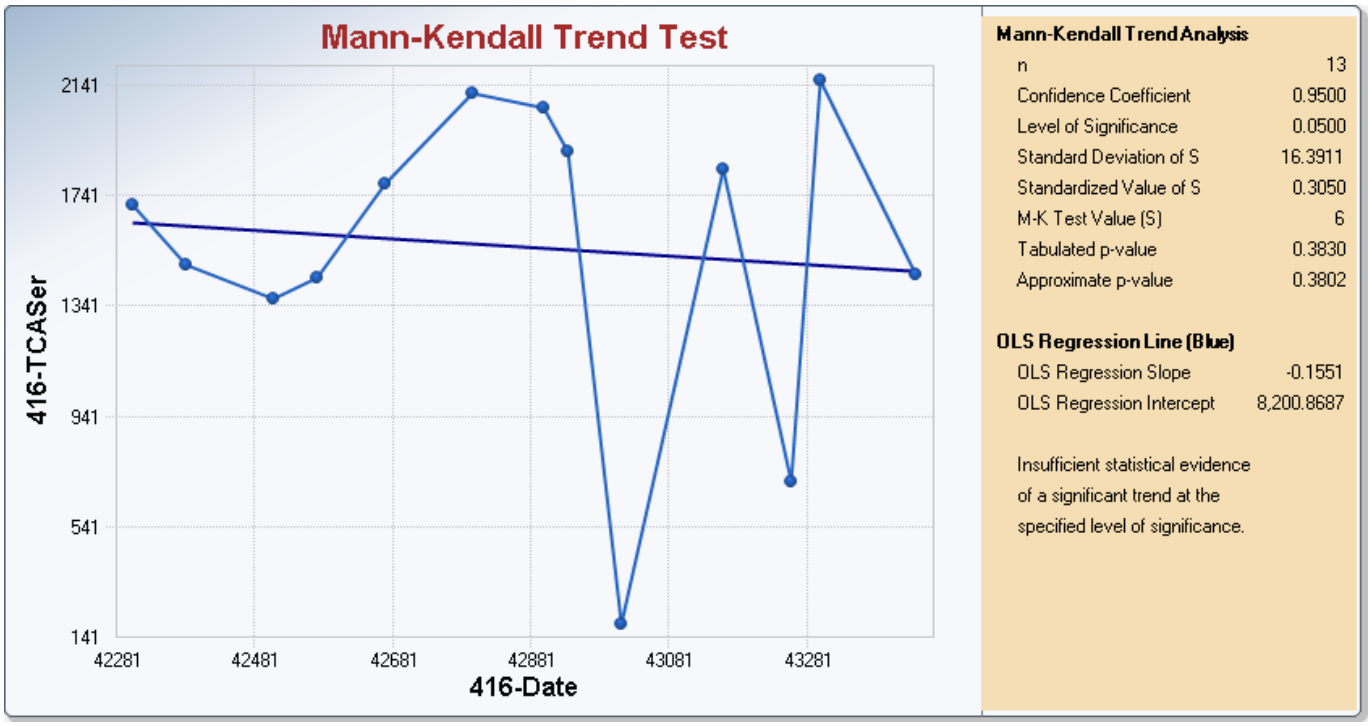
Statistically significant evidence of a decreasing trend at the specified level of significance.

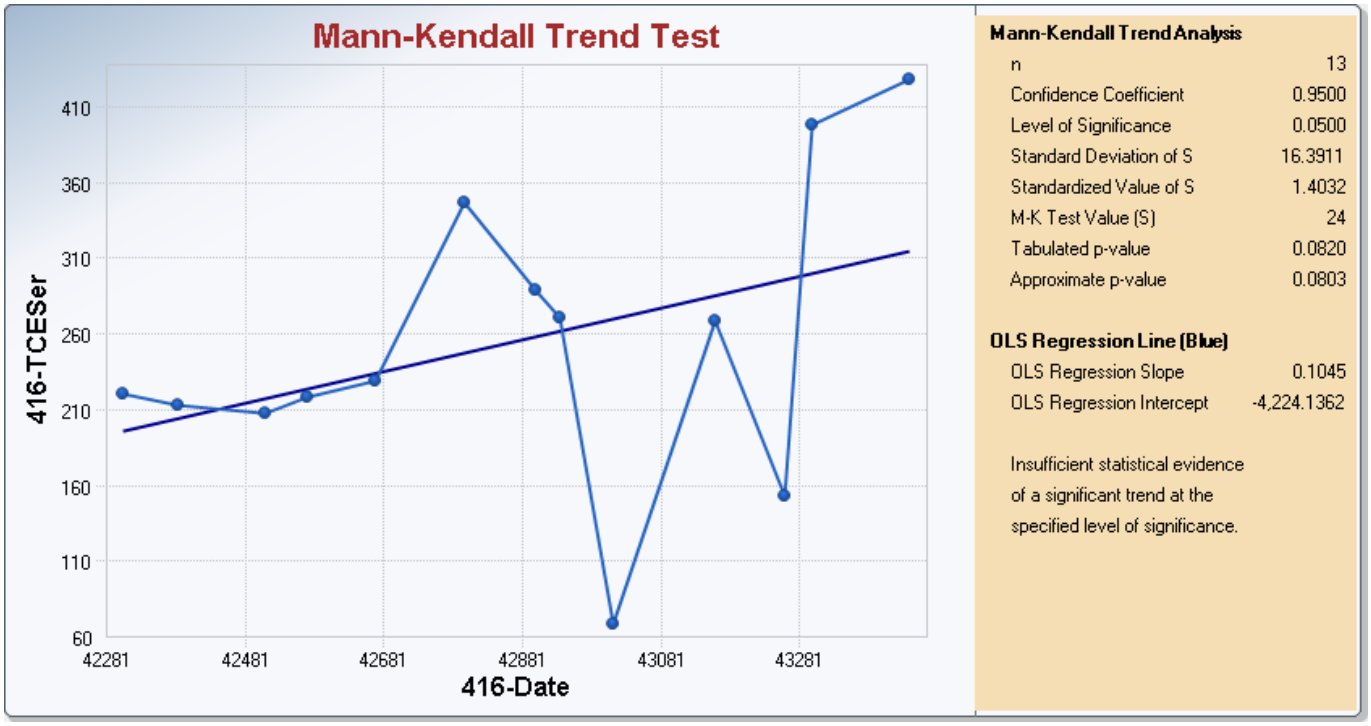
Well 413

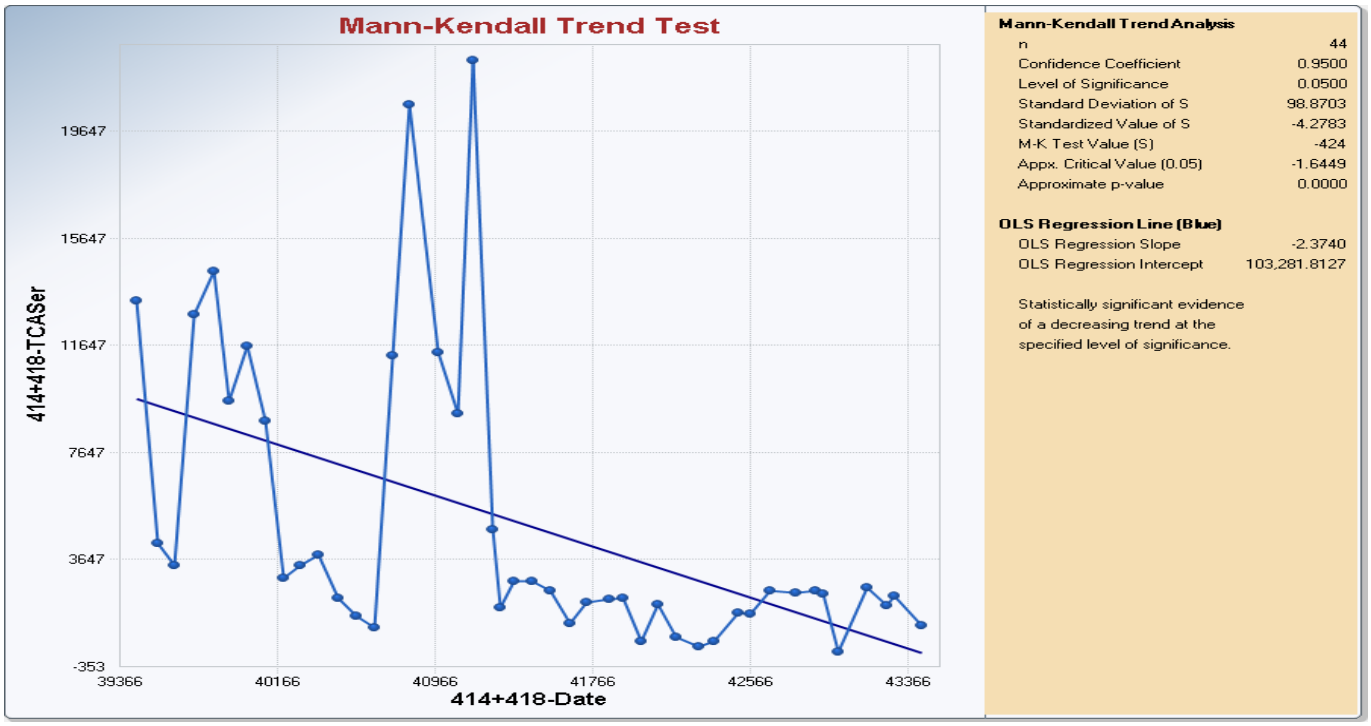

Mann-Kendall Trend Test
413-TCASer
2428
2028
1628
1228
828
428
28
39366
40166
40966
41766
42566
43366
413-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 0.4349
M-K Test Value (S) 44
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.3318
OLS Regression Line (Blue)
OLS Regression Slope -0.0096
OLS Regression Intercept 705.3765
Insufficient statistical evidence of a significant trend at the specified level of significance.

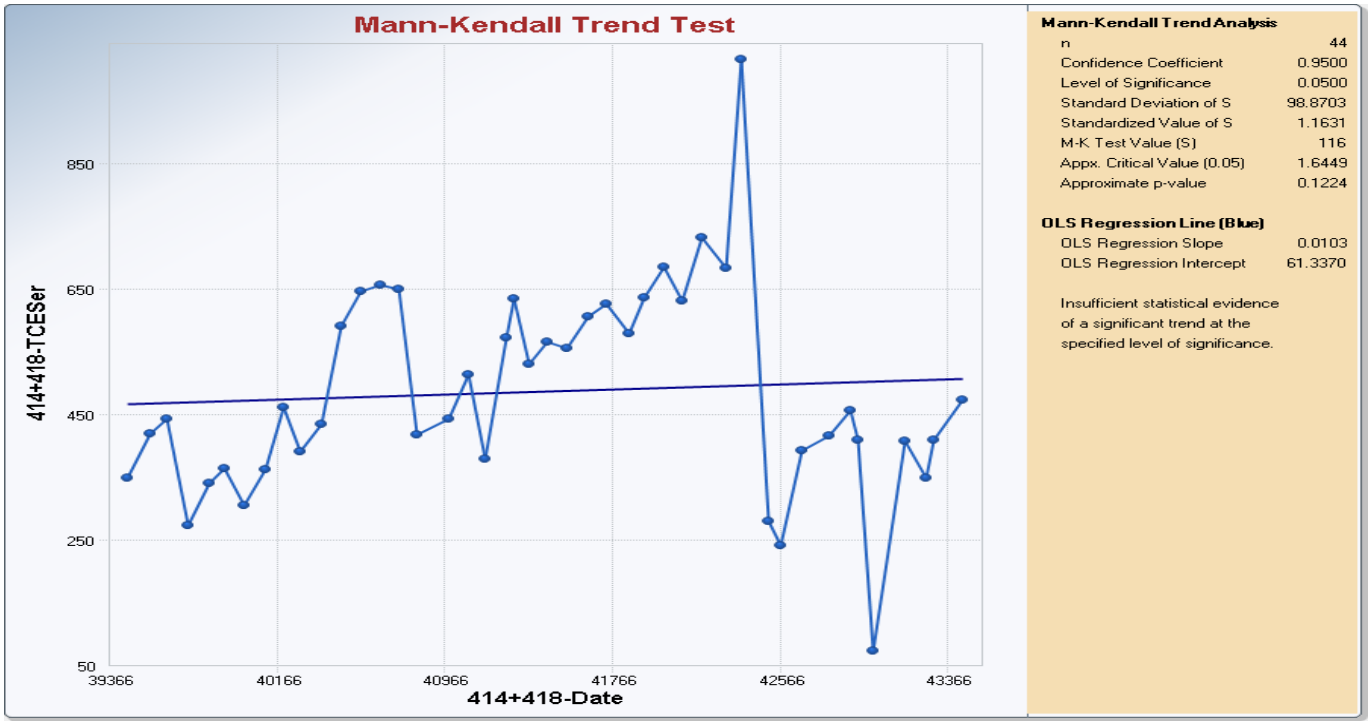

Mann-Kendall Trend Test
413-TCESer
305
255
205
155
105
55
5
39366
40166
40966
41766
42566
43366
413-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 3.9749
M-K Test Value (S) 394
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope 0.0155
OLS Regression Intercept -574.0977
Statistically significant evidence of an increasing trend at the specified level of significance.

Well 416

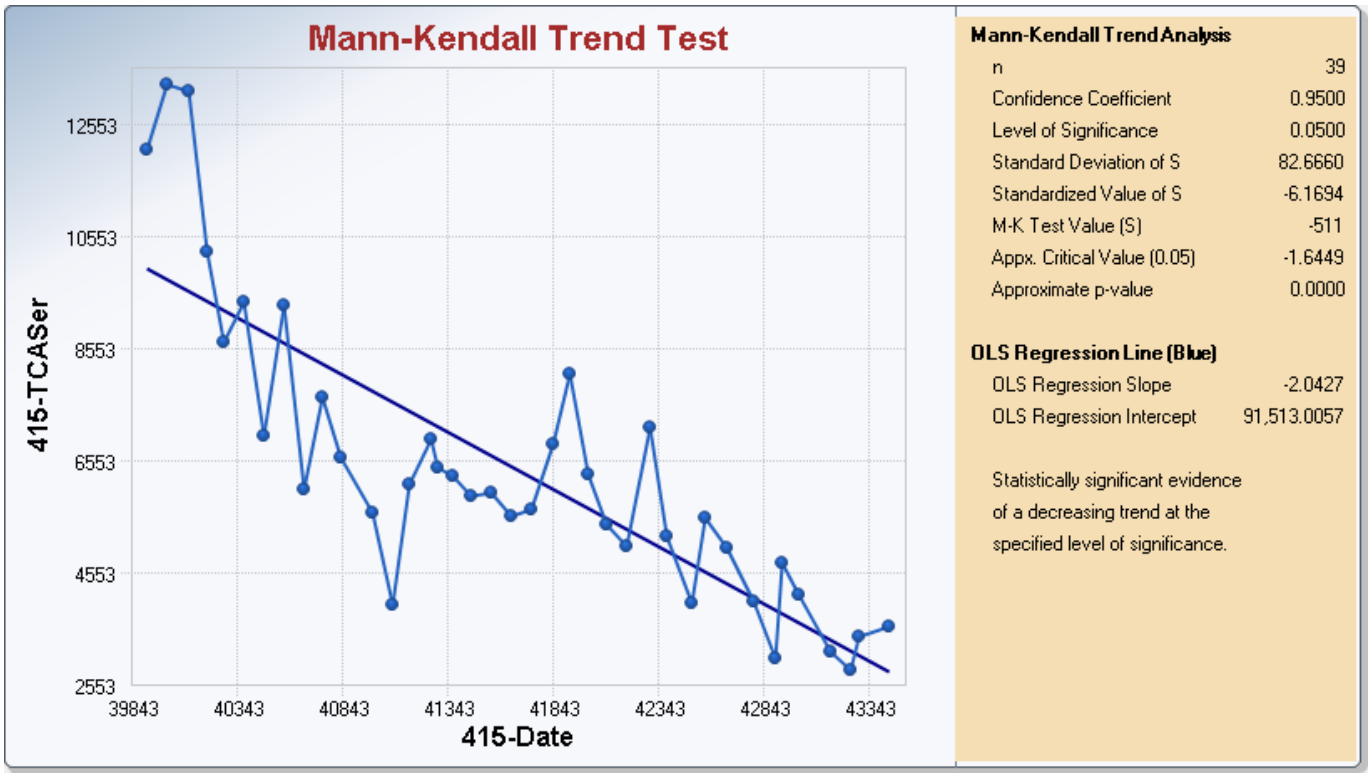

Mann-Kendall Trend Test
416-TCASer
2141
1741
1341
941
541
141
42281
42481
42681
42881
43081
43281
416-Date
Mann-Kendall Trend Analysis
n 13
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 16.3911
Standardized Value of S 0.3050
M-K Test Value (S) 6
Tabulated p-value 0.3830
Approximate p-value 0.3802
OLS Regression Line (Blue)
OLS Regression Slope -0.1551
OLS Regression Intercept 8,200.8687
Insufficient statistical evidence of a significant trend at the specified level of significance.

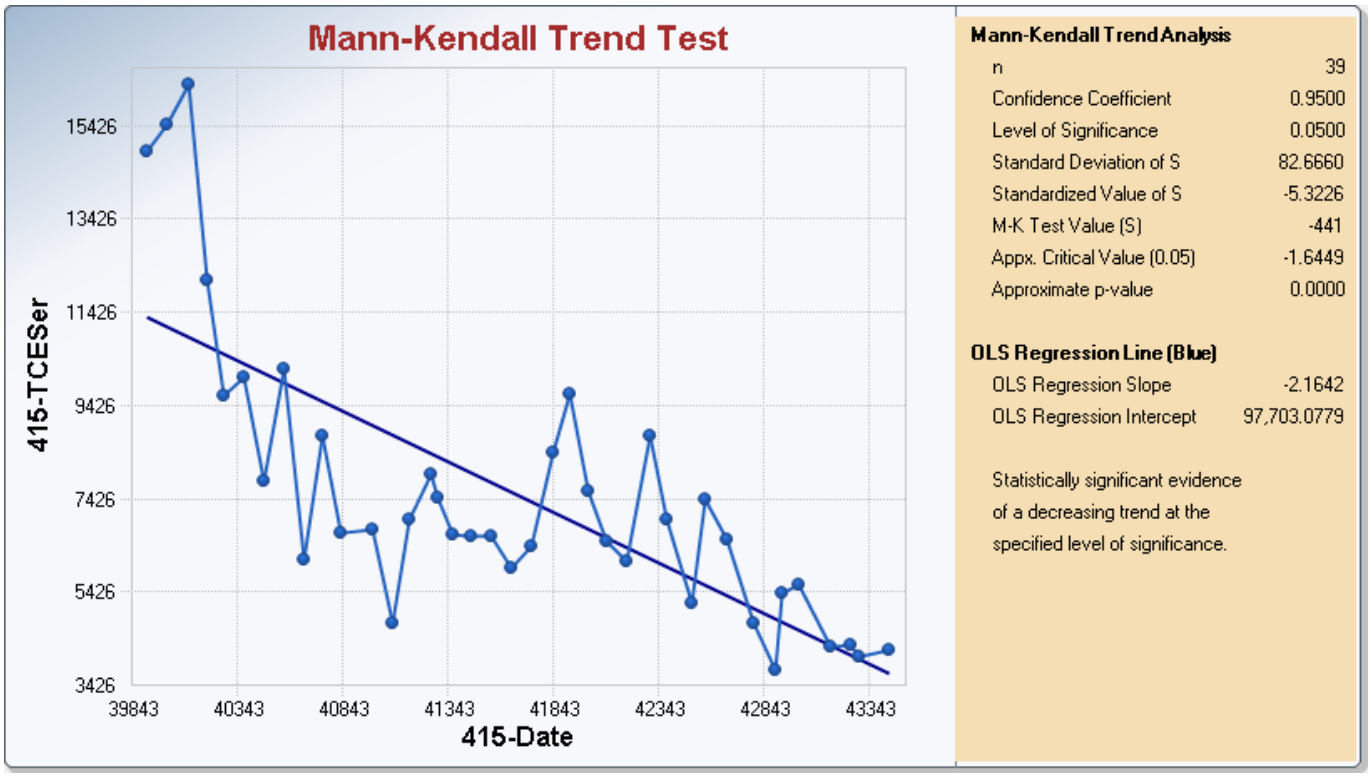

Mann-Kendall Trend Test
416-TCESer
410
360
310
260
210
160
110
60
42281
42481
42681
42881
43081
43281
416-Date
Mann-Kendall Trend Analysis
n 13
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 16.3911
Standardized Value of S 1.4032
M-K Test Value (S) 24
Tabulated p-value 0.0820
Approximate p-value 0.0803
OLS Regression Line (Blue)
OLS Regression Slope 0.1045
OLS Regression Intercept -4,224.1362
Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test
414+418-TCASer
19647
15647
11647
7647
3647
-353
39366
40166
40966
41766
42566
43366
414+418-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S -4.2783
M-K Test Value (S) -424
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -2.3740
OLS Regression Intercept 103,281.8127
Statistically significant evidence of a decreasing trend at the specified level of significance.

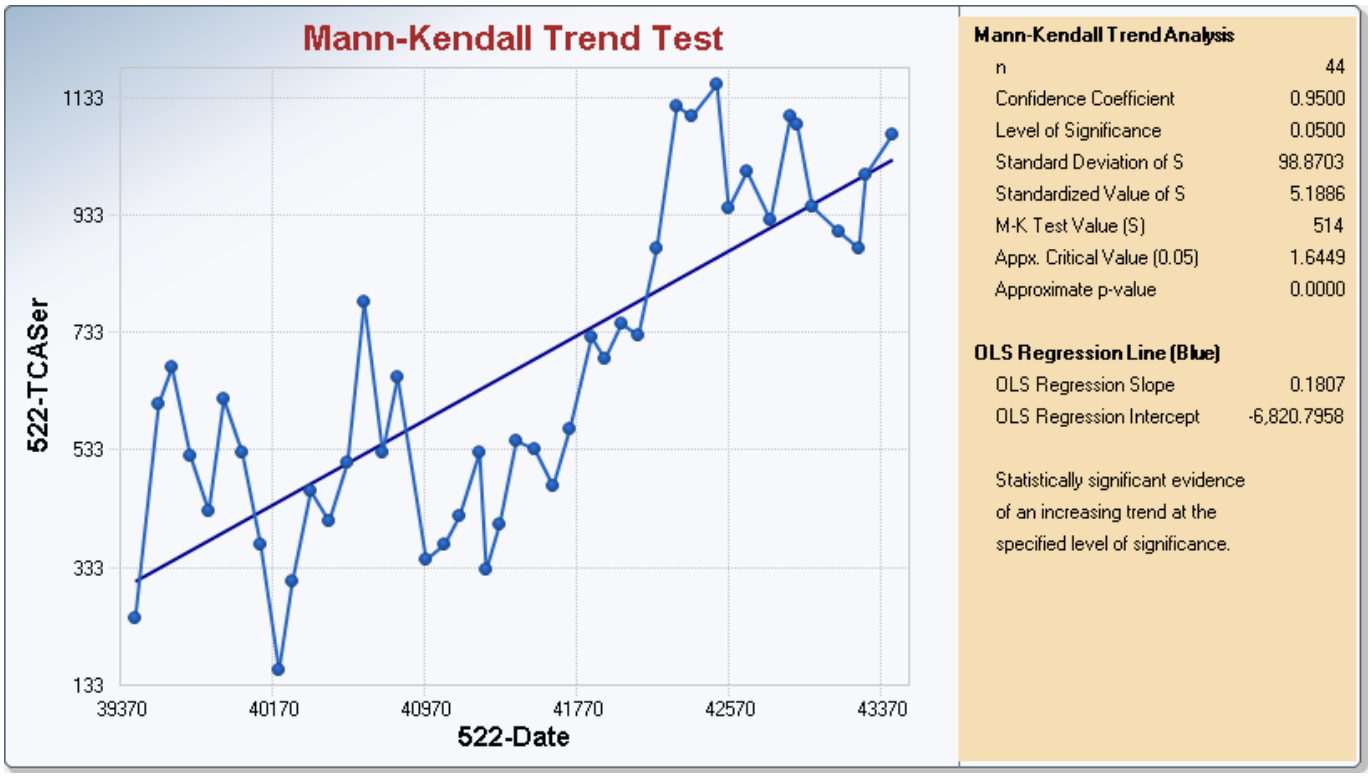

Mann-Kendall Trend Test
414+418-TCESer
850
650
450
250
50
39366
40166
40966
41766
42566
43366
414+418-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 1.1631
M-K Test Value (S) 116
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.1224
OLS Regression Line (Blue)
OLS Regression Slope 0.0103
OLS Regression Intercept 61.3370
Insufficient statistical evidence of a significant trend at the specified level of significance.

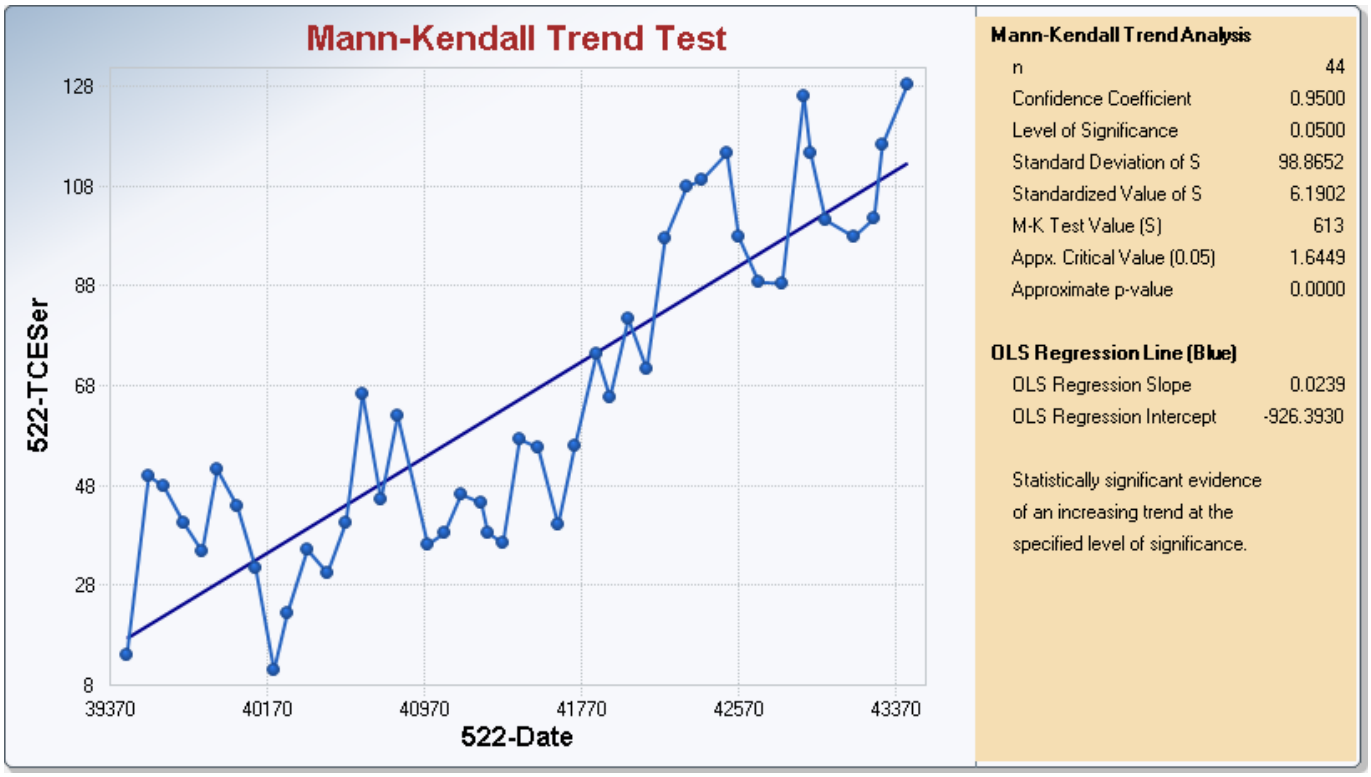
Well 415


Mann-Kendall Trend Test
415-TCASer
12553
10553
8553
6553
4553
2553
39843
40343
40843
41343
41843
42343
42843
43343
415-Date
Mann-Kendall Trend Analysis
n 39
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 82.6660
Standardized Value of S -6.1694
M-K Test Value (S) -511
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -2.0427
OLS Regression Intercept 91,513.0057
Statistically significant evidence of a decreasing trend at the specified level of significance.

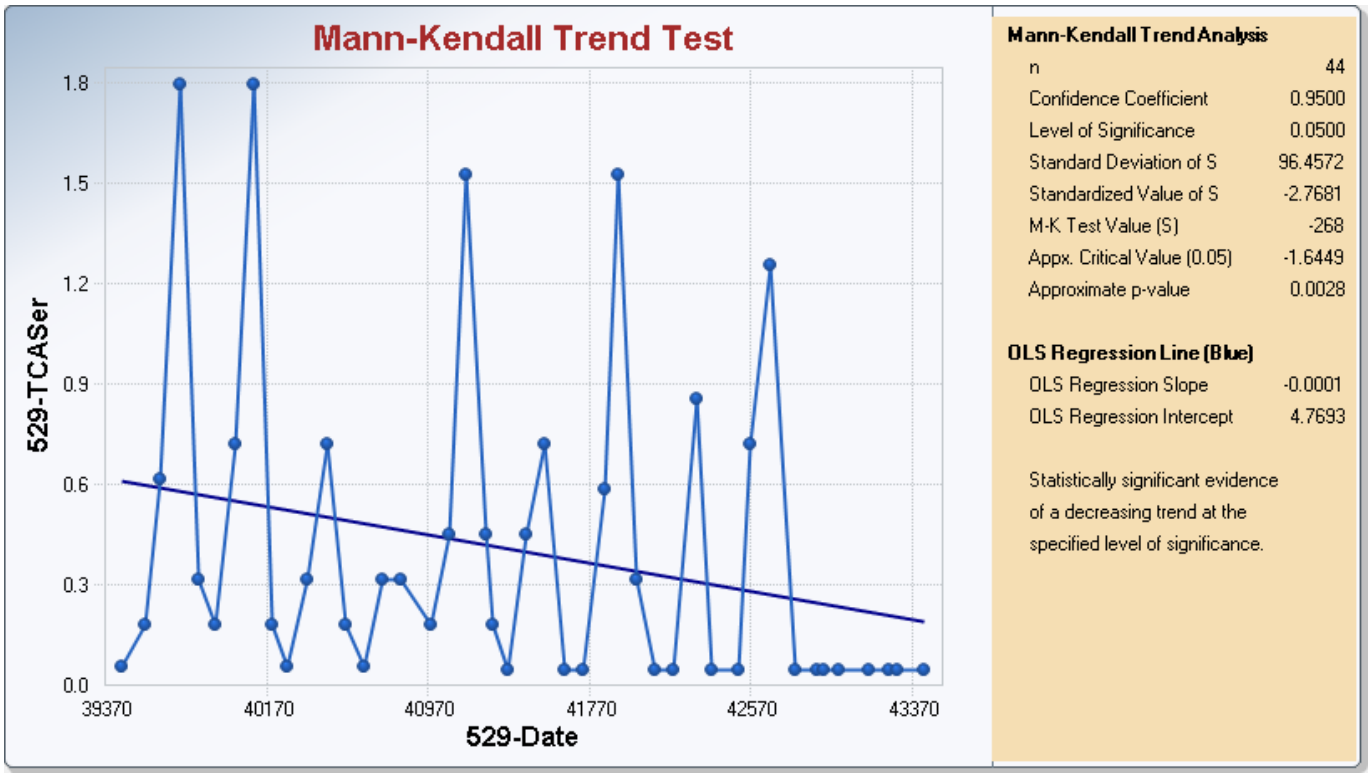

Mann-Kendall Trend Test
415-TCESer
15426
13426
11426
9426
7426
5426
3426
39843
40343
40843
41343
41843
42343
42843
43343
415-Date
Mann-Kendall Trend Analysis
n 39
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 82.6660
Standardized Value of S -5.3226
M-K Test Value (S) -441
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -2.1642
OLS Regression Intercept 97,703.0779
Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 522


Mann-Kendall Trend Test
522-TCASer
1133
933
733
533
333
133
39370
40170
40970
41770
42570
43370
522-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 5.1886
M-K Test Value (S) 514
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope 0.1807
OLS Regression Intercept -6,820.7958
Statistically significant evidence of an increasing trend at the specified level of significance.


Mann-Kendall Trend Test
522-TCESer
128
108
88
68
48
28
8
39370
40170
40970
41770
42570
43370
522-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8652
Standardized Value of S 6.1902
M-K Test Value (S) 613
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope 0.0239
OLS Regression Intercept -926.3930
Statistically significant evidence of an increasing trend at the specified level of significance.

Well 529



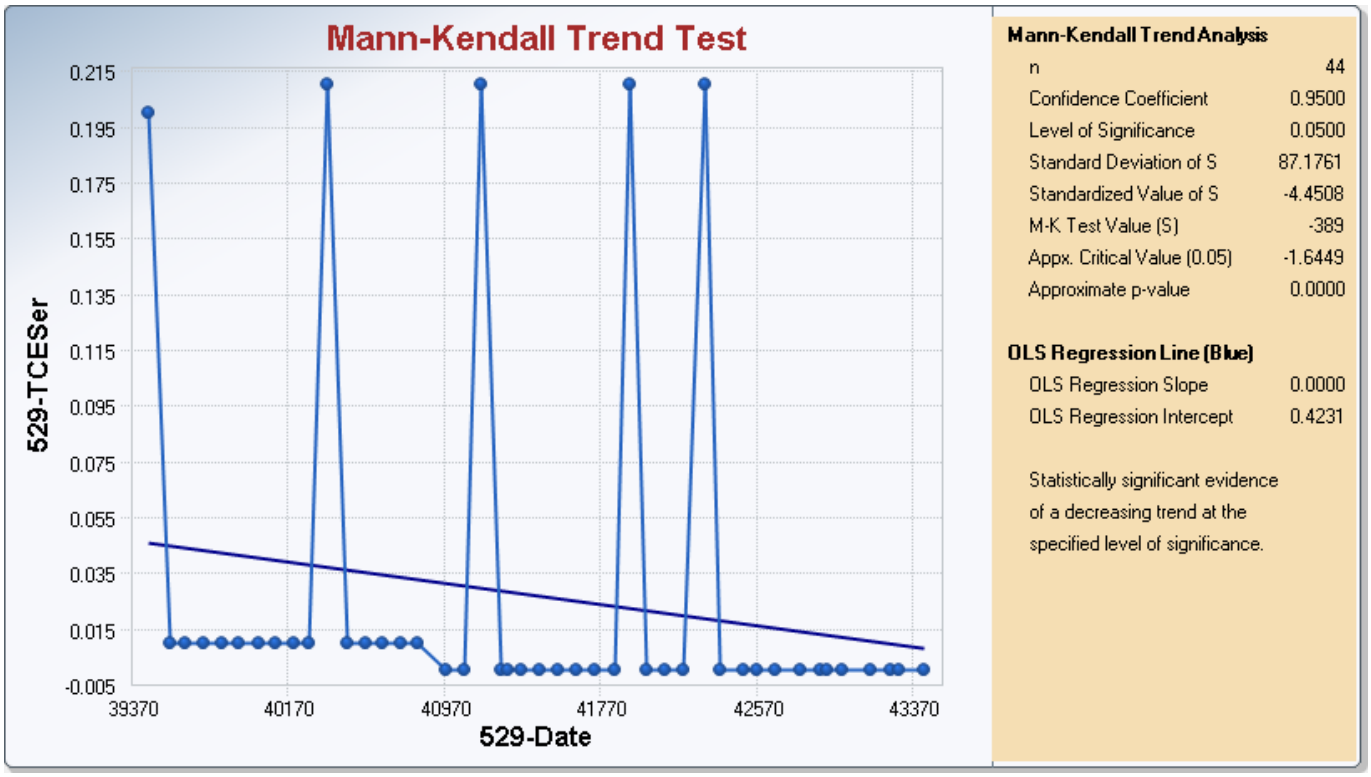
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	96.4572
Standardized Value of S	-2.7681
M-K Test Value (S)	-268
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0028

OLS Regression Line (Blue)

OLS Regression Slope	-0.0001
OLS Regression Intercept	4.7693

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

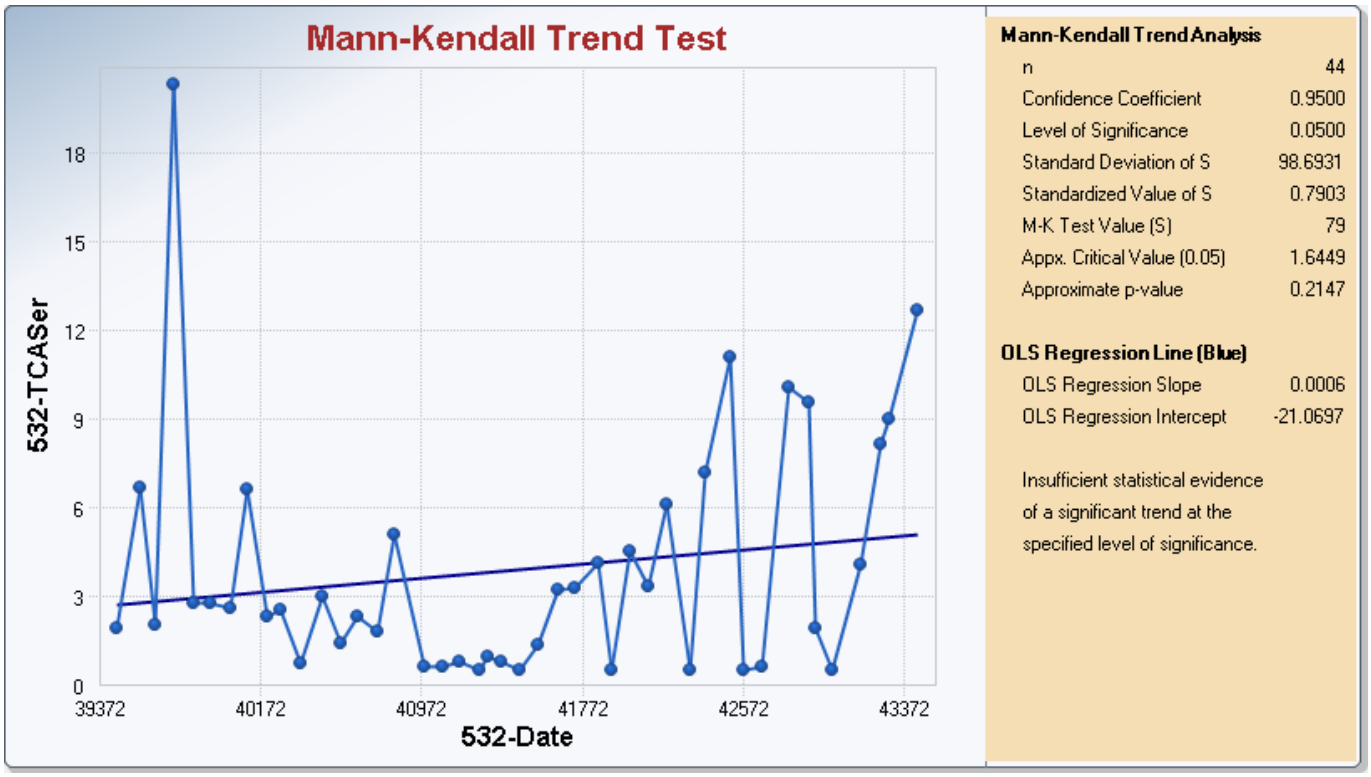
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	87.1761
Standardized Value of S	-4.4508
M-K Test Value (S)	-389
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	0.4231

Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 532



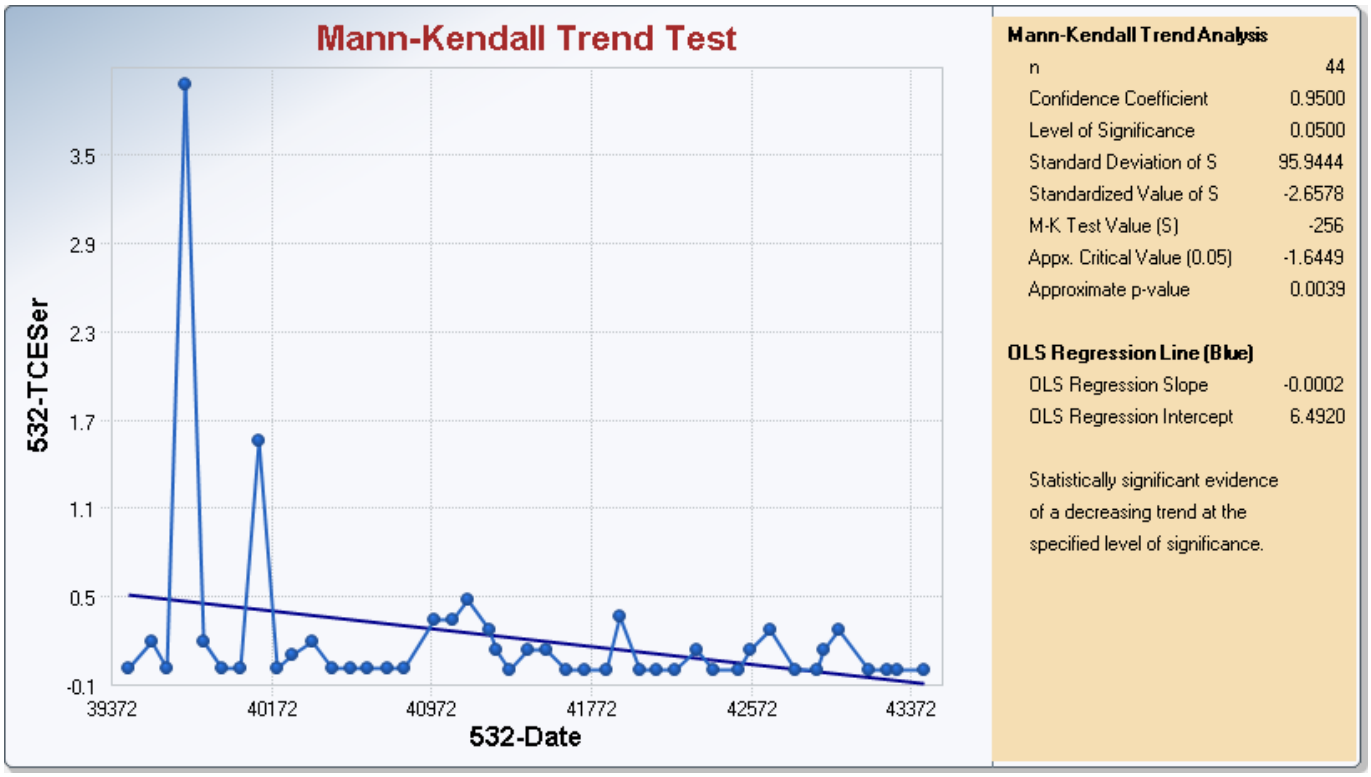
Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.6931
Standardized Value of S	0.7903
M-K Test Value (S)	79
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.2147

OLS Regression Line (Blue)

OLS Regression Slope	0.0006
OLS Regression Intercept	-21.0697

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

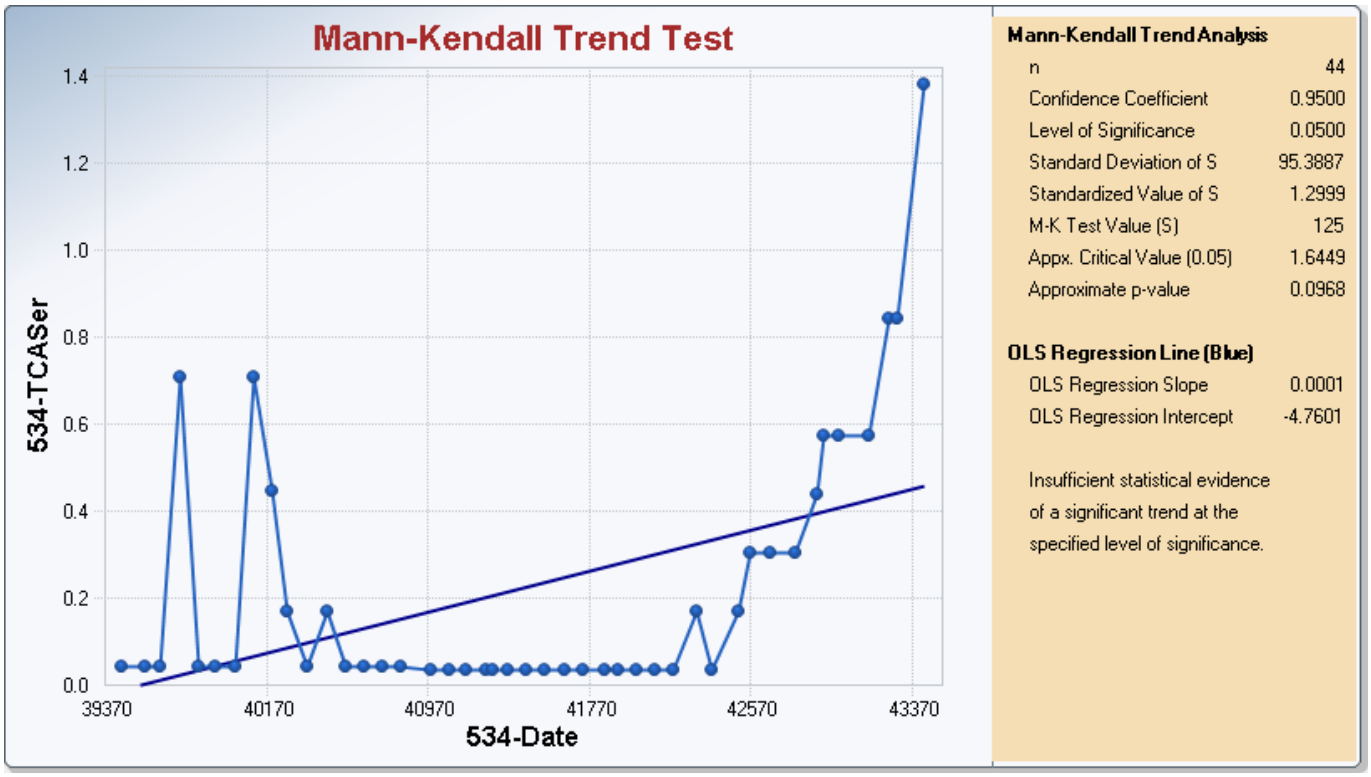
n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	95.9444
Standardized Value of S	-2.6578
M-K Test Value (S)	-256
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0039

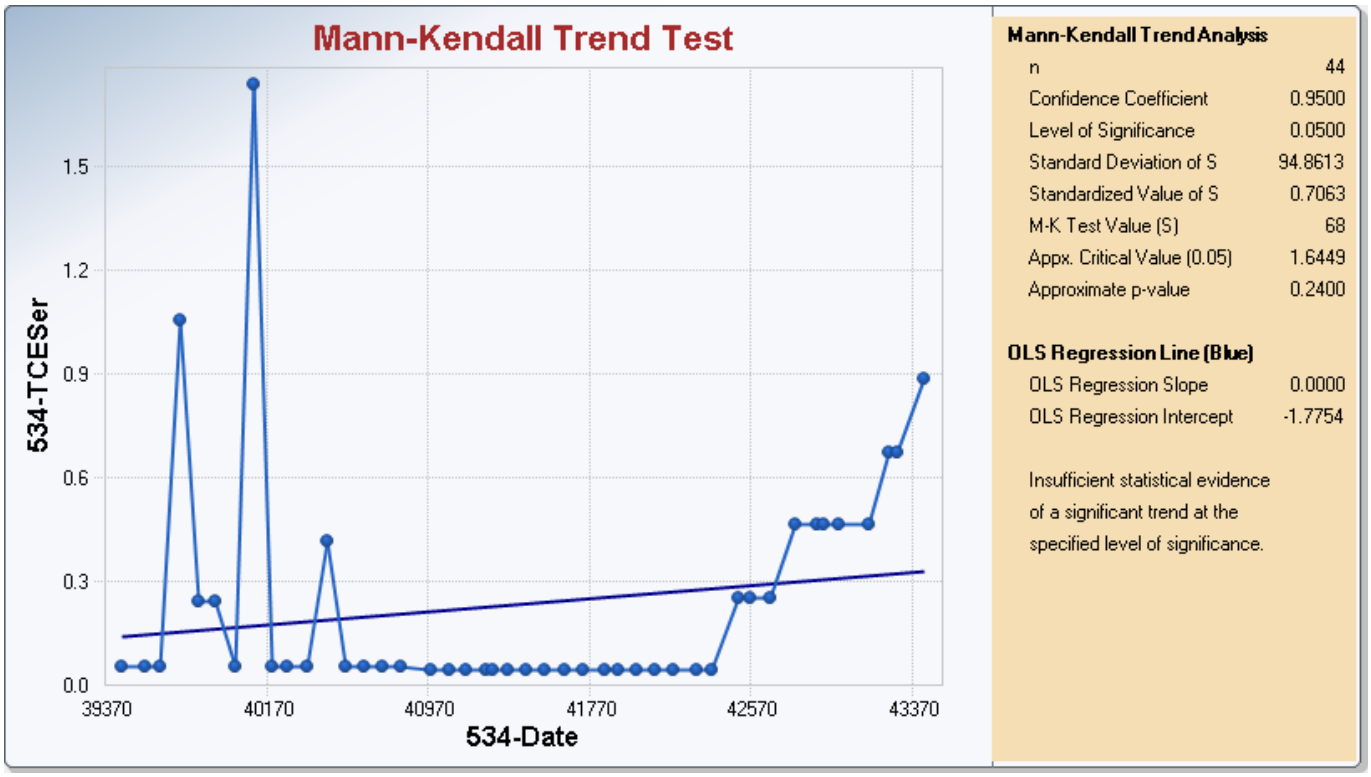
OLS Regression Line (Blue)

OLS Regression Slope	-0.0002
OLS Regression Intercept	6.4920

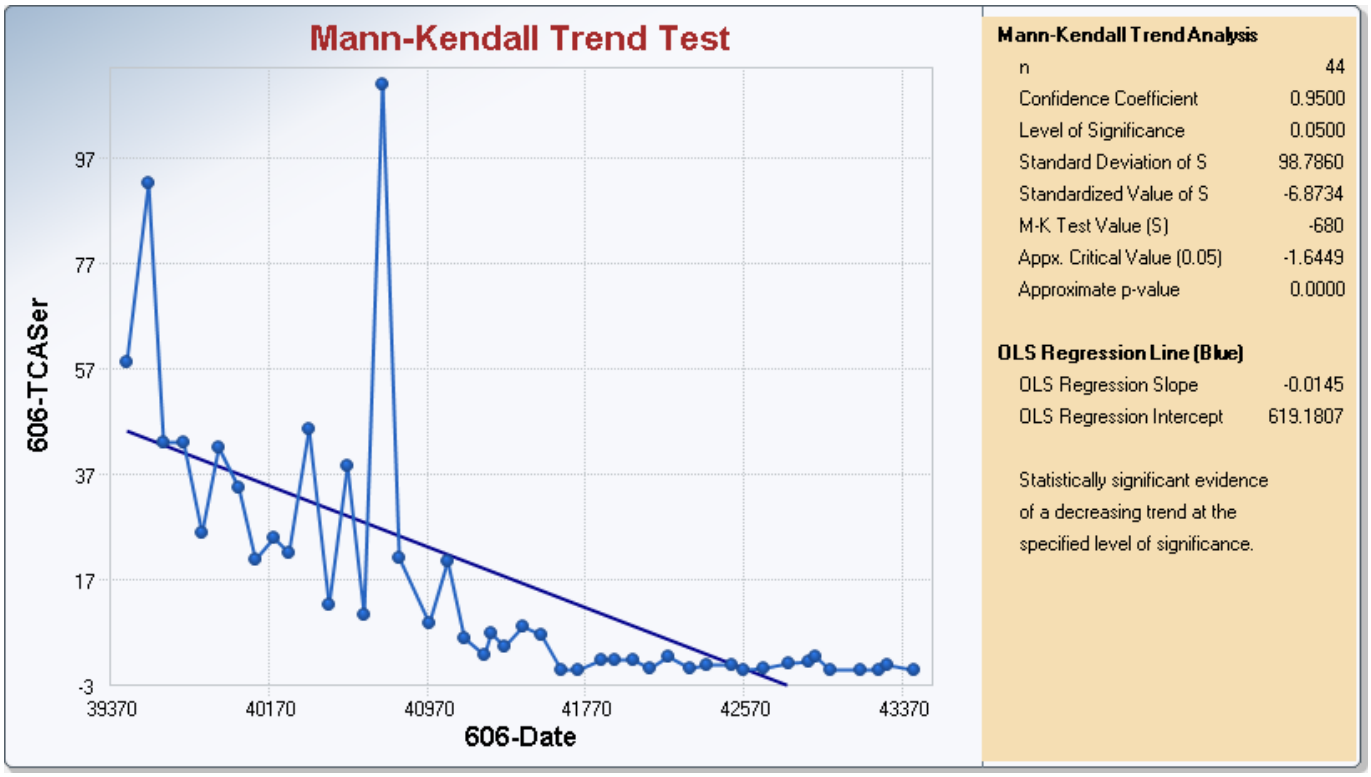
Statistically significant evidence of a decreasing trend at the specified level of significance.

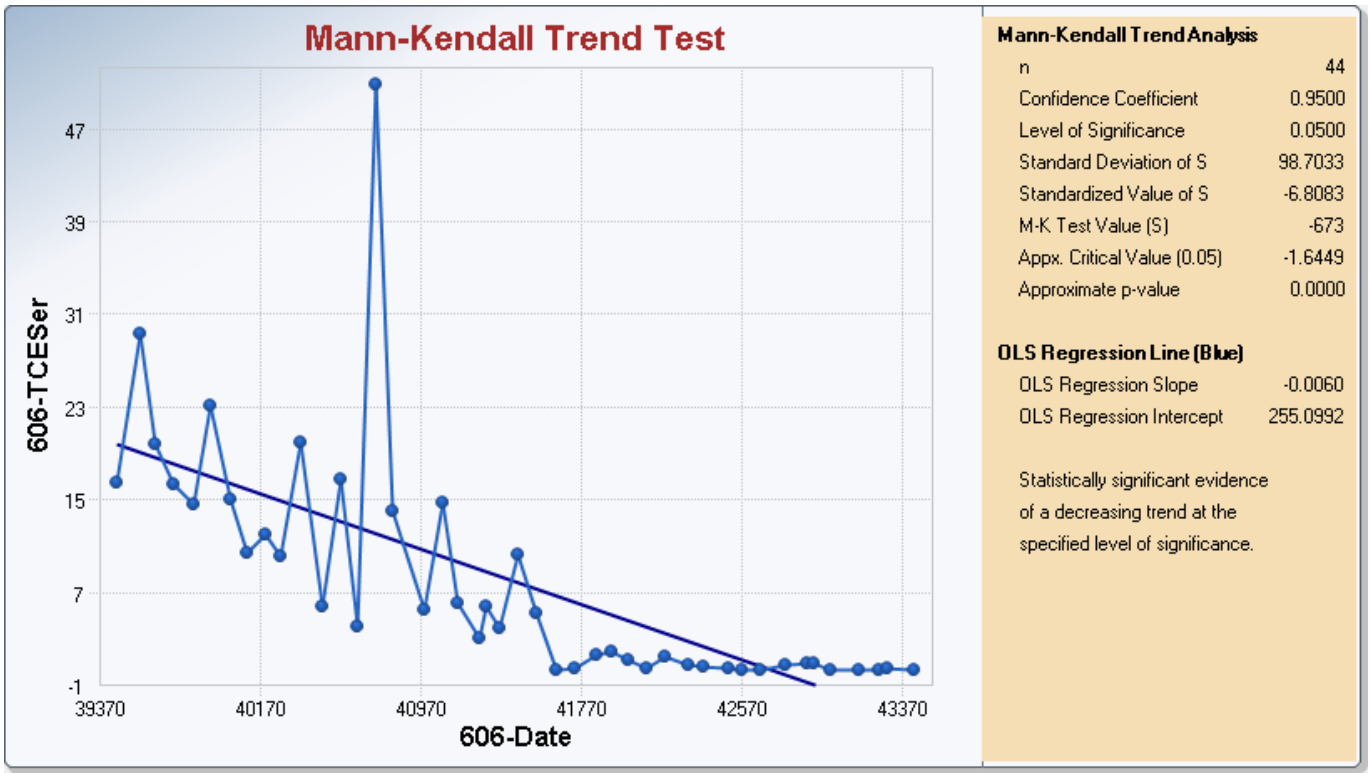
Well 534


Mann-Kendall Trend Test
534-TCASer
534-Date
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
39370
40170
40970
41770
42570
43370
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 95.3887
Standardized Value of S 1.2999
M-K Test Value (S) 125
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0968
OLS Regression Line (Blue)
OLS Regression Slope 0.0001
OLS Regression Intercept -4.7601
Insufficient statistical evidence of a significant trend at the specified level of significance.

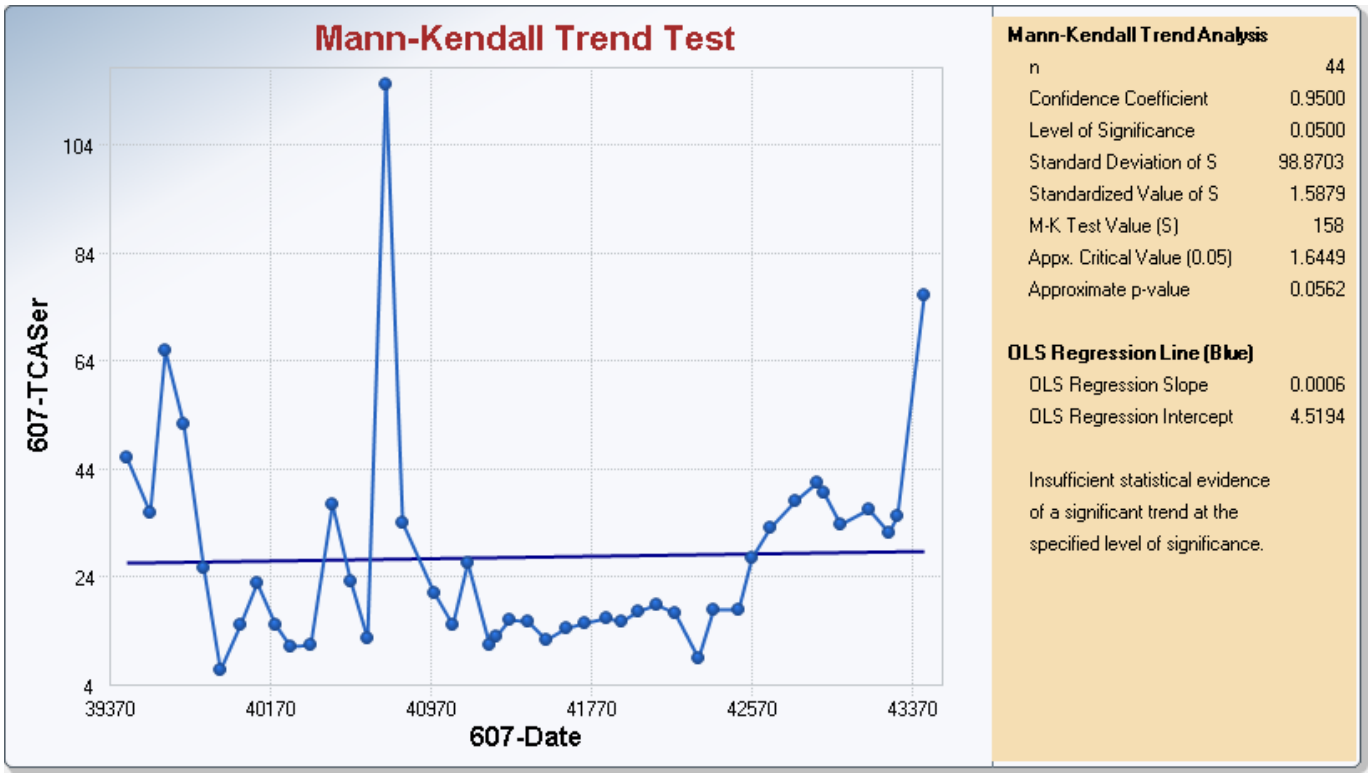

Mann-Kendall Trend Test
534-TCESer
534-Date
1.5
1.2
0.9
0.6
0.3
0.0
39370
40170
40970
41770
42570
43370
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 94.8613
Standardized Value of S 0.7063
M-K Test Value (S) 68
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.2400
OLS Regression Line (Blue)
OLS Regression Slope 0.0000
OLS Regression Intercept -1.7754
Insufficient statistical evidence of a significant trend at the specified level of significance.

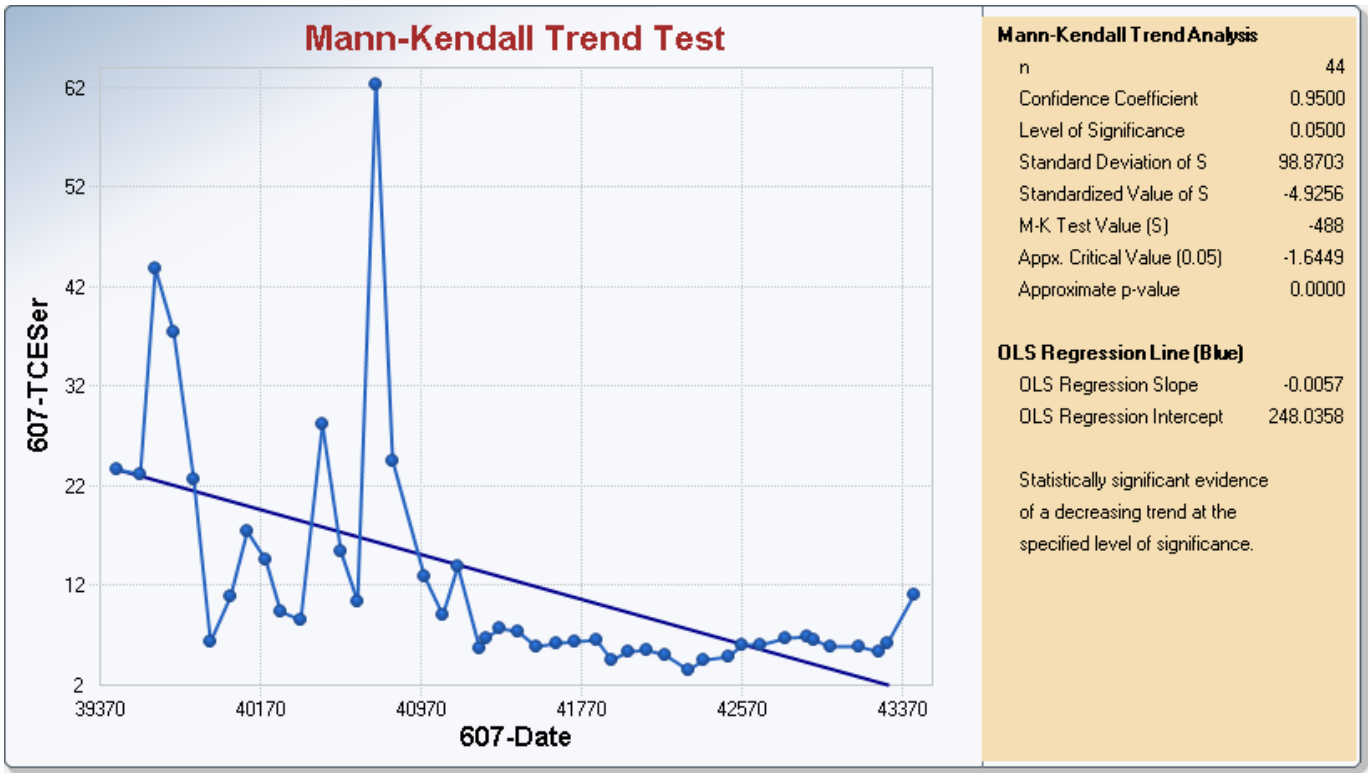
Well 606


Mann-Kendall Trend Test
606-TCASer
97
77
57
37
17
-3
39370
40170
40970
41770
42570
43370
606-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.7860
Standardized Value of S -6.8734
M-K Test Value (S) -680
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0145
OLS Regression Intercept 619.1807
Statistically significant evidence of a decreasing trend at the specified level of significance.

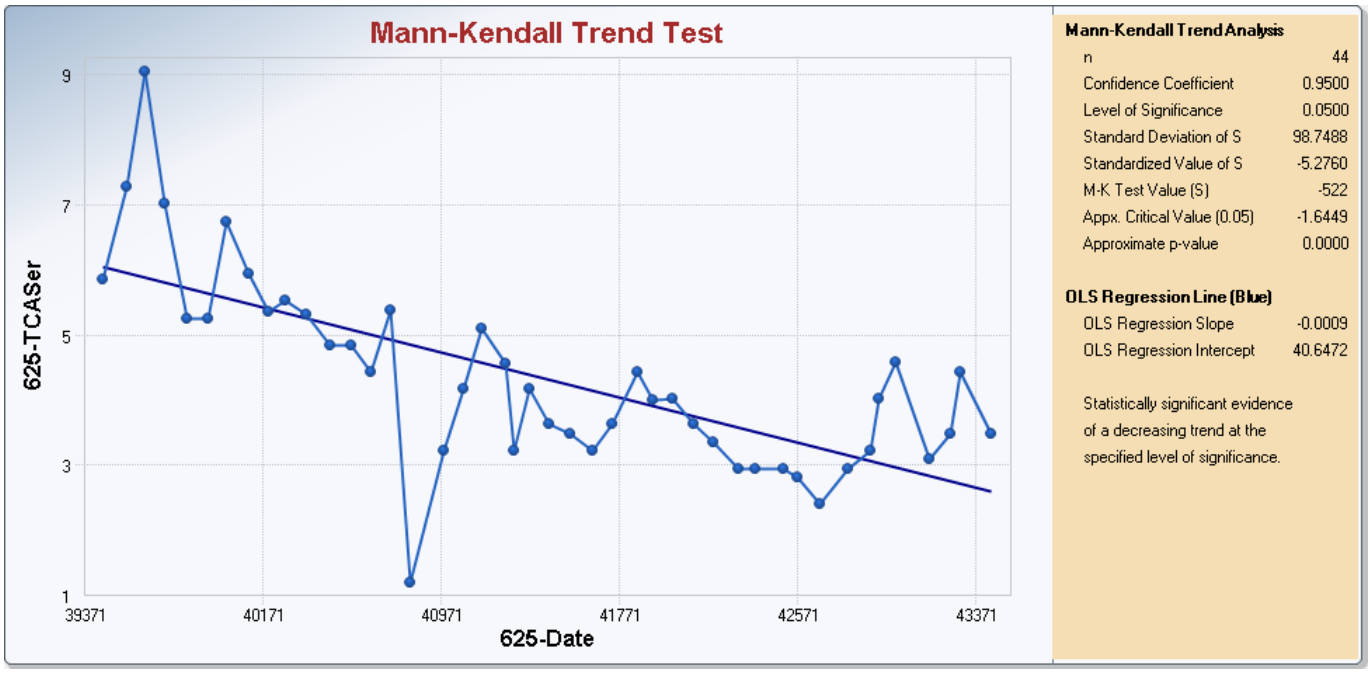

Mann-Kendall Trend Test
606-TCESer
47
39
31
23
15
7
-1
39370
40170
40970
41770
42570
43370
606-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.7033
Standardized Value of S -6.8083
M-K Test Value (S) -673
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0060
OLS Regression Intercept 255.0992
Statistically significant evidence of a decreasing trend at the specified level of significance.

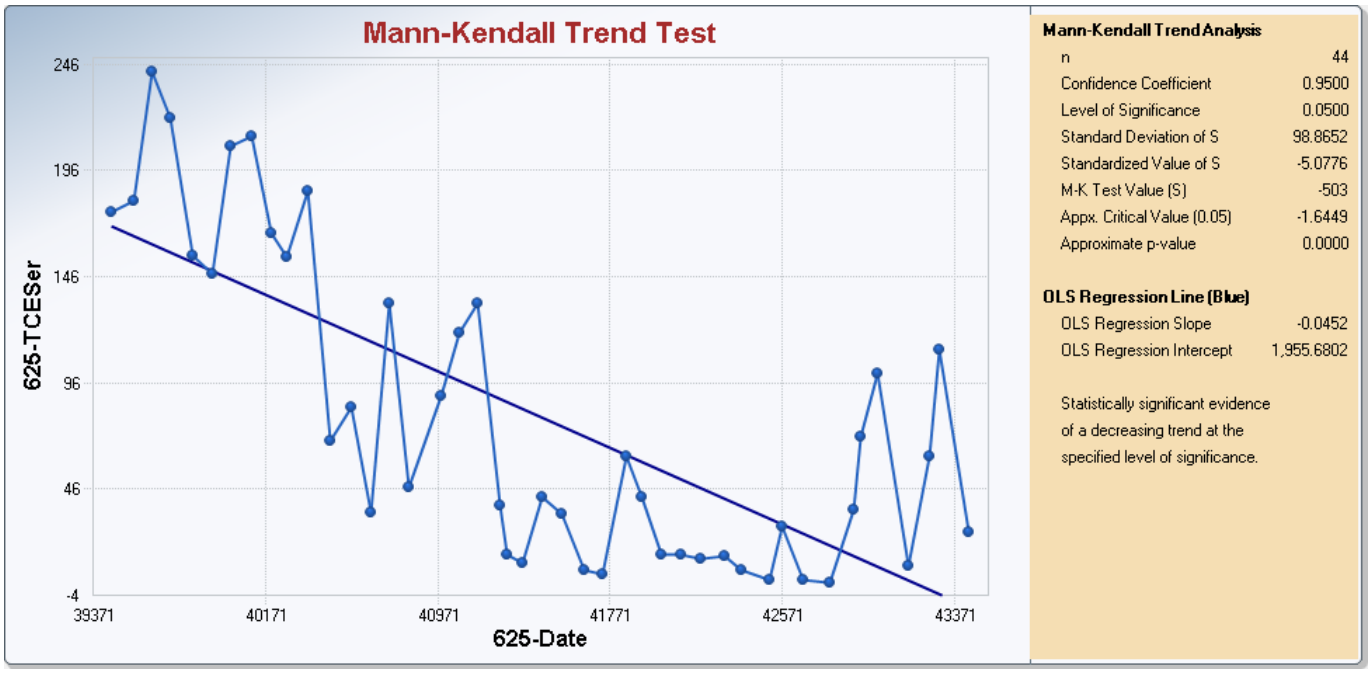
Well 607


Mann-Kendall Trend Test
607-TCASer
104
84
64
44
24
4
39370
40170
40970
41770
42570
43370
607-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S 1.5879
M-K Test Value (S) 158
Appx. Critical Value (0.05) 1.6449
Approximate p-value 0.0562
OLS Regression Line (Blue)
OLS Regression Slope 0.0006
OLS Regression Intercept 4.5194
Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test
607-TCESer
62
52
42
32
22
12
2
39370
40170
40970
41770
42570
43370
607-Date
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8703
Standardized Value of S -4.9256
M-K Test Value (S) -488
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0057
OLS Regression Intercept 248.0358
Statistically significant evidence of a decreasing trend at the specified level of significance.

Well 625


Mann-Kendall Trend Test
625-TCASer
625-Date
9
7
5
3
1
39371
40171
40971
41771
42571
43371
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.7488
Standardized Value of S -5.2760
M-K Test Value (S) -522
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0009
OLS Regression Intercept 40.6472
Statistically significant evidence of a decreasing trend at the specified level of significance.


Mann-Kendall Trend Test
625-TCESer
625-Date
246
196
146
96
46
-4
39371
40171
40971
41771
42571
43371
Mann-Kendall Trend Analysis
n 44
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 98.8652
Standardized Value of S -5.0776
M-K Test Value (S) -503
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -0.0452
OLS Regression Intercept 1,955.6802
Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX J

Extraction Well 417
Design, Installation & Performance Testing Report

Extraction Well 417
Design, Installation & Performance Testing

Introduction

Based on the results from geophysical tests, test borings, and hydraulic testing performed during the Remedial Alternatives Investigation (RAI) for the Northern Plume and Parking Lot 001 (P001) Area, an optimal location was identified for a new groundwater extraction well (417) completed in the till/bedrock zone. The selected location is at a low point in the bedrock surface and is concordant with a significant east-west fracture extending across the northern parking lot area that may offer a preferential pathway for transport across the Site and into the Moore Tire area. The location also coincides with the off-Site extension of the TCE plume and was determined to be a better location for intercepting VOC mass flux in the till/bedrock zone of the northern P001 Area than the line of extraction wells (413, 414, and 416) in place in 2018.

Well Siting

The location of extraction well 417 was selected after conducting a geophysical survey in the western parking lot of the P001 Area. The results of this survey are presented in **Attachment A**. The purpose of the survey was to locate a low point in the surface of the bedrock trough near the western edge of the Site, downgradient from extraction wells 413, 414, and 416. A seismic reflection survey was performed to map the bedrock surface by collecting seismic data from four seismic profiles in the lower parking lot area. The seismic data was supplemented with a Very Low Frequency (VLF) electromagnetic survey consisting of five survey profiles. Together, these surveys provided both a refined bedrock surface contour map and locations of potential bedrock fractures oriented east-west. The data suggested that an optimal site for an extraction well in the till/bedrock zone would be at the western edge of the parking lot near monitoring well 393. The bedrock surface elevation is less than 835 feet above mean sea level (amsl) in this area and seismic profile SR-4 detected a deeper bedrock elevation and an anomaly in the profile that suggested the presence of a weathered bedrock zone. Based on the results of the survey, two test wells were planned: one at the location of the seismic profile anomaly and one in the center of the area of the deepest bedrock surface elevation. The locations of these test wells are shown on **Figure 1**.

Test Wells

Test wells 700 and 701 were drilled to confirm the depth to bedrock and characterize the soil stratigraphy at each of the two possible locations for extraction well 417. Test well 700 was drilled approximately 10 feet east of monitoring well 393 at the location of the anomaly detected in seismic profile SR-4 whereas test well 701 was drilled in the deepest bedrock surface depression detected approximately 50 feet northeast of test well 700. Logs for each of these test wells, which were sampled continuously below a depth of 20 feet and completed as 2-inch diameter monitoring wells, are presented in **Attachment B**. Bedrock was encountered at a depth of approximately 63 feet below ground surface (bgs) in the boring for test well 700, and several shale boulders were encountered in the till unit above the bedrock surface. These boulders are believed to be the cause of the anomaly detected in the seismic profile, which indicated a solid layer above a softer layer immediately above the bedrock surface. Bedrock was encountered at a depth of approximately 62.5 feet bgs in the boring for test well 701, similar to the bedrock depth at test well 700.

Monitoring wells 700 and 701 were sampled for organic, inorganic, and field screening parameters to understand the groundwater geochemistry throughout the northern VOC plume area. Pulse (slug) tests were performed on monitoring wells 700 and 701 to provide additional hydraulic conductivity data for the northern VOC plume area and to determine the location with the highest hydraulic conductivity in an effort to select the most favorable location for the proposed extraction well. The slug tests were performed using a physical displacement slug and automated water level recorder, and were analyzed using aquifer test software. The test results yielded hydraulic conductivities of 6.5 feet/day for well 700 and 3.0 feet/day for well 701; these are typical rates for unconsolidated deposits consisting of silty sand or fine sand. A location near well 700 was ultimately selected for the location of extraction well 417 because of its higher hydraulic conductivity and because its location at the edge of the parking lot was more suitable for wellhead and surface infrastructure. Hydraulic testing results are presented in **Attachment C**.

Well Design

The design of the screen for till/bedrock extraction well 417 was based on analysis of sieve data from basal lodgment till samples collected from nearby monitoring well 324. This sieve data is presented in **Attachment D** and was originally used to design the lower screen of extraction well 414 in 1990. The screen for well 417 was partially set within the lower portion of the till unit located just above the bedrock surface. The till is typically well-graded and contains a significant fraction of fine material with occasional coarse clasts of shale. A screen interval from 58 to 64 feet bgs was identified with the lower portion positioned in the weathered bedrock and bedrock, thereby straddling the till/bedrock interface. The screen for extraction well 417 was designed based on procedures described in Chapter 13, Water Well Design, of the technical reference *Groundwater and Wells, Second Edition* (1986) by F.G. Driscoll. A 20-slot (0.020-inch) screen size was selected with a matching #00N pack sand specification for 90% cumulative percent retained. These sizes were selected to optimize the retention of finer particles in the till where the upper portion of the screen would be positioned. As shown on the design log for extraction well 417 presented in **Attachment E**, a five-foot sump section was planned below the screen and a solid riser pipe was planned to extend from the top of the screen to approximately two feet above ground surface. A well diameter of eight inches was selected to facilitate placement of the pump equipment and instrumentation.

Well Installation

Installation of well 417 began on September 25, 2018 using air rotary drilling methods with simultaneous casing advancement. This method advanced the 16-inch diameter drill casing with a special bit to hold back the formation as the well bore was advanced through the soil interval and into bedrock. The boring was drilled to a target depth of 64 feet, about one foot into competent shale bedrock. An open borehole was then advanced using conventional 12-inch diameter air rotary methods to a total depth of 70 feet, over-drilling the borehole by one foot to allow for potential collapse of the shale bedrock that might occur before the well casing could be installed. The stainless steel sump, well screen, and riser pipe were installed at a depth of 69 feet, and the sand pack was emplaced as the drill casing was retracted in stages to allow for a continuous and uniform width to the sand pack surrounding the screened interval. Following development of the sand pack, the annulus between the borehole and the well casing was sealed with bentonite chips and bentonite slurry as the drill casing was retracted up to approximately five feet below grade. The remainder of the borehole was then backfilled with sand to the ground surface to facilitate excavation around the

well casing for connection to the buried discharge conveyance line. Installation of well 417 was completed on September 26, 2018 and the final well construction log is shown in **Attachment F**.

Well Development

Development of well 417 began on October 1, 2018 by surging and bailing the well. Surging was performed to set the sand pack by removing fines from the sand pack and adjacent formation. Bailing was performed periodically during surging to clean out the well sump as material accumulated during surging and to assess the quantity of sediment entering the well from the formation. After surging and bailing was completed, the well was developed with a submersible pump to continue cleaning fines from the sand pack and to promote optimal flow into the sand pack and well screen from the surrounding aquifer. Well development ceased on October 2, 2018 when the clarity of the pumped water was clear.

Performance Testing

Following completion of well development, well 417 was pump-tested to assess its performance as an extraction well. This testing was done as a one-day step-drawdown pumping test on October 4, 2018. The test began at a constant pumping rate of four gallons per minute (gpm) for 60 minutes. After 60 minutes, the pumping rate was increased to 8 gpm for an additional 60 minutes. A total of five 60-minutes steps were attempted at rates of 4, 8, 12, 14 and 16 gpm. Only the 16 gpm step could not be sustained as the water level fell to the level of the pump intake, resulting in cavitation. Pumping continued under cavitation for several minutes with a maximum yield of 14.5 gpm and the pump set at the base of the well screen. The test ended after 255 minutes and recovery was monitored until the water level recovered to within approximately six feet of the pre-test static level.

The data collected during the test was plotted on a graph of drawdown versus time. The data and graph are presented in **Attachment G**. The drawdown graph was used to determine the change in drawdown for each pumping test step, extrapolate the late-time data for each step, and estimate a total drawdown for the long-term pumping test at a given flow rate. A straight line was fitted to the late-time data for each step and the projection of these straight lines was used to determine the trend in drawdown for each pumping rate and whether cavitation would occur at a particular rate. The goal of the step-test analysis was to select the highest sustainable pumping rate for long-term operation of the well. A rate of 12 to 14 gpm was selected to maximize drawdown in the well without cavitation of a pump set at the base of the screen interval, which is the maximum level of available drawdown.

The step-drawdown test data was also used to calculate the specific capacity of well 417 at various pumping rates and is plotted versus the corresponding discharge rate on the graph of specific capacity in **Attachment G**. The total drawdown at the end of each 60-minute step was determined for each of the first three steps and was used to calculate the specific capacity of the average pumping rate for each step. A straight line was fitted to the test data and the slope of this line was used to estimate the change in the capacity of the well at various discharge rates (e.g., the rate of decrease in the specific capacity as the discharge rate was increased). This specific capacity data will be used as a baseline for future assessments of changes in specific capacity during well rehabilitation activities.

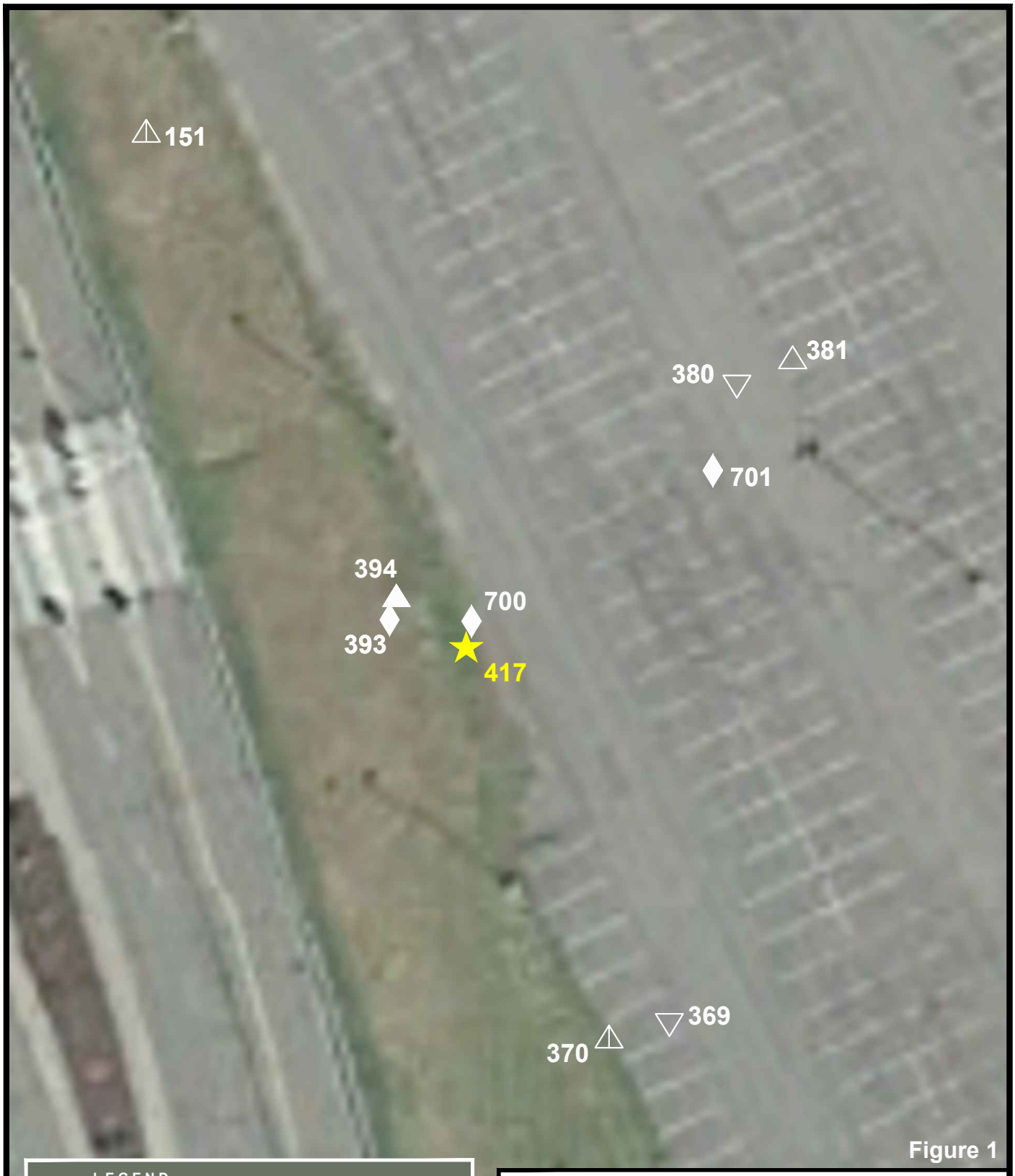


Figure 1

LEGEND

- ★ - Extraction Well
- ☆ - Former Extraction Well (Decommissioned)
- ▲ - Alluvial Monitoring Well
- △ - Decommissioned Alluvial Monitoring Well
- ⚠ - Decommissioned Till Monitoring Well
- ♦ - Till/Bedrock Zone Monitoring Well
- ◊ - Decommissioned Till/Bedrock Zone Monitoring Well
- ▽ - Decommissioned Bedrock Monitoring Well

Approximate

Source: Google Earth, aerial dated September 2016.

Scale

0 30'

IBM
Owego, New York

Well 417 Area
Well Location Map

DRAWN BY: JPB	DATE: 2/19/19	DRAWING NO. 93004-126-A1
CHECKED & APPROVED BY: SMF		

GROUNDWATER SCIENCES CORPORATION

ADVANCED GEOLOGICAL SERVICES

3 Mystic Lane
Malvern, PA 19355
(610) 722-5500 (ph.)
(610) 722-0250 (fax)

December 14, 2017
Reference: 17-262-1

Mr. Stephen Fisher, P.G.
Groundwater Sciences Corporation
2601 Market Place Street, Suite 310
Harrisburg, PA 17110

Subject: Geophysical Investigation Results
Former IBM Site (Lockheed Martin)
Owego, New York

Dear Mr. Fisher:

Advanced Geological Services (AGS) presents this letter report to Groundwater Sciences Corporation (GSC)summarizing the geophysical investigation completed by AGS on November 3, 4, 17, and 18, 2017 at the former IBM facility in Owego, New York.

The investigation area was situated in the parking lots located to the north of IBM Parkway East and east of Lakeview Parkway. The survey area is composed of fill, alluvium, till, shale bedrock. Based on information from previously site work conducted by GSC it was believed that a bedrock low may be present beneath parking lot lower parking lot adjacent to Lakeview Parkway. Nearby well information indicates the bedrock in the survey area is likely about ±60 feet below ground surface.

The objectives of the present geophysical investigation were to:

1. Map the bedrock surface within the parking lot to identify the lowest occurrence of the bedrock surface, and
2. Identify potential bedrock fractures that cross through the investigation area.

Methods

A combination of the seismic refraction method and the very low frequency (VLF) electromagnetic (EM) method were used to achieve the objectives of the investigation. The seismic refraction method was used to identify the bedrock surface and map the bedrock topography. The VLF EM method was used identify bedrock fractures that may coincide with topographic bedrock lows or weathered bedrock zones determined from the seismic refraction results.

Seismic Refraction Method

The seismic refraction method uses the propagation of elastic waves (shock waves) to map subsurface features. An energy source, such as the sledge hammer and strike plate used in this investigation, produces an elastic wave that propagates downward and outward from its initiation point at the ground surface. When the wave encounters a material having a different propagation velocity, part of the energy is refracted along the layer surface. The refracted

wave front returns to the surface where it is detected by a sensor (geophone). The velocity at which the seismic wave travels is a function of the density and elastic properties of the material. By geometrical calculations, it is possible to determine the acoustic velocity of, and thickness or depth to individual layers.

A DAQLink II seismograph manufactured by Seismic Source Co. and a Geode seismograph manufactured by Geometrics, Inc. were used to complete the seismic investigation. Both of these engineering seismographs have 24 channels and were configured with 24 10-Hz geophones. A 16-lb. sledge hammer and metal strike plate were used as an energy source to initiate a seismic wave. Each seismic spread consisted of 24 geophones. The spacing between geophones was set at 15 feet for a total spread length of 345 feet. Far offset shots, which are needed to provide bedrock refractor information near the ends of each seismic spread, were located 60 feet from geophone 1 (GP-1) and geophone 24 GP-24).

All seismic refraction data were processed using SeisOpt@2D, a commercially available program by Optim, Inc. SeisOpt@2D uses seismic first arrival times and survey geometry to derive subsurface information by using a non-linear optimization technique called generalized simulated annealing. The technique basically generates a velocity model of the subsurface, calculates travel time curves through forward modeling, then compares the calculated travel times to the observed travel times. The velocity model is then systematically modified through an inversion routine to decrease the statistical error to a predetermined level. Of course the resulting velocity model is reviewed by an AGS geophysicist to verify that the model is realistically compatible with known existing geologic conditions of the site.

The advantage to using this modeling method as opposed to other seismic refraction interpretation methods is that it can effectively image gradational seismic velocity variations laterally and vertically. Lateral and vertical variations in the seismic velocity are commonly observed in areas where a thick saprolite layer may be present above the unweathered bedrock, or where preferential weathering of the bedrock may have occurred within bedrock fracture zones.

Very Low Frequency (VLF) Electromagnetic (EM) Method

The VLF method detects electrical conductors, such as mineralized, or water filled bedrock fractures by utilizing the carrier wave of long distance communication radio signals in the range of 15 to 30 kilohertz (kHz). The transmitted radio signal induces electrical current flow into a linear electrical conductor, such as a water filled bedrock fracture, in the same manner as an antenna, which in turn produces a secondary magnetic field around the conductor. The VLF instrument compares the magnetic field strength of the primary (transmitted) signal to that of the secondary signal (induced current flow). When a conductor is crossed, the secondary magnetic field becomes measurably and predictably distorted relative to the primary field and is displayed on the instrument screen.

The VLF instrument records two components of the measured response known as the real and imaginary components that are related to the phase angle of the radio frequency carrier wave.

The response when crossing a conductive fracture or fault is a peak response slightly before the fracture, an abrupt decrease when crossing the fracture, then a trough after the fracture before returning to the background response level. The fracture is located at the inflection or cross-over point of the response.

During this investigation a VLF radio signal frequency of 24.0 kHz transmitted from Cutler, Maine was used for all traverses. Measurements were made every 10 feet along each VLF traverse.

Results and Discussion

The primary investigation area was located in the lower parking lot situated immediately north of Lakeside Parkway. The geophysical investigation also extended into the parking lot located to the north of the lower parking lot to provide additional subsurface information in that area. The survey area and locations of seismic refraction lines and VLF traverses are shown on Figure 1.

Seismic refraction data were collected along lines SR-1 through SR-5 to determine bedrock topography (Figure 1). Lines SR-1 through SR-4 were located within the primary investigation area in the lower parking lot, and line SR-5 was located in the parking lot to the north of the lower parking lot to provide additional information regarding depth to bedrock in that area.

VLF data were also collected along five southeast to northwest oriented traverses identified as VLF-1 through VLF-5 (Figure 1). The VLF traverses were spaced to provide the ability to correlate potential bedrock fractures across the entire survey area.

Seismic Refraction Results and Bedrock Topography

Seismic refraction lines SR-1 through SR-4 were located in the lower parking lot and were oriented from south-southeast to north-northwest. Line SR-5 angled from southwest to northeast diagonally across the upper parking lot (Figure 1). Overall the quality of the seismic data were good. Despite some noise from road traffic and wind, it was possible to pick the first arrivals of the seismic response in each individual seismic trace (i.e. each geophone location). Modeled refraction results indicated that the velocity of the bedrock varied between 8,000 to greater than 10,000 feet per second (fps) depending on the degree of bedrock weathering. Bedrock elevations were determined using a bedrock velocity of 9,000 fps.

Depth to the top of weathered bedrock beneath the seismic profiles ranged between approximately 32 feet in profile SR-5 and approximately 60 feet in SR-1. Ground surface elevations along each of the seismic refraction profiles was determined from a map provided by GSC (map file: 002E Parking Lot Underground.pdf). The ground surface elevations were used during modeling to calculated bedrock elevations.

Seismically derived contoured bedrock elevations are shown on Figure 2. Generally the bedrock elevation decreases from east to west across the investigation area. The contoured bedrock map indicates that the lowest portion of the bedrock surface within the study area is

located along profiles SR-1 and SR-2, near the middle of the lower parking lot (Figure 2). Furthermore, if bedrock topography controls preferential ground water flow in this area, the ground water could flow into the lower parking lot area from the east and exit the western side of the lower parking lot in the area of well 393 and the northern half of seismic line SR-4 (Figure2).

Individual seismic profile models are provided on Figure 3. Generally, the profiles show a slight weathered bedrock layer estimated to between 8,000 and 9,000 fps. The thickness of the weathered bedrock layer varies across the study area, but is generally approximately 3 to 5 feet thick.

Two potential low velocity zones were identified from the seismic profiles that could indicate areas of increased bedrock weathering. The first low velocity zone noted is located in the central portion of profile SR-4 (Figure 3). This low velocity zone is situated slightly to the southeast of the topographic bedrock low observed in profile SR-4. It is possible that this low velocity zone is related to preferential weathering along a potential fracture zone noted in the VLF results (Figure 4).

The second potential low velocity zone was noted at the northeast end of seismic profile SR-5, near the northeastern corner of the study area. It is possible that this low velocity zone could also be the result of preferential weathering, and does appear to coincide with the deepening of the bedrock surface in that area. However, being situated near the end of the seismic profile does make it a little more suspect that it could simply be a remnant of the modeling process. Drilling would be required to verify and better characterize the low velocity zones note in profiles SR-4 and SR-5.

VLE EM Results

VLF were collected along five traverses within the investigation area to identify potential bedrock fractures. The real component of the VLF Profiles are overlain along the map traces of the VLF traverses on Figure 4 along with potential fractures identified from the VLF data. Individual VLF profiles are presented on Figure 5.

Generally the strongest VLF responses noted in the data were caused by the presence of utilities near the ground surface. The potential anomalies attributed to potential bedrock fractures are of a smaller magnitude than those caused by utilities. The bedrock fracture responses in this area are somewhat muted because of the thick overburden combined with the water table being shallower than the bedrock surface. Slightly stronger bedrock responses would be expected if the water table were situated at or deeper than the bedrock surface.

Attempts were made to correlate the most prominent potential fracture responses across the investigation area. Note that some response variation between adjacent profiles and some of the potential fractures identified may not be readily identifiable in all profiles. Based on the identified responses, it appears that there may be a repeating joint pattern oriented approximately east-northeast to west-southwest, with more prominent joints spaced approximately ±75 feet apart. Of course potential fracture or joint spacing and orientation in

the bedrock may be better determined or verified if a nearby bedrock outcrop is available for analysis. In-situ fracture orientations can also be determined within an un-cased well using either acoustic or optical televiewer sondes.

Summary and Closing

Five seismic refraction lines were completed to identify bedrock topography within the parking lots located to the north of Lakeside Parkway. Seismic result did identify a bedrock low situated in the central portion of the lower parking lot, and also verified that the bedrock generally slopes downward towards the western portion of the investigation area. Five VLF EM traverses were collected to identify potential bedrock fractures. Several potential fractures were identified and a repeating set of parallel joints oriented east-northeast to west-southwest could be present across the study area.

All geophysical data and field notes collected as a part of this investigation will be archived at the AGS office. The data collection and interpretation methods used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site. Intrusive field activities, such as soil borings or other appropriate methods, would be needed to further investigate and confirm the presence or absence of identified and interpreted features. Due to the nature of geophysical data, no guarantees can be made or implied regarding the presence or absence of additional objects or targets beyond those identified.

If you have any questions regarding the results of this field investigation, please contact me at 610-722-5500. It was a pleasure working with you on this project and we look forward to being able to provide you with sub-surface imaging services in the future.

Sincerely,

Donald Jagel

Donald Jagel, P.G.
Principal Geophysicist

attachment: Figures 1 through 5



Northing (NY Central State Plane; NAD83; feet)

767550 767500 767450 767400 767350 767300 767250 767200 767150 767100 767050 767000 766950 766900 766850 766800 766750 766700

917700 917750 917800 917850 917900 917950 918000 918050 918100 918150 918200 918250 918300 918350 918400 918450 918500 918550 918600 918650 918700

Easting (NY Central State Plane; NAD83; feet)

0 50 100 150 200
feet

Legend

SR-1 — Seismic Refraction Profile

VLF-1 — Very Low Frequency (VLF) Electromagnetic (EM) Traverse

612 — Bedrock Well

NOTES:

1) Seismic refraction data were collected with a 24-channel engineering seismograph and 24 10-Hz geophones. Geophones were spaced 15 feet apart and far offset shots were 60 feet from the end geophones. A 16-lb sledge hammer and metal strike plate were used as the seismic source.
2) VLF data were collected using an Abem Wadi VLF instrument. VLF data were recorded every 10 feet along each traverse. The VLF instrument was tuned to 24.0 KHz, the Cutler, Maine transmitting station.
3) Base aerial orthophotograph files c_09150766_12_15100_4bd_2014.zip and c_09180766_12_15100_4bd_2014 were downloaded from http://gis.ny.gov/gateway/mg/index.html/.
This work was not completed by a licensed surveyor, and as such should be considered approximate, and is for illustrative purposes only.
4) The items shown on this figure may not be all inclusive. AGS does not warrant the fact that additional buried features/utilities may be present which could not be identified by AGS personnel during this investigation.

ADVANCED GEOLOGICAL SERVICES

Geophysical Survey Area Showing Locations of Seismic Refraction (SR) Lines and VLF Traverses

LOCATION: Former IBM Facility (Lockheed Martin)
Owego, New York

CLIENT: Groundwater Sciences Corp.

PROJECT #: 17-262-1

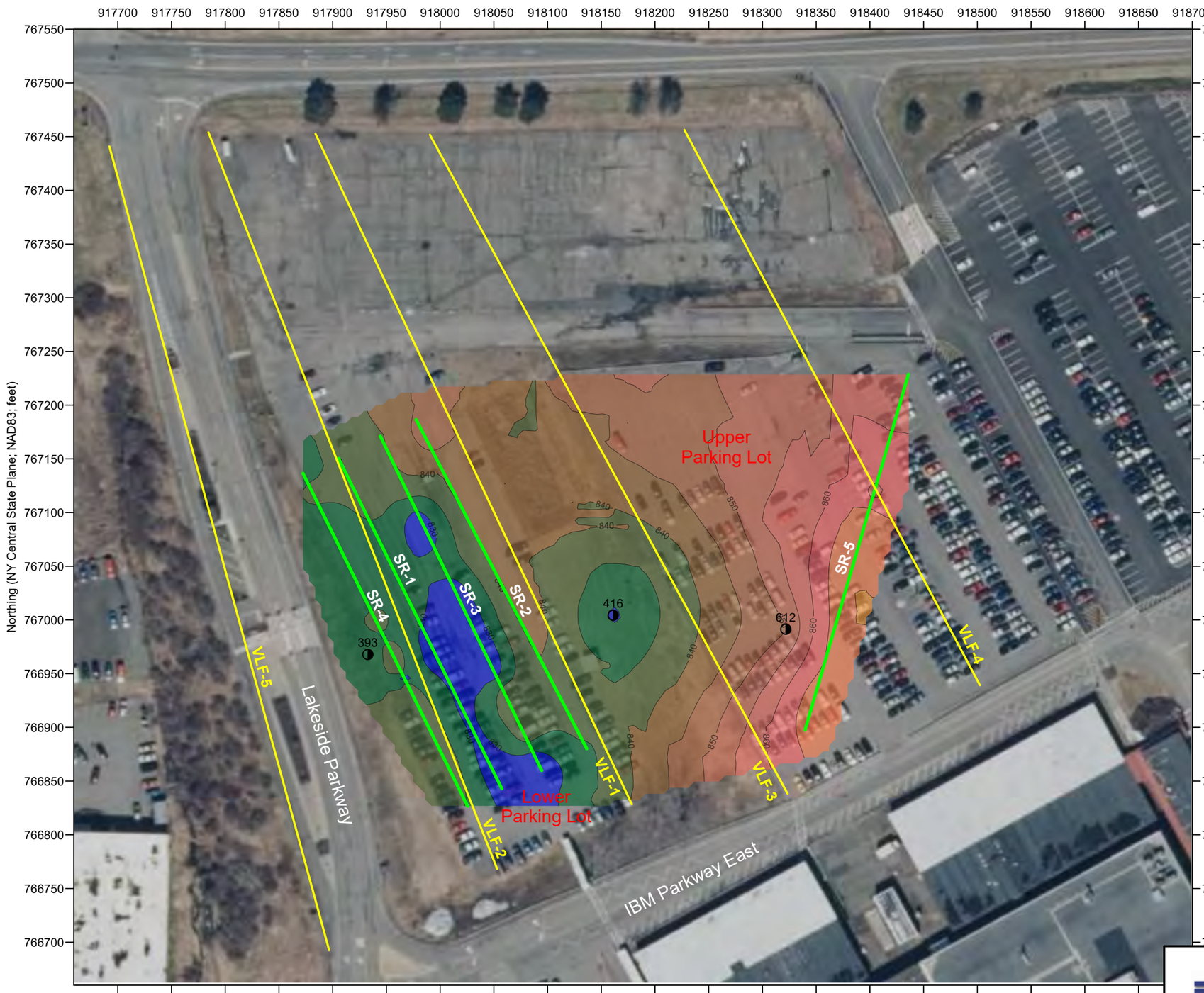
ADVANCED GEOLOGICAL SERVICES, INC.

DATE: December 14, 2017

DRAWN BY: D. JAGEL

APPROVED BY: D. JAGEL

FIGURE 1



Northing (NY Central State Plane; NAD83; feet)

767550 767500 767450 767400 767350 767300 767250 767200 767150 767100 767050 767000 766950 766900 766850 766800 766750 766700

Easting (NY Central State Plane; NAD83; feet)

917700 917750 917800 917850 917900 917950 918000 918050 918100 918150 918200 918250 918300 918350 918400 918450 918500 918550 918600 918650 918700

0 50 100 150 200
feet

870
865
860
855
850
845
840
835
830
825
820
Bedrock Elevation (feet)

Legend

SR-1 — Seismic Refraction Profile

VLF-1 — Very Low Frequency (VLF) Electromagnetic (EM) Traverse

612 — Bedrock Well

NOTES:

1) Seismic refraction data were collected with a 24-channel engineering seismograph and 24 10-Hz geophones. Geophones were spaced 15 feet apart and far offset shots were 60 feet from the end geophones. A 16-lb sledge hammer and metal strike plate were used as the seismic source. Ground surface elevations along the seismic profiles were picked from a map (002E Parking Lot Underground.pdf) provided by GSC, and were used during modeling to determine bedrock elevations.
2) VLF data were collected using an Abem Wadi VLF instrument. VLF data were recorded every 10 feet along each traverse. The VLF instrument was tuned to 24.0 KHz, the Cutler, Maine transmitting station.
3) Base aerial orthophotograph files c_09150766_12_15100_4bd_2014.zip and c_09180766_12_15100_4bd_2014 were downloaded from http://gis.ny.gov/gateway/mg/index.html/.
This work was not completed by a licensed surveyor, and as such should be considered approximate, and is for illustrative purposes only.
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N W E S

ADVANCED GEOLOGICAL SERVICES

Geophysical Survey Area Showing Bedrock Topography Derived from Modeled Seismic Refraction Data and Select Bedrock Well Information

LOCATION: Former IBM Facility (Lockheed Martin) Owego, New York

CLIENT: Groundwater Sciences Corp.

PROJECT #: 17-262-1

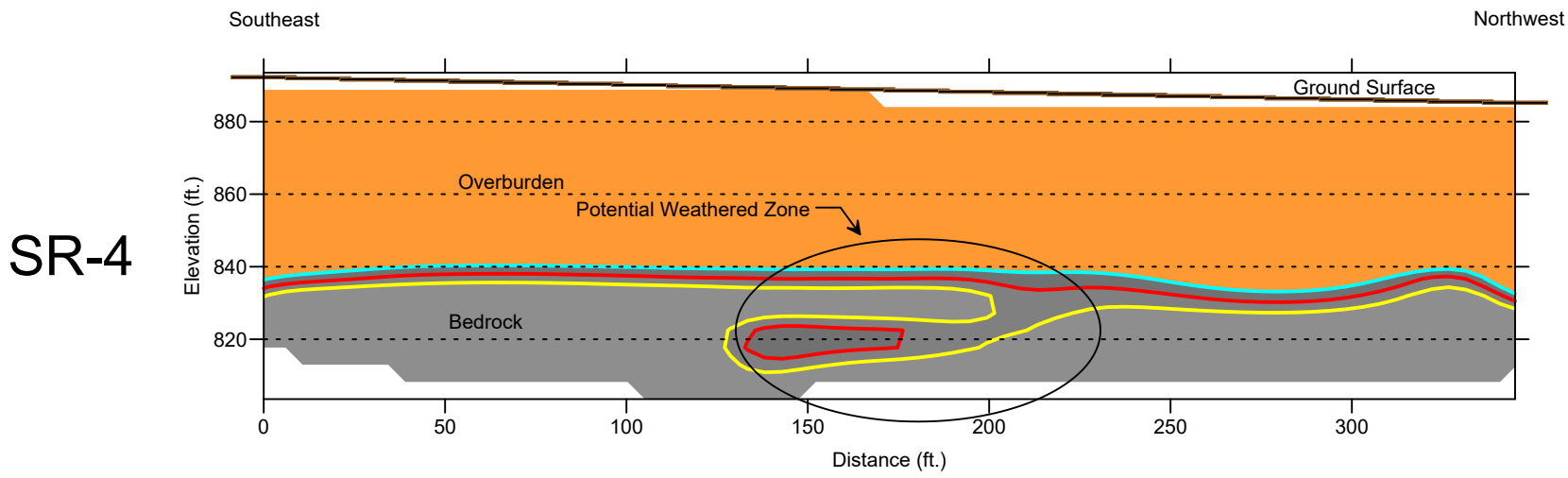
ADVANCED GEOLOGICAL SERVICES, INC.

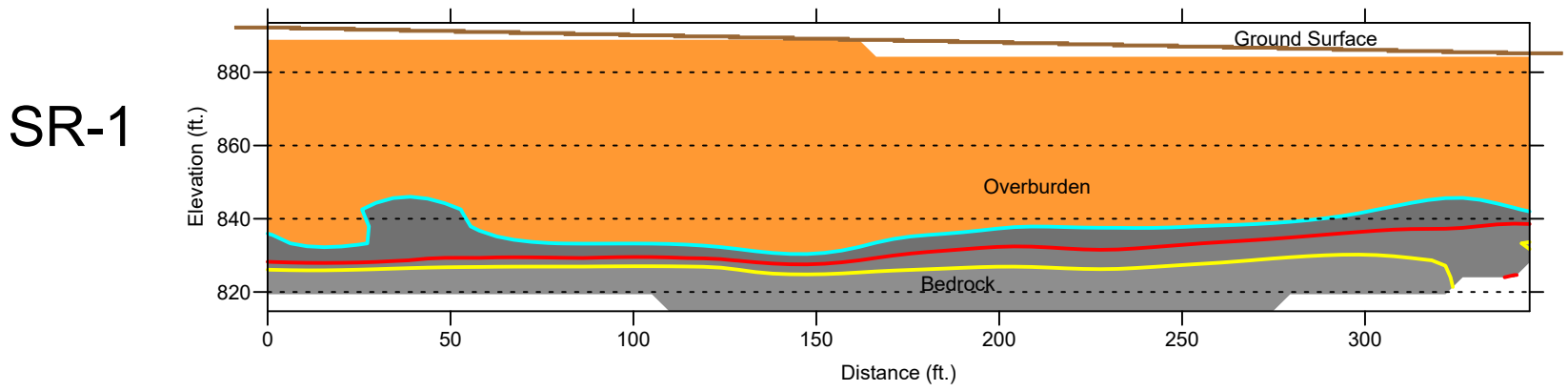
DATE: December 14, 2017

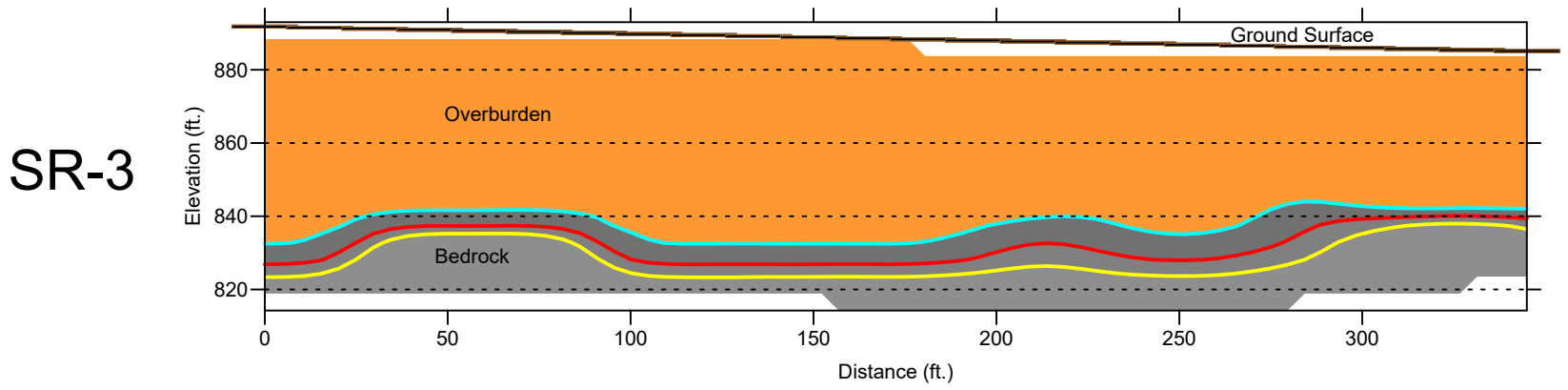
DRAWN BY: D. JAGEL

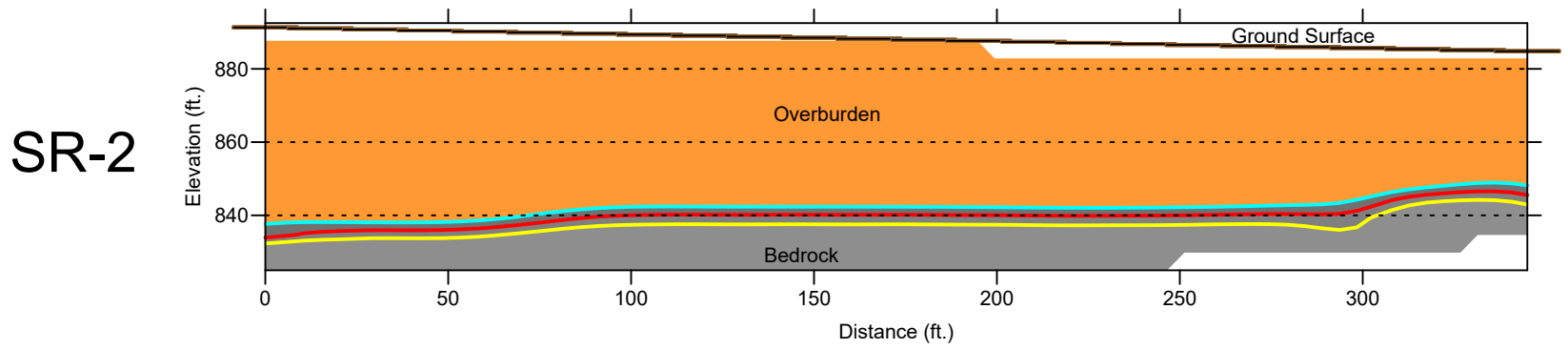
APPROVED BY: D. JAGEL

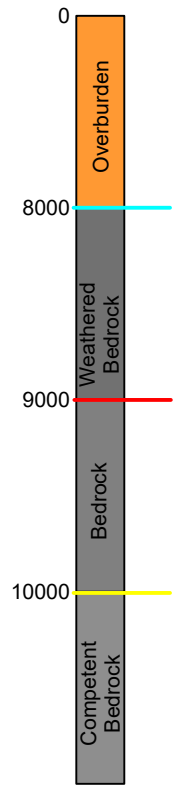
FIGURE 2

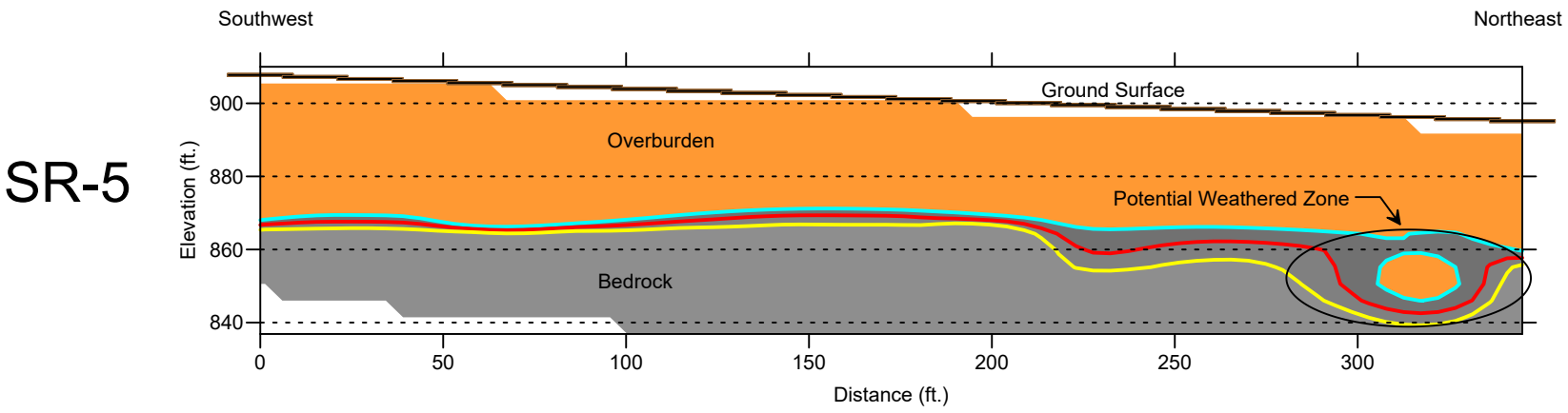












Seismic profiles are ordered from southern most profile
at the top of the page to northern most profile at the bottom of the page

NOTES:

1) Locations of the seismic refraction lines are shown on Figures 1 and 2. Seismic refraction data were collected with a 24-channel engineering seismograph and 24 10-Hz geophones. Geophones were spaced 15 feet apart and far offset shots were 60 feet from the end geophones. A 16-lb sledge hammer and metal strike plate were used as the seismic source. Seismic data were modeled using the program SeisOpt@2d.
2) Ground surface elevations along the seismic profiles were picked from a map (002E Parking Lot Underground.pdf) provided by GSC, and were used during modeling to determine bedrock elevation. Bedrock surface elevations assume the average bedrock velocity of 9,000 fps. Generally, the berock velocity varies between approximately 8,000 fps to greater than 10,000 fps.

ADVANCED GEOLOGICAL SERVICES

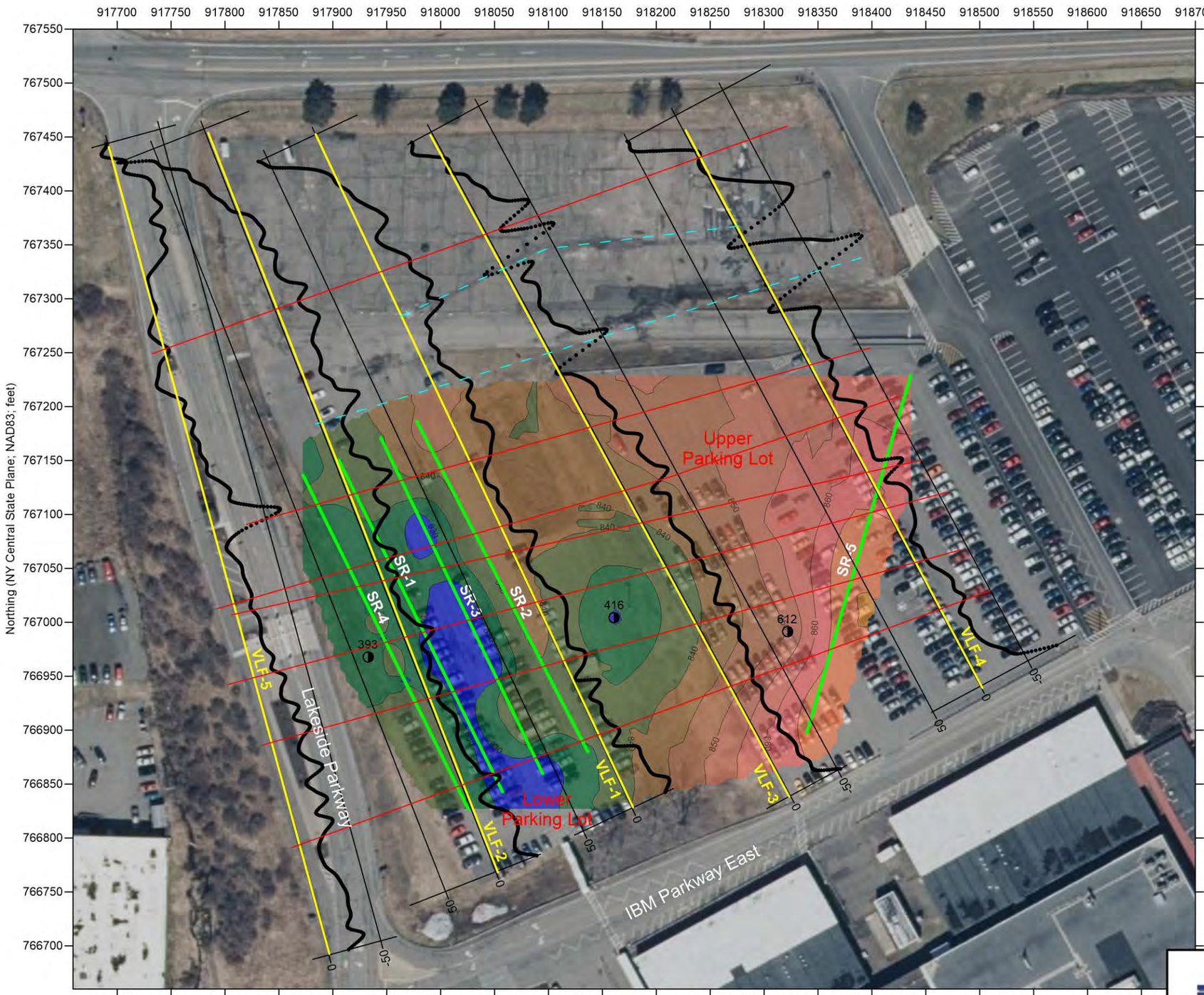
Modeled Seismic Refraction (SR) Profiles

LOCATION: Former IBM Facility (Lockheed Martin)
Owego, New York

CLIENT: Groundwater Sciences Corp.

FIGURE 3

PROJECT #:	17-262-1	ADVANCED GEOLOGICAL SERVICES, INC.	
DATE:	December 14, 2017	DRAWN BY: D. JAGEL	APPROVED BY: D. JAGEL



870
865
860
855
850
845
840
835
830
825
820

Bedrock Elevation (feet)

Legend

SR-1 — Seismic Refraction Profile

VLF-1 — Very Low Frequency (VLF) Electromagnetic (EM) Traverse

Potential Bedrock Fracture Correlated Between VLF Profiles

Potential Utility

612 — Bedrock Well

NOTES:

1) Seismic refraction data were collected with a 24-channel engineering seismograph and 24 10-Hz geophones. Geophones were spaced 15 feet apart and far offset shots were 60 feet from the end geophones. A 16-lb sledge hammer and metal strike plate were used as the seismic source. Ground surface elevations along the seismic profiles were picked from a map (002E Parking Lot Underground.pdf) provided by GSC, and were used during modeling to determine bedrock elevations.
2) VLF data were collected using an Abem Wadi VLF instrument. VLF data were recorded every 10 feet along each traverse. The VLF instrument was tuned to 24.0 KHz, the Cutler, Maine transmitting station. VLF real component shown. VLF anomalies occur at the inflection point between the pike and trough of the anomlies.
3) Base aerial orthophotograph files c_09150766_12_15100_4bd_2014.zip and c_09180766_12_15100_4bd_2014 were downloaded from http://gis.ny.gov/gateway/mg/index.html/.
This work was not completed by a licensed surveyor, and as such should be considered approximate, and is for illustrative purposes only.
4) The items shown on this figure may not be all inclusive. AGS does not warrant the fact that additional buried features/utilities may be present which could not be identified by AGS personnel during this investigation.

ADVANCED GEOLOGICAL SERVICES

Geophysical Survey Area Showing Bedrock Topography, VLF Profile Data, and Interpreted Potential Bedrock Fractures

LOCATION: Former IBM Facility (Lockheed Martin)
Owego, New York

CLIENT: Groundwater Sciences Corp.

FIGURE 4

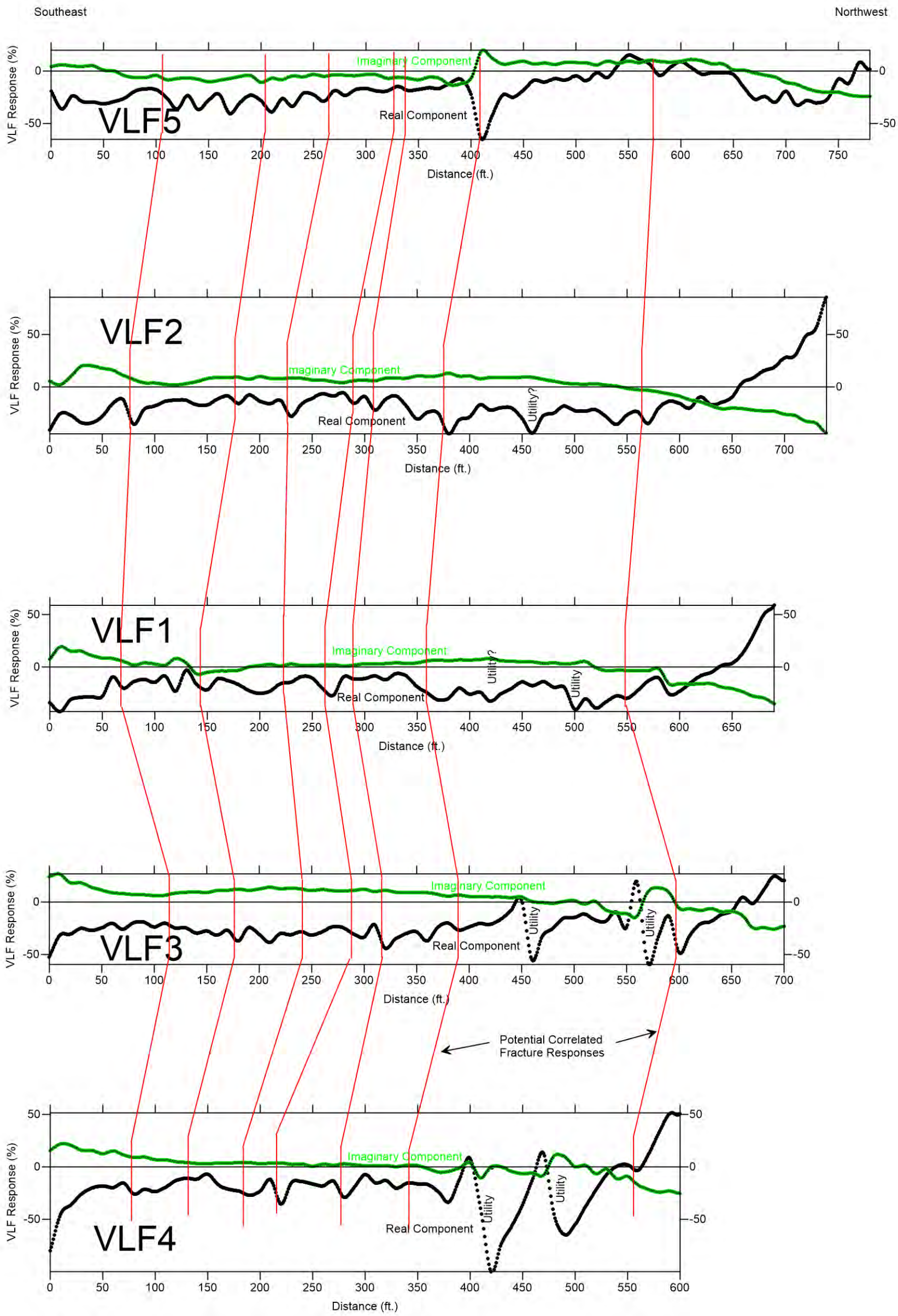
PROJECT #: 17-262-1

ADVANCED GEOLOGICAL SERVICES, INC.

DATE: December 14, 2017

DRAWN BY: D. JAGEL

APPROVED BY: D. JAGEL



VLF profiles are ordered from southern most profile at the top of the page to northern most profile at the bottom of the page

NOTES:

1) Locations of the VLF traverses are shown on Figures 1, 2, and 4. The identified potential fractures (shown in red) correspond to the potential fractures shown on Figure 4. Note that not all anomalies can be correlated directly from one profile to the adjacent profile. Also, ther may be other potential fractures that can be correlated between profiles that have not been identified. Anomaly locations are generally indicated by the inflection point between peak and trough of any given anomaly.

ADVANCED GEOLOGICAL SERVICES

VLF Profiles (Real and Imaginary Components) and Potential Correlated Bedrock Fractures

LOCATION: Former IBM Facility (Lockheed Martin) Owego, New York

CLIENT: Groundwater Sciences Corp.

FIGURE 5

PROJECT #: 17-262-1

ADVANCED GEOLOGICAL SERVICES, INC.

DATE: December 14, 2017

DRAWN BY: D. JAGEL

APPROVED BY: D. JAGEL

GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: 700

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	***Lockheed Martin Facility***	DRILLING CO.:	***Parratt Wolff Inc.***
SITE LOCATION:	***Owego, New York***	DRILLER:	***W. Rice***
JOB NO.:	***94004.46.1701***	RIG TYPE:	***CME 55***
LOGGED BY:	***S. Fisher***	DRILLING METHOD:	***Hollow Stem Auger***
DATES DRILLED:	***4/16/18 - 4/18/18***	DEVELOPMENT DATE:	***4/25/18***
		LOCATION:	***P001 Area, approx. 10 ft E of well 393***
NOTES: SWL= 26.52 ft below TOC, 4/26/18 TOC elevation: 889.06 ft amsl		SURFACE ELEVATION	889.3 ft amsl
		EASTING	917950.4813
		NORTHING	766967.5284

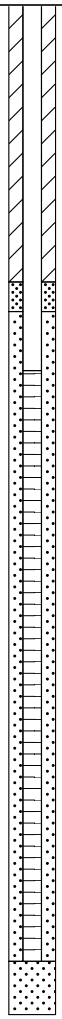
DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
0							0		
	Augered to 20 ft	---	---	---	SILT, SAND & GRAVEL: dusky yellow to dk yellowish brown (10 YR 4/2) silt and vf-m, lit c-vc with f-m A-SR gravel, dense, crumbly, moist to dry				Flushmounted manhole with concrete surface apron (0'-1.0')
2							2		Sand annular fill (0.5'-3')
4							4		
6							6		8" dia. HSA borehole (0'-49')
8							8		
10							10		
12							12		Bentonite slurry annular seal (3'-55.5')
14							14		
16							16		
18							18		2" dia. Sch. 40 PVC riser (0.5'-57')
20	3 4 7 7	0	12"	1	SILT, SAND & GRAVEL: mod. yellowish brown (10 YR 5/4) to dusky yellow (5 Y 6/4) pred silt, tr clay, some vf-c sand, w/ A-SR gravel, tr. orgnics, dense, stiff, moist		20		
22	5				SILT, SAND & GRAVEL: as above,		22		

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
	9 8 9	0	16"	2	turning more olive gray (5 Y 4/1) in lower 4", increasing silt and clay, more plastic, moist				
24	6 7 9 11	0	11"	3	SILT & CLAY: olive gray to lt brownish gray (5 YR 6/1) pred silt w/ clay, dense, plastic, with olive black (5 Y 2/1) peat masses and rootlets, large 3" SA rock frag, moist		24		
26	8 11 12 12	0	20"	4	SILT & CLAY: as above SILT & CLAY: as above, less peat and rootlets, pred greenish gray (5 GY 6/1) to med gray (N5) silt, tr clay, w/ dk yellow orange (10 YR 6/6) mottling, tr f sand, stiff, moist		26		
28	12 13 13 12	0	24"	5			28		8" dia. HSA borehole (0'-49')
30	6 15 14 14	0	24"	6	SILT, SAND & GRAVEL: pred silt w/ vf-f sand, tr m-vc, w/ A-SA wthrd siltstone gravel, mottled, dense, moist SILT, SAND & GRAVEL: as above, less mottled below 14"		30		
32	9 11 18 20	0	16"	7	SILT & GRAVEL: brownish gray (5 YR 4/1) silt, SA-SR fine gravel, tr vf-f sand, dense stiff, moist to wet		32		
34	9 10 11 16	0	23"	8	SILT, SAND & GRAVEL: pred. silt , w/ vf-f sand, w/ more SA siltstone frags, some m gravel, pred silt, tr clay lower 3", more homogeneous, dense, stiff, wet		34		
36	5 15 16 15	0	21"	9	SILT, SAND & GRAVEL: as above, pred. silt 15-21", dense, stiff, wet		36		Bentonite slurry annular seal (3'-55.5')
38	7 11 21 21	0	21"	10	SILT, SAND & GRAVEL: as above, silty 10-14", pred. granules 14-16", v. gravelly elsewhere, some vf-c sand, dense, sl crumbly, wet		38		
40	12 17 38 35	0	20"	11	SILT, SAND & GRAVEL: as above, pred f-m SA-SR clasts of shale and siltstone, v gravelly below 15", dense, stiff, wet		40		
42	37 45 40 40	0	19"	12	SILT, SAND & GRAVEL: as above w/ more f-m A-SA gravel, dense, wet, turning mod yell brown (10 YR 5/4) lower 8", w/ wthrd clasts, wet		42		
44	15 24 26 28	0	22"	13	SILT, SAND & GRAVEL: dk yell brown to olive gray, sl less silt, w/ vf-vc sand, f-m SA-SR gravel, loose, crumbly, wet		44		2" dia. Sch. 40 PVC riser (0.5'-57')
46	33 22 42 37	0	14"	14	SILT, SAND & GRAVEL: as above top 6", then olive gray silt, w/ vf-f sand, tr m-vc, w/ f-m SA-SR gravel, v. dense, stiff, moist to wet		46		
48	14 88	0	12"	15	SILT, SAND & GRAVEL: olive gray, silt, some vf-f sand, f-m gravel, v. dense, stiff, moist		48		
	Spin casing	---	---	---					
50					SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts		50		5" dia. PQ Core corehole (49'-67.9')

GROUNDWATER SCIENCES CORPORATION

***GEOLOGIC LOG:* 700**

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
52	PQ Core	0	39"/41"	RUN 1	SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet		52		Bentonite slurry annular seal (3'-55.5')
54	PQ Core	0	32"/36"	RUN 2	SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet		54		2" dia. Sch. 40 PVC riser (0.5'-57')
56	PQ Core	0	20"/24"	RUN 3	SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts		56		Fine choke sand (55.5'-56')
58	PQ Core	0	60"/60"	RUN 4	SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet		58		#00N Sand pack (56'-67.9')
60					SHALE: deeply wthrd boulder 60.2' to 61 ft		60		
62					SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet		62		
64	PQ Core	0	60"/60"	RUN 5	SHALE: fractured shale boulder 61.5 ft to 62.2 ft		64		2" dia. 20-slot PVC screen (57'-67')
66					SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet		66		
68					SHALE: med. dk gray (N4), competent , thin horizontal bedding, occ calcite fossil masses 6"-33", calcitic fossil layer 48.5"-49.5", possible clean natural fracture at 8"		68		



GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: 701

PROJECT INFORMATION

PROJECT:	***Lockheed Martin Facility***
SITE LOCATION:	***Owego, New York***
JOB NO.:	***94004.46.1701***
LOGGED BY:	***S. Fisher***
DATES DRILLED:	***4/19/18 - 4/23/18***

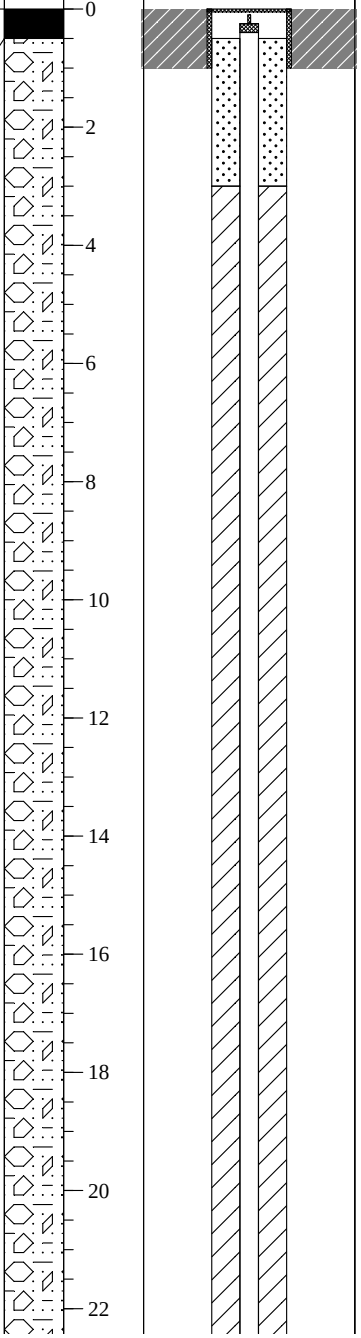
NOTES: SWL= 25.18 ft below TOC, 4/26/18
TOC elevation: 888.24 ft amsl

DRILLING INFORMATION

DRILLING CO.:	***Parratt Wolff Inc.***
DRILLER:	***W. Rice***
RIG TYPE:	***CME 55***
DRILLING METHOD:	***Hollow Stem Auger/Core***
DEVELOPMENT DATE:	***4/25/18***
LOCATION:	***P001 Area, approx. 10 ft E of well 393***
SURFACE ELEVATION	888.7 ft amsl
EASTING	918002.7785
NORTHING	767000.2126

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
0					
	Augered to 24 ft	---	---	---	Asphalt: asphalt pavement with gravel base
2					SILT, SAND & GRAVEL: moderate yellowish brown (10 YR 5/4) to dusky yellow (5 Y 6/4) silt with vf-vc sand, and f-m A-SR gravel, crumbly, moist to dry
4					
6					
8					
10					
12					
14					
16					
18					
20					
22					

GRAPHIC



WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
	Flushmounted manhole with concrete surface apron (0'-1')
	Sand annular fill (0.5'-3')
	8" dia. HSA borehole (0'-59.5')
	Bentonite slurry annular seal (3'-57')
	2" dia. Sch. 40 PVC riser (0.5'-60')

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
	Augered to 24 ft								
24	4 8 11 13	0	24"	1	SILT & CLAY: olive gray (5 Y 4/1) organic, silt with tr vf sand, tr clay, with peat masses and wood frags, color grading to greenish gray (5 GY 6/1) with dk yellow orange (10 YR 6/6) mottling, tr, roots, dense, stiff, moist		24		
26	9 12 19 15	0	24"	2	SILT, SAND & GRAVEL: mod. brown (5 YR 4/4) pred silt, tr vf-vc sand, w/ A-SA wthrd shale frags, dense, sl crumbly, moist		26		
28	3 9 12 9	0	23"	3	SILT, SAND & GRAVEL: as above, color grading to brownish gray (5 YR 4/1) at 15.5", dense, stiff, f gravel more SR, moist		28		8" dia. HSA borehole (0'-59.5')
30	9 10 13 13	0	24"	4	SILT, SAND & GRAVEL: as above with more A-SA f-m shale frags w/ SR f shale clasts, occ wthrd rock frag, tr clay, sl plastic, dense, moist		30		
32	11 12 16 12	0	17"	5	SILT, SAND & GRAVEL: as above, more gravelly 11-15", pred. shale frags, tr wthrd siltstone frags, dense, stiff, moist		32		
34	5 5 7 8	0	20"	6	SILT, SAND & GRAVEL: as above w/ less gravel, gravelly zone 13-18", dense, stiff, moist		34		
36	6 8 10 10	0	21"	7	SILT & CLAY: olive gray to pale yellowish brown (10 YR 6/2), homogeneous, some clay, some color banding w/ pale red lams, pred vc sand near bottom with tr. vf-c sand, dense plastic, moist		36		Bentonite slurry annular seal (3'-57')
38	6 9 12 11	0	15"	8	SILT & GRAVEL: olive gray (5 Y 4/1) silt w/ f-m SR shale gravel, 2" m-vc sand layer at top, large shale frags at bottom, less dense and stiff, wet		38		
40	7 11 12 20	0	18"	9	SILT & GRAVEL: as above top 7", color changing to grayish orange (10 YR 7/4) silt w/ SA-SR f-m gravel, dense stiff, wet		40		
42	12 27 30 18	0	16"	10	SILT, SAND & GRAVEL: dusky yellow (5 Y 6/4) to grayish orange silt w/ vf-vc sand, and f-m SA-SR gravel, occ. wthrd shale frags, less dense, sl crumbly, wet		42		
44	10 20 24 37	0	14"	11	SILT, SAND & GRAVEL: as above, large SR m gravel 4-7", pred c-vc sand matrix, lit silt binder, all silt lower inch, cohesive, crumbly , wet		44		2" dia. Sch. 40 PVC riser (0.5'-60')
46	14 22 25 42	0	22"	12	SILT, SAND & GRAVEL: olive gray silt, some vf-vc sand w/ f-m SA-SR shale gravel, v. dense, stiff, moist		46		
48	13 30 60/0.5' augered	0	18"	13	SILT, SAND & GRAVEL: olive gray as above, dense, stiff, sl porous 12-14", moist to wet		48		
50	28 62				SILT, SAND & GRAVEL: olive gray as above, w/ abundant m SA-SR shale frags,		50		

GROUNDWATER SCIENCES CORPORATION

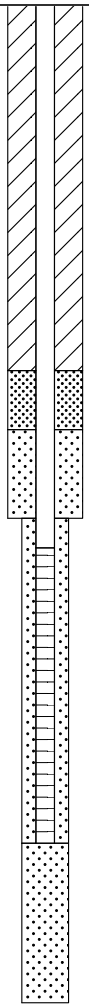
***GEOLOGIC LOG:* 701**

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
	45 48	0	20"	14	dense, stiff, moist
52	35 72 31 33	0	19"	15	SILT, SAND & GRAVEL: as above, dense, very gravelly w/ A-SA shale frags, dense, stiff, wet
54	30 47 41 44	0	18"	16	SILT, SAND & GRAVEL: as above, large 3.5" shale frag in tip of spoon, moist
56	32 28 30 38	0	19"	17	SILT, SAND & GRAVEL: as above, sl more vf-vc sand, dense, less stiff, wet
58	37 49 84/0.5'	0	18"	18	SILT, SAND & GRAVEL: as above, oxidized dusky yellow (5 Y 6/4) color 4-10", texturally continuous, dense, wet
60	PQ Core	0	36"/ 38.4"	RUN 1	SILT, SAND & GRAVEL: olive gray pred silt with vf-m sand, w/ f-m SA-SR gravel, cobble at 19-24", dense, wet WEATHERED SHALE: olive gray to dark gray, pred wthrd shale frags, some silt and vf sand, broken, loose, wet
62					
64	PQ Core	0	60"/60"	RUN 2	SHALE: dk gray (N3) horizontally bedded, occ. calcitic fossil frag, occ bedding plane fracture, moist to wet
66					
68					

GRAPHIC

DEPTH FEET: 52, 54, 56, 58, 60, 62, 64, 66, 68

WELL CONSTRUCTION

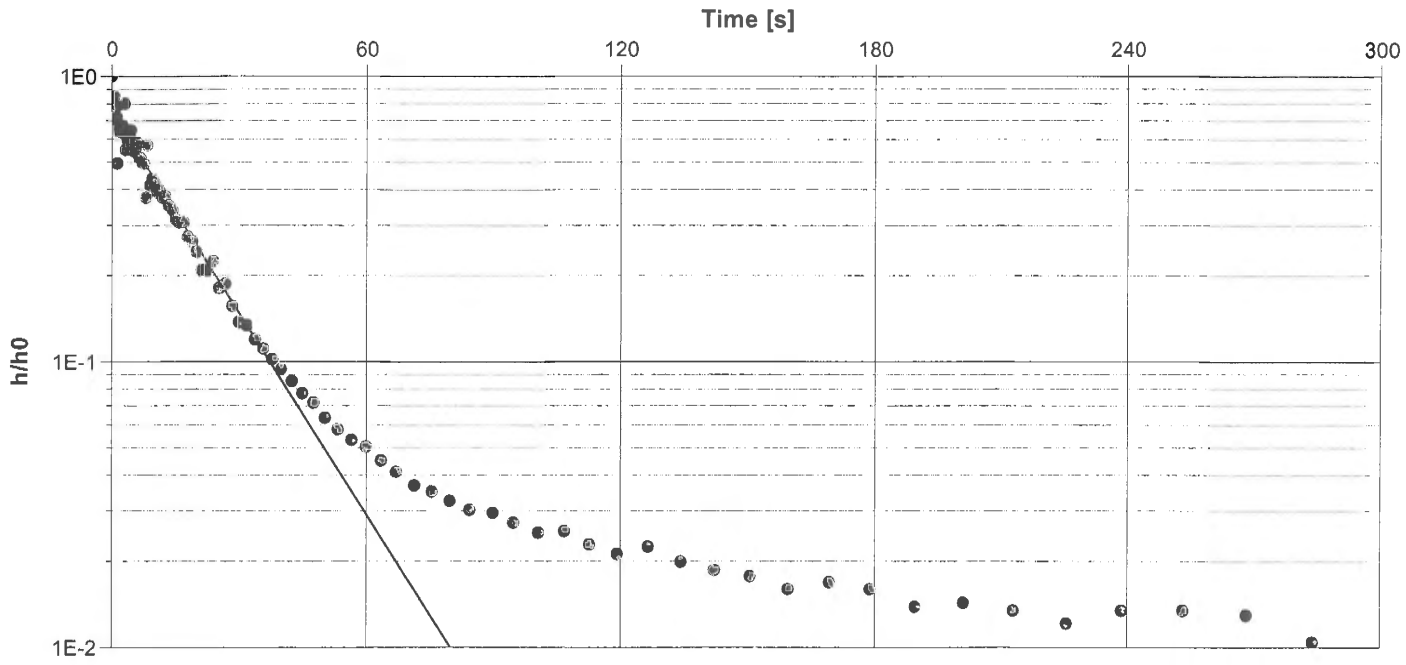


WELL CONSTRUCTION DETAILS

- Bentonite slurry annular seal (3'-57')
- 2" dia. Sch. 40 PVC riser (0.5'-60')
- Fine choke sand (57'-58')
- #00N Sand pack (58'-67.7')
- 2" dia. 20-slot PVC screen (60'-65')
- 5" dia. PQ Core corehole (59.5'-67.7')

Groundwater Sciences Corp. 2601 Market Place Street, Ste 310 Harrisburg, PA 17110	**Slug Test Analysis Report**
	Project: Lockheed Martin Owego
	Number: 93004.46.1701
	Client: IBM

Location: Owego, NY	Slug Test: 700 Slug In	Test Well: 700
Test Conducted by: S. Fisher		Test Date: 7/5/2018
Analysis Performed by: S. Fisher	Bouwer & Rice	Analysis Date: 7/6/2018
Aquifer Thickness: 40.71 ft		

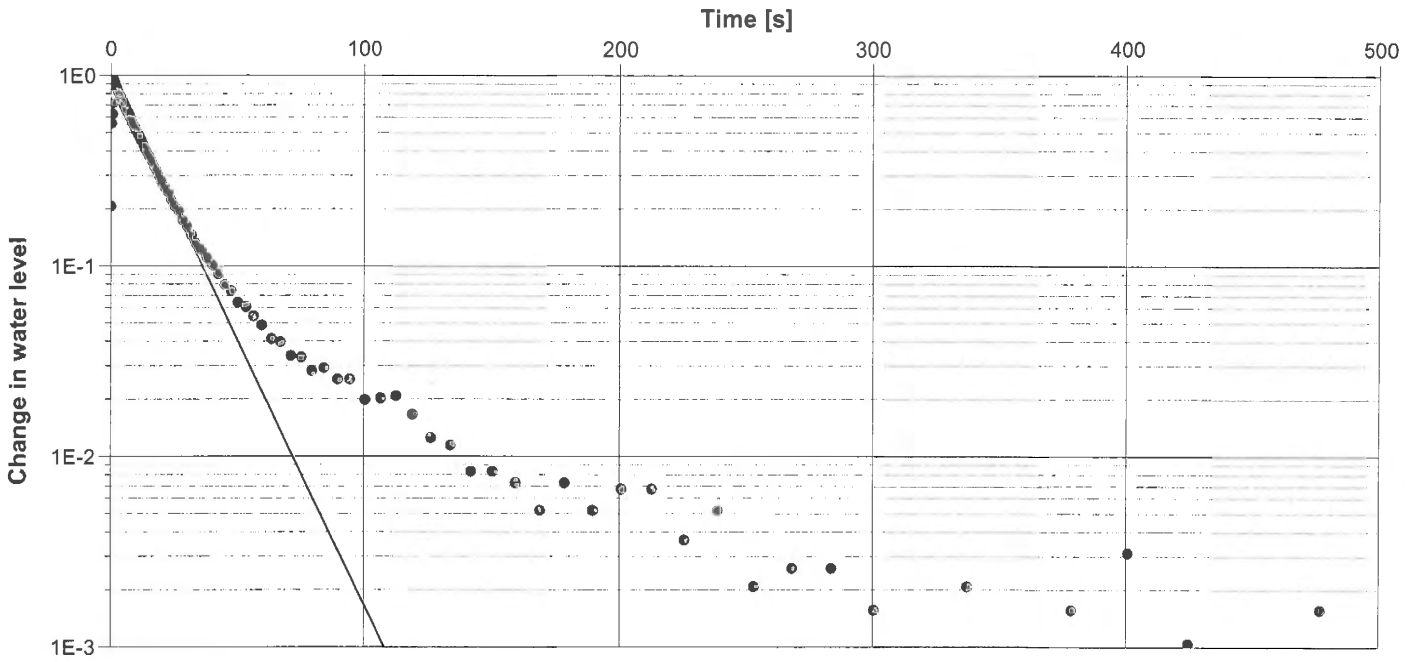


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [ft/d]	
700	6.03×10^{0}	

Groundwater Sciences Corp. **2601 Market Place Street, Ste 310** **Harrisburg, PA 17110**	**Slug Test Analysis Report** Project: Lockheed Martin Owego Number: 93004.46.1701 Client: IBM

Location: Owego, NY	Slug Test: 700 Slug Out	Test Well: 700
Test Conducted by: S. Fisher		Test Date: 7/5/2018
Analysis Performed by: S Fisher	Bouwer & Rice	Analysis Date: 7/6/2018
Aquifer Thickness: 40.71 ft		

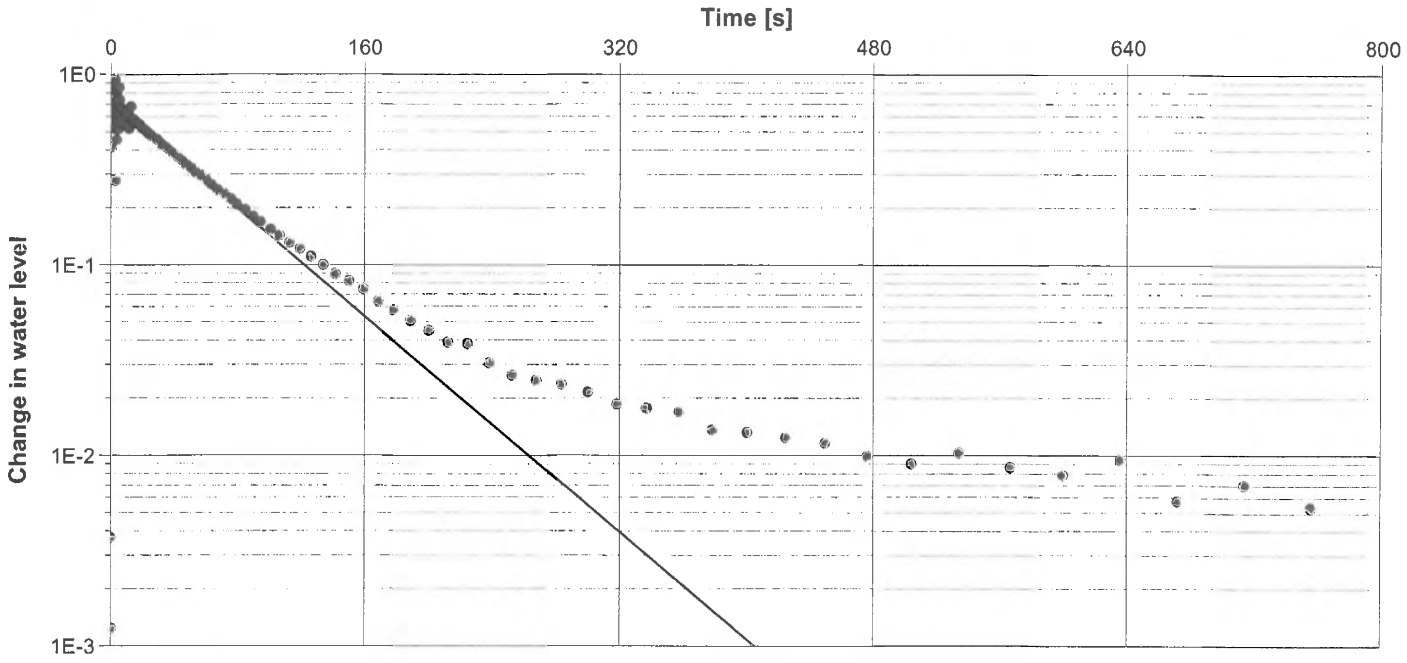


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [ft/d]	
700	7.12×10^{0}	

Groundwater Sciences Corp. *2601 Market Place Street, Ste 310* *Harrisburg, PA 17110*	**Slug Test Analysis Report** Project: Lockheed Martin Owego Number: 93004.46.1701 Client: IBM

Location: Owego, NY	Slug Test: 701 Slug In	Test Well: 701
Test Conducted by: S. Fisher		Test Date: 7/5/2018
Analysis Performed by: S. Fisher	Bouwer & Rice	Analysis Date: 7/6/2018
Aquifer Thickness: 39.74 ft		

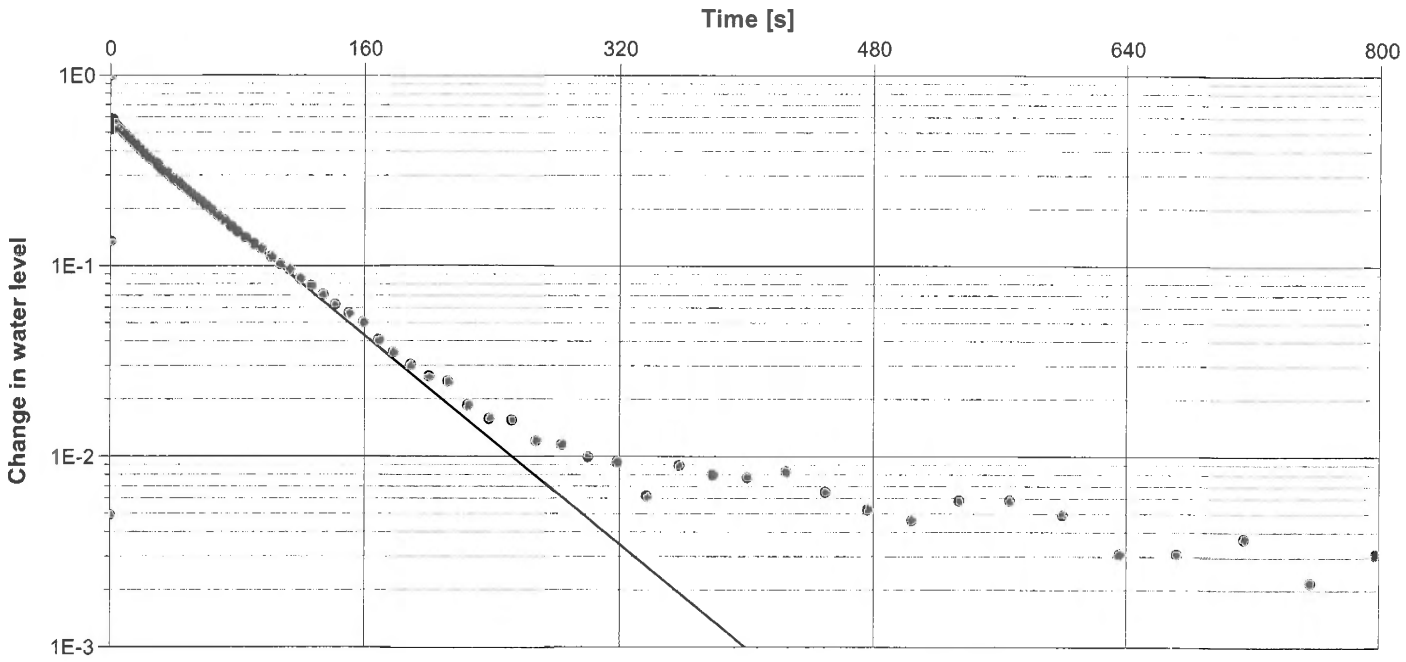


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [ft/d]	
701	3.08×10^{0}	

Groundwater Sciences Corp. **2601 Market Place Street, Ste 310** **Harrisburg, PA 17110**	**Slug Test Analysis Report**	
	Project: Lockheed Martin Owego	
	Number: 93004.46.1701	
	Client: IBM	

Location: Owego, NY	Slug Test: 701 Slug Out	Test Well: 701
Test Conducted by: S. Fisher		Test Date: 7/5/2018
Analysis Performed by:	Bouwer & Rice	Analysis Date: 7/6/2018
Aquifer Thickness: 39.74 ft		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [ft/d]	
701	2.99×10^{0}	

FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

Project No. L-[redacted]2

Project Title Laboratory Testing - IBM

Sieve Analysis ASTM D422

well 324 Lodgement Till

WELL 324		Sieve Size - Percent Passing Sieve													
Sample	Depth (in feet)	1½"	1"	3/4"	1/2"	3/8"	1/4"	#4	#10	#30	#40	#60	#100	#200	
S-11	37.0 - 38.0	--	100	95.0	87.1	82.5	77.1	72.7	61.9	50.8	48.7	46.8	45.3	43.0	
S-12	38.0 - 44.0	100	93.0	86.0	80.0	75.6	69.0	65.3	55.8	46.1	44.2	42.2	40.5	37.3	
S-15	44.0 - 46.0	--	100	97.3	93.8	89.6	82.9	78.6	67.9	57.8	55.6	53.0	50.6	46.1	
S-16	46.0 - 48.0	100	95.9	83.3	76.4	72.3	65.6	61.4	50.0	38.8	36.6	34.5	33.0	31.2	
S-17	48.0 - 50.0	100	95.7	93.2	82.5	77.0	68.8	62.7	49.4	37.4	35.2	33.1	31.5	29.7	
	BR														
		Sieve Size - Percent Retained by Sieve													
S-11	37-38	-	0	5.0	12.9	17.5	22.9	27.3	38.1	49.2	51.3	53.2	54.7	57.0	
S-12	38-44	0	7.0	14.0	20.0	24.4	31.0	34.7	44.2	53.9	55.8	57.8	59.5	62.7	
S-15	44-46	-	0	2.7	6.2	10.4	17.1	21.4	32.1	42.2	44.4	47.0	49.4	53.9	
S-16	46-48	→ 0	4.1	16.7	23.6	27.7	34.4	38.6	50.8	61.2	63.4	65.5	67.0	68.8	
S-17	48-50	→ 0	4.3	6.8	17.5	23.0	31.2	37.3	50.6	62.6	64.8	66.9	68.5	70.3	

Remarks:

Prewashed ASTM C-117
Yes X No

Performed By VJT, AFI

Johnson Filtration Systems Inc.
P.O. Box 64118 • St. Paul, MN 55164-0118
TEL. 612-636-3900 or 1-800-833-9473
TELEX 29-7451 FAX 612-636-0889
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

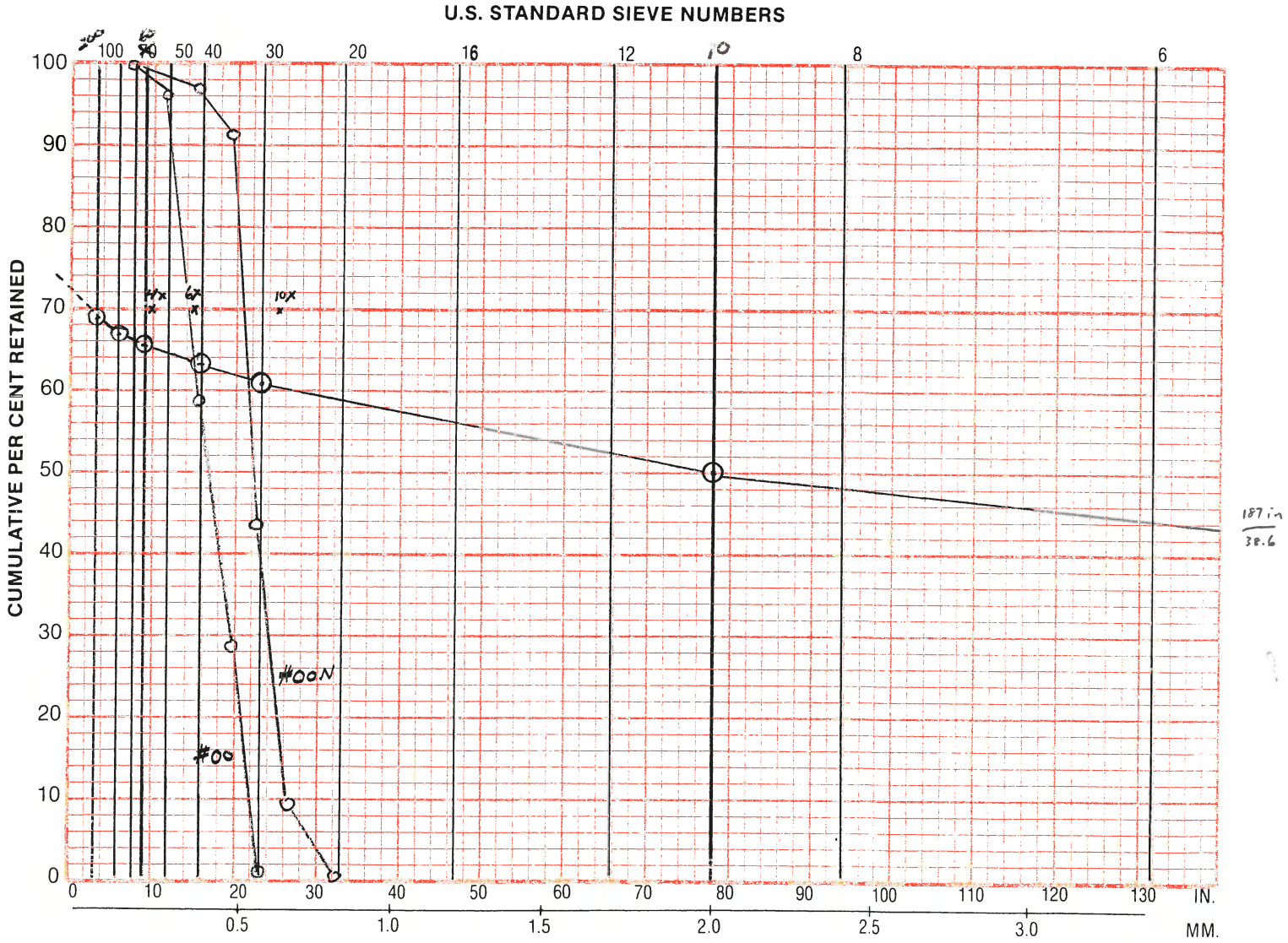
Job Name IBM Date

City Owego State NY Zip

Driller Phone

Engineer Well 417 Design Phone

Remarks 46' – 48' depth



187 in / 38.6

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 46-48			
4	0.187	4.75	38.6			
10	0.078	2.00	50.0			
12	.066	1.68	—			
16	.047	1.19	—			
20	.033	0.84	—			
30	.023	0.60	61.2			
40	.016	0.42	63.4			
60	0.009	0.250	65.5			
70	.008	0.21	—			
100	.006	0.15	67.0			
200	0.003	0.075	68.8			

Comments Sample from well 324
#00 or #00N Sand Pack – 20 slot screen

59 in²/ft × 0.31 = 18.3 gpm/ft

SCREEN RECOMMENDATIONS: DIAM. 8" PS

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Johnson Filtration Systems Inc.
P.O. Box 64118 • St. Paul, MN 55164-0118
TEL. 612-636-3900 or 1-800-833-9473
TELEX 29-7451 FAX 612-636-0889
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

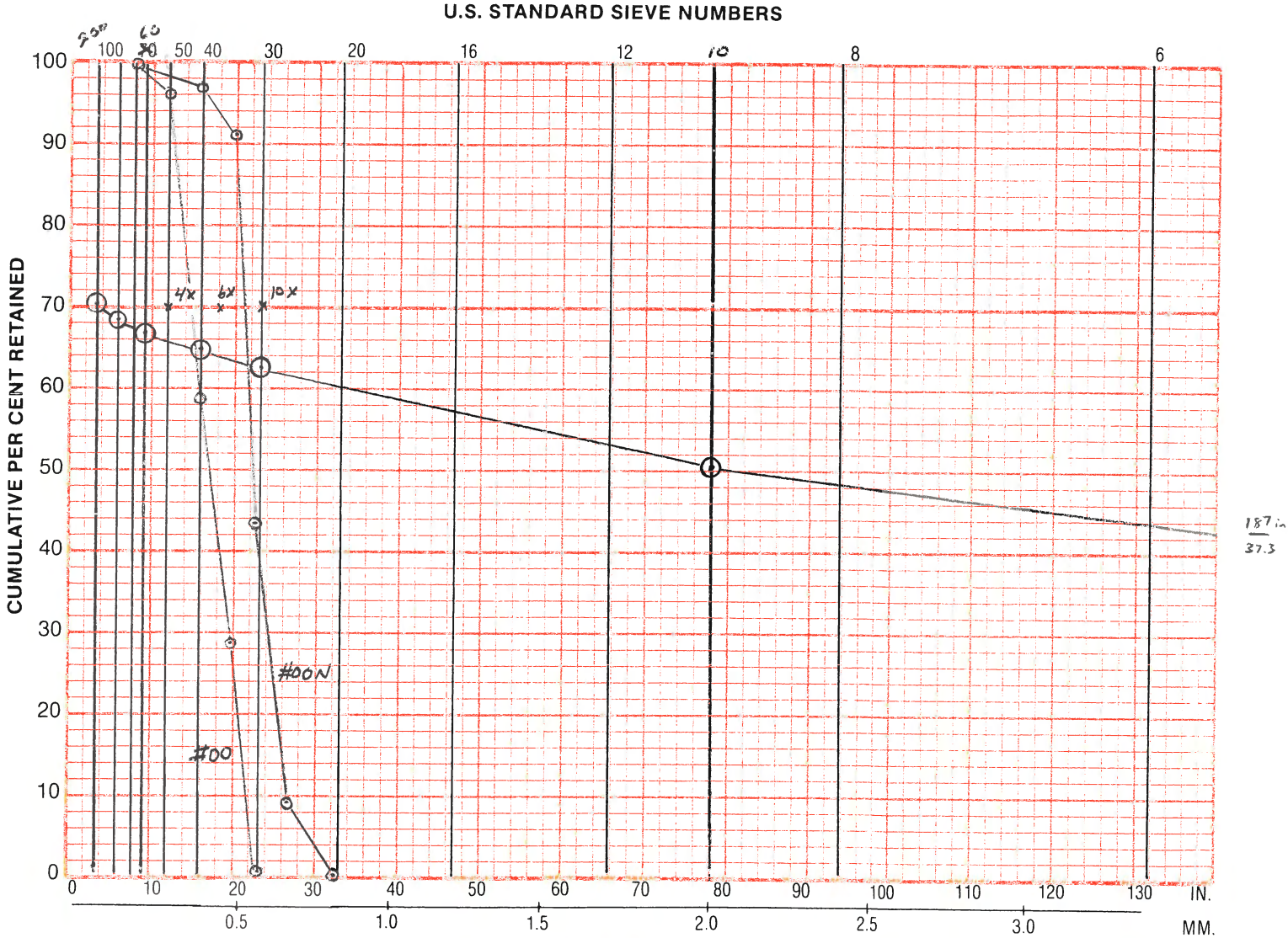
Job Name IBM Date

City Owego State NY Zip

Driller Phone

Engineer Well 417 Design Phone

Remarks 48' - 50' Depth (Bedrock @ 50')



187 in / 37.3

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 48-50			
4	0.187	4.75	37.3			
10	0.078	2.00	50.6			
12	.066	1.68	—			
16	.047	1.19	—			
20	.033	0.84	—			
30	.023	0.60	62.6			
40	.016	0.42	64.8			
60	0.009	0.250	66.9			
70	.008	0.21	—			
100	.006	0.15	68.5			
200	.003	0.075	70.3			

Comments Sample from well 324
#00 or #00N Sand Pack (20-slot screen)

8" PS, 20-slot : 59 in² × 0.31 = 18.3 gpm/ft

SCREEN RECOMMENDATIONS: DIAM. 8" PS

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: 417 Design

PROJECT INFORMATION

PROJECT:	***Lockheed Martin Facility***
SITE LOCATION:	***Owego, New York***
JOB NO.:	***94004.46.1701***
LOGGED BY:	---
DATES DRILLED:	---

NOTES: Approx. 26.5 ft below grade
Soil description from nearby well 700 log

DRILLING INFORMATION

DRILLING CO.:	---
DRILLER:	---
RIG TYPE:	---
DRILLING METHOD:	***Dual Rotary***
DEVELOPMENT DATE:	---
LOCATION:	***P001 Area, approx. 10 ft N of well 700***
SURFACE ELEVATION	Approx. 889 ft amsl
EASTING	---
NORTHING	---

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
-2							-2		8" locking well cap
0							0		Concrete surface apron (0'-1.0')
					SILT, SAND & GRAVEL: dusky yellow to dk yellowish brown (10 YR 4/2) silt and vf-m, lit c-vc with f-m A-SR gravel, dense, crumbly, moist to dry				
2							2		
4	Augered to 20 ft	---	---	---			4		16" dia. dual rotary borehole (0'-69')
6							6		
8							8		
10							10		Bentonite slurry annular seal (1'-54')
12							12		
14							14		
16							16		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
18							18		

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
20	3 4 7 7	0	12"	1	SILT, SAND & GRAVEL: mod. yellowish brown (10 YR 5/4) to dusky yellow (5 Y 6/4) pred silt, tr clay, some vf-c sand, w/ A-SR gravel, tr. orgnics, dense, stiff, moist		20		
22	5 9 8 9	0	16"	2	SILT, SAND & GRAVEL: as above, turning more olive gray (5 Y 4/1) in lower 4", increasing silt and clay, more plastic, moist		22		16" dia. dual rotary borehole (0'-69')
24	6 7 9 11	0	11"	3	SILT & CLAY: olive gray to lt brownish gray (5 YR 6/1) pred silt w/ clay, dense, plastic, with olive black (5 Y 2/1) peat masses and rootlets, large 3" SA rock frag, moist		24		
26	8 11 12 12	0	20"	4	SILT & CLAY: as above SILT & CLAY: as above, less peat and rootlets, pred greenish gray (5 GY 6/1) to med gray (N5) silt, tr clay, w/ dk yellow orange (10 YR 6/6) mottling, tr f sand, stiff, moist		26		
28	12 13 13 12	0	24'	5	SILT, SAND & GRAVEL: pred silt w/ vf-f sand, tr m-vc, w/ A-SA wthrd siltstone gravel, mottled, dense, moist		28		
30	6 15 14 14	0	24"	6	SILT, SAND & GRAVEL: as above, less mottled below 14"		30		Bentonite slurry annular seal (1'-54')
32	9 11 18 20	0	16"	7	SILT & GRAVEL: brownish gray (5 YR 4/1) silt, SA-SR fine gravel, tr vf-f sand, dense stiff, moist to wet		32		
34	9 10 11 16	0	23"	8	SILT, SAND & GRAVEL: pred. silt , w/ vf-f sand, w/ more SA siltstone frags, some m gravel, pred silt, tr clay lower 3", more homogeneous, dense, stiff, wet		34		
36	5 15 16 15	0	21"	9	SILT, SAND & GRAVEL: as above, pred. silt 15-21", dense, stiff, wet		36		
38	7 11 21 21	0	21"	10	SILT, SAND & GRAVEL: as above, silty 10-14", pred. granules 14-16", v. gravelly elsewhere, some vf-c sand, dense, sl crumbly, wet		38		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
40	12 17 38 35	0	20"	11	SILT, SAND & GRAVEL: as above, pred f-m SA-SR clasts of shale and siltstone, v gravelly below 15", dense, stiff, wet		40		
42	37 45 40 40	0	19"	12	SILT, SAND & GRAVEL: as above w/ more f-m A-SA gravel, dense, wet, turning mod yell brown (10 YR 5/4) lower 8", w/ wthrd clasts, wet		42		
44	15 24				SILT, SAND & GRAVEL: dk yell brown to olive gray, sl less silt, w/ vf-vc sand, f-m		44		

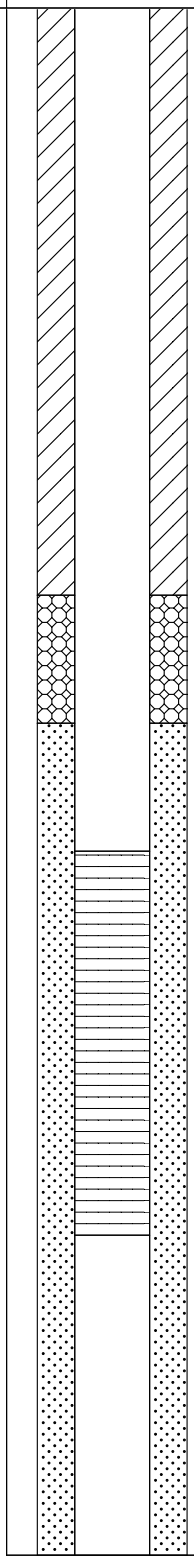
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GEOLOGIC LOG: **417 Design**

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
46	26 28	0	22"	13	SA-SR gravel, loose, crumbly, wet
	33 22 42 37	0	14"	14	SILT, SAND & GRAVEL: as above top 6", then olive gray silt, w/ vf-f sand, tr m-vc, w/ f-m SA-SR gravel, v. dense, stiff, moist to wet
48	14 88	0	12"	15	SILT, SAND & GRAVEL: olive gray, silt, some vf-f sand, f-m gravel, v. dense, stiff, moist
	Spin casing	---	---	---	
50	PQ Core	0	39"/41"	RUN 1	SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts
52					SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet
54	PQ Core	0	32"/36"	RUN 2	SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet
56	PQ Core	0	20"/24"	RUN 3	SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts
58	PQ Core	0	60"/60"	RUN 4	SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet
60					SHALE: deeply wthrd boulder 60.2' to 61 ft
62					SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet
					SHALE: fractured shale boulder 61.5 ft to 62.2 ft
64	PQ Core	0	60"/60"	RUN 5	SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet
66					SHALE: med. dk gray (N4), competent , thin horizontal bedding, occ calcite fossil masses 6"-33", calcitic fossil layer 48.5"-49.5", possible clean natural fracture at 8"
68					

GRAPHIC

DEPTH FEET: 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68



WELL CONSTRUCTION DETAILS

- 16" dia. dual rotary borehole (0'-69')
- Bentonite slurry annular seal (1'-54')
- 8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
- Bentonite chip annular seal, (54'-56')
- #00N Sand pack (56'-69')
- 8" dia. Sch 40, Type 316, 20-slot, stainless steel wire-wrapped screen (58'-64')
- 8" dia. Sch 40, Type 316, stainless steel sump (64'-69')

GROUNDWATER SCIENCES CORPORATION

***WELL LOG:* 417**

PROJECT INFORMATION

PROJECT:	***Lockheed Martin Facility, P001 Study***
SITE LOCATION:	***Owego, New York***
JOB NO.:	***94004.46.1701***
LOGGED BY:	***S. Fisher***
DATES DRILLED:	***9/25/18 - 9/26/18***

DRILLING INFORMATION

DRILLING CO.:	***Eichelbergers, Inc.***
DRILLER:	***C. Knaub***
RIG TYPE:	***Ingersoll Rand T4***
DRILLING METHOD:	***Air Rotary***
DEVELOPMENT DATE:	***10/2/18***
LOCATION:	***P001 Area, approx. 5 ft S of monitoring well 700***

NOTES: Soil description from adjacent monitoring well 700 log
SWL=24.99 ft below TOC, 10/4/18
WL Measuring Point elevation: 891.78 ft amsl

SURFACE ELEVATION	889.4 ft amsl
EASTING	917949.34
NORTHING	766961.71

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
-2							-2		8" locking well cap
0							0		
					SILT, SAND & GRAVEL: dusky yellow to dk yellowish brown (10 YR 4/2) silt and vf-m, lit c-vc with f-m A-SR gravel, dense, crumbly, moist to dry				Topsoil backfill (0'-1')
2							2		Sand backfill (1'-6')
4	Augered to 20 ft	---	---	---			4		
6							6		16" dia. air rotary simultaneous casing advancement borehole, (0'-64')
8							8		
10							10		
12							12		Bentonite slurry annular seal (6'-50')
14							14		
16							16		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
18							18		

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
20	3 4 7 7	0	12"	1	SILT, SAND & GRAVEL: mod. yellowish brown (10 YR 5/4) to dusky yellow (5 Y 6/4) pred silt, tr clay, some vf-c sand, w/ A-SR gravel, tr. orgnics, dense, stiff, moist		20		
22	5 9 8 9	0	16"	2	SILT, SAND & GRAVEL: as above, turning more olive gray (5 Y 4/1) in lower 4", increasing silt and clay, more plastic, moist		22		16" dia. air rotary simultaneous casing advancement borehole, (0'-64')
24	6 7 9 11	0	11"	3	SILT & CLAY: olive gray to lt brownish gray (5 YR 6/1) pred silt w/ clay, dense, plastic, with olive black (5 Y 2/1) peat masses and rootlets, large 3" SA rock frag, moist		24		
26	8 11 12 12	0	20"	4	SILT & CLAY: as above SILT & CLAY: as above, less peat and rootlets, pred greenish gray (5 GY 6/1) to med gray (N5) silt, tr clay, w/ dk yellow orange (10 YR 6/6) mottling, tr f sand, stiff, moist		26		
28	12 13 13 12	0	24'	5	SILT, SAND & GRAVEL: pred silt w/ vf-f sand, tr m-vc, w/ A-SA wthrd siltstone gravel, mottled, dense, moist		28		
30	6 15 14 14	0	24"	6	SILT, SAND & GRAVEL: as above, less mottled below 14"		30		Bentonite slurry annular seal (6'-50')
32	9 11 18 20	0	16"	7	SILT & GRAVEL: brownish gray (5 YR 4/1) silt, SA-SR fine gravel, tr vf-f sand, dense stiff, moist to wet		32		
34	9 10 11 16	0	23"	8	SILT, SAND & GRAVEL: pred. silt , w/ vf-f sand, w/ more SA siltstone frags, some m gravel, pred silt, tr clay lower 3", more homogeneous, dense, stiff, wet		34		
36	5 15 16 15	0	21"	9	SILT, SAND & GRAVEL: as above, pred. silt 15-21", dense, stiff, wet		36		
38	7 11 21 21	0	21"	10	SILT, SAND & GRAVEL: as above, silty 10-14", pred. granules 14-16", v. gravelly elsewhere, some vf-c sand, dense, sl crumbly, wet		38		
40	12 17 38 35	0	20"	11	SILT, SAND & GRAVEL: as above, pred f-m SA-SR clasts of shale and siltstone, v gravelly below 15", dense, stiff, wet		40		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
42	37 45 40 40	0	19"	12	SILT, SAND & GRAVEL: as above w/ more f-m A-SA gravel, dense, wet, turning mod yell brown (10 YR 5/4) lower 8", w/ wthrd clasts, wet		42		
44	15 24 26 28	0	22"	13	SILT, SAND & GRAVEL: dk yell brown to olive gray, sl less silt, w/ vf-vc sand, f-m SA-SR gravel, loose, crumbly, wet		44		
46	33 22 42	0	14"	14	SILT, SAND & GRAVEL: as above top 6", then olive gray silt, w/ vf-f sand, tr m-vc, w/ f-m SA-SR gravel, v. dense, stiff, moist		46		

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***WELL LOG:* 417**

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
48	37				to wet		48		
	14 88	0	12"	15	SILT, SAND & GRAVEL: olive gray, silt, some vf-f sand, f-m gravel, v. dense, stiff, moist				Bentonite slurry annular seal (6'-50')
	Spin casing	---	---	---					
50	PQ Core	0	39"/41"	RUN 1	SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts		50		Bentonite chip annular seal, (50'-52')
52					SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet		52		16" dia. air rotary simultaneous casing advancement borehole, (0'-64')
54	PQ Core	0	32"/36"	RUN 2	SILT, SAND & GRAVEL: olive gray silt with vf-f sand, some m-vc sand, w/ f-m A-SA shale fragments, dense, wet		54		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-58')
56	PQ Core	0	20"/24"	RUN 3	SHALE: (boulder) med. dark gray (N4) horizontally bedded, some fracturing, irregular top and bottom contacts		56		
58	PQ Core	0	60"/60"	RUN 4	SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet		58		#00N grade sand pack (52'-70')
60					SHALE: deeply wthrd boulder 60.2' to 61 ft		60		
62					SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet		62		8" dia. Sch 40, Type 316, 20-slot, stainless steel wire-wrapped screen (58'-64')
64	PQ Core	0	60"/60"	RUN 5	SHALE: fractured shale boulder 61.5 ft to 62.2 ft		64		
					SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand, some m-vc, w/ A-SA grvl, dense, wet				8" dia. Sch 40, Type 316, stainless steel sump (64'-69')
66					SHALE: med. dk gray (N4), competent , thin horizontal bedding, occ calcite fossil masses 6"-33", calcitic fossil layer 48.5"-49.5", possible clean natural fracture at 8"		66		
68	Air rotary	---	---	---	SHALE		68		12" dia. air rotary borehole (64'-70')
70							70		

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 7:30	16.456	12.39	24.96	--	--	--	0	Pre test
10/4/2018 7:31	16.468	12.38	24.93	--	--	--	0	
10/4/2018 7:32	16.461	12.34	24.95	--	--	--	0	
10/4/2018 7:33	16.452	12.37	24.97	--	--	--	0	
10/4/2018 7:34	16.464	12.38	24.94	--	--	--	0	
10/4/2018 7:35	16.453	12.37	24.97	--	--	--	0	
10/4/2018 7:36	16.468	12.38	24.93	--	--	--	0	
10/4/2018 7:37	16.456	12.38	24.96	--	--	--	0	
10/4/2018 7:38	16.45	12.39	24.97	--	--	--	0	
10/4/2018 7:39	16.482	12.38	24.90	--	--	--	0	
10/4/2018 7:40	16.449	12.36	24.97	--	--	--	0	
10/4/2018 7:41	16.462	12.37	24.95	--	--	--	0	
10/4/2018 7:42	16.454	12.40	24.96	--	--	--	0	
10/4/2018 7:43	16.469	12.37	24.93	--	--	--	0	
10/4/2018 7:44	16.469	12.37	24.93	--	--	--	0	
10/4/2018 7:45	16.463	12.33	24.94	0	--	64487.3		Start Step #1
10/4/2018 7:46	15.644	12.37	26.83	1	1.89			Target: 4 gpm
10/4/2018 7:47	15.368	12.38	27.47	2	2.53			
10/4/2018 7:48	15.201	12.40	27.86	3	2.91			
10/4/2018 7:49	15.098	12.41	28.09	4	3.15			
10/4/2018 7:50	15.001	12.40	28.32	5	3.38			
10/4/2018 7:51	14.902	12.42	28.55	6	3.61			
10/4/2018 7:52	14.809	12.44	28.76	7	3.82			
10/4/2018 7:53	14.748	12.43	28.90	8	3.96			
10/4/2018 7:54	14.687	12.39	29.04	9	4.10			
10/4/2018 7:55	14.626	12.38	29.19	10	4.24			
10/4/2018 7:56	14.575	12.38	29.30	11	4.36			
10/4/2018 7:57	14.536	12.39	29.39	12	4.45			
10/4/2018 7:58	14.486	12.39	29.51	13	4.56			
10/4/2018 7:59	14.456	12.37	29.58	14	4.64			
10/4/2018 8:00	14.432	12.39	29.63	15	4.69			
10/4/2018 8:01	14.39	12.40	29.73	16	4.79			
10/4/2018 8:02	14.356	12.40	29.81	17	4.87			
10/4/2018 8:03	14.336	12.39	29.85	18	4.91			
10/4/2018 8:04	14.313	12.39	29.91	19	4.96			
10/4/2018 8:05	14.277	12.38	29.99	20	5.05			
10/4/2018 8:06	14.253	12.36	30.05	21	5.10			
10/4/2018 8:07	14.227	12.38	30.11	22	5.16			
10/4/2018 8:08	14.232	12.39	30.09	23	5.15			
10/4/2018 8:09	14.185	12.37	30.20	24	5.26			
10/4/2018 8:10	14.175	12.40	30.23	25	5.28			
10/4/2018 8:11	14.169	12.37	30.24	26	5.30			
10/4/2018 8:12	14.141	12.37	30.30	27	5.36			
10/4/2018 8:13	14.134	12.38	30.32	28	5.38			
10/4/2018 8:14	14.127	12.36	30.34	29	5.40			
10/4/2018 8:15	14.115	12.36	30.36	30	5.42			
10/4/2018 8:16	14.064	12.38	30.48	31	5.54			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 8:17	14.071	12.35	30.47	32	5.52			
10/4/2018 8:18	14.067	12.38	30.47	33	5.53			
10/4/2018 8:19	14.044	12.34	30.53	34	5.59			
10/4/2018 8:20	14.011	12.35	30.60	35	5.66			
10/4/2018 8:21	14.009	12.35	30.61	36	5.67			
10/4/2018 8:22	13.986	12.37	30.66	37	5.72			
10/4/2018 8:23	13.971	12.35	30.70	38	5.76			
10/4/2018 8:24	13.96	12.36	30.72	39	5.78			
10/4/2018 8:25	13.962	12.36	30.72	40	5.78			
10/4/2018 8:26	13.952	12.34	30.74	41	5.80			
10/4/2018 8:27	13.929	12.35	30.79	42	5.85			
10/4/2018 8:28	13.926	12.38	30.80	43	5.86			
10/4/2018 8:29	13.921	12.37	30.81	44	5.87			
10/4/2018 8:30	13.915	12.36	30.83	45	5.88			
10/4/2018 8:31	13.889	12.38	30.89	46	5.95			
10/4/2018 8:32	13.9	12.37	30.86	47	5.92			
10/4/2018 8:33	13.892	12.39	30.88	48	5.94			
10/4/2018 8:34	13.865	12.37	30.94	49	6.00			
10/4/2018 8:35	13.869	12.35	30.93	50	5.99			
10/4/2018 8:36	13.854	12.36	30.97	51	6.02			
10/4/2018 8:37	13.858	12.35	30.96	52	6.01			
10/4/2018 8:38	13.828	12.36	31.03	53	6.08			
10/4/2018 8:39	13.847	12.37	30.98	54	6.04			
10/4/2018 8:40	13.824	12.35	31.04	55	6.09			
10/4/2018 8:41	13.828	12.35	31.03	56	6.09			
10/4/2018 8:42	13.814	12.34	31.06	57	6.12			
10/4/2018 8:43	13.792	12.37	31.11	58	6.17			
10/4/2018 8:44	13.794	12.37	31.11	59	6.16			
10/4/2018 8:45	13.808	12.37	31.07	60	6.13	64739.5	4.2	Step #2
10/4/2018 8:46	13.26	12.36	32.34	61	7.40			Target: 8 gpm
10/4/2018 8:47	12.887	12.38	33.20	62	8.26			
10/4/2018 8:48	12.59	12.42	33.89	63	8.94			
10/4/2018 8:49	12.332	12.40	34.48	64	9.54			
10/4/2018 8:50	12.106	12.46	35.00	65	10.06			
10/4/2018 8:51	11.936	12.45	35.40	66	10.45			
10/4/2018 8:52	11.789	12.45	35.73	67	10.79			
10/4/2018 8:53	11.682	12.43	35.98	68	11.04			
10/4/2018 8:54	11.56	12.39	36.26	69	11.32			
10/4/2018 8:55	11.486	12.38	36.43	70	11.49			
10/4/2018 8:56	11.384	12.42	36.67	71	11.73			
10/4/2018 8:57	11.314	12.36	36.83	72	11.89			
10/4/2018 8:58	11.26	12.36	36.96	73	12.01			
10/4/2018 8:59	11.205	12.35	37.08	74	12.14			
10/4/2018 9:00	11.158	12.36	37.19	75	12.25			
10/4/2018 9:01	11.103	12.40	37.32	76	12.38			
10/4/2018 9:02	11.085	12.39	37.36	77	12.42			
10/4/2018 9:03	11.051	12.37	37.44	78	12.50			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 9:04	10.992	12.35	37.58	79	12.63			
10/4/2018 9:05	10.955	12.37	37.66	80	12.72			
10/4/2018 9:06	10.909	12.35	37.77	81	12.83			
10/4/2018 9:07	10.873	12.34	37.85	82	12.91			
10/4/2018 9:08	10.852	12.33	37.90	83	12.96			
10/4/2018 9:09	10.836	12.39	37.94	84	12.99			
10/4/2018 9:10	10.791	12.36	38.04	85	13.10			
10/4/2018 9:11	10.776	12.34	38.07	86	13.13			
10/4/2018 9:12	10.739	12.38	38.16	87	13.22			
10/4/2018 9:13	10.684	12.36	38.29	88	13.34			
10/4/2018 9:14	10.696	12.38	38.26	89	13.32			
10/4/2018 9:15	10.648	12.37	38.37	90	13.43			
10/4/2018 9:16	10.622	12.36	38.43	91	13.49			
10/4/2018 9:17	10.617	12.40	38.44	92	13.50			
10/4/2018 9:18	10.588	12.37	38.51	93	13.57			
10/4/2018 9:19	10.561	12.37	38.57	94	13.63			
10/4/2018 9:20	10.565	12.40	38.56	95	13.62			
10/4/2018 9:21	10.521	12.39	38.66	96	13.72			
10/4/2018 9:22	10.502	12.39	38.71	97	13.76			
10/4/2018 9:23	10.519	12.36	38.67	98	13.73			
10/4/2018 9:24	10.486	12.38	38.74	99	13.80			
10/4/2018 9:25	10.478	12.36	38.76	100	13.82			
10/4/2018 9:26	10.467	12.32	38.79	101	13.85			
10/4/2018 9:27	10.435	12.37	38.86	102	13.92			
10/4/2018 9:28	10.422	12.37	38.89	103	13.95			
10/4/2018 9:29	10.403	12.35	38.94	104	13.99			
10/4/2018 9:30	10.397	12.37	38.95	105	14.01			
10/4/2018 9:31	10.383	12.37	38.98	106	14.04			
10/4/2018 9:32	10.367	12.36	39.02	107	14.08			
10/4/2018 9:33	10.36	12.36	39.04	108	14.09			
10/4/2018 9:34	10.319	12.36	39.13	109	14.19			
10/4/2018 9:35	10.332	12.41	39.10	110	14.16			
10/4/2018 9:36	10.333	12.35	39.10	111	14.16			
10/4/2018 9:37	10.316	12.36	39.14	112	14.19			
10/4/2018 9:38	10.288	12.36	39.20	113	14.26			
10/4/2018 9:39	10.278	12.38	39.22	114	14.28			
10/4/2018 9:40	10.268	12.36	39.25	115	14.31			
10/4/2018 9:41	10.257	12.35	39.27	116	14.33			
10/4/2018 9:42	10.248	12.38	39.29	117	14.35			
10/4/2018 9:43	10.244	12.36	39.30	118	14.36			
10/4/2018 9:44	10.228	12.38	39.34	119	14.40			
10/4/2018 9:45	10.198	12.38	39.41	120	14.47	65207.2	7.8	Step #3
10/4/2018 9:46	9.477	12.37	41.07	121	16.13			Target: 12 gpm
10/4/2018 9:47	8.997	12.41	42.18	122	17.24			
10/4/2018 9:48	8.645	12.47	42.99	123	18.05			
10/4/2018 9:49	8.401	12.48	43.56	124	18.61			
10/4/2018 9:50	8.211	12.43	44.00	125	19.05			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 9:51	8.014	12.48	44.45	126	19.51			
10/4/2018 9:52	7.871	12.48	44.78	127	19.84			
10/4/2018 9:53	7.751	12.46	45.06	128	20.12			
10/4/2018 9:54	7.624	12.48	45.35	129	20.41			
10/4/2018 9:55	7.533	12.43	45.56	130	20.62			
10/4/2018 9:56	7.459	12.42	45.73	131	20.79			
10/4/2018 9:57	7.365	12.42	45.95	132	21.01			
10/4/2018 9:58	7.267	12.39	46.18	133	21.23			
10/4/2018 9:59	7.226	12.42	46.27	134	21.33			
10/4/2018 10:00	7.142	12.42	46.47	135	21.52			
10/4/2018 10:01	7.093	12.40	46.58	136	21.64			
10/4/2018 10:02	7.047	12.41	46.69	137	21.74			
10/4/2018 10:03	6.992	12.38	46.81	138	21.87			
10/4/2018 10:04	6.951	12.39	46.91	139	21.96			
10/4/2018 10:05	6.93	12.40	46.96	140	22.01			
10/4/2018 10:06	6.886	12.38	47.06	141	22.11			
10/4/2018 10:07	6.835	12.37	47.17	142	22.23			
10/4/2018 10:08	6.815	12.38	47.22	143	22.28			
10/4/2018 10:09	6.776	12.35	47.31	144	22.37			
10/4/2018 10:10	6.738	12.37	47.40	145	22.45			
10/4/2018 10:11	6.725	12.39	47.43	146	22.49			
10/4/2018 10:12	6.682	12.37	47.53	147	22.58			
10/4/2018 10:13	6.675	12.36	47.54	148	22.60			
10/4/2018 10:14	6.632	12.35	47.64	149	22.70			
10/4/2018 10:15	6.61	12.36	47.69	150	22.75			
10/4/2018 10:16	6.569	12.37	47.79	151	22.85			
10/4/2018 10:17	6.538	12.35	47.86	152	22.92			
10/4/2018 10:18	6.524	12.37	47.89	153	22.95			
10/4/2018 10:19	6.499	12.37	47.95	154	23.01			
10/4/2018 10:20	6.49	12.37	47.97	155	23.03			
10/4/2018 10:21	6.464	12.36	48.03	156	23.09			
10/4/2018 10:22	6.439	12.37	48.09	157	23.15			
10/4/2018 10:23	6.418	12.35	48.14	158	23.19			
10/4/2018 10:24	6.389	12.34	48.20	159	23.26			
10/4/2018 10:25	6.372	12.37	48.24	160	23.30			
10/4/2018 10:26	6.378	12.36	48.23	161	23.29			
10/4/2018 10:27	6.341	12.34	48.31	162	23.37			
10/4/2018 10:28	6.315	12.36	48.37	163	23.43			
10/4/2018 10:29	6.308	12.35	48.39	164	23.45			
10/4/2018 10:30	6.299	12.35	48.41	165	23.47			
10/4/2018 10:31	6.287	12.36	48.44	166	23.50			
10/4/2018 10:32	6.252	12.35	48.52	167	23.58			
10/4/2018 10:33	6.236	12.35	48.56	168	23.61			
10/4/2018 10:34	6.214	12.33	48.61	169	23.66			
10/4/2018 10:35	6.214	12.37	48.61	170	23.66			
10/4/2018 10:36	6.182	12.36	48.68	171	23.74			
10/4/2018 10:37	6.172	12.34	48.70	172	23.76			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

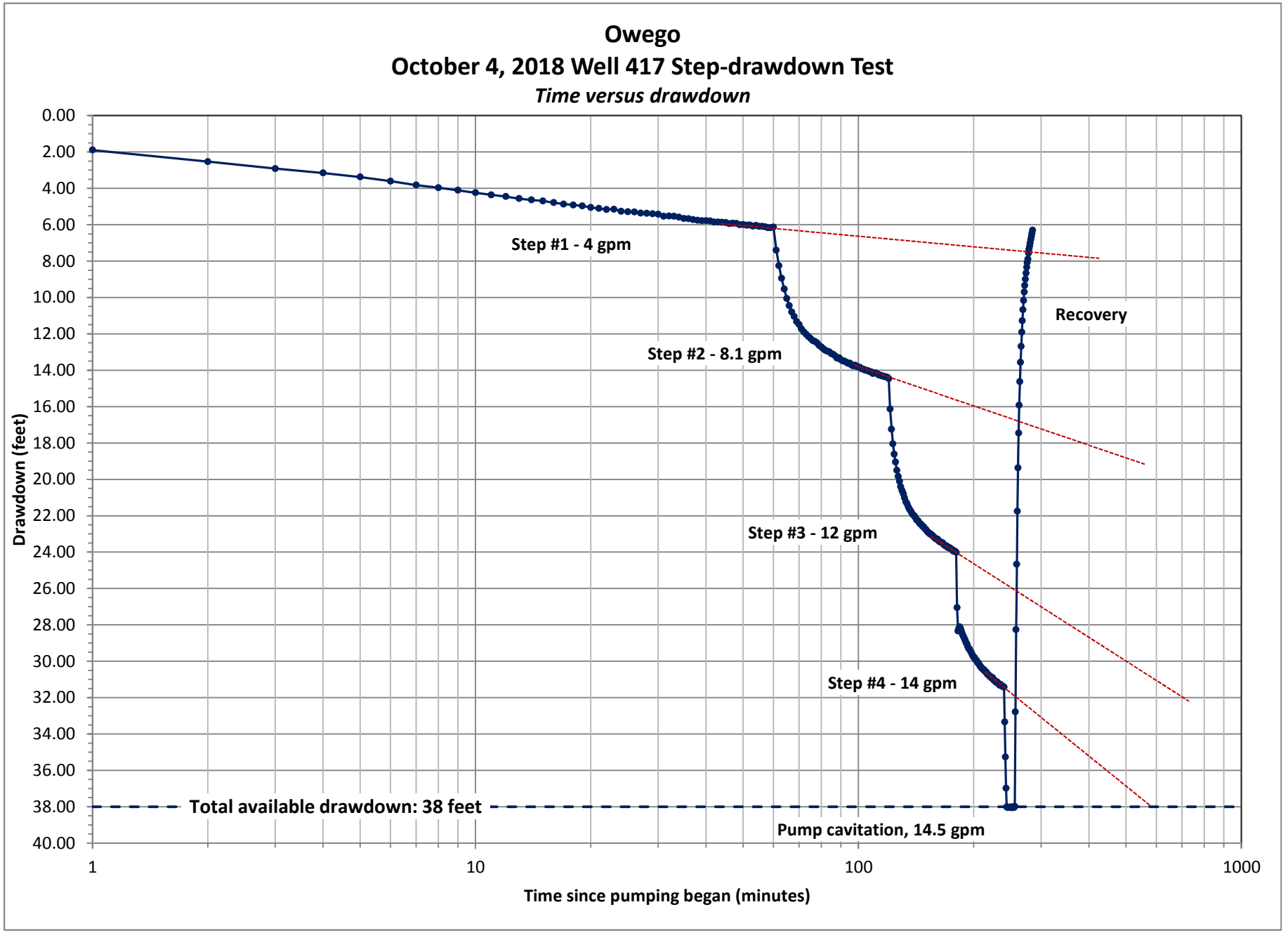
Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 10:38	6.177	12.34	48.69	173	23.75			
10/4/2018 10:39	6.155	12.32	48.74	174	23.80			
10/4/2018 10:40	6.139	12.35	48.78	175	23.84			
10/4/2018 10:41	6.121	12.36	48.82	176	23.88			
10/4/2018 10:42	6.091	12.38	48.89	177	23.95			
10/4/2018 10:43	6.096	12.37	48.88	178	23.94			
10/4/2018 10:44	6.084	12.35	48.91	179	23.97			
10/4/2018 10:45	6.065	12.34	48.95	180	24.01	65914	11.8	Step #4
10/4/2018 10:46	4.745	12.35	52.00	181	27.06			Target: 14 gpm
10/4/2018 10:47	4.192	12.48	53.28	182	28.33			
10/4/2018 10:48	4.255	12.47	53.13	183	28.19			
10/4/2018 10:49	4.285	12.44	53.06	184	28.12			
10/4/2018 10:50	4.238	12.46	53.17	185	28.23			
10/4/2018 10:51	4.173	12.42	53.32	186	28.38			
10/4/2018 10:52	4.109	12.37	53.47	187	28.53			
10/4/2018 10:53	4.062	12.40	53.58	188	28.63			
10/4/2018 10:54	4.019	12.39	53.68	189	28.73			
10/4/2018 10:55	3.972	12.39	53.78	190	28.84			
10/4/2018 10:56	3.913	12.37	53.92	191	28.98			
10/4/2018 10:57	3.878	12.35	54.00	192	29.06			
10/4/2018 10:58	3.826	12.34	54.12	193	29.18			
10/4/2018 10:59	3.776	12.35	54.24	194	29.30			
10/4/2018 11:00	3.764	12.38	54.26	195	29.32			
10/4/2018 11:01	3.714	12.36	54.38	196	29.44			
10/4/2018 11:02	3.675	12.34	54.47	197	29.53			
10/4/2018 11:03	3.643	12.36	54.54	198	29.60			
10/4/2018 11:04	3.605	12.36	54.63	199	29.69			
10/4/2018 11:05	3.564	12.36	54.73	200	29.78			
10/4/2018 11:06	3.553	12.36	54.75	201	29.81			
10/4/2018 11:07	3.518	12.37	54.83	202	29.89			
10/4/2018 11:08	3.498	12.36	54.88	203	29.94			
10/4/2018 11:09	3.478	12.34	54.93	204	29.98			
10/4/2018 11:10	3.432	12.36	55.03	205	30.09			
10/4/2018 11:11	3.423	12.34	55.05	206	30.11			
10/4/2018 11:12	3.389	12.33	55.13	207	30.19			
10/4/2018 11:13	3.344	12.35	55.23	208	30.29			
10/4/2018 11:14	3.334	12.33	55.26	209	30.31			
10/4/2018 11:15	3.301	12.33	55.33	210	30.39			
10/4/2018 11:16	3.294	12.37	55.35	211	30.41			
10/4/2018 11:17	3.267	12.35	55.41	212	30.47			
10/4/2018 11:18	3.263	12.32	55.42	213	30.48			
10/4/2018 11:19	3.235	12.33	55.49	214	30.54			
10/4/2018 11:20	3.216	12.35	55.53	215	30.59			
10/4/2018 11:21	3.206	12.35	55.55	216	30.61			
10/4/2018 11:22	3.169	12.32	55.64	217	30.70			
10/4/2018 11:23	3.147	12.31	55.69	218	30.75			
10/4/2018 11:24	3.139	12.36	55.71	219	30.77			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

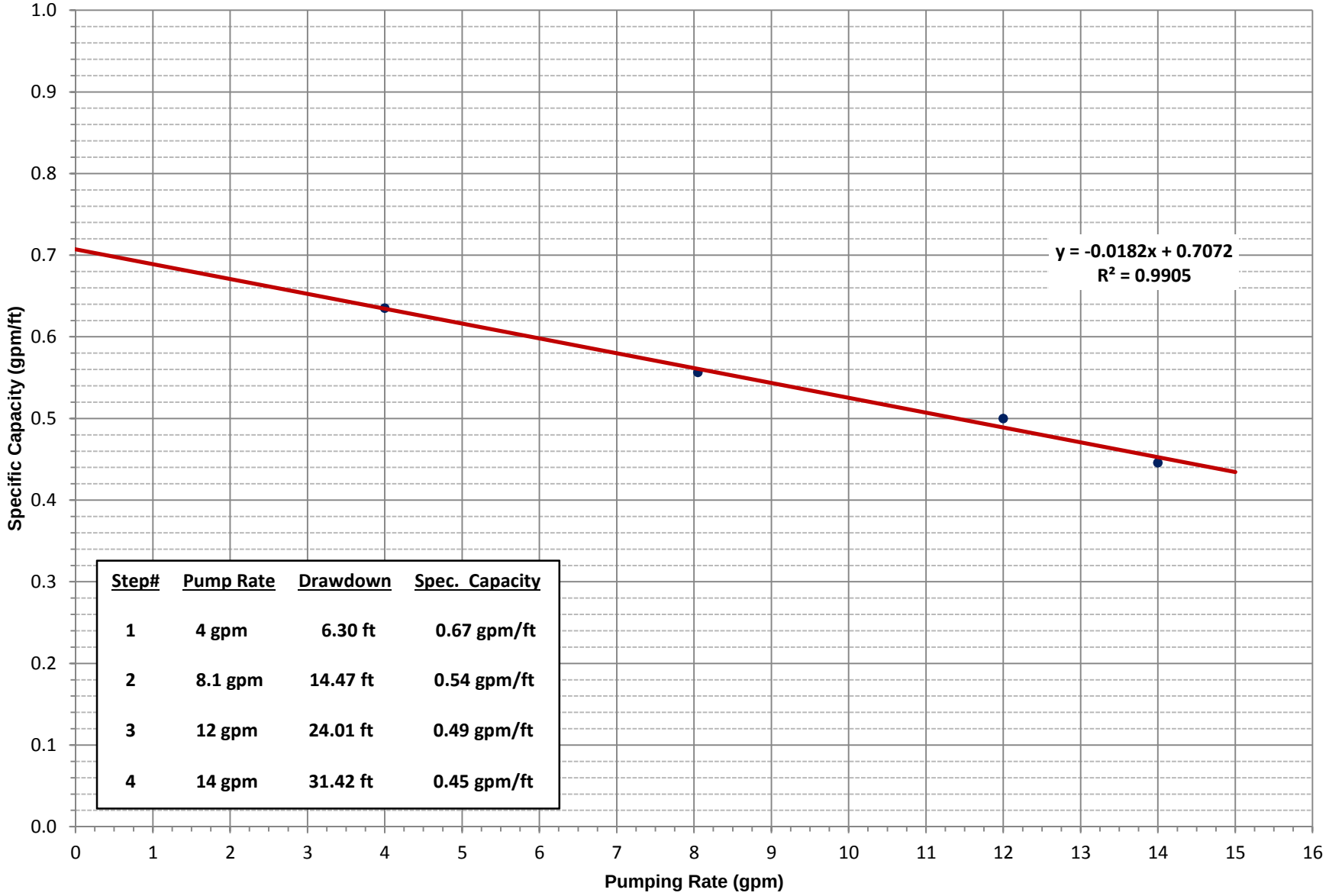
Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 11:25	3.12	12.34	55.75	220	30.81			
10/4/2018 11:26	3.095	12.32	55.81	221	30.87			
10/4/2018 11:27	3.099	12.34	55.80	222	30.86			
10/4/2018 11:28	3.066	12.33	55.88	223	30.93			
10/4/2018 11:29	3.076	12.34	55.85	224	30.91			
10/4/2018 11:30	3.038	12.33	55.94	225	31.00			
10/4/2018 11:31	3.017	12.33	55.99	226	31.05			
10/4/2018 11:32	3.01	12.34	56.01	227	31.06			
10/4/2018 11:33	2.988	12.34	56.06	228	31.11			
10/4/2018 11:34	2.963	12.30	56.11	229	31.17			
10/4/2018 11:35	2.981	12.32	56.07	230	31.13			
10/4/2018 11:36	2.952	12.29	56.14	231	31.20			
10/4/2018 11:37	2.945	12.34	56.15	232	31.21			
10/4/2018 11:38	2.925	12.34	56.20	233	31.26			
10/4/2018 11:39	2.899	12.34	56.26	234	31.32			
10/4/2018 11:40	2.917	12.32	56.22	235	31.28			
10/4/2018 11:41	2.885	12.34	56.29	236	31.35			
10/4/2018 11:42	2.887	12.33	56.29	237	31.35			
10/4/2018 11:43	2.873	12.32	56.32	238	31.38			
10/4/2018 11:44	2.86	12.34	56.35	239	31.41			
10/4/2018 11:45	2.854	12.31	56.37	240	31.42	66768.3	14.2	Step #5
10/4/2018 11:46	2.023	12.29	58.29	241	33.34			Valve open
10/4/2018 11:47	1.191	12.44	60.20	242	35.26			
10/4/2018 11:48	0.448	12.47	61.92	243	36.98			
10/4/2018 11:49	0.002	12.39	62.95	244	38.01			
10/4/2018 11:50	-0.011	12.39	62.98	245	38.04			
10/4/2018 11:51	-0.009	12.37	62.98	246	38.04			
10/4/2018 11:52	-0.007	12.42	62.97	247	38.03			
10/4/2018 11:53	-0.009	12.39	62.98	248	38.03			
10/4/2018 11:54	-0.015	12.41	62.99	249	38.05			
10/4/2018 11:55	-0.002	12.43	62.96	250	38.02			
10/4/2018 11:56	-0.001	12.42	62.96	251	38.02			
10/4/2018 11:57	-0.021	12.43	63.00	252	38.06			
10/4/2018 11:58	-0.002	12.42	62.96	253	38.02			
10/4/2018 11:59	-0.002	12.46	62.96	254	38.02			14.5 gpm with
10/4/2018 12:00	-0.012	12.47	62.98	255	38.04			Pump Cavitation
10/4/2018 12:01	0.011	12.46	62.93	256	37.99			Start recovery
10/4/2018 12:02	2.265	12.41	57.73	257	32.78			
10/4/2018 12:03	4.224	12.37	53.20	258	28.26			
10/4/2018 12:04	5.782	12.35	49.61	259	24.66			
10/4/2018 12:05	7.044	12.36	46.69	260	21.75			
10/4/2018 12:06	8.073	12.36	44.32	261	19.37			
10/4/2018 12:07	8.902	12.37	42.40	262	17.46			
10/4/2018 12:08	9.565	12.37	40.87	263	15.93			
10/4/2018 12:09	10.129	12.38	39.57	264	14.63			
10/4/2018 12:10	10.586	12.43	38.51	265	13.57			
10/4/2018 12:11	10.969	12.41	37.63	266	12.69			

Lockheed Martin Site, Owego, NY
Extraction Well 417
October 4, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/4/2018 12:12	11.306	12.42	36.85	267	11.91			
10/4/2018 12:13	11.58	12.42	36.22	268	11.27			
10/4/2018 12:14	11.841	12.43	35.61	269	10.67			
10/4/2018 12:15	12.062	12.45	35.10	270	10.16			
10/4/2018 12:16	12.261	12.47	34.65	271	9.70			
10/4/2018 12:17	12.417	12.49	34.28	272	9.34			
10/4/2018 12:18	12.568	12.49	33.94	273	9.00			
10/4/2018 12:19	12.711	12.47	33.61	274	8.66			
10/4/2018 12:20	12.853	12.46	33.28	275	8.34			
10/4/2018 12:21	12.965	12.49	33.02	276	8.08			
10/4/2018 12:22	13.045	12.52	32.83	277	7.89			
10/4/2018 12:23	13.189	12.52	32.50	278	7.56			
10/4/2018 12:24	13.278	12.50	32.30	279	7.36			
10/4/2018 12:25	13.357	12.51	32.12	280	7.17			
10/4/2018 12:26	13.429	12.49	31.95	281	7.01			
10/4/2018 12:27	13.508	12.49	31.77	282	6.82			
10/4/2018 12:28	13.585	12.50	31.59	283	6.65			
10/4/2018 12:29	13.66	12.47	31.41	284	6.47			
10/4/2018 12:30	13.732	12.49	31.25	285	6.31			End of Recovery


Owego
October 4, 2018 Well 417 Step-drawdown Test
Time versus drawdown
Drawdown (feet)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00
28.00
30.00
32.00
34.00
36.00
38.00
40.00
Step #1 - 4 gpm
Step #2 - 8.1 gpm
Step #3 - 12 gpm
Step #4 - 14 gpm
Recovery
Total available drawdown: 38 feet
Pump cavitation, 14.5 gpm
1
10
100
1000
Time since pumping began (minutes)

Owego
October 4, 2018 Well 417 Step-drawdown Test
Specific Capacity vs. Pumping Rate



Step#	Pump Rate	Drawdown	Spec. Capacity
1	4 gpm	6.30 ft	0.67 gpm/ft
2	8.1 gpm	14.47 ft	0.54 gpm/ft
3	12 gpm	24.01 ft	0.49 gpm/ft
4	14 gpm	31.42 ft	0.45 gpm/ft

APPENDIX K

Extraction Well 418
Design, Installation & Performance Testing Report

Extraction Well 418
Design, Installation & Performance Testing

Introduction

The performance of extraction well 414 in the Parking Lot 001 (P001) Area had been declining for several years and continued to decline during the course of the Remedial Alternatives Investigation (RAI) for the Northern Plume and P001 Area in April 2018. Well 414 was a low yielding, dual-zone extraction well screened from the till/bedrock interface zone up to the base of the alluvial zone. The well was installed in 1990 and replaced extraction well 402, which was installed in 1981. The locations of both wells are shown on **Figure 1**. For the past several years, well 414 experienced intermittent issues associated with a degraded/corroded casing, failing pumps, and fouling. The steel-cased section of the well was stabilized several years ago by relining with a thin fiberglass liner. The lower fiberglass liner apparently failed on August 3, 2018, allowing formation material (rock fragments) to enter and plug well 414. Attempts to remove the well pump using a heavy hoist truck were unsuccessful due to binding of the pump with collapsed formation material.

Well Siting

In anticipation of the need to eventually replace well 414, and with a drilling rig already on-site for the RAI, soil boring 418A was drilled five feet northeast of well 414 in April 2018 near a potential location for a new extraction well to replace well 414. The purpose of soil boring 418A was to generate a detailed well log for installing a replacement well solely in the alluvial zone and fill, and to collect soil samples for sieve analysis and selection of a well screen size. A geologic log for boring 418A is presented in **Attachment A**.

Well Design

Soil samples were collected continuously using split spoon samplers from a depth of 10 feet below ground surface (bgs) to a total depth of 42 feet bgs, the base of the alluvial unit, at which point the boring was backfilled with clean sand to the ground surface. Following gradation analysis of the soil samples (**Attachment B**), the screen for a new extraction well was designed based on procedures described in Chapter 13, Water Well Design, of the technical reference *Groundwater and Wells, Second Edition* (1986) by F.G. Driscoll. A screen interval from 34 to 39 feet bgs was selected, straddling the target water-bearing zone of 35.5 and 38.4 feet bgs. A 20-slot screen size was selected based on a grain-size analysis of this target zone (see below), which consists of fine-grained formation material, some of which would be removed as the well was developed. The formation material near the top of the selected screen interval is coarser-grained and would be expected to be retained by the finer screen slot size and sand pack.

Using sieve analysis data for the interval from 28 to 40 feet (**Attachment B)**, the slot size and grade of pack sand were selected by multiplying the 70% cumulative percent retained size from the gradation curves by a factor of four, and then using the resultant grain size to select a pack sand with a corresponding 70% cumulative percent retained size. As shown in **Attachment B**, the pack sand matching this specification is Morie #00N. The screen slot size was selected based on the 90% cumulative percent retained size of #1 sand (i.e., 20-slot or 0.020-inch). A five-foot sump section was planned below the screen and a solid riser pipe was planned to extend from the top of the screen to approximately two feet above ground surface. A well diameter of eight inches was selected to facilitate placement of the pump equipment and instrumentation.

Well Installation

Replacement extraction well 418 was installed on an accelerated schedule using hollow-stem auger methods in mid-September 2018 following the failure of well 414. The location of well 418 is shown on **Figure 1**.

Installation began on September 18, 2018 using air rotary drilling methods with simultaneous casing advancement. This method advanced the drill casing with a special bit to hold back the formation as the well bore was advanced to its target depth. The boring was slightly over-drilled to a total depth of 45 feet to allow for some formation heave at the bottom of the boring. The stainless steel sump, well screen, and riser pipe were installed at a depth of 44 feet, and the sand pack was emplaced as the drill casing was retracted in stages to allow for a continuous and uniform width to the sand pack surrounding the screened interval. Following development of the sand pack, the annulus between the borehole and the well casing was sealed with bentonite chips and bentonite slurry as the drill casing was retracted up to approximately five feet below grade. The remainder of the borehole was then backfilled with sand to the ground surface to facilitate excavation around the well casing for connection to the buried discharge conveyance line. Installation of well 418 was completed on September 19, 2018 and the well construction log is shown in **Attachment C**.

Well Development

Development of well 418 began on September 26, 2018 by surging and bailing the well. Surging was performed to set the sand pack by removing fines from the sand pack and adjacent formation. Bailing was performed periodically during surging to clean out the well sump as material accumulated during surging and to assess the quantity of sediment entering the well from the formation. After surging and bailing was completed, the well was developed with a submersible pump to continue cleaning fines from the sand pack and to promote optimal flow into the sand pack and well screen from the surrounding aquifer. Well development ceased on September 27, 2018 when the clarity of the pumped water was clear.

Performance Testing

Following completion of well development, well 418 was pump-tested to assess its performance as an extraction well. This testing was done as a one-day step-drawdown pumping test on October 2, 2018. The test began at a constant pumping rate of one gallon per minute (gpm) for 60 minutes. After 60 minutes, the pumping rate was increased to two gpm for an additional 60 minutes. A total of five 60-minutes steps were attempted at rates of 1, 2, 3, 4 and 5 gpm. Only the 5 gpm step could not be sustained as the water level fell to the level of the pump intake, resulting in cavitation. Pumping continued under cavitation for several minutes with a maximum yield of 4.5 gpm and the pump set at the base of the well screen. The test ended after 278 minutes and recovery was monitored until the water level recovered to within one foot of the pre-test static level.

The data collected during the test was plotted on a graph of drawdown versus time. The data and graph are presented in **Attachment D**. The drawdown graph was used to determine the change in drawdown for each pumping test step, extrapolate the late-time data for each step, and estimate a total drawdown for the long-term pumping test at a given flow rate. A straight line was fitted to the late-time data for each step and the projection of these straight lines was used to determine the trend in drawdown for each pumping rate and whether cavitation would occur at a particular rate. The

goal of the step-test analysis was to select the highest sustainable pumping rate for long-term operation of the well. A rate of 2 to 4 gpm was selected to maximize drawdown in the well without cavitation of a pump set at the base of the screen interval, which is the maximum level of available drawdown.

The step-drawdown test data was also used to calculate the specific capacity of well 418 at various pumping rates and is plotted versus the corresponding discharge rate on the graph of specific capacity in **Attachment D**. The total drawdown at the end of each 60-minute step was determined for each of the first three steps and was used to calculate the specific capacity of the average pumping rate for each step. A straight line was fitted to the test data and the slope of this line was used to estimate the change in the capacity of the well at various discharge rates (e.g., the rate of decrease in the specific capacity as the discharge rate was increased). This specific capacity data will be used as a baseline for future assessments of changes in specific capacity during well rehabilitation activities.



Figure 1

LEGEND

- ★ - Extraction Well
- ☆ - Former Extraction Well (Decommissioned)
- ▲ - Alluvial Monitoring Well
- △ - Decommissioned Alluvial Monitoring Well
- ◬ - Decommissioned Till Monitoring Well
- ♦ - Till/Bedrock Zone Monitoring Well
- ◊ - Decommissioned Till/Bedrock Zone Monitoring Well
- ▽ - Decommissioned Bedrock Monitoring Well

Approximate

Source: Google Earth, aerial dated September 2016.

Scale

0 30'

IBM
Owego, New York

Well 418 Area
Well Location Map

DRAWN BY: JPB	DATE: 2/19/19	DRAWING NO. 93004-126-A2
CHECKED & APPROVED BY: SMF		

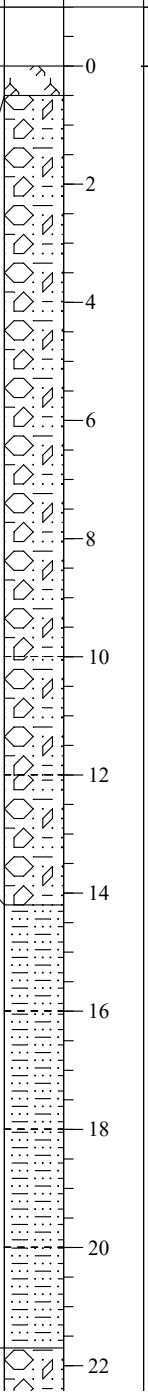
GROUNDWATER SCIENCES CORPORATION

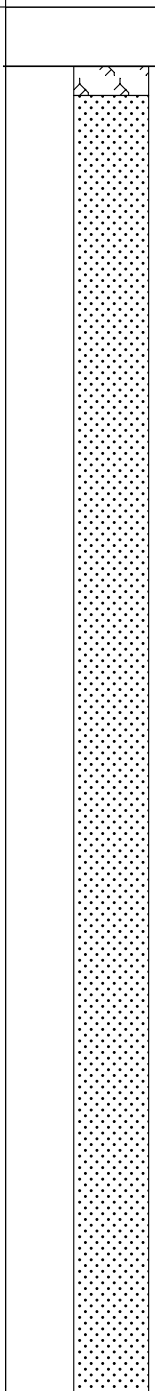
GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: 418A

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	***Lockheed Martin Facility***	DRILLING CO.:	***Parratt Wolff Inc.***
SITE LOCATION:	***Owego, New York***	DRILLER:	***W. Rice***
JOB NO.:	***94004.46.1701***	RIG TYPE:	***CME 55***
LOGGED BY:	***S. Fisher***	DRILLING METHOD:	***Hollow Stem Auger***
DATES DRILLED:	***4/24/18***	DEVELOPMENT DATE:	***NA***
		LOCATION:	***P001 Area, approx. 5 ft NE of well 414***
NOTES: Water encountered at approx. 28 feet below g.s. Pilot boring for extraction well 418		SURFACE ELEVATION	891.1 ft amsl
		EASTING	918197.3152
		NORTHING	766895.6085

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
0					
	Augered to 10 ft	---	---	---	TOPSOIL: sod and organic silt and sand, moist
2					SILT, SAND & GRAVEL: dark yellowish brown (10 YR 4/2) silt with vf-vc sand, and f-m gravel, crumbly, moist
4					
6					
8					
10	13 8 7 6	0	0"	1	SILT, SAND & GRAVEL: pushed large rock fragment (no recovery)
12	6 6 8 11	0	6"	2	SILT, SAND & GRAVEL: dk yell brown, pred. silt with vf-vc sand matrix, f-m A-SA gravel throughout, crumbly, moist
14	4 3 2 2	0	23"	3	SILT & SAND: olive gray (5 Y 4/1) pred organic silt w/ vf-f sand, tr m-vc, tr. f SR gravel, w/ rootlets and organic masses, cohesive, moist
16	3 4 3 4	0	21"	4	SILT & SAND: as above, w/ occ large 0.5 "dia. roots, occ wthrd A-SA shale frags, cohesive, moist
18	4 6 10 9	0	5"	5	SILT & SAND: as above, large SA siltstone frag jammed in tip of spoon
20	3 3 5 18	0	23"	6	SILT & SAND: as above, sl more fine SR gravel in lower 9", w/ rootlets, cohesive, moist
22	24				SILT, SAND & GRAVEL: olive gray silt





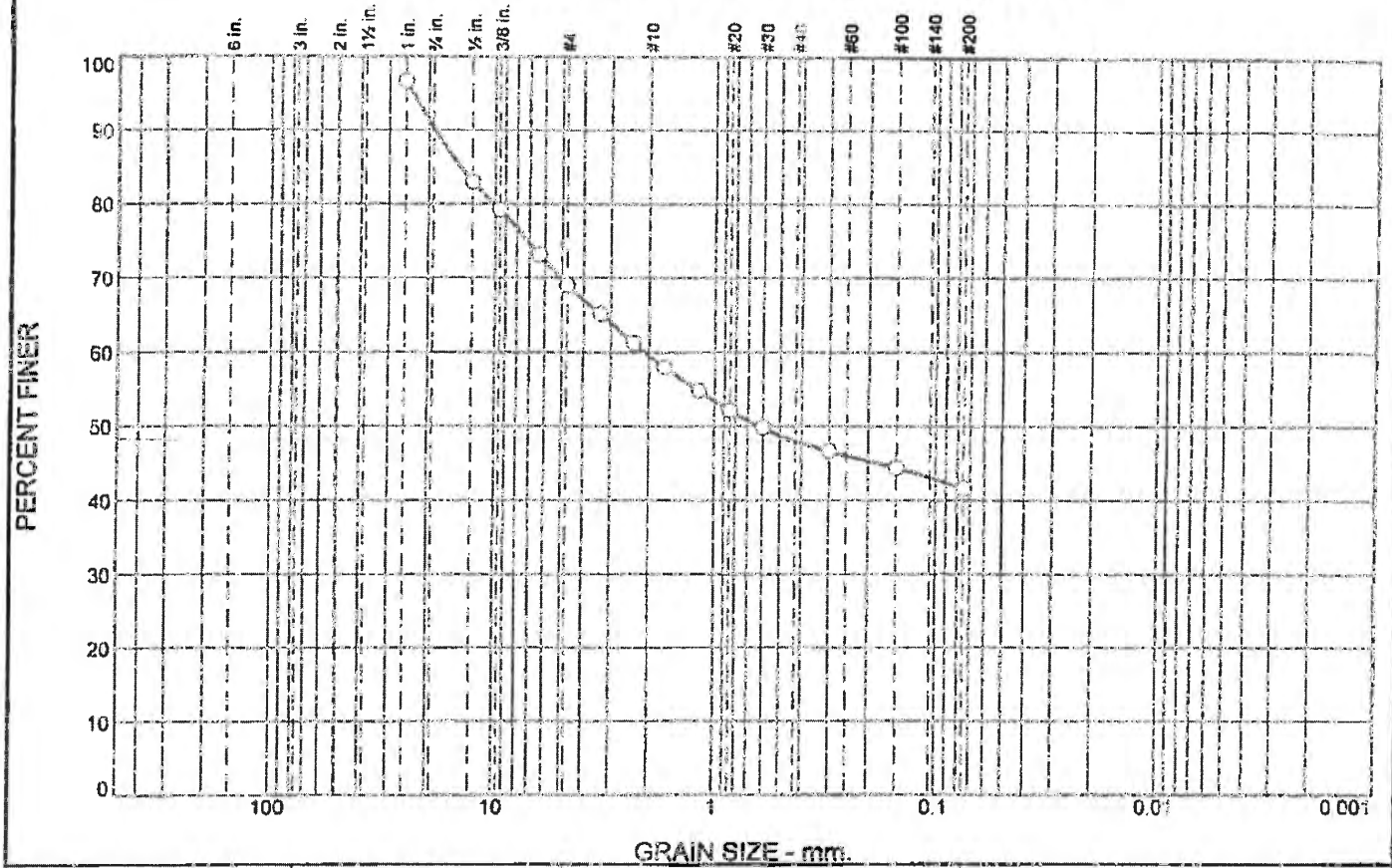
WELL CONSTRUCTION DETAILS
Top soil backfill, (0 to 0.5')
8" dia. HSA borehole (0'-41.3')
Sand backfill, (0.5' to 42')

GROUNDWATER SCIENCES CORPORATION

***GEOLOGIC LOG:* 418A**

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
	21 23 24	0	24"	7	w/ vf-f sand matrix, some m-vc, w/ f-m SA-SR gravel, occ A shale/siltstone frag, crumbly to sl. cohesive, moist				
24	10 15 15 13	0	18"	8	SAND & GRAVEL: dk yell brown, to olive gray, pred m-c, tr silt, lit vf-f, some vc and f SR-R gravel, loose, moist		24		
26	14 21 22 17	0	13"	9	SILT, SAND & GRAVEL: dk yell brown, silt with vf-f, tr m-vc, SA-SR f gravel, dense, cohesive, moist		26		
28	6 7 12 13	0	22"	10	SILT, SAND & GRAVEL: olive gray pred. SR f gravel, tr. A-SA rock wthrd rock frags, dense, sl. crumbly, wet		28		8" dia. HSA borehole (0'-41.3')
30	13 22 29 25	0	23"	11	SILT, SAND & GRAVEL: as above, wet top 8" then more A-SA wthrd shale and siltstone frags, more moderate brown (5 YR 4/4) and moist		30		
32	39 33 34 29	0	22"	12	SILT, SAND & GRAVEL: as above, with thin vc and f SR gravel laminations, pred SA shale and siltstone clasts, some SR clasts, cohesive to crumbly, wet		32		
34	20 24 30 23	0	24"	13	SILT, SAND & GRAVEL: as above, v. gravelly, some layering, freq. SR gravel w/ silty zones, wet		34		Sand backfill, (0.5' to 42')
36	Augered	---	---	---	SILT & SAND: mod yellowish brown (10 YR 5/4), layered vf-f sand with silt, wet		36		
38	23 40 46 46	0	24"	14	SAND: c-vc sand, lit f-m, tr f SR-R gravel, loose, wet SILT, SAND & GRAVEL: mod yell brown, silt with vf-f sans, lit m-vc, w/ f SA-SR gravel throughout, pred dusky brown (5 Y 2/2) wthrd siltstone frags 8"-14", v. dense, stiff, wet		38		
40	13 26 35 69	0	18"	15	SILT, SAND & GRAVEL: as above top 6", then pred silt w/ vf sand, some color banding, cohesive, wet		40		3" dia. split spoon borhole (40' to 42')
42					SILT, SAND & GRAVEL: lt. olive gray (5 Y 5/2) pred silt w/ vf sand matrix, some f-vc, w/ SA-SR f gravel, v. dense, stiff, cohesive, moist		42		
44							44		

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		21.4	9.4	11.5	6.4	41.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	96.7		
.50	83.0		
.375	79.3		
.25	73.2		
#4	69.0		
#6	65.2		
#8	61.3		
#12	58.0		
#16	54.8		
#20	52.2		
#30	49.8		
#50	46.7		
#100	44.5		
#200	41.7		

* (no specification provided)

Material Description

Brown Sandy Silt And Clay With Some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.6900 D_{85}= 14.3980 D_{60}= 2.0844
D_{50}= 0.6181 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-4(0)

Remarks

Source of Sample: Test Boring #418A **Depth:** 28.0' to 30.0'
Sample Number: 1

Date: 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 1

Johnson Filtration Systems Inc.
P.O. Box 64118 • St. Paul, MN 55164-0118
TEL. 612-636-3900 or 1-800-833-9473
TELEX 29-7451 FAX 612-636-0889
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY: SMF

Job Name Owego Well 414 Replacement Date

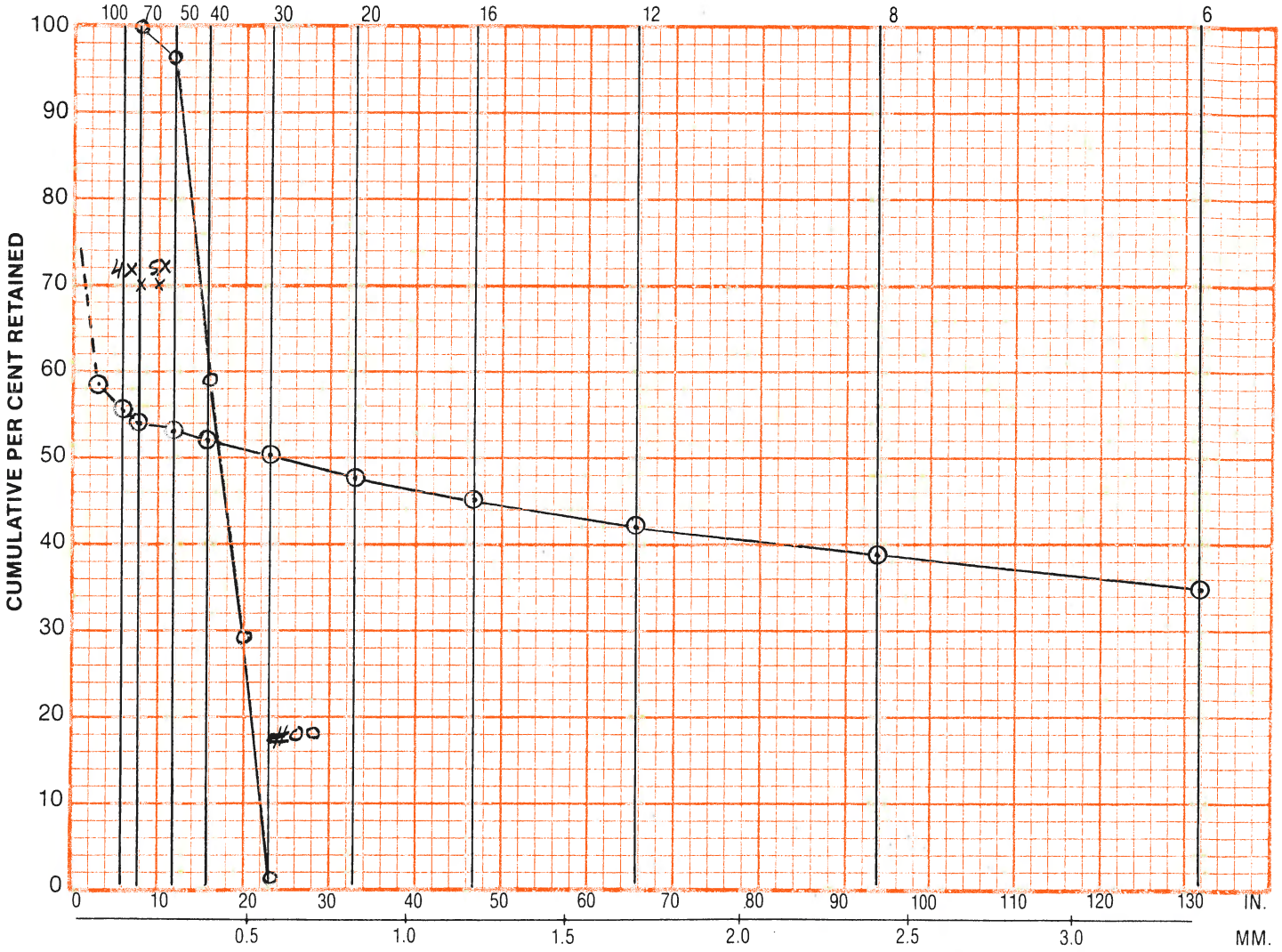
City Owego State NY Zip

Driller Phone

Engineer Phone

Remarks Test Boring 418A, 28 ft - 30 ft Interval

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS			
6	.132	3.36	34.8			
8	.094	2.38	38.7			
12	.066	1.68	42.0			
16	.047	1.19	45.2			
20	.033	0.84	47.8			
30	.023	0.60	50.2			
40	.016	0.42	52.0			
50	.012	0.30	53.3			
70	.008	0.21	54.0			
100	.006	0.15	55.5			
200			58.3			

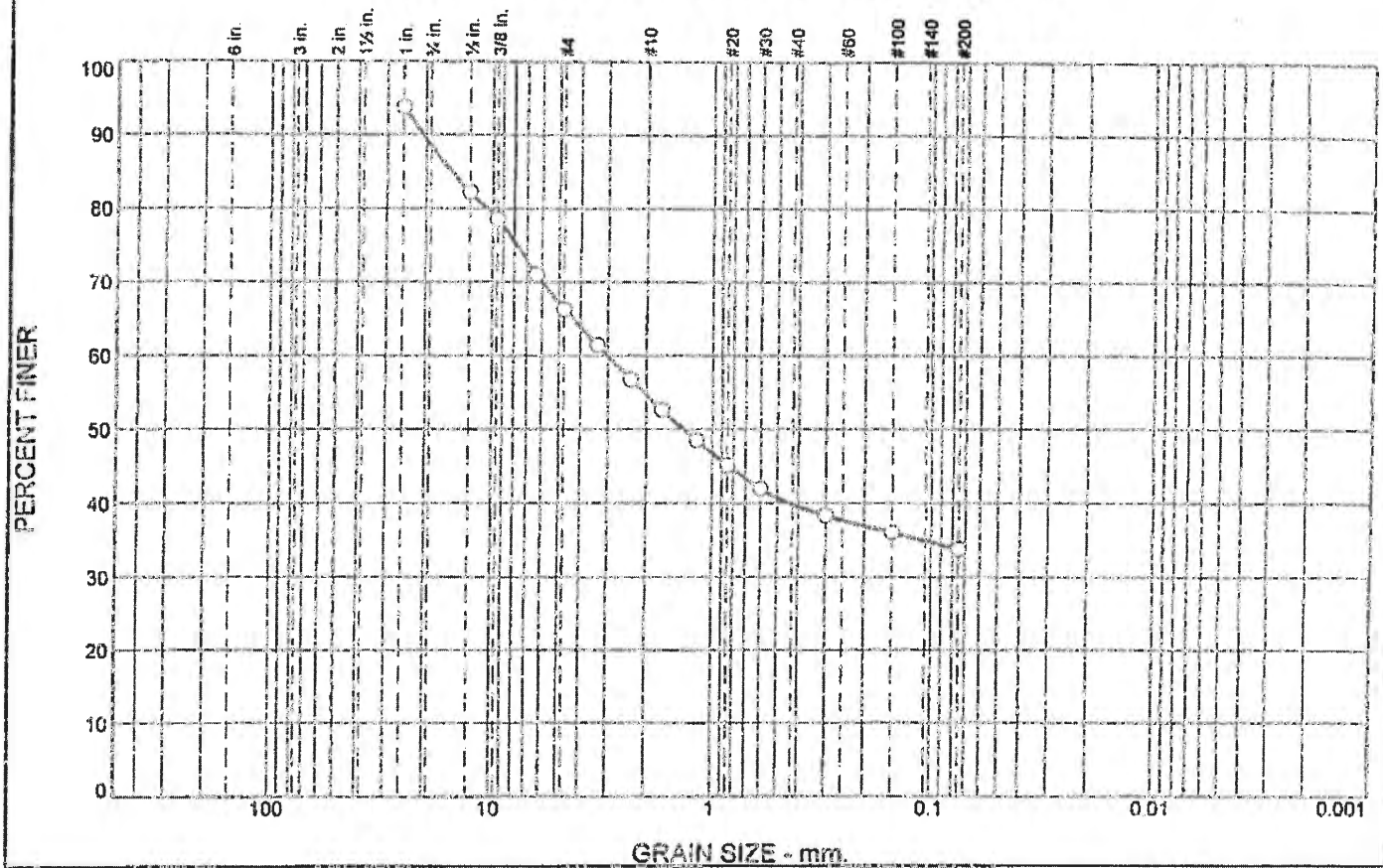
Comments

SCREEN RECOMMENDATIONS: DIAM.

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		22.2	11.6	14.8	6.1	33.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	93.8		
.50	82.2		
.375	78.6		
.25	71.1		
#4	66.3		
#6	61.4		
#8	56.8		
#12	52.7		
#16	48.5		
#20	45.1		
#30	42.1		
#50	38.3		
#100	36.0		
#200	33.8		

* (no specification provided)

Material Description

Brown Sandy Silt And Clay With Some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 20.6865 D_{85}= 15.4291 D_{60}= 3.0064
D_{50}= 1.3505 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Boring #418A **Depth:** 30.0' to 30.75'
Sample Number: 2

Date: 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 2

Johnson Filtration Systems inc.
P.O. Box 64118 • St. Paul, MN 55164-0118
TEL. 612-636-3900 or 1-800-833-9473
TELEX 29-7451 FAX 612-636-0889
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name Owego well 414 Replacement Date

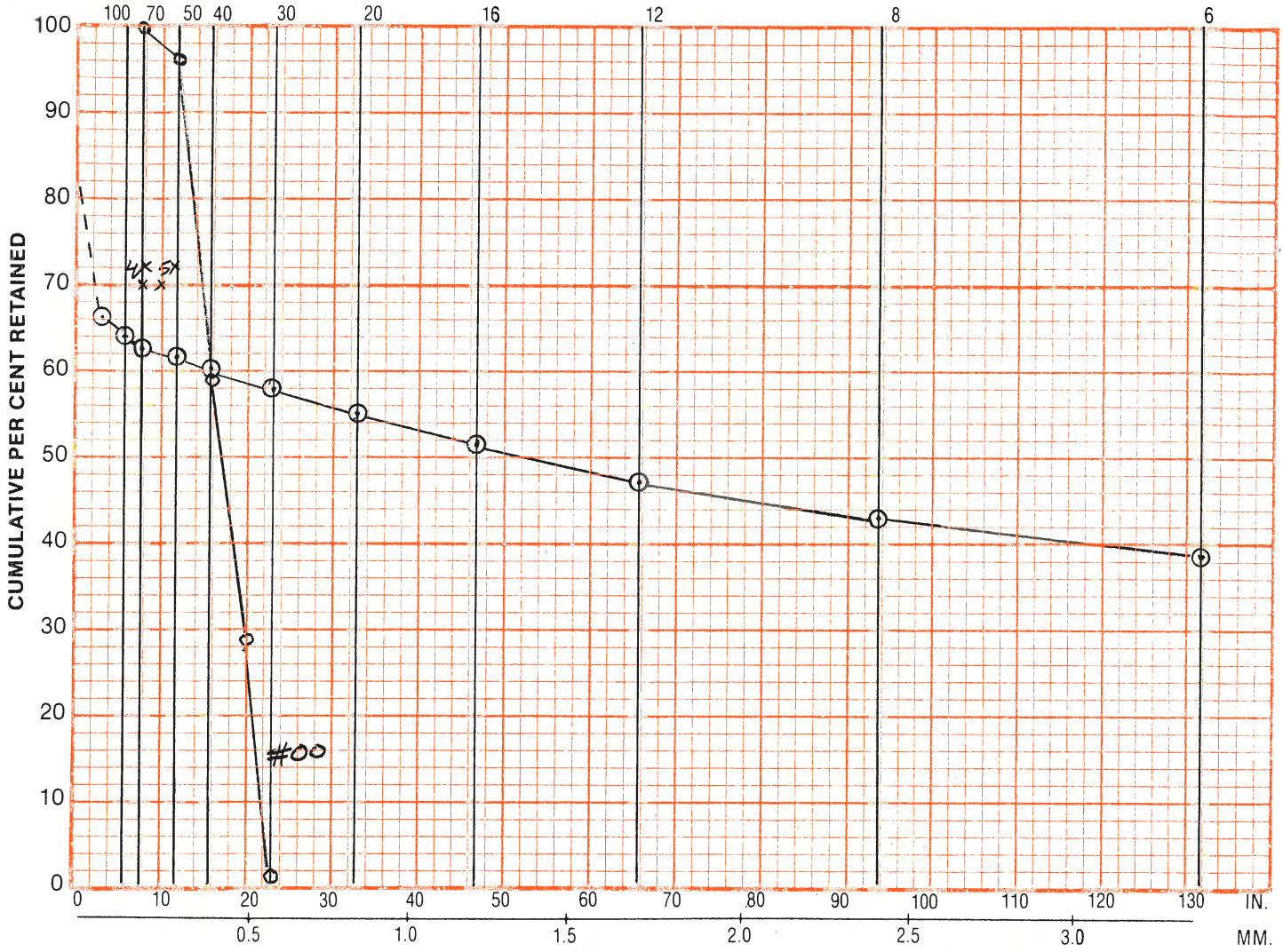
City Owego State NY Zip

Driller Phone

Engineer Phone

Remarks Test Boring 414A, 30-30.75 ft Interval

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS			
6	.132	3.36	38.6			
8	.094	2.38	43.2			
12	.066	1.68	47.3			
16	.047	1.19	51.5			
20	.033	0.84	54.9			
30	.023	0.60	57.9			
40	.016	0.42	60.1			
50	.012	0.30	61.7			
70	.008	0.21	62.5			
100	.006	0.15	64.0			
200			66.2			

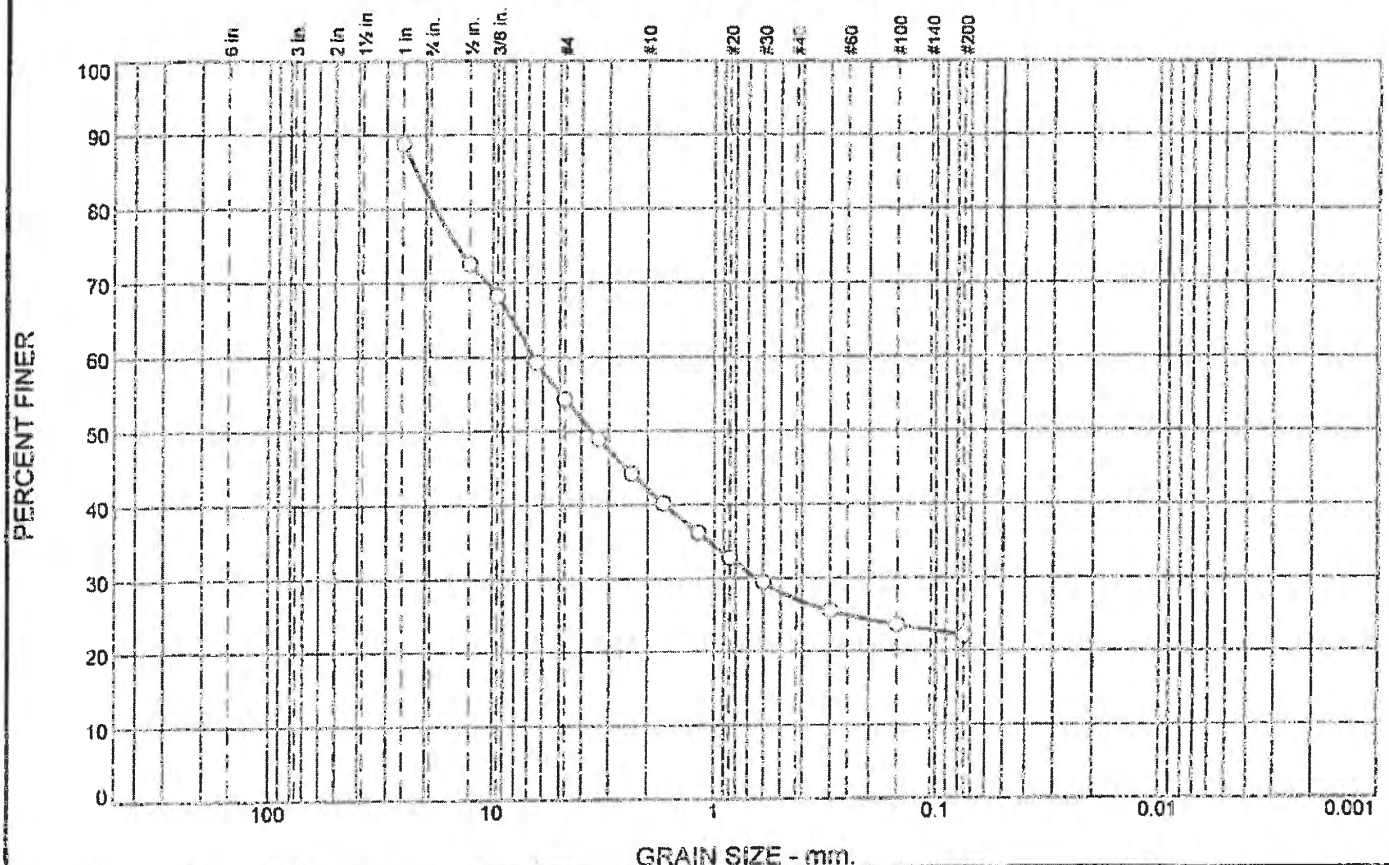
Comments

SCREEN RECOMMENDATIONS: DIAM.

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		26.9	12.1	15.1	5.0	22.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	88.8		
.50	72.6		
.375	68.3		
.25	59.3		
#4	54.3		
#6	49.0		
#8	44.3		
#12	40.2		
#16	36.2		
#20	32.8		
#30	29.5		
#50	25.5		
#100	23.5		
#200	22.1		

* (no specification provided)

Material Description

Brown Gravely Sand With Some Silt And Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= 22.0498 D_{60}= 6.5555
D_{50}= 3.5905 D_{30}= 0.6371 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-b

Remarks

Source of Sample: Test Boring #418A **Depth:** 30.75' to 32.0'
Sample Number: 3 **Date:** 05/18/2018

F. T. Kitlinski & Associates, Inc.
Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 3

Johnson Division
1950 Old Highway 8
St. Paul, Minnesota 55112
UOP Inc.

SAND ANALYSIS
(COARSE)

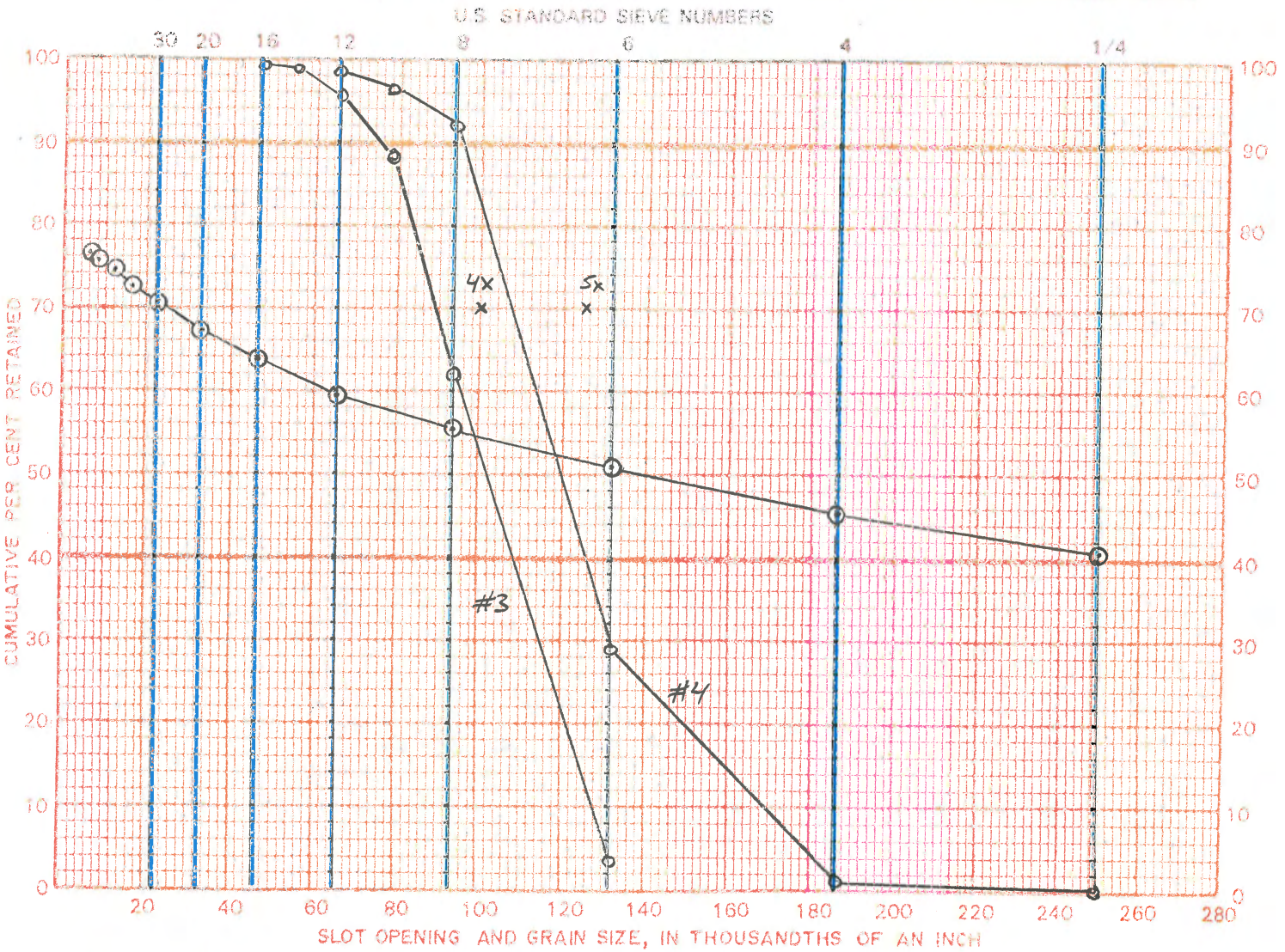
MAILING ADDRESS: P.O. BOX 43116
ST. PAUL, MINNESOTA • 55164

Sample sent in by _____

Town _____ State _____ Zip _____ Date _____

From well of _____

Remarks: Test Boring 418A, 30.75 – 32 ft Interval



U.S. SIEVE NO.	SIEVE OPENING INCHES	SIEVE OPENING MM.	CUMULATIVE % RETAINED		
¼	.250	6.35	40.7		
4	.187	4.76	45.7		
6	.132	3.36	51		
8	.094	2.38	55.7		
12	.066	1.68	59.8		
16	.047	1.19	63.8		
20	.033	0.84	67.2		
30	.023	0.60	70.5		
40	.016	0.42	72.5		
50	.012	0.30	74.5		
70	.008	0.21	75.5		
100	.006	0.15	76.5		

Notes: _____

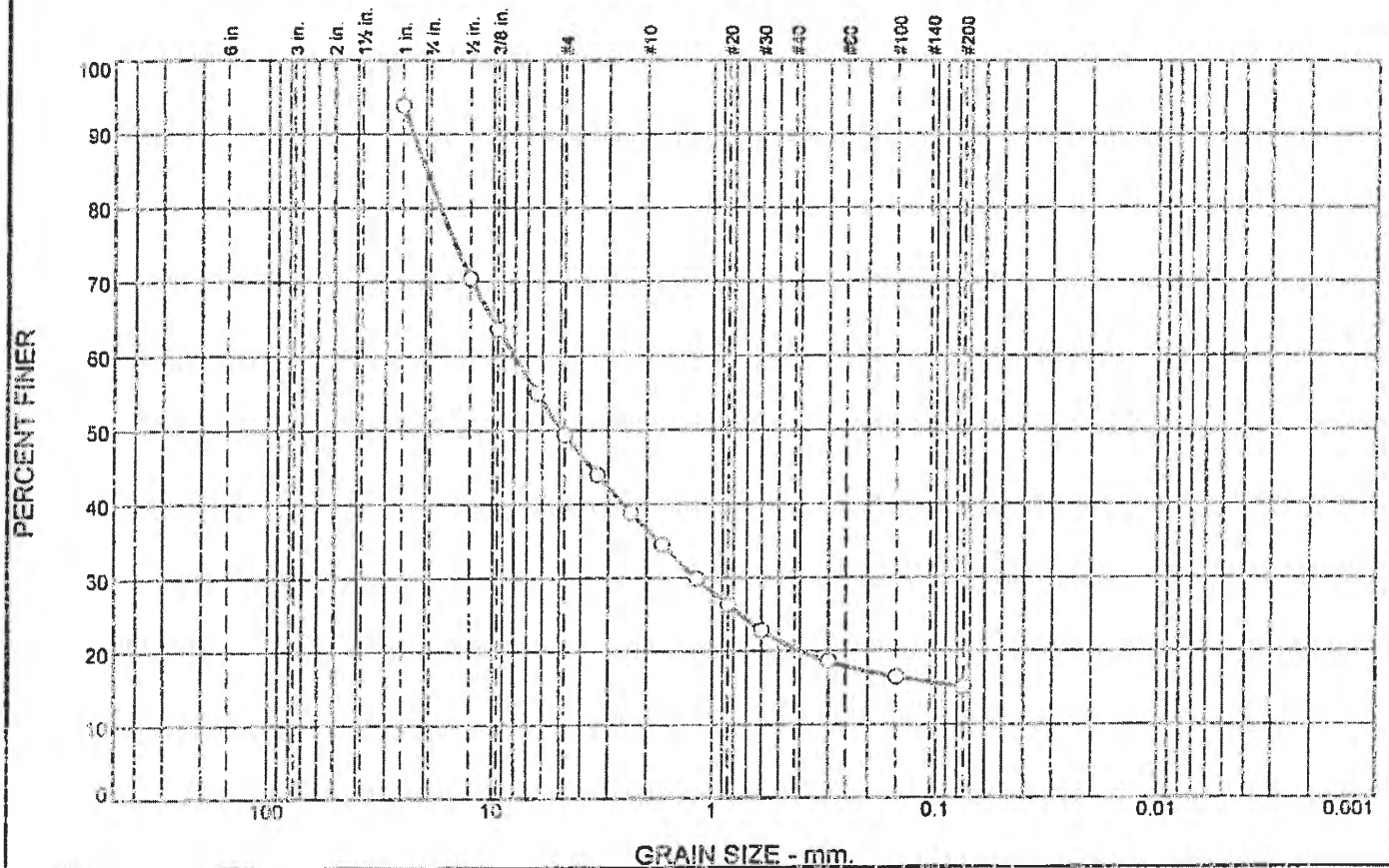
Recommended Slot Opening: _____

Recommended Screen: Dia. _____ in. Length _____ Ft.

By: _____

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		33.9	12.8	16.3	5.2	15.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	93.9		
.50	70.5		
.375	63.7		
.25	55.0		
#4	49.4		
#6	44.0		
#8	38.8		
#12	34.5		
#16	29.9		
#20	26.3		
#30	22.9		
#50	18.6		
#100	16.5		
#200	15.1		

* (no specification provided)

Material Description

Brown Sand And Gravel With Little Silt And Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.8997 D_{85}= 19.9796 D_{60}= 8.0403
D_{50}= 4.9032 D_{30}= 1.1871 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-a

Remarks

Source of Sample: Test Boring #418A **Depth:** 32.0' to 34.0'
Sample Number: 4

Date: 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 4

Johnson Division
1950 Old Highway 8
St. Paul, Minnesota 55112
UOP Inc.

SAND ANALYSIS
(COARSE)

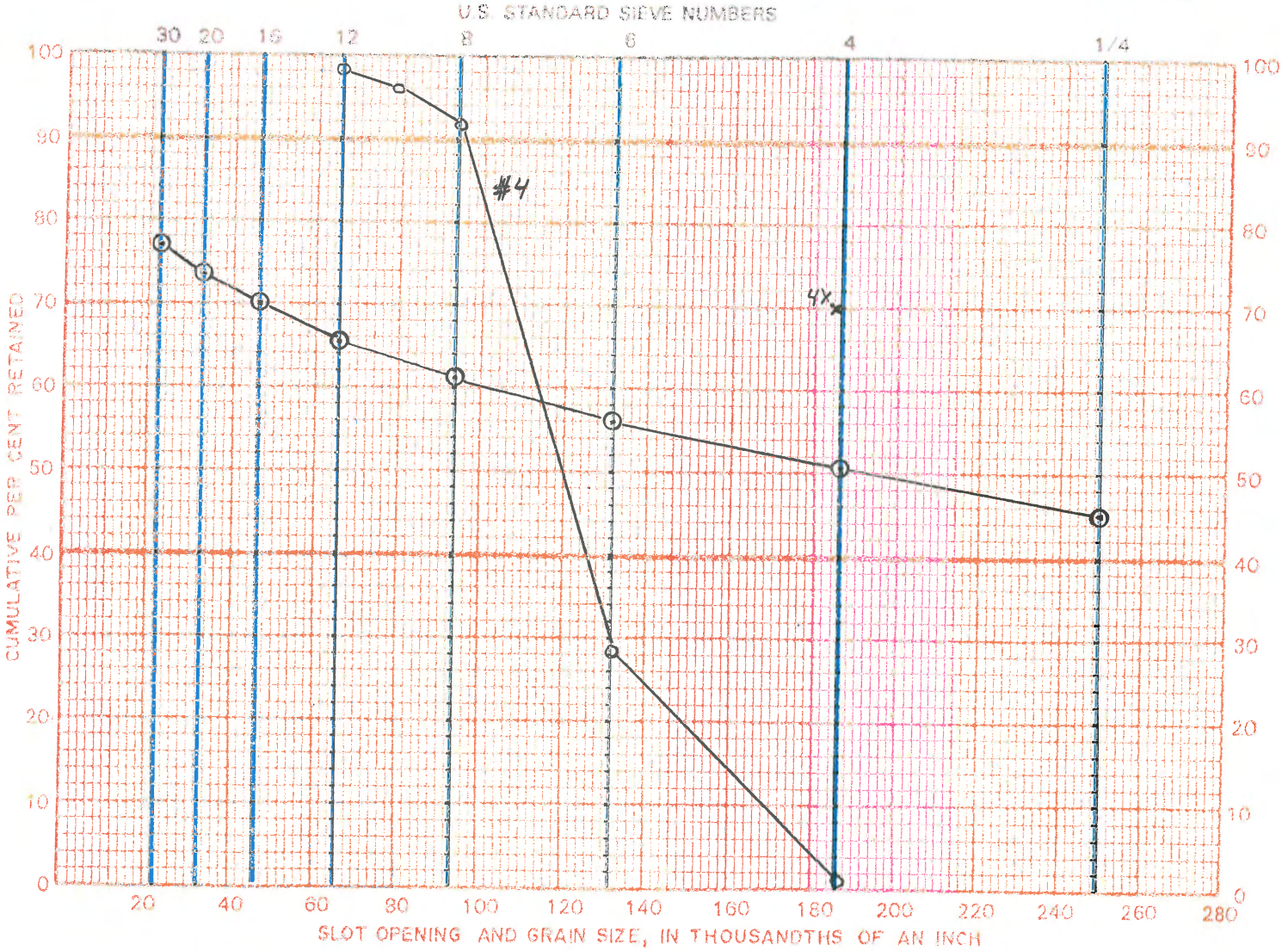
MAILING ADDRESS: P.O. BOX 43118
ST. PAUL, MINNESOTA • 55164

Sample sent in by Owego Well 414 Replacement

Town Owego State NY Zip _____ Date _____

From well of _____

Remarks: Test Boring 418A, 32-34 ft Interval



U.S. SIEVE NO.	SIEVE OPENING INCHES	SIEVE OPENING MM.	CUMULATIVE % RETAINED		
¼	.250	6.35	45		
4	.187	4.76	50.6		
6	.132	3.36	56		
8	.094	2.38	61.2		
12	.066	1.68	65.5		
16	.047	1.19	70.1		
20	.033	0.84	73.7		
30	.023	0.60	77.1		
40	.016	0.42	79.0		
50	.012	0.30	81.4		
70	.008	0.21	82.5		
100	.006	0.15	83.5		

Notes: Coarse interval, <20% silt/clay
>30% gravel, >30% sand

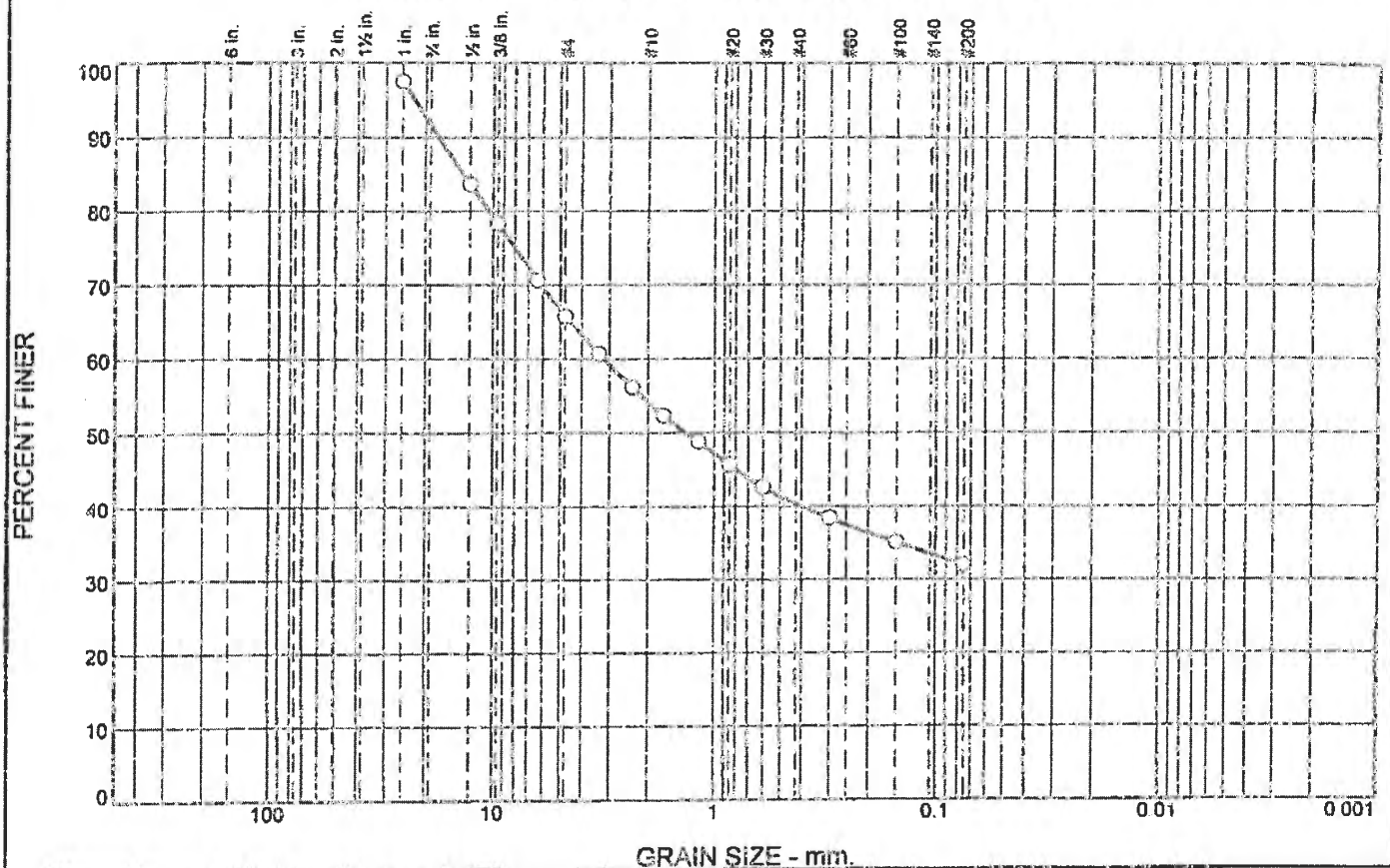
Recommended Slot Opening: _____

Recommended Screen: Dia. _____ In. Length _____ Ft.

By: _____

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		25.8	11.6	13.8	8.3	32.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	97.5		
.50	83.7		
.375	78.4		
.25	70.7		
#4	65.8		
#6	60.7		
#8	56.2		
#12	52.3		
#16	48.8		
#20	45.7		
#30	42.7		
#50	38.5		
#100	35.1		
#200	32.1		

* (no specification provided)

Material Description

Brown Sandy Silt And Clay With Some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 17.5976 D_{85}= 13.6357 D_{60}= 3.1754
D_{50}= 1.3395 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Boring #418A **Depth:** 34.0' to 36.0'
Sample Number: 5

Date: 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 5

Johnson Filtration Systems Inc.
P.O. Box 64118 • St. Paul, MN 55164-0118
TEL. 612-636-3900 or 1-800-833-9473
TELEX 29-7451 FAX 612-636-0889
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name Owego Well 414 Replacement Date

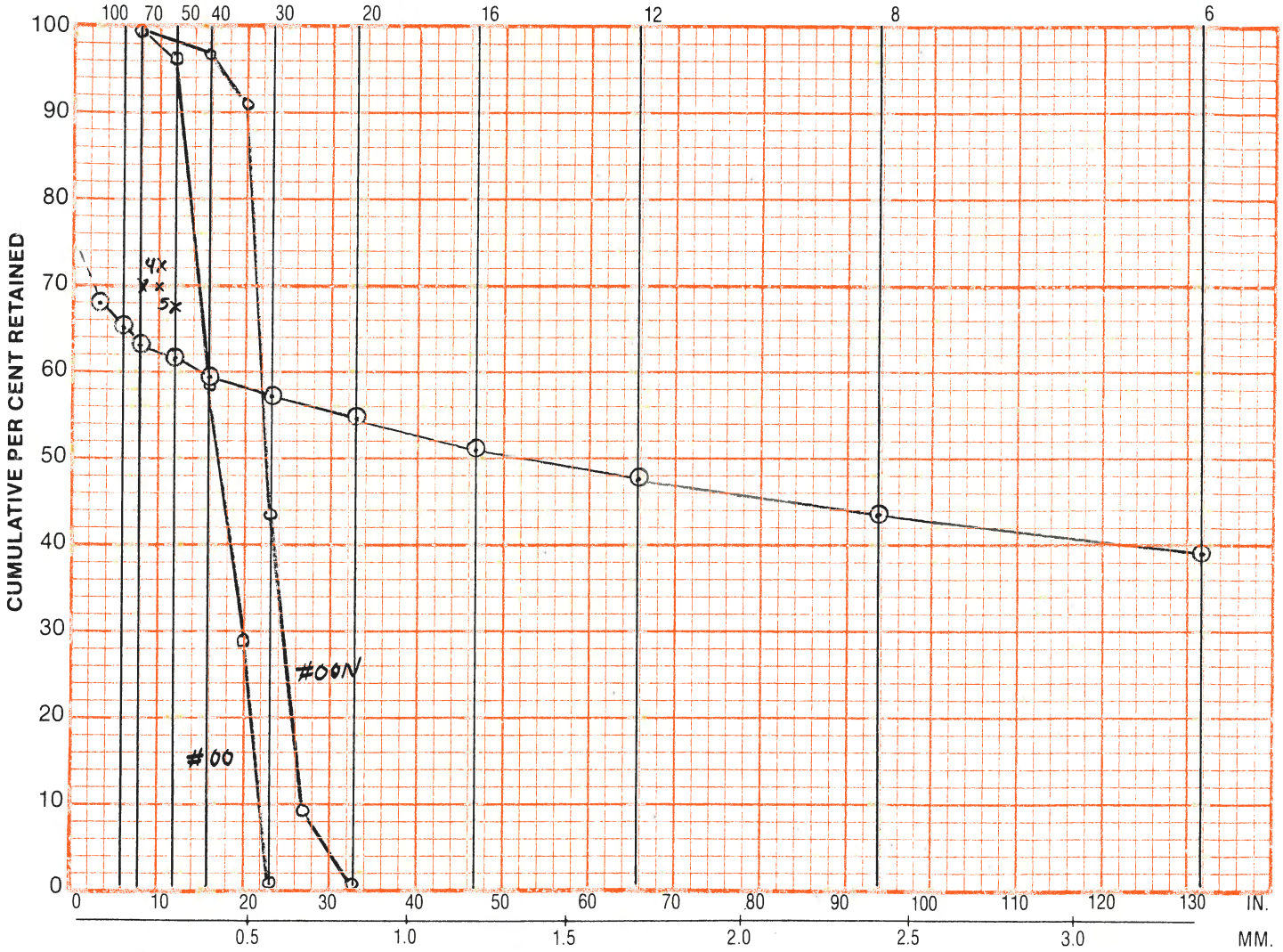
City Owego State NY Zip

Driller Phone

Engineer Phone

Remarks Test Boring 418A, 34 – 36 ft Interval

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS			
6	.132	3.36	39.3			
8	.094	2.38	43.8			
12	.066	1.68	47.7			
16	.047	1.19	51.2			
20	.033	0.84	54.3			
30	.023	0.60	57.3			
40	.016	0.42	59.5			
50	.012	0.30	61.5			
70	.008	0.21	63.0			
100	.006	0.15	64.9			
200	.003	0.075	67.9			

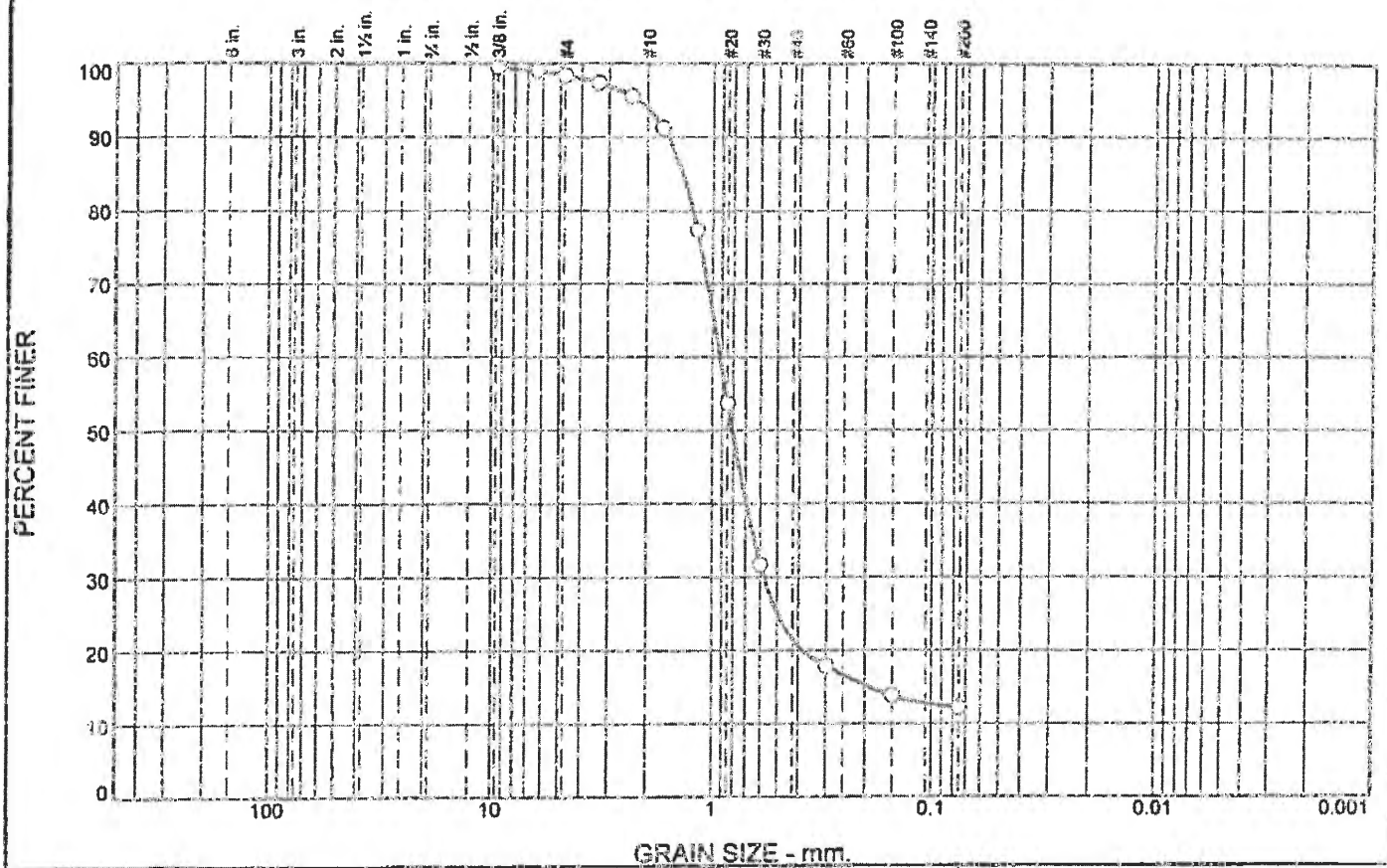
Comments Silty interval, >30% silt/clay

SCREEN RECOMMENDATIONS: DIAM.

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			4.5	72.5	9.2	12.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	99.4		
.25	99.0		
#4	98.4		
#6	97.4		
#8	95.6		
#12	91.2		
#16	77.4		
#20	53.7		
#30	31.8		
#50	17.9		
#100	13.8		
#200	12.2		

* (no specification provided)

Material Description

Brown Sand With Little Silt And Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.6135 D_{85}= 1.3788 D_{60}= 0.9231
D_{50}= 0.8083 D_{30}= 0.5761 D_{15}= 0.1909
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: Test Boring #418A **Depth:** 38.0' to 38.4'
Sample Number: 6

Date: 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 6

Johnson Division
1950 Old Highway 8
St. Paul, Minnesota 55112
UOP Inc.

SAND ANALYSIS
(COARSE)

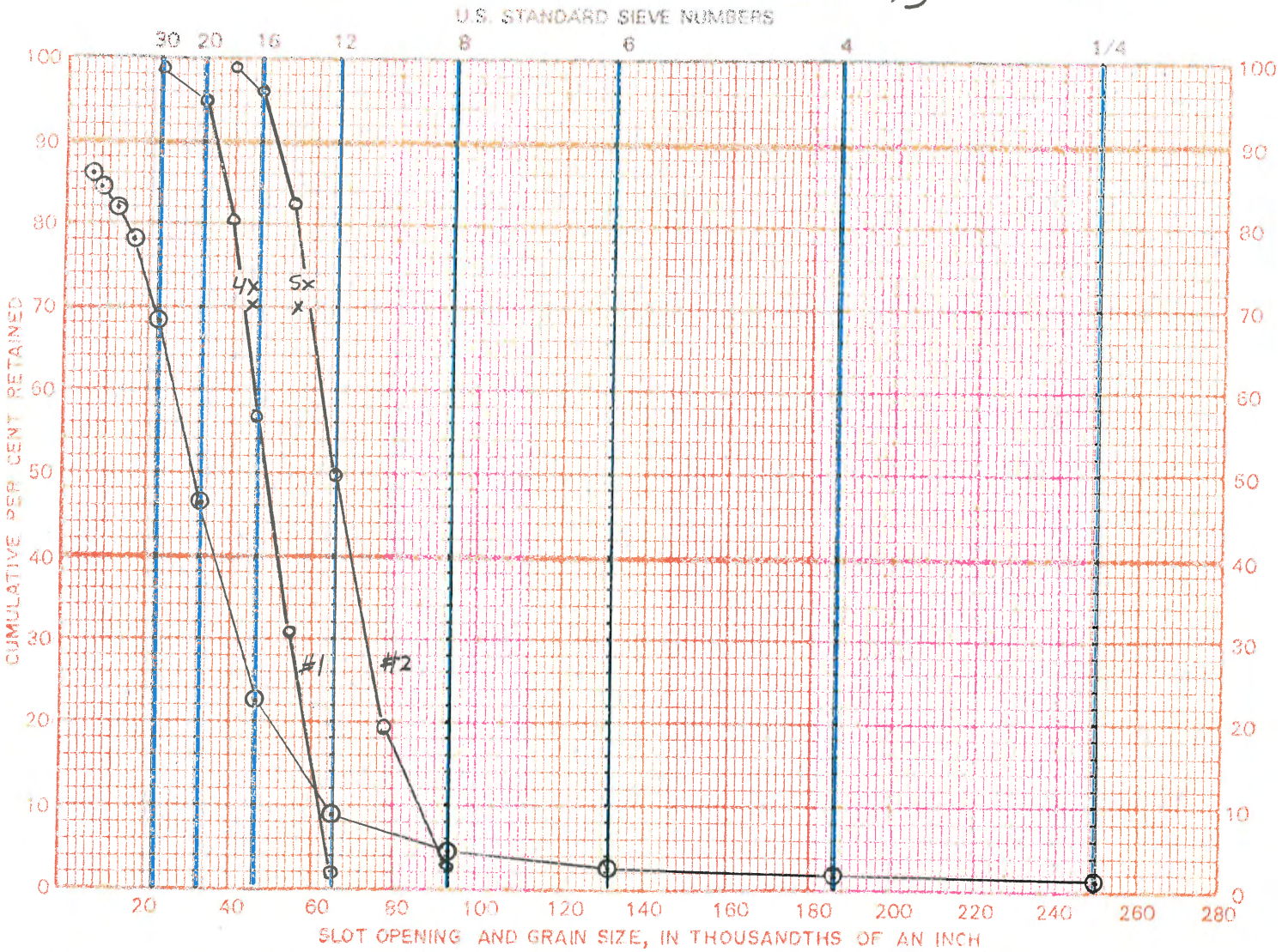
MAILING ADDRESS: P.O. BOX 43118
ST. PAUL, MINNESOTA • 55164

Sample sent in by Owego Well 414 Replacement

Town Owego State NY Zip _____ Date _____

From well of _____

Remarks: Test Boring 418A, 38 - 38.4 ft Interval
(Probably represents 36 - 38 ft Interval - no recovery)



U.S. SIEVE NO	SIEVE OPENING INCHES	SIEVE OPENING MM.	CUMULATIVE % RETAINED		
¼	.250	6.35	1.0		
4	.187	4.76	1.6		
6	.132	3.36	2.6		
8	.094	2.36	4.4		
12	.066	1.68	8.8		
16	.047	1.19	22.6		
20	.033	0.84	46.3		
30	.023	0.60	68.2		
40	.016	0.42	78.0		
50	.012	0.30	82.1		
70	.008	0.21	84.5		
100	.006	0.15	86.2		

Notes: _____

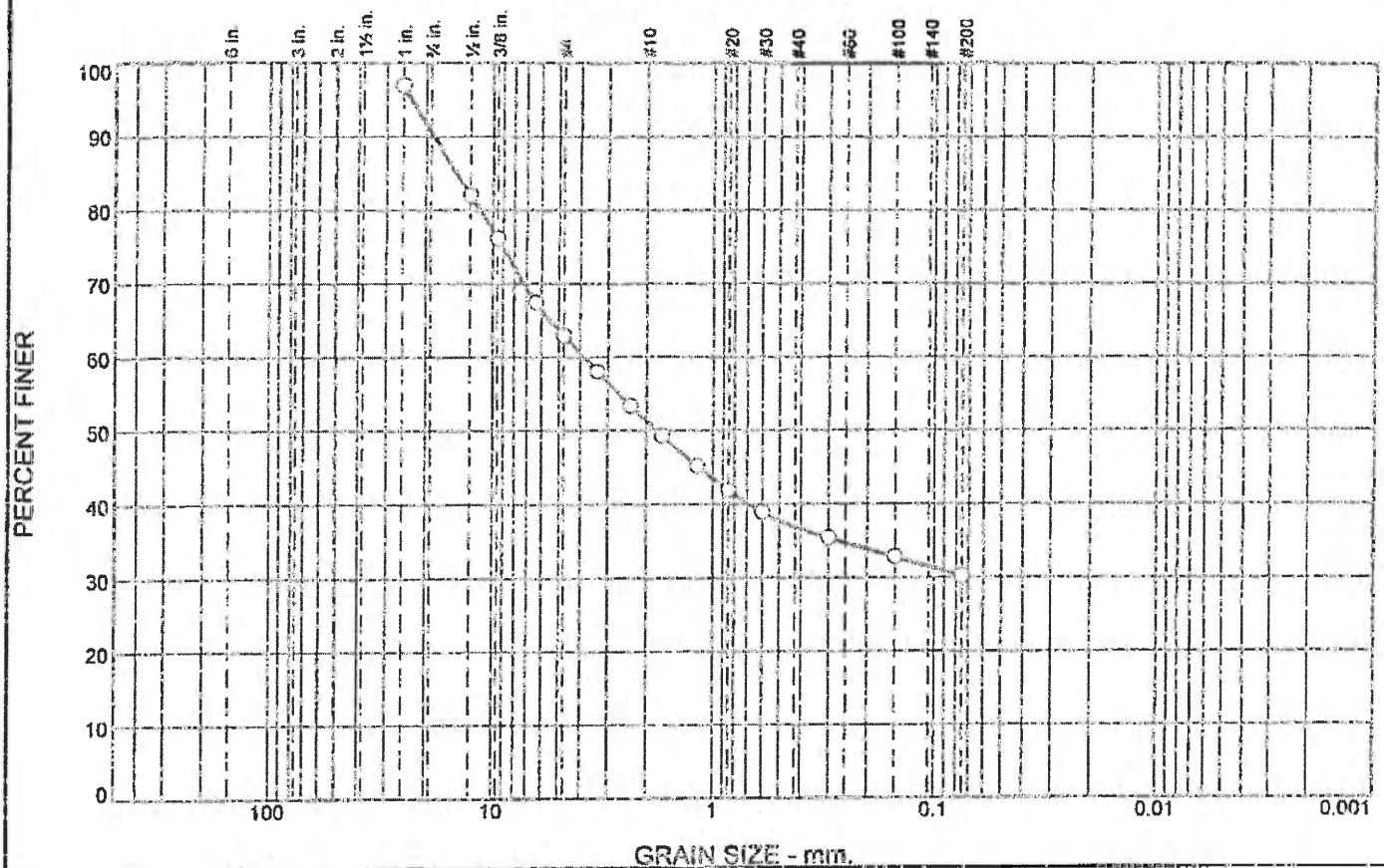
Recommended Slot Opening. _____

Recommended Screen: Dia. _____ in. Length _____ Ft.

By: _____

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		27.6	11.8	14.3	6.6	30.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	96.9		
.50	82.1		
.375	76.2		
.25	67.4		
#4	63.0		
#6	58.1		
#8	53.3		
#12	49.3		
#16	45.2		
#20	41.9		
#30	39.0		
#50	35.4		
#100	32.9		
#200	30.3		

* (no specification provided)

Material Description

Brown Gravely Sand With Some Silt And Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.5300 D_{85}= 14.6555 D_{60}= 3.8413
D_{50}= 1.8058 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Boring #418A **Depth:** 38.4' to 40.0'
Sample Number: 7 **Date:** 05/18/2018

F. T. Kitlinski & Associates, Inc.

Harrisburg, PA

Client: Groundwater Sciences Corporation
Project: IBM Owego, New York
Groundwater Sciences Corporation Project #93004
Project No: 18-05-10699 **Figure** 7

Johnson Division
1950 Old Highway 8
St. Paul, Minnesota 55112
UOP Inc.

SAND ANALYSIS
(COARSE)

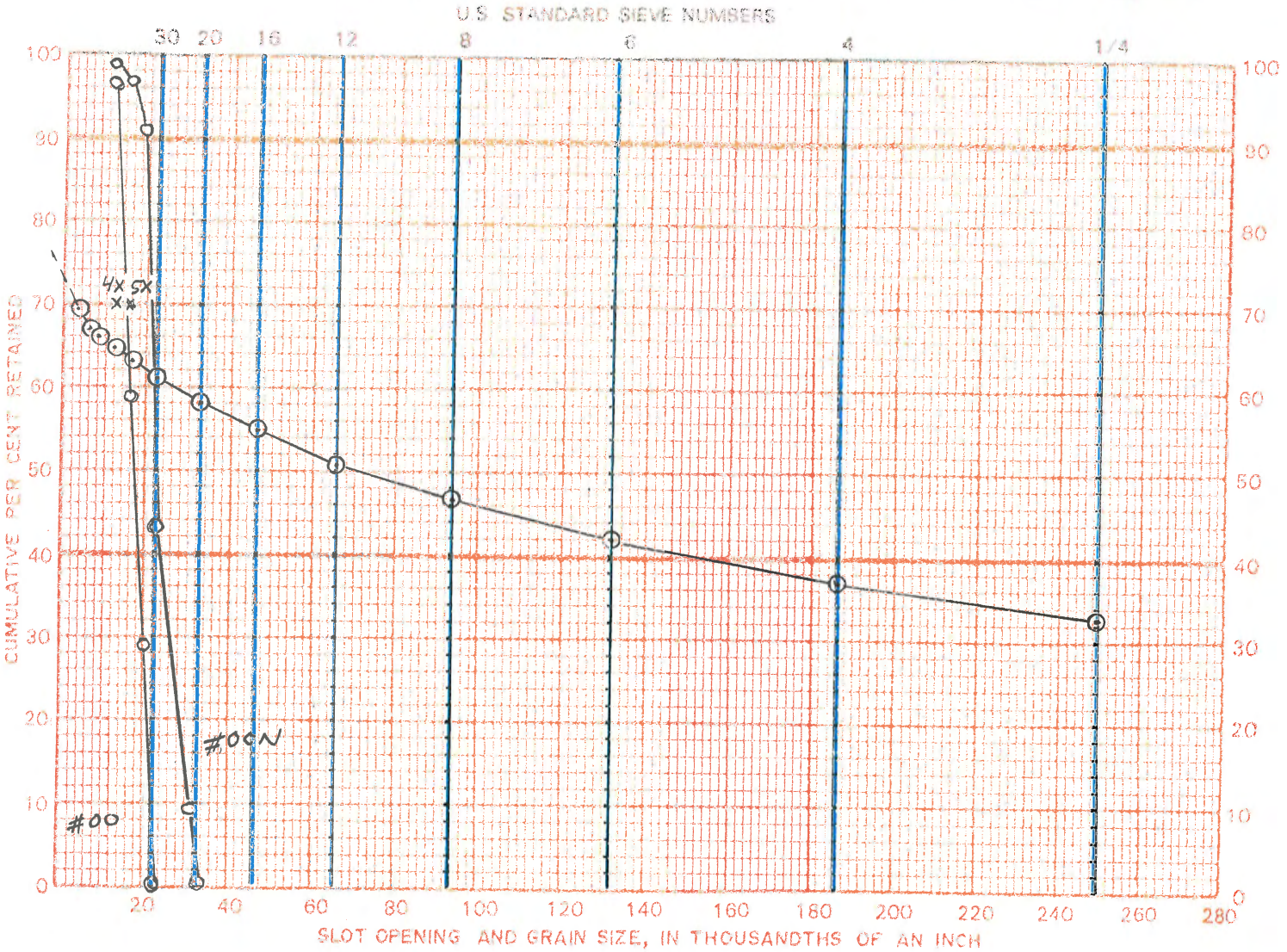
MAILING ADDRESS: P.O. BOX 43118
ST. PAUL, MINNESOTA • 55164

Sample sent in by Owego Well 414 Replacement

Town Owego State NY Zip _____ Date _____

From well of _____

Remarks: Test Boring 418A, 38.4 - 40 ft Interval



U.S. SIEVE NO	SIEVE OPENING INCHES	SIEVE OPENING MM.	CUMULATIVE % RETAINED		
¼	.250	6.35	32.6		
4	.187	4.76	37.0		
6	.132	3.36	41.9		
8	.094	2.38	46.7		
12	.066	1.68	50.7		
16	.047	1.19	54.8		
20	.033	0.84	58.1		
30	.023	0.60	61.0		
40	.016	0.42	63.0		
50	.012	.30	64.6		
70	.008	.21	66.0		
100	.006	.15	67.1		
200	.003	.075	69.7		

Notes: _____

Recommended Slot Opening: _____

Recommended Screen: Dia. _____ in. Length _____ Ft.

By: _____

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

GROUNDWATER SCIENCES CORPORATION

***WELL LOG:* 418**

PROJECT INFORMATION

PROJECT:	***Lockheed Martin Facility***
SITE LOCATION:	***Owego, New York***
JOB NO.:	***93004.46.1701***
LOGGED BY:	***S. Fisher***
DATES DRILLED:	***9/18/18 - 9/19/18***

DRILLING INFORMATION

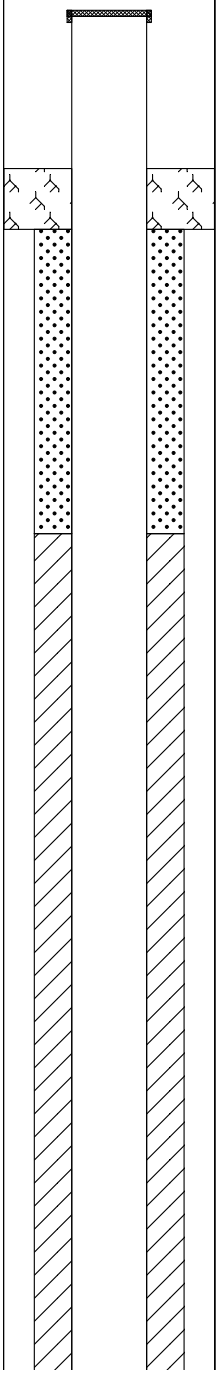
DRILLING CO.:	***Eichelbergers, Inc.***
DRILLER:	***C. Knaub***
RIG TYPE:	***Ingersoll Rand T4***
DRILLING METHOD:	***Air Rotary***
DEVELOPMENT DATE:	***9/26/18 - 9/27/18***
LOCATION:	***P001 Area, approx. 5 ft NE of former well 414***

NOTES: Final well construction completed on 9/28/18
SWL=23.56 ft below TOC, 10/2/18
WL Measuring Point elevation: 893.21 ft amsl

SURFACE ELEVATION	891.0 ft amsl
EASTING	918198.98
NORTHING	766895.69

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
-2					
0					TOPSOIL: sod and organic silt and sand, moist
2					SILT, SAND & GRAVEL: dark yellowish brown (10 YR 4/2) silt with vf-vc sand, and f-m gravel, crumbly, moist
4	Augered to 10 ft	---	---	---	
6					
8					
10	13 8 7 6	0	0"	1	SILT, SAND & GRAVEL: pushed large rock fragment (no recovery)
12	6 6 8 11	0	6"	2	SILT, SAND & GRAVEL: dk yell brown, pred. silt with vf-vc sand matrix, f-m A-SA gravel throughout, crumbly, moist
14	4 3 2 2	0	23"	3	SILT & SAND: olive gray (5 Y 4/1) pred organic silt w/ vf-f sand, tr m-vc, tr. f SR gravel, w/ rootlets and organic masses, cohesive, moist
16	3 4 3 4	0	21"	4	SILT & SAND: as above, w/ occ large 0.5 "dia. roots, occ wthrd A-SA shale frags, cohesive, moist
18	4 6 10	0	5"	5	SILT & SAND: as above, large SA siltstone frag jammed in tip of spoon

GRAPHIC

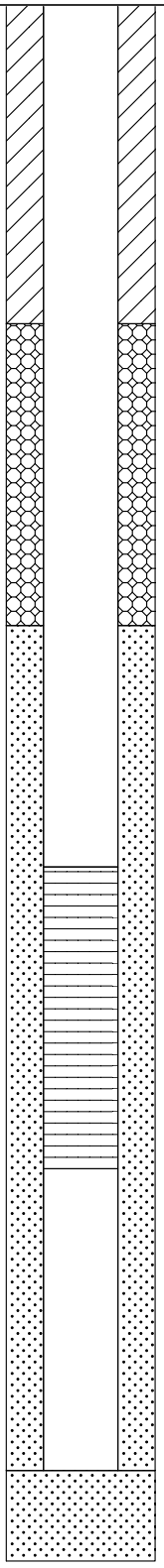


DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
-2		8" locking well cap
0		Topsoil backfill (0'-1')
2		Sand backfill (1'-6')
4		
6		16" dia. air rotary simultaneous casing advancement borehole (0'-45.5')
8		
10		
12		Bentonite slurry annular seal (6'-25')
14		
16		
18		8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-34')

GROUNDWATER SCIENCES CORPORATION

WELL LOG: 418

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION
20	9				
	3 3 5 18	0	23"	6	SILT & SAND: as above, sl more fine SR gravel in lower 9", w/ rootlets, cohesive, moist
22	24 21 23 24	0	24"	7	SILT, SAND & GRAVEL: olive gray silt w/ vf-f sand matrix, some m-vc, w/ f-m SA-SR gravel, occ A shale/siltstone frag, crumbly to sl. cohesive, moist
24	10 15 15 13	0	18"	8	SAND & GRAVEL: dk yell brown, to olive gray, pred m-c, tr silt, lit vf-f, some vc and f SR-R gravel, loose, moist
26	14 21 22 17	0	13"	9	SILT, SAND & GRAVEL: dk yell brown, silt with vf-f, tr m-vc, SA-SR f gravel, dense, cohesive, moist
28	6 7 12 13	0	22"	10	SILT, SAND & GRAVEL: olive gray pred. SR f gravel, tr. A-SA rock wthrd rock frags, dense, sl. crumbly, wet
30	13 22 29 25	0	23"	11	SILT, SAND & GRAVEL: as above, wet top 8" then more A-SA wthrd shale and siltstone frags, more moderate brown (5 YR 4/4) and moist
32	39 33 34 29	0	22"	12	SILT, SAND & GRAVEL: as above, with thin vc and f SR gravel laminations, pred SA shale and siltstone clasts, some SR clasts, cohesive to crumbly, wet
34	20 24 30 23	0	24"	13	SILT, SAND & GRAVEL: as above, v. gravelly, some layering, freq. SR gravel w/ silty zones, wet
36	Augered	---	---	---	SILT & SAND: mod yellowish brown (10 YR 5/4), layered vf-f sand with silt, wet SAND: c-vc sand, lit f-m, tr f SR-R gravel, loose, wet
38	23 40 46 46	0	24"	14	SILT, SAND & GRAVEL: mod yell brown, silt with vf-f sans, lit m-vc, w/ f SA-SR gravel throughout, pred dusky brown (5 Y 2/2) wthrd siltstone frags 8"-14", v. dense, stiff, wet
40	13 26 35 69	0	18"	15	SILT, SAND & GRAVEL: as above top 6", then pred silt w/ vf sand, some color banding, cohesive, wet
42					SILT, SAND & GRAVEL: lt. olive gray (5 Y 5/2) pred silt w/ vf sand matrix, some f-vc, w/ SA-SR f gravel, v. dense, stiff, cohesive, moist
44	Air rotary	---	---	---	SILT, SAND & GRAVEL: as above
46					



WELL CONSTRUCTION DETAILS
16" dia. air rotary simultaneous casing advancement borehole (0'-45.5')
Bentonite slurry annular seal (6'-25')
Bentonite chip annular seal, (25'-30')
8" dia. Sch 40, Type 316, stainless steel riser (+2.5'-34')
#00N grade sand pack (30'-44')
8" dia. Sch 40, Type 316, 20-slot, stainless steel wire-wrapped screen (34'-39')
8" dia. Sch 40, Type 316, stainless steel sump (39'-44')
#00N grade sand backfill (44'-45.5')

Lockheed Martin Site, Owego, NY
Extraction Well 418
October 2, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 7:50	8.02	12.23	23.55	--	--	--	0	Pre test
10/2/2018 7:51	8.02	12.20	23.55	--	--	--	0	
10/2/2018 7:52	8.02	12.21	23.55	--	--	--	0	
10/2/2018 7:53	8.02	12.21	23.56	--	--	--	0	
10/2/2018 7:54	8.03	12.22	23.54	--	--	--	0	
10/2/2018 7:55	8.00	12.22	23.59	--	--	--	0	
10/2/2018 7:56	8.01	12.23	23.58	--	--	--	0	
10/2/2018 7:57	8.02	12.19	23.55	--	--	--	0	
10/2/2018 7:58	8.03	12.23	23.53	--	--	--	0	
10/2/2018 7:59	8.01	12.20	23.56	--	--	--	0	
10/2/2018 8:00	8.03	12.21	23.53	0	0.00	61597.2		Start Step #1
10/2/2018 8:01	7.35	12.23	25.10	1	1.57			Target: 1 gpm
10/2/2018 8:02	7.33	12.24	25.15	2	1.62			
10/2/2018 8:03	7.40	12.22	24.99	3	1.46			
10/2/2018 8:04	7.43	12.22	24.91	4	1.37			
10/2/2018 8:05	7.44	12.21	24.89	5	1.36			
10/2/2018 8:06	7.44	12.21	24.88	6	1.35			
10/2/2018 8:07	7.44	12.21	24.88	7	1.35			
10/2/2018 8:08	7.47	12.24	24.82	8	1.29			
10/2/2018 8:09	7.45	12.23	24.86	9	1.33			
10/2/2018 8:10	7.45	12.22	24.87	10	1.33			
10/2/2018 8:11	7.44	12.20	24.88	11	1.35			
10/2/2018 8:12	7.43	12.20	24.92	12	1.39			
10/2/2018 8:13	7.43	12.18	24.90	13	1.37			
10/2/2018 8:14	7.44	12.24	24.89	14	1.35			
10/2/2018 8:15	7.43	12.22	24.91	15	1.38			
10/2/2018 8:16	7.41	12.22	24.97	16	1.44			
10/2/2018 8:17	7.41	12.21	24.96	17	1.43			
10/2/2018 8:18	7.41	12.22	24.96	18	1.43			
10/2/2018 8:19	7.39	12.19	25.00	19	1.47			
10/2/2018 8:20	7.39	12.24	25.01	20	1.48			
10/2/2018 8:21	7.41	12.23	24.96	21	1.42			
10/2/2018 8:22	7.40	12.19	24.99	22	1.46			
10/2/2018 8:23	7.40	12.20	24.98	23	1.45			
10/2/2018 8:24	7.40	12.25	24.99	24	1.45			
10/2/2018 8:25	7.39	12.23	25.02	25	1.48			
10/2/2018 8:26	7.39	12.22	25.01	26	1.48			
10/2/2018 8:27	7.40	12.21	24.99	27	1.46			
10/2/2018 8:28	7.40	12.21	24.99	28	1.46			
10/2/2018 8:29	7.40	12.23	24.99	29	1.46			
10/2/2018 8:30	7.36	12.23	25.08	30	1.55			
10/2/2018 8:31	7.38	12.21	25.03	31	1.50			
10/2/2018 8:32	7.38	12.21	25.02	32	1.49			
10/2/2018 8:33	7.38	12.20	25.03	33	1.49			
10/2/2018 8:34	7.36	12.21	25.09	34	1.55			
10/2/2018 8:35	7.36	12.22	25.07	35	1.54			
10/2/2018 8:36	7.37	12.21	25.05	36	1.52			

Lockheed Martin Site, Owego, NY
Extraction Well 418
October 2, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 8:37	7.37	12.21	25.05	37	1.51			
10/2/2018 8:38	7.36	12.22	25.08	38	1.54			
10/2/2018 8:39	7.37	12.19	25.04	39	1.51			
10/2/2018 8:40	7.37	12.20	25.05	40	1.52			
10/2/2018 8:41	7.37	12.21	25.05	41	1.52			
10/2/2018 8:42	7.38	12.21	25.04	42	1.50			
10/2/2018 8:43	7.35	12.23	25.09	43	1.56			
10/2/2018 8:44	7.37	12.22	25.05	44	1.52			
10/2/2018 8:45	7.35	12.20	25.10	45	1.57			
10/2/2018 8:46	7.35	12.21	25.10	46	1.57			
10/2/2018 8:47	7.36	12.22	25.08	47	1.55			
10/2/2018 8:48	7.36	12.21	25.09	48	1.55			
10/2/2018 8:49	7.36	12.22	25.08	49	1.55			
10/2/2018 8:50	7.36	12.20	25.07	50	1.54			
10/2/2018 8:51	7.34	12.22	25.11	51	1.58			
10/2/2018 8:52	7.35	12.20	25.09	52	1.56			
10/2/2018 8:53	7.35	12.23	25.09	53	1.56			
10/2/2018 8:54	7.33	12.20	25.13	54	1.60			
10/2/2018 8:55	7.36	12.21	25.08	55	1.55			
10/2/2018 8:56	7.35	12.24	25.10	56	1.57			
10/2/2018 8:57	7.33	12.23	25.14	57	1.61			
10/2/2018 8:58	7.32	12.21	25.16	58	1.63			
10/2/2018 8:59	7.33	12.22	25.15	59	1.62			
10/2/2018 9:00	7.31	12.22	25.18	60	1.65	61669	1.20	Step #2
10/2/2018 9:01	6.92	12.23	26.09	61	2.56			Target: 2 gpm
10/2/2018 9:02	6.89	12.23	26.16	62	2.63			
10/2/2018 9:03	6.87	12.21	26.21	63	2.68			
10/2/2018 9:04	6.86	12.25	26.23	64	2.70			
10/2/2018 9:05	6.82	12.22	26.33	65	2.80			
10/2/2018 9:06	6.81	12.19	26.35	66	2.82			
10/2/2018 9:07	6.78	12.23	26.43	67	2.89			
10/2/2018 9:08	6.77	12.23	26.45	68	2.91			
10/2/2018 9:09	6.72	12.23	26.55	69	3.02			
10/2/2018 9:10	6.73	12.21	26.53	70	3.00			
10/2/2018 9:11	6.71	12.22	26.57	71	3.04			
10/2/2018 9:12	6.70	12.22	26.61	72	3.07			
10/2/2018 9:13	6.68	12.20	26.66	73	3.12			
10/2/2018 9:14	6.68	12.25	26.65	74	3.12			
10/2/2018 9:15	6.66	12.22	26.69	75	3.16			
10/2/2018 9:16	6.64	12.19	26.74	76	3.20			
10/2/2018 9:17	6.62	12.24	26.78	77	3.25			
10/2/2018 9:18	6.62	12.19	26.79	78	3.26			
10/2/2018 9:19	6.61	12.23	26.82	79	3.28			
10/2/2018 9:20	6.62	12.23	26.79	80	3.26			
10/2/2018 9:21	6.59	12.20	26.84	81	3.31			
10/2/2018 9:22	6.58	12.18	26.87	82	3.33			
10/2/2018 9:23	6.60	12.24	26.84	83	3.31			

Lockheed Martin Site, Owego, NY
Extraction Well 418
October 2, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 9:24	6.58	12.22	26.87	84	3.34			
10/2/2018 9:25	6.58	12.19	26.89	85	3.36			
10/2/2018 9:26	6.57	12.23	26.89	86	3.36			
10/2/2018 9:27	6.56	12.20	26.92	87	3.39			
10/2/2018 9:28	6.57	12.20	26.90	88	3.37			
10/2/2018 9:29	6.55	12.18	26.95	89	3.42			
10/2/2018 9:30	6.55	12.19	26.95	90	3.42			
10/2/2018 9:31	6.55	12.21	26.95	91	3.41			
10/2/2018 9:32	6.53	12.19	26.99	92	3.46			
10/2/2018 9:33	6.54	12.20	26.96	93	3.43			
10/2/2018 9:34	6.54	12.20	26.96	94	3.43			
10/2/2018 9:35	6.52	12.22	27.02	95	3.49			
10/2/2018 9:36	6.53	12.23	27.00	96	3.47			
10/2/2018 9:37	6.52	12.23	27.01	97	3.48			
10/2/2018 9:38	6.51	12.22	27.04	98	3.51			
10/2/2018 9:39	6.51	12.19	27.03	99	3.50			
10/2/2018 9:40	6.52	12.22	27.02	100	3.49			
10/2/2018 9:41	6.50	12.21	27.05	101	3.52			
10/2/2018 9:42	6.48	12.24	27.11	102	3.58			
10/2/2018 9:43	6.50	12.22	27.07	103	3.54			
10/2/2018 9:44	6.50	12.20	27.06	104	3.53			
10/2/2018 9:45	6.49	12.22	27.10	105	3.56			
10/2/2018 9:46	6.49	12.22	27.08	106	3.55			
10/2/2018 9:47	6.50	12.20	27.07	107	3.54			
10/2/2018 9:48	6.50	12.20	27.07	108	3.54			
10/2/2018 9:49	6.49	12.22	27.10	109	3.56			
10/2/2018 9:50	6.50	12.19	27.07	110	3.54			
10/2/2018 9:51	6.48	12.21	27.11	111	3.58			
10/2/2018 9:52	6.49	12.20	27.08	112	3.55			
10/2/2018 9:53	6.49	12.18	27.08	113	3.55			
10/2/2018 9:54	6.47	12.24	27.13	114	3.60			
10/2/2018 9:55	6.47	12.21	27.14	115	3.61			
10/2/2018 9:56	6.46	12.21	27.15	116	3.62			
10/2/2018 9:57	6.47	12.20	27.13	117	3.60			
10/2/2018 9:58	6.47	12.20	27.13	118	3.60			
10/2/2018 9:59	6.46	12.23	27.15	119	3.62			
10/2/2018 10:00	6.47	12.19	27.14	120	3.61	61783.3	1.91	Step #3
10/2/2018 10:01	6.21	12.20	27.73	121	4.19			Target: 3 gpm
10/2/2018 10:02	5.95	12.22	28.32	122	4.79			
10/2/2018 10:03	5.89	12.21	28.46	123	4.93			
10/2/2018 10:04	5.86	12.19	28.55	124	5.02			
10/2/2018 10:05	5.82	12.19	28.63	125	5.10			
10/2/2018 10:06	5.79	12.24	28.70	126	5.17			
10/2/2018 10:07	5.76	12.24	28.78	127	5.24			
10/2/2018 10:08	5.74	12.22	28.81	128	5.28			
10/2/2018 10:09	5.70	12.23	28.90	129	5.37			
10/2/2018 10:10	5.70	12.22	28.90	130	5.37			

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October 2, 2018 Step-Drawdown Test

Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 10:11	5.69	12.21	28.93	131	5.40			
10/2/2018 10:12	5.66	12.22	28.99	132	5.46			
10/2/2018 10:13	5.63	12.21	29.08	133	5.55			
10/2/2018 10:14	5.61	12.21	29.12	134	5.59			
10/2/2018 10:15	5.59	12.18	29.15	135	5.62			
10/2/2018 10:16	5.58	12.25	29.18	136	5.65			
10/2/2018 10:17	5.58	12.20	29.19	137	5.66			
10/2/2018 10:18	5.55	12.22	29.25	138	5.72			
10/2/2018 10:19	5.56	12.21	29.23	139	5.69			
10/2/2018 10:20	5.54	12.21	29.29	140	5.75			
10/2/2018 10:21	5.54	12.18	29.27	141	5.74			
10/2/2018 10:22	5.51	12.20	29.34	142	5.80			
10/2/2018 10:23	5.49	12.24	29.39	143	5.86			
10/2/2018 10:24	5.50	12.19	29.36	144	5.83			
10/2/2018 10:25	5.49	12.22	29.40	145	5.87			
10/2/2018 10:26	5.49	12.24	29.39	146	5.86			
10/2/2018 10:27	5.48	12.22	29.42	147	5.89			
10/2/2018 10:28	5.46	12.21	29.46	148	5.93			
10/2/2018 10:29	5.46	12.21	29.47	149	5.93			
10/2/2018 10:30	5.43	12.23	29.53	150	6.00			
10/2/2018 10:31	5.43	12.21	29.52	151	5.99			
10/2/2018 10:32	5.43	12.21	29.52	152	5.99			
10/2/2018 10:33	5.43	12.21	29.52	153	5.99			
10/2/2018 10:34	5.44	12.22	29.52	154	5.99			
10/2/2018 10:35	5.42	12.23	29.56	155	6.03			
10/2/2018 10:36	5.39	12.25	29.63	156	6.09			
10/2/2018 10:37	5.41	12.22	29.58	157	6.05			
10/2/2018 10:38	5.38	12.23	29.65	158	6.12			
10/2/2018 10:39	5.39	12.22	29.62	159	6.08			
10/2/2018 10:40	5.37	12.22	29.68	160	6.15			
10/2/2018 10:41	5.36	12.23	29.68	161	6.15			
10/2/2018 10:42	5.36	12.20	29.70	162	6.17			
10/2/2018 10:43	5.35	12.20	29.71	163	6.18			
10/2/2018 10:44	5.34	12.20	29.75	164	6.22			
10/2/2018 10:45	5.35	12.22	29.71	165	6.18			
10/2/2018 10:46	5.31	12.20	29.80	166	6.27			
10/2/2018 10:47	5.33	12.19	29.76	167	6.23			
10/2/2018 10:48	5.30	12.21	29.82	168	6.29			
10/2/2018 10:49	5.33	12.23	29.76	169	6.23			
10/2/2018 10:50	5.30	12.19	29.83	170	6.29			
10/2/2018 10:51	5.31	12.21	29.80	171	6.27			
10/2/2018 10:52	5.29	12.20	29.85	172	6.32			
10/2/2018 10:53	5.29	12.21	29.85	173	6.32			
10/2/2018 10:54	5.27	12.22	29.90	174	6.36			
10/2/2018 10:55	5.29	12.22	29.85	175	6.32			
10/2/2018 10:56	5.27	12.22	29.90	176	6.37			
10/2/2018 10:57	5.27	12.20	29.90	177	6.37			

Lockheed Martin Site, Owego, NY
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Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 10:58	5.24	12.21	29.96	178	6.43			
10/2/2018 10:59	5.25	12.20	29.94	179	6.41			
10/2/2018 11:00	5.25	12.23	29.94	180	6.40	61989.2	3.43	Step #4
10/2/2018 11:01	4.80	12.23	30.99	181	7.46			Target: 4 gpm
10/2/2018 11:02	4.53	12.23	31.62	182	8.09			
10/2/2018 11:03	4.14	12.19	32.51	183	8.97			
10/2/2018 11:04	3.96	12.22	32.92	184	9.39			
10/2/2018 11:05	3.88	12.21	33.10	185	9.57			
10/2/2018 11:06	3.87	12.23	33.14	186	9.61			
10/2/2018 11:07	3.86	12.24	33.16	187	9.63			
10/2/2018 11:08	3.85	12.21	33.19	188	9.66			
10/2/2018 11:09	3.80	12.22	33.29	189	9.76			
10/2/2018 11:10	3.80	12.20	33.29	190	9.76			
10/2/2018 11:11	3.76	12.20	33.40	191	9.86			
10/2/2018 11:12	3.73	12.23	33.47	192	9.94			
10/2/2018 11:13	3.70	12.24	33.52	193	9.99			
10/2/2018 11:14	3.68	12.21	33.58	194	10.05			
10/2/2018 11:15	3.67	12.20	33.60	195	10.07			
10/2/2018 11:16	3.63	12.21	33.68	196	10.15			
10/2/2018 11:17	3.65	12.22	33.64	197	10.10			
10/2/2018 11:18	3.60	12.22	33.76	198	10.23			
10/2/2018 11:19	3.56	12.23	33.85	199	10.32			
10/2/2018 11:20	3.57	12.21	33.84	200	10.30			
10/2/2018 11:21	3.52	12.25	33.95	201	10.42			
10/2/2018 11:22	3.50	12.23	34.00	202	10.46			
10/2/2018 11:23	3.46	12.22	34.07	203	10.54			
10/2/2018 11:24	3.45	12.24	34.09	204	10.56			
10/2/2018 11:25	3.43	12.21	34.15	205	10.61			
10/2/2018 11:26	3.41	12.22	34.20	206	10.66			
10/2/2018 11:27	3.40	12.20	34.23	207	10.70			
10/2/2018 11:28	3.36	12.22	34.32	208	10.79			
10/2/2018 11:29	3.35	12.24	34.35	209	10.81			
10/2/2018 11:30	3.32	12.24	34.40	210	10.87			
10/2/2018 11:31	3.33	12.19	34.39	211	10.86			
10/2/2018 11:32	3.29	12.24	34.46	212	10.93			
10/2/2018 11:33	3.27	12.22	34.51	213	10.98			
10/2/2018 11:34	3.27	12.21	34.51	214	10.98			
10/2/2018 11:35	3.24	12.22	34.58	215	11.05			
10/2/2018 11:36	3.21	12.21	34.65	216	11.12			
10/2/2018 11:37	3.23	12.22	34.62	217	11.09			
10/2/2018 11:38	3.20	12.16	34.67	218	11.14			
10/2/2018 11:39	3.16	12.20	34.77	219	11.24			
10/2/2018 11:40	3.16	12.21	34.77	220	11.24			
10/2/2018 11:41	3.14	12.17	34.81	221	11.28			
10/2/2018 11:42	3.12	12.18	34.86	222	11.32			
10/2/2018 11:43	3.10	12.20	34.92	223	11.38			
10/2/2018 11:44	3.08	12.20	34.97	224	11.43			

Lockheed Martin Site, Owego, NY
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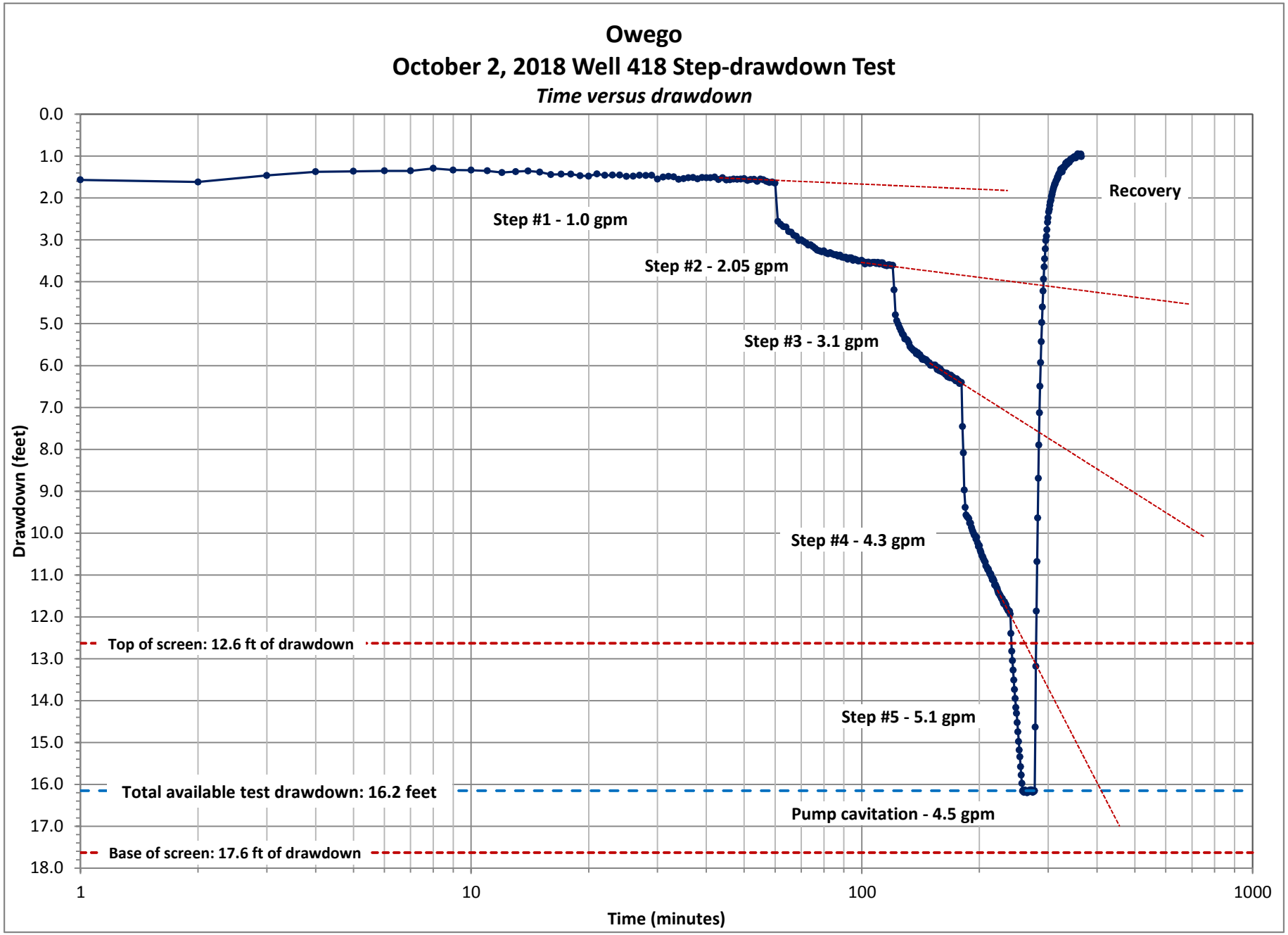
Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 11:45	3.07	12.20	34.99	225	11.46			
10/2/2018 11:46	3.05	12.23	35.02	226	11.49			
10/2/2018 11:47	3.04	12.22	35.05	227	11.52			
10/2/2018 11:48	3.02	12.21	35.10	228	11.57			
10/2/2018 11:49	3.02	12.21	35.10	229	11.57			
10/2/2018 11:50	2.99	12.21	35.17	230	11.64			
10/2/2018 11:51	2.97	12.18	35.22	231	11.69			
10/2/2018 11:52	2.99	12.20	35.17	232	11.64			
10/2/2018 11:53	2.95	12.20	35.25	233	11.72			
10/2/2018 11:54	2.96	12.19	35.24	234	11.71			
10/2/2018 11:55	2.92	12.21	35.32	235	11.78			
10/2/2018 11:56	2.91	12.21	35.35	236	11.81			
10/2/2018 11:57	2.89	12.21	35.39	237	11.85			
10/2/2018 11:58	2.89	12.20	35.40	238	11.86			
10/2/2018 11:59	2.89	12.17	35.40	239	11.87			
10/2/2018 12:00	2.86	12.20	35.47	240	11.93	62231.5	4.04	Step #5
10/2/2018 12:01	2.66	12.17	35.93	241	12.40			Target: 5 gpm
10/2/2018 12:02	2.47	12.23	36.36	242	12.82			
10/2/2018 12:03	2.38	12.21	36.58	243	13.05			
10/2/2018 12:04	2.28	12.22	36.80	244	13.27			
10/2/2018 12:05	2.18	12.21	37.04	245	13.51			
10/2/2018 12:06	2.08	12.22	37.27	246	13.74			
10/2/2018 12:07	1.99	12.20	37.48	247	13.95			
10/2/2018 12:08	1.89	12.23	37.70	248	14.17			
10/2/2018 12:09	1.83	12.26	37.84	249	14.30			
10/2/2018 12:10	1.74	12.24	38.06	250	14.53			
10/2/2018 12:11	1.64	12.26	38.28	251	14.74			
10/2/2018 12:12	1.54	12.24	38.51	252	14.98			
10/2/2018 12:13	1.45	12.27	38.71	253	15.18			
10/2/2018 12:14	1.38	12.27	38.87	254	15.34			
10/2/2018 12:15	1.28	12.25	39.11	255	15.58			
10/2/2018 12:16	1.19	12.23	39.31	256	15.78			
10/2/2018 12:17	1.11	12.25	39.51	257	15.98			
10/2/2018 12:18	1.03	12.27	39.69	258	16.16			
10/2/2018 12:19	1.04	12.24	39.67	259	16.14			
10/2/2018 12:20	1.01	12.26	39.73	260	16.19			
10/2/2018 12:21	1.03	12.26	39.69	261	16.16			
10/2/2018 12:22	1.04	12.28	39.67	262	16.14			
10/2/2018 12:23	1.03	12.28	39.70	263	16.16			
10/2/2018 12:24	1.03	12.27	39.69	264	16.16			
10/2/2018 12:25	1.01	12.26	39.74	265	16.20			
10/2/2018 12:26	1.02	12.29	39.72	266	16.18			
10/2/2018 12:27	1.02	12.29	39.71	267	16.18			
10/2/2018 12:28	1.03	12.30	39.69	268	16.16			
10/2/2018 12:29	1.04	12.29	39.67	269	16.14			
10/2/2018 12:30	1.03	12.25	39.68	270	16.15			
10/2/2018 12:31	1.04	12.24	39.67	271	16.13			

Lockheed Martin Site, Owego, NY
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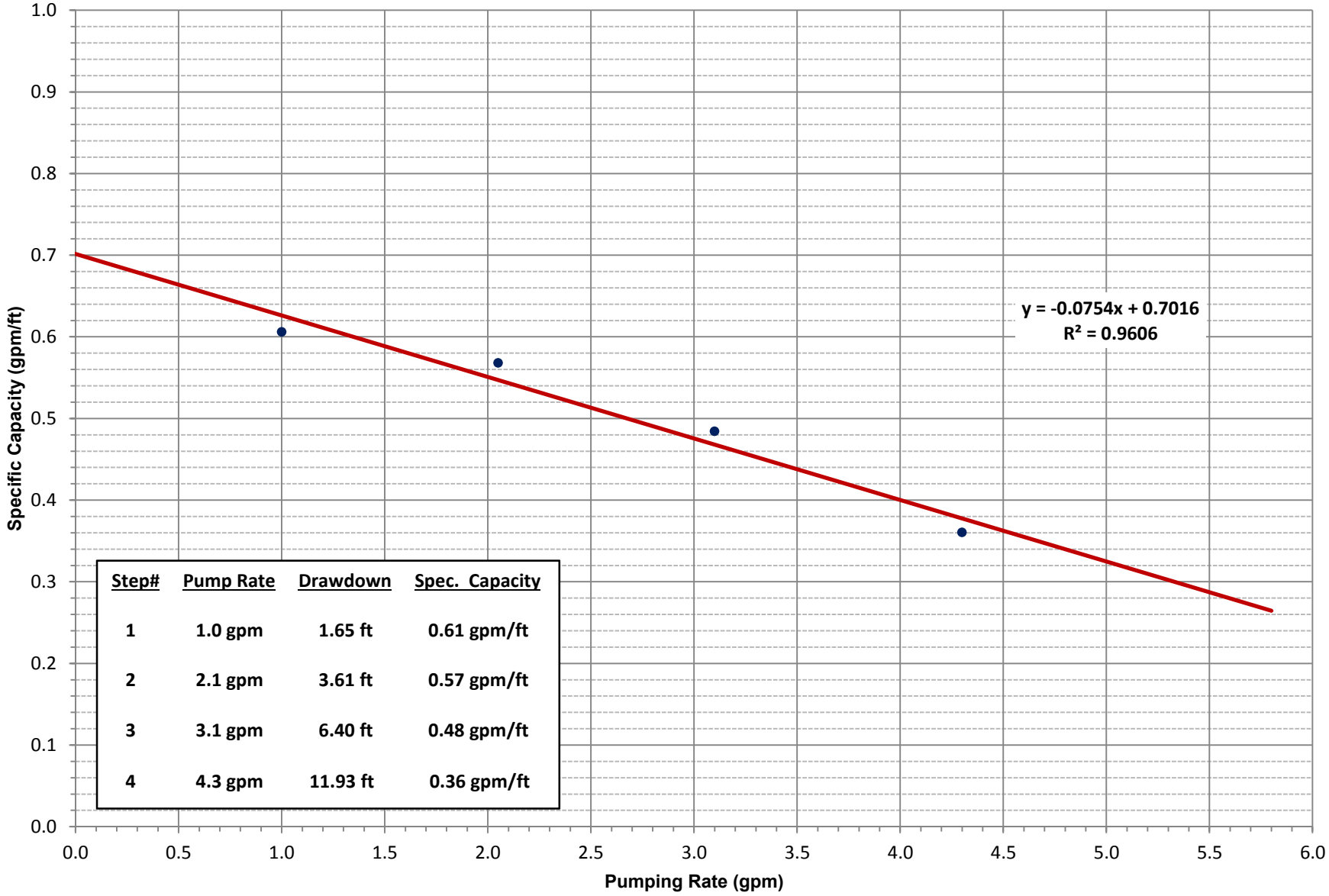
Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 12:32	1.03	12.29	39.69	272	16.16			
10/2/2018 12:33	1.04	12.28	39.67	273	16.14			
10/2/2018 12:34	1.01	12.25	39.73	274	16.20			
10/2/2018 12:35	1.02	12.29	39.71	275	16.17			
10/2/2018 12:36	1.02	12.26	39.70	276	16.17			
10/2/2018 12:37	1.03	12.29	39.69	277	16.16			
10/2/2018 12:38	1.69	12.26	38.17	278	14.63	62419.5	4.95	End of test
10/2/2018 12:39	2.32	12.29	36.71	279	13.18		0	Recovery
10/2/2018 12:40	2.89	12.29	35.40	280	11.87		0	
10/2/2018 12:41	3.40	12.28	34.21	281	10.68		0	
10/2/2018 12:42	3.85	12.29	33.17	282	9.64		0	
10/2/2018 12:43	4.26	12.29	32.23	283	8.69		0	
10/2/2018 12:44	4.61	12.27	31.43	284	7.90		0	
10/2/2018 12:45	4.94	12.28	30.66	285	7.13		0	
10/2/2018 12:46	5.22	12.26	30.03	286	6.49		0	
10/2/2018 12:47	5.46	12.25	29.46	287	5.93		0	
10/2/2018 12:48	5.68	12.30	28.96	288	5.43		0	
10/2/2018 12:49	5.88	12.24	28.50	289	4.97		0	
10/2/2018 12:50	6.04	12.25	28.13	290	4.60		0	
10/2/2018 12:51	6.20	12.26	27.75	291	4.22		0	
10/2/2018 12:52	6.32	12.28	27.47	292	3.94		0	
10/2/2018 12:53	6.45	12.25	27.18	293	3.64		0	
10/2/2018 12:54	6.53	12.25	26.98	294	3.45		0	
10/2/2018 12:55	6.64	12.27	26.75	295	3.21		0	
10/2/2018 12:56	6.72	12.24	26.55	296	3.02		0	
10/2/2018 12:57	6.77	12.25	26.45	297	2.92		0	
10/2/2018 12:58	6.83	12.26	26.29	298	2.76		0	
10/2/2018 12:59	6.91	12.25	26.11	299	2.58		0	
10/2/2018 13:00	6.96	12.26	26.00	300	2.47		0	
10/2/2018 13:01	7.02	12.25	25.87	301	2.34		0	
10/2/2018 13:02	7.05	12.23	25.80	302	2.27		0	
10/2/2018 13:03	7.08	12.25	25.71	303	2.18		0	
10/2/2018 13:04	7.12	12.26	25.63	304	2.10		0	
10/2/2018 13:05	7.14	12.24	25.59	305	2.06		0	
10/2/2018 13:06	7.18	12.22	25.50	306	1.97		0	
10/2/2018 13:07	7.20	12.25	25.45	307	1.92		0	
10/2/2018 13:08	7.22	12.22	25.39	308	1.86		0	
10/2/2018 13:09	7.25	12.24	25.33	309	1.80		0	
10/2/2018 13:10	7.27	12.25	25.29	310	1.75		0	
10/2/2018 13:11	7.29	12.25	25.24	311	1.70		0	
10/2/2018 13:12	7.31	12.24	25.19	312	1.66		0	
10/2/2018 13:13	7.31	12.26	25.19	313	1.66		0	
10/2/2018 13:14	7.33	12.24	25.13	314	1.60		0	
10/2/2018 13:15	7.34	12.26	25.11	315	1.58		0	
10/2/2018 13:16	7.35	12.23	25.09	316	1.56		0	
10/2/2018 13:17	7.38	12.25	25.03	317	1.50		0	
10/2/2018 13:18	7.37	12.23	25.05	318	1.52		0	

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Date and Time	Logger Pressure (PSI)	Logger Temp. (deg. C)	Depth to Water (ft)	Test Time (minute)	Drawdown (feet)	Totalizer (gallons)	Ave Flow Rate (gpm)	Notes
10/2/2018 13:19	7.40	12.23	24.98	319	1.45		0	
10/2/2018 13:20	7.41	12.25	24.95	320	1.42		0	
10/2/2018 13:21	7.41	12.24	24.95	321	1.42		0	
10/2/2018 13:22	7.43	12.24	24.91	322	1.38		0	
10/2/2018 13:23	7.46	12.26	24.85	323	1.32		0	
10/2/2018 13:24	7.45	12.24	24.86	324	1.33		0	
10/2/2018 13:25	7.47	12.25	24.83	325	1.30		0	
10/2/2018 13:26	7.43	12.25	24.91	326	1.38		0	
10/2/2018 13:27	7.47	12.26	24.81	327	1.28		0	
10/2/2018 13:28	7.47	12.25	24.81	328	1.28		0	
10/2/2018 13:29	7.48	12.23	24.79	329	1.26		0	
10/2/2018 13:30	7.48	12.22	24.80	330	1.27		0	
10/2/2018 13:31	7.49	12.21	24.77	331	1.24		0	
10/2/2018 13:32	7.50	12.22	24.74	332	1.21		0	
10/2/2018 13:33	7.52	12.25	24.70	333	1.17		0	
10/2/2018 13:34	7.50	12.24	24.74	334	1.21		0	
10/2/2018 13:35	7.51	12.23	24.73	335	1.20		0	
10/2/2018 13:36	7.54	12.25	24.67	336	1.14		0	
10/2/2018 13:37	7.52	12.19	24.70	337	1.17		0	
10/2/2018 13:38	7.53	12.25	24.69	338	1.16		0	
10/2/2018 13:39	7.53	12.22	24.68	339	1.14		0	
10/2/2018 13:40	7.53	12.23	24.68	340	1.15		0	
10/2/2018 13:41	7.55	12.25	24.63	341	1.10		0	
10/2/2018 13:42	7.55	12.23	24.64	342	1.11		0	
10/2/2018 13:43	7.57	12.23	24.60	343	1.07		0	
10/2/2018 13:44	7.56	12.24	24.61	344	1.08		0	
10/2/2018 13:45	7.57	12.22	24.59	345	1.06		0	
10/2/2018 13:46	7.57	12.23	24.59	346	1.06		0	
10/2/2018 13:47	7.58	12.20	24.57	347	1.04		0	
10/2/2018 13:48	7.58	12.24	24.58	348	1.04		0	
10/2/2018 13:49	7.58	12.23	24.57	349	1.04		0	
10/2/2018 13:50	7.59	12.24	24.55	350	1.02		0	
10/2/2018 13:51	7.59	12.25	24.55	351	1.01		0	
10/2/2018 13:52	7.58	12.24	24.57	352	1.03		0	
10/2/2018 13:53	7.58	12.24	24.58	353	1.04		0	
10/2/2018 13:54	7.59	12.23	24.54	354	1.01		0	
10/2/2018 13:55	7.60	12.24	24.53	355	1.00		0	
10/2/2018 13:56	7.60	12.23	24.52	356	0.99		0	
10/2/2018 13:57	7.62	12.25	24.48	357	0.95		0	
10/2/2018 13:58	7.61	12.24	24.49	358	0.96		0	
10/2/2018 13:59	7.61	12.24	24.49	359	0.96		0	
10/2/2018 14:00	7.60	12.24	24.53	360	0.99		0	
10/2/2018 14:01	7.61	12.24	24.50	361	0.96		0	
10/2/2018 14:02	7.61	12.24	24.50	362	0.97		0	
10/2/2018 14:03	7.61	12.22	24.49	363	0.96		0	
10/2/2018 14:04	7.62	12.22	24.49	364	0.95		0	
10/2/2018 14:05	7.59	12.25	24.54	365	1.01		0	


Owego
October 2, 2018 Well 418 Step-drawdown Test
Time versus drawdown
Drawdown (feet)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
1
10
100
1000
Time (minutes)
Step #1 - 1.0 gpm
Step #2 - 2.05 gpm
Step #3 - 3.1 gpm
Step #4 - 4.3 gpm
Step #5 - 5.1 gpm
Recovery
Top of screen: 12.6 ft of drawdown
Total available test drawdown: 16.2 feet
Pump cavitation - 4.5 gpm
Base of screen: 17.6 ft of drawdown

Owego
October 2, 2018 Well 418 Step-drawdown Test
Specific Capacity vs. Pumping Rate



Step#	Pump Rate	Drawdown	Spec. Capacity
1	1.0 gpm	1.65 ft	0.61 gpm/ft
2	2.1 gpm	3.61 ft	0.57 gpm/ft
3	3.1 gpm	6.40 ft	0.48 gpm/ft
4	4.3 gpm	11.93 ft	0.36 gpm/ft

APPENDIX L

Vapor Intrusion Assessment - 2018 Annual Report by Sanborn, Head Engineering, PC

SANBORN HEAD ENGINEERING

Building Trust. Engineering Success.

VAPOR INTRUSION ASSESSMENT
2018 ANNUAL REPORT

Former IBM Owego Facility
Owego, New York

Corporate Environmental Affairs

Prepared for IBM Corporation
File No. 4136.02
February 2019

SANBORN HEAD ENGINEERING
Building Trust. Engineering Success.

20 Foundry Street
Concord, NH 03301

Brandon Ashby, P.G., R.E.M.
IBM Corporate Environmental Affairs
8976 Wellington Road
Manassas, VA 20109

February 25, 2019
File No. 4136.02

Re: Vapor Intrusion Assessment – 2018 Annual Report
Former IBM Owego Facility
Owego, New York
EPA ID No. NYD986874501
NYSDEC Site No. 754006

Dear Mr. Ashby:

The enclosed report provides a summary of vapor intrusion assessment and mitigation-related work that was completed in 2018 at the former IBM Owego facility. We understand that this report will be included as an appendix to the facility's 2018 Annual Corrective Action Status Report. Please contact us if you have any questions.

Please contact us if you require additional information.

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

David Shea, P.E.
President

Bradley A. Green, P.G.
Sanborn, Head & Associates, Inc.

Encl. Vapor Intrusion Assessment – 2018 Annual Report

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APPENDICES

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Appendix B Analytical Laboratory and Data Usability Summary Reports

1.0 INTRODUCTION

This report summarizes the status of vapor intrusion (VI) assessment and mitigation-related work at the former IBM Owego Facility (the site) for the calendar year 2018. The site is currently owned and operated by Lockheed Martin Corporation (LM). This report (hereinafter referred to as the VI Assessment Annual Report) will be submitted to the New York State Department of Environmental Conservation (NYSDEC) as an attachment to the 2018 Annual Corrective Action Status Report.

A site location plan is provided as Figure 1, and a map of site buildings is provided as Figure 2. The work described herein was conducted on behalf of IBM by Sanborn, Head Engineering, PC (SHPC) in general accordance with IBM's Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan – Soil Vapor Intrusion Assessment dated February 1, 2017 (RFI Work Plan), and the B001 Interim Indoor Air Monitoring Work Plan dated February 23, 2018 (B001 Work Plan – note this was mistakenly dated February 23, 2017). Both above-referenced work plans were approved by the NYSDEC and the New York State Department of Health (collectively, the Agencies).

The services conducted, and this report are subject to the standard limitations for this type of work, as described in Appendix A.

1.1 Report Organization

This report is organized into five sections as described below:

Section 1 presents a general introduction, including the objectives and scope of the report, and a summary of the status of the buildings that were the focus of the RFI Work Plan.

Section 2 summarizes the status of heating, ventilating, and air conditioning (HVAC) operations and occupancy for buildings 001, 002, and 351 in 2018.

Section 3 summarizes the results of indoor air sampling performed in B001 in 2018.

Section 4 provides a summary of subslab depressurization (SSD) system operation and performance in 2018.

Section 5 provides a summary of upcoming activities at the site.

1.2 Objectives and Scope

The purpose of this report is to summarize the status of VI assessment and mitigation-related work at the site, and to provide system performance data for the existing SSD systems in Building 002 (B002) and Building 351 (B351), for the calendar year 2018. Additionally, the work in 2018 included indoor air quality (IAQ) sampling in Building 001 (B001) as an approved interim measure pending the establishment of a forthcoming VI Performance Monitoring Plan (PMP).

IBM is currently implementing a "Work Plan for Soil Vapor Intrusion Engineering Control Demonstration Project" (EC Work Plan) for the IBM Poughkeepsie and Former IBM Endicott facilities[1], which was approved by the Agencies on June 13, 2017. The results from that project will be used to inform decisions related to on-going monitoring at other sites (including the former IBM Owego site), which will be part of the basis for the above-described forthcoming PMP. Because the work described in the EC Work Plan is still in progress, IBM agreed to conduct indoor air sampling in B001 in 2018 before the above-described PMP is established.

IBM is working cooperatively with the site owner, LM, to maintain the appropriate HVAC operating conditions necessary for VI mitigation in routinely occupied portions of buildings B001 and B002. For B351, HVAC is not part of VI mitigation system, and it is therefore not necessary to monitor HVAC operations. It is LM's responsibility to communicate to IBM planned changes to occupancy or HVAC conditions in buildings B001 and B002, so that IBM can assess whether additional indoor air quality (IAQ) testing is warranted. IBM maintains responsibility for operation and maintenance (O&M) of the SSD systems located in B002 and B351.

Other work conducted in 2018 included a soil vapor extraction (SVE) remedial alternative assessment to evaluate the feasibility of volatile organic compound (VOC) source reduction within vadose zone soils beneath B002 and the B306/former tank farm area. The results of this assessment were provided in a report submitted to the NYSDEC on September 24, 2018[2] and are not discussed herein.

2.0 STATUS OF BUILDING HVAC AND OCCUPANCY

The status of HVAC conditions and occupancy for B001 and B002 were initially reviewed as part of the 2017 VI assessment and summarized in the December 2017 Soil Vapor Intrusion Assessment and Interim Corrective Measures (ICM) Report[3]. According to LM, neither HVAC operations nor building use/occupancy has changed in B002 in 2018 as compared to the 2017 conditions documented in the above-referenced report.

Prior to the December 2018 IAQ sampling in B001, LM reported that the outside air dampers for all the HVAC units in B001 were replaced. According to LM, the operating conditions for these HVAC units and the building use/occupancy for B001 were not changed as compared to the 2017 conditions documented in the above-referenced report. Refer to Section 3.1 for additional information.

---

1 IBM Corporation and Sanborn Head Engineering P.C., *Work Plan for Soil Vapor Intrusion Engineering Control Demonstration Project, IBM Poughkeepsie and Former IBM Endicott Facilities*, April 2017

2 Sanborn, Head Engineering, PC, *Soil Vapor Extraction Remedial Alternative Assessment Report – Building 002 and Former Tank Farm Area, Owego, NY, former IBM Owego Facility,* September 2018.

3 Sanborn, Head Engineering, PC, *Soil Vapor Intrusion Assessment and Interim Corrective Measures (ICM) Report, Owego, NY, former IBM Owego Facility, December 2017.*

3.0 B001 INDOOR AIR SAMPLING

B001 indoor air screening and sampling in 2018 was conducted at the locations shown on Figures 3 and 4 in accordance with the procedures described in the B001 Interim Indoor Air Work Plan and the RFI Work Plan. Indoor air screening was conducted with a portable gas chromatograph/electron capture device (GC/ECD) followed by collection of 8-hour time averaged indoor air samples using Summa® canisters.

3.1 HVAC Review

Consistent with the approach used for the 2017 sampling, the outside air exchange rate (AER) for each HVAC zone was reduced to a "reasonable worst-case condition" by locking the outside air (OA) dampers at their minimum allowable position (0% open) for at least 24 hours before and during the indoor air screening and sampling process. This approach was also followed for the December 2018 screening and sampling rounds.

In 2018, LM replaced the aging OA damper louvers and actuators for the 12 main air handling units (AHUs) that serve B001. The minimum allowable positions for these OA dampers (0% open) remained unchanged in 2018.

In 2017, the operating conditions for two HVAC systems were adjusted slightly to increase the AER and achieve slightly lower VOC indoor air concentrations under the presumption that these adjustments could be maintained after LM completed upgrades to its HVAC control system. As of the December 2018 sampling round, LM had not completed these upgrades. After further discussion with LM in December 2018, it was determined that the 2017 adjustments summarized in Exhibit 1 were not maintained in 2018, nor can they be sustained in the future. Therefore, in December 2018, the HVAC operating conditions for the two HVAC systems listed in Exhibit 1 were re-adjusted to conditions that LM can sustain. These are the conditions under which the December 2018 indoor air sampling was conducted.

Exhibit 1 – Summary of Adjustments to HVAC Operating Conditions – 2017 vs. 2018

HVAC Unit	October 2017	December 2018	
	8-Hr Summa Sampling Round	**Round 1 GC/ECD Screening**	**Rounds 2 and 3 GC/ECD Screening & 8-Hr Summa Sampling Round**
103C/D	Fan speed manually set to constant (100%)	Fan speed manually set to constant (100%)	2017 fan speed not sustainable. Fan speed varies based on pressure/ temperature demands in space
1394	Makeup air damper position from Unit 102D manually set to constant (100%)	Makeup air damper position from Unit 102D manually set to constant (100%)	2017 makeup air damper position not sustainable. Damper position various based on temperature / pressure demands in space.

3.2 Indoor Air Screening

On December 11 and 12, 2018, indoor air screening with a GC/ECD was conducted for TCE at the 17 locations in B001 shown on Figure 3. Except for IA001-055, these are the same locations where 8-hr indoor air sampling using Summa® canisters was performed in 2017. IA001-055 was added to the screening program to provide spatial coverage in the northeast portion of B001. Three rounds of screening were conducted in 2018 and the results are presented on Figure 3. Approximately 24 hours before the 2018 screening and sampling, the AER for each HVAC zone was reduced to a reasonable worst-case condition by locking the OA dampers at their minimum allowable position (0% open). Screening round 1 was conducted under HVAC operating conditions like the October 2017 indoor air sampling round. For screening rounds 2 and 3, and the 8-hr Summa canister indoor air sampling round, adjustments were made to HVAC operating conditions that LM can sustain with its existing systems.

As summarized on Figure 3, TCE screening concentrations in rounds 2 and 3 were less than or similar to the concentrations from round 1, suggesting that the HVAC operational adjustment made before rounds 2 and 3 were beneficial or not consequential. The screening concentrations from rounds 2 and 3 were collected on the same day as the 8-hr Summa® canister indoor air samples further discussed below. In general, the TCE screening concentrations from rounds 2 and 3 were similar to, or slightly greater than, the results of the 8-hr Summa® canister sampling.

3.3 Indoor Air Sampling and Results

Summa ® sampling was conducted on December 12, 2018 at seven locations in B001 shown on Figure 4. Locations selected for Summa® sampling were where the TCE concentrations in indoor air Summa® samples collected in 2017 were greater than or equal to 2 $\mu g/m^3$, and/or where IBM previously evaluated adjustment of HVAC operating conditions. Indoor air samples were submitted for laboratory analysis by USEPA Method TO-15 in selective ion monitoring (SIM) mode for the same list of analytes as the October 2017 sampling round.

The TCE concentration results for the October 2017 and December 2018 8-hr Summa® canister indoor air sampling rounds are shown on Figure 4. Table 1 summarizes the concentrations of all analytes from the 2017 and 2018 sampling rounds. The analytical laboratory report and data usability assessment for the 2018 indoor air samples are provided in Appendix B.

TCE was reported in the December 2018 indoor air samples at concentrations ranging from not detected (less than 1.6 $\mu g/m^3$) to 3.9 $\mu g/m^3$, with an arithmetic mean of 1.8 $\mu g/m^3$. These results are generally consistent with previous results from the October 2017 sampling round.

As shown in Table 1, 1,2-dichloroethane (1,2-DCA) was the only other analyte detected in the 2018 indoor air samples in one field duplicate sample collected from location IA001-010; however, it was not detected in the primary sample at this location. 1,2-DCA was also detected in the ambient air sample collected in 2018 and in samples from the October 2017 sampling round, but at concentrations less than 1 $\mu g/m^3$.

4.0 SUBSLAB DEPRESSURIZATION AND SOIL VAPOR EXTRACTION SYSTEMS

In 2018, operations continued for the SSD systems in B002 and B351. The design objectives for the SSD systems are to depressurize the subslab, and prevent VOC vapors from migrating into indoor air. The B002 SSD system also serves a dual purpose of reducing vadose zone VOC concentrations as further discussed below.

The B002 and B351 SSD systems are designed for continuous operation. They are each equipped with a control panel and cellular modem that can be monitored remotely. Operating personnel are automatically notified in the event of any system alarms, including those that cause a system shut down.

In addition to automatic alarm monitoring, IBM conducts periodic operational checks and monitoring of system performance. Operations checks in 2018 included weekly checks of system operating parameters (e.g., system vacuum, temperature, blower speed), the results of which are recorded on a log sheet. Performance monitoring in 2018 included semi-annual monitoring of subslab vacuum conditions, monthly or quarterly sampling of extracted vapor to track VOC mass removal, and monthly sampling of the B002 SSD process vapor to assess when change-out of the granular activated carbon (GAC) vapor treatment units is appropriate.

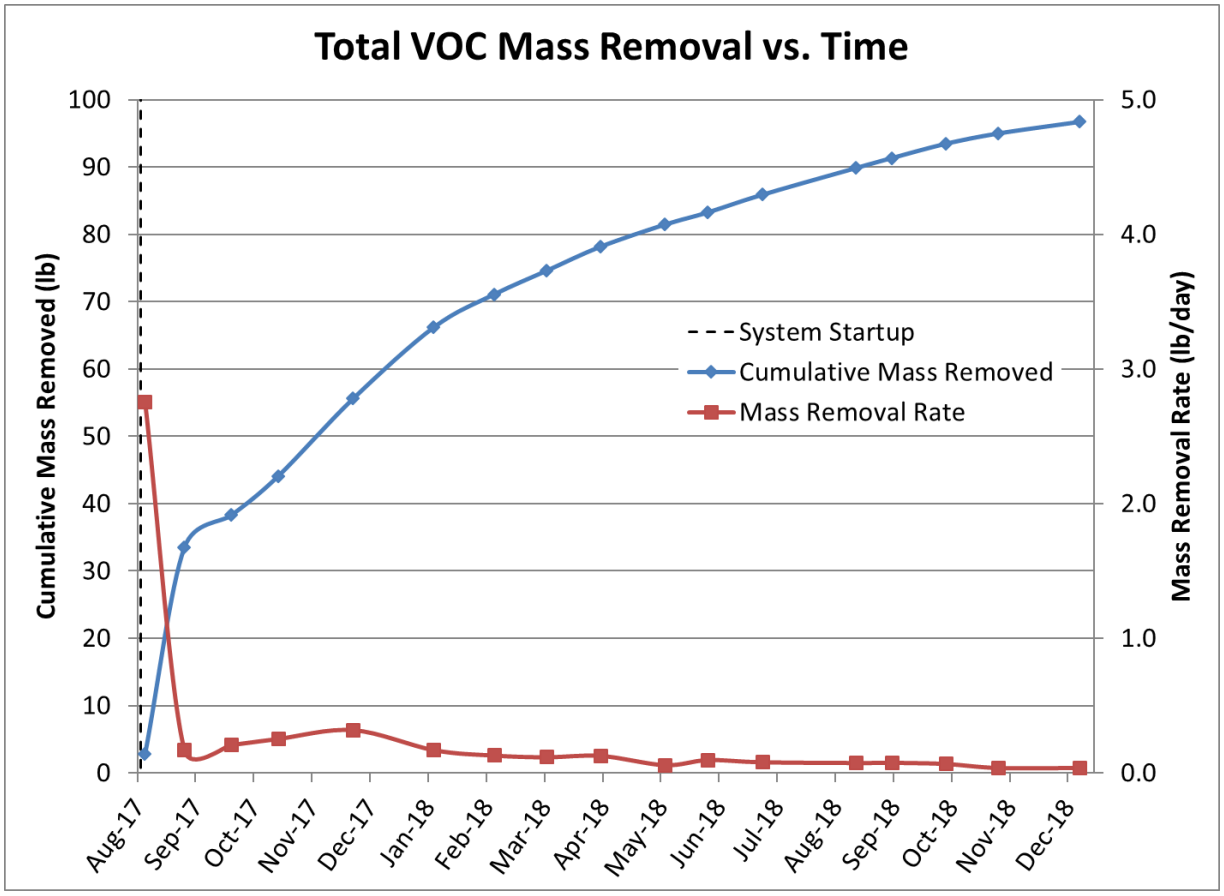
Operation and performance summaries of these systems are provided below.

4.1 B002 SSD System

As summarized in the ICM Report, the B002 SSD system began operation in August 2017. Review of the 2018 operations log sheets indicates that the system operated consistently without any significant shutdowns. Semi-annual monitoring of vacuum field conditions was also conducted to verify adequate subslab (0-2 ft below ground surface [bgs]), intermediate (2-6 ft bgs), and deep (>6 ft bgs) soil vapor depressurization. The June 2018 readings, along with the applied vacuum and extracted vapor flow rate at the two extraction ports in operation, and the approximate extent of soil vapor depressurization, are shown on Figures 5 through 7. Based on review of the operations log sheets and the subslab vacuum measurements, the SSD system operated in accordance with its design objectives, and is removing VOC mass from the subslab, intermediate, and deep portions of the vadose zone.

Treatment system process vapor samples were collected monthly and analyzed for VOCs. Approximately 35 pounds of VOCs were removed from the subsurface during 2018, bringing the total VOC mass removed since the August 2017 system startup to approximately 96 pounds. A summary of mass removal rate and cumulative mass removed is shown on Exhibit 2 below.

Exhibit 2 – B002 Total VOC Mass Removal vs. Time

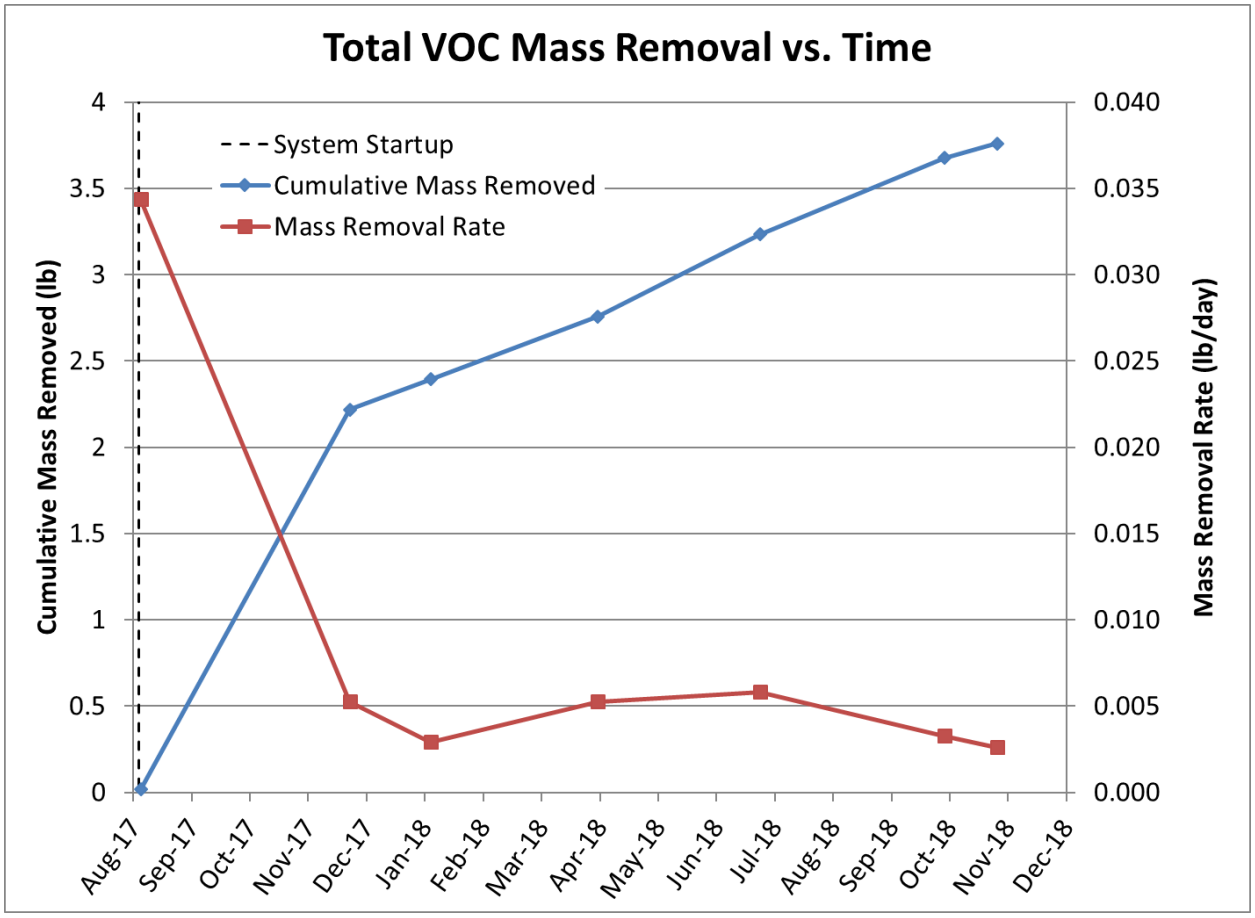


4.2 B351 SSD System

As summarized in the ICM Report, the B351 SSD system began operation in August 2017. Review of the 2018 operations log sheets indicates the system operated consistently without any significant shutdowns. The July 2018 readings of cross-slab differential pressure readings within B351, along with the applied vacuums and extracted vapor flow rates at each of the operating extraction ports, and the approximate extent of subslab depressurization, are shown on Figure 8. Based on review of the operations log sheets and the cross-slab differential pressure measurements, the SSD system operated in accordance with its design objectives.

Samples of extracted vapor were collected approximately quarterly and analyzed for VOCs. Approximately 2 pounds of VOCs were removed from the subsurface during 2018, bringing the total mass of VOCs removed since the August 2017 system startup to approximately 4 pounds. A plot of mass removal rate and cumulative mass removed since system start-up is shown on Exhibit 3 below.

Exhibit 3 – VE2 PCE Mass Removal vs. Time



5.0 SUMMARY AND UPCOMING ACTIVITIES

In 2018, IBM completed a round of indoor air screening and sampling in B001 consistent with the approach described in the B001 Work Plan, which was approved by the Agencies. IBM worked cooperatively with LM in 2018 to stay abreast of potential changes to HVAC infrastructure or operations, and/or changes to building use or occupancy. LM indicated that building use and occupancy, and HVAC operations did not change in 2018 relative to the conditions from the October 2017 sampling round except for minor adjustments to the fan speed and makeup air damper position of two units.

TCE screening and sampling concentrations in 2018 in B001 were less than or consistent with concentrations observed in 2017, confirming that indoor air quality has not appreciably changed. Consistent with the conclusions approved by the Agencies in the 2017 ICM Report, IBM believes that given the non-residential workplace setting, the TCE concentrations observed in B001 in 2018 do not present an unacceptable risk to human health that would warrant further action beyond on-going HVAC operational monitoring checks and verification of building use and occupancy.

Based on our discussions with LM, it is unclear if or when additional modifications/upgrades to the HVAC systems in B001 might occur. In 2019, IBM intends to conduct two site visits with LM representatives to evaluate whether changes to building use or occupancy, and/or changes to HVAC infrastructure or operations have occurred. If significant changes have occurred, IBM will consult with the Agencies and evaluate whether additional indoor air screening or sampling is recommended.

Based on evaluation of 2018 operational records, periodic monitoring, and the results from subslab vacuum monitoring, the B002 and B351 SSD systems are meeting their design objectives of depressurizing the subslab and preventing VOC vapors from migrating into indoor air. In total, the B002 and B351 systems have successfully removed approximately 100 lbs of VOCs since startup of these systems in 2017. IBM will continue operation, maintenance, and performance monitoring of the SSD systems in B002 and B351 in 2019 in a manner consistent with the approach of 2018.

Following completion of the EC Work Plan for the IBM Poughkeepsie and former IBM Endicott sites, IBM will prepare a VI engineering control PMP for the Owego site by the end of 2019 that addresses how the engineering controls will be operated, maintained, and monitored, including the B001 and B002 HVAC systems, and the B002 and B351 SSD systems. We note that IBM's proposed long-term monitoring in the forthcoming PMP will likely be different than the monitoring performed in 2018. IBM will prepare a 2019 annual report of vapor intrusion monitoring and mitigation, which will be included as an attachment to the Annual Corrective Action Status Report.

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TABLE

Table 1
Summary of Indoor Air 8-Hour Confirmatory Sampling Results - B001
Former IBM Owego Facility
Owego, New York

Sample Location	Sample Date	Concentrations in µg/m³																							
		Dichloroethane (1,1-)			Dichloroethane (1,2-)			Dichloroethene (1,1-)			Dichloroethene (cis-1,2-)			Tetrachloroethene (PCE)			Trichloroethane (1,1,1-)			Trichloroethene (TCE)			Vinyl chloride		
		Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias
AA001-001	10/19/2017	0.081	U		0.081	U		0.079			0.079			0.14			0.11			0.11			0.051		
AA001-001	12/12/2018	0.12	U		0.23			0.061	U		0.12	U		0.21	U		0.17	U		0.16	U		0.039	U	
IA001-004	10/19/2017	0.12			0.085			0.14			0.13			0.16			0.34			2.9			0.051	U	
IA001-004 DUP	10/19/2017	0.15			0.081	U		0.16			0.14			0.16			0.37			2.8			0.051	U	
IA001-004	12/12/2018	0.66	U		0.66	U		0.32	U		0.65	U		1.1	U		0.89	U		0.95			0.21	U	
IA001-010	10/19/2017	0.20			0.081	U		0.079	U		0.26			0.18			0.42			3.4			0.051	U	
IA001-010	12/12/2018	1.3	U		1.3	UJ	I	0.65	U		1.3	U		2.2	U		1.8	U		3.9			0.42	U	
IA001-010 DUP	12/12/2018	1.3	U		13	J	I	0.63	U		1.3	U		2.2	U		1.7	U		3.9			0.41	U	
IA001-014	10/19/2017	0.18			0.081	U		0.15			0.41			0.14	U		0.33			2.0			0.051	U	
IA001-014	12/12/2018	1.3	U		1.3	U		0.63	U		1.3	U		2.2	U		1.7	U		1.7	U		0.41	U	
IA001-021	10/19/2017	0.15			0.081	U		0.11			0.23			0.14	U		0.39			1.8			0.051	U	
IA001-021	12/12/2018	0.65	U		0.65	U		0.32	U		0.63	U		1.1	U		0.87	U		2.2			0.20	U	
IA001-025	10/19/2017	0.089			0.081	U		0.16			0.10			0.14	U		0.27			2.1			0.051	U	
IA001-025	12/12/2018	0.32	U		0.32	U		0.16	U		0.32	U		0.54	U		0.44	U		0.68			0.10	U	
IA001-034	10/19/2017	0.13			0.081	U		0.11			0.17			0.14	U		0.38			2.1			0.051	U	
IA001-034	12/12/2018	0.34	U		0.34	U		0.17	U		0.33	U		0.57	U		0.46	U		1.8			0.11	U	
IA001-052	10/19/2017	0.12			0.081	U		0.15			0.099			0.14	U		0.28			2.2			0.051	U	
IA001-052	12/12/2018	1.2	U		1.2	U		0.61	U		1.2	U		2.1	U		1.7	U		1.6	U		0.39	U	

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC on the dates indicated. The samples collected in October 2017 were 8-hour samples collected in 2.7L SUMMA canisters and analyzed by Alpha Analytical of Westborough, Massachusetts for the project-specific list of volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method TO-15 in selective ion monitoring (SIM) mode. The samples collected in December 2018 were 8-hour samples collected in 6L SUMMA canisters and analyzed by Eurofins Air Toxics of Folsom by USEPA Method TO-15 SIM.

2. Concentrations are presented in micrograms per cubic meter (µg/m³), as reported by the laboratory.

3. An In-Depth data usability review (DUR) was performed on the October 2017 and December 2018 data by New Environmental Horizons, Inc. (NEH). All results were considered acceptable. In some cases, NEH assigned the following qualifier to the data. Refer to the Data Usability Summary Report reports for further details.
"U" indicates the analyte is non-detect at or above the indicated sample specific practical quantification limit (PQL).
"J" indicates the result is an estimated value.
"I" indicates an indeterminate bias.

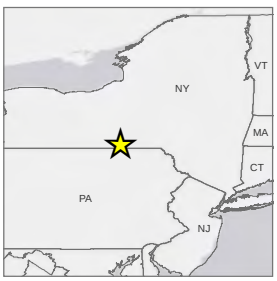
4. The "AA" designation indicates that the sample consists of ambient air collected from outside the building.

5. Results were rounded to two significant figures.

FIGURES

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Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

1,000 500 0 1,000 2,000 Feet

SANBORN HEAD ENGINEERING

Figure 1

Site Location Plan

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

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Last Edited By: hpothier

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Figure 2

Building Location Plan

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows the buildings at the former IBM Owego Facility.

Legend

002 Building Number

Unlabeled features include tanks, storage sheds, and other structures and features not intended for human occupancy

Property Line

N
W E
S

200 100 0 200 400 Feet

SANBORN HEAD ENGINEERING

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Last Edited By: hpothier

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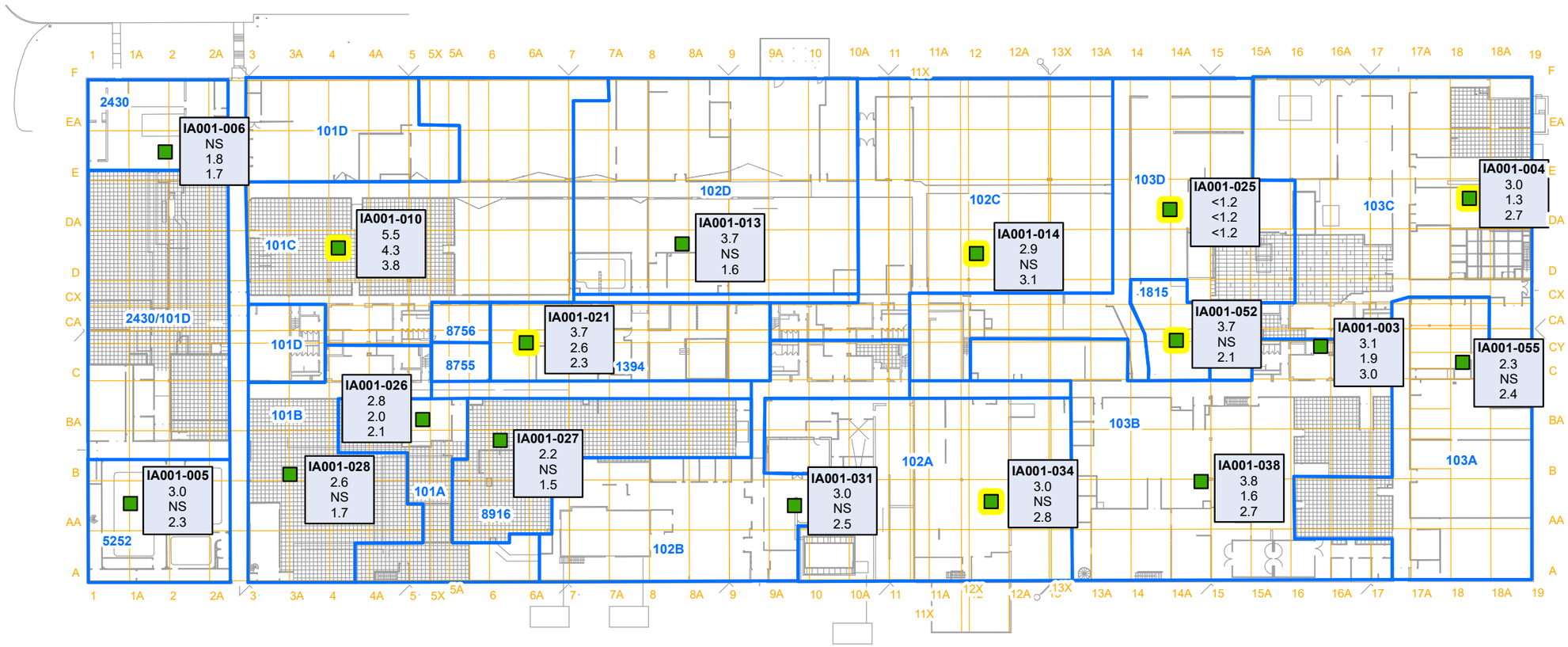


Figure 3

Summary of Indoor Air Screening Results - B001

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows trichloroethene (TCE) results for indoor air screening using a portable gas chromatograph / electron capture detector (GC / ECD). A description of each screening event is included in the legend and the text of this report. Results are shown in micrograms per cubic meter ($\mu g/m^3$).

Legend

- Indoor Air Screening Location (IA001-004)
- Summa Canister Indoor Air Sampling Location (see Figure 4 for results)
- 102A — HVAC Zone and Designation

Portable GC / ECD Result ($\mu g/m^3$)

IA001-004	Location and Designation
3.0	Round 1 - 12/11/18
1.3	Round 2 - 12/12/18 AM
2.7	Round 3 - 12/12/18 PM

NS — Not Screened

30 15 0 30 60 Feet

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Last Edited By: hpothier

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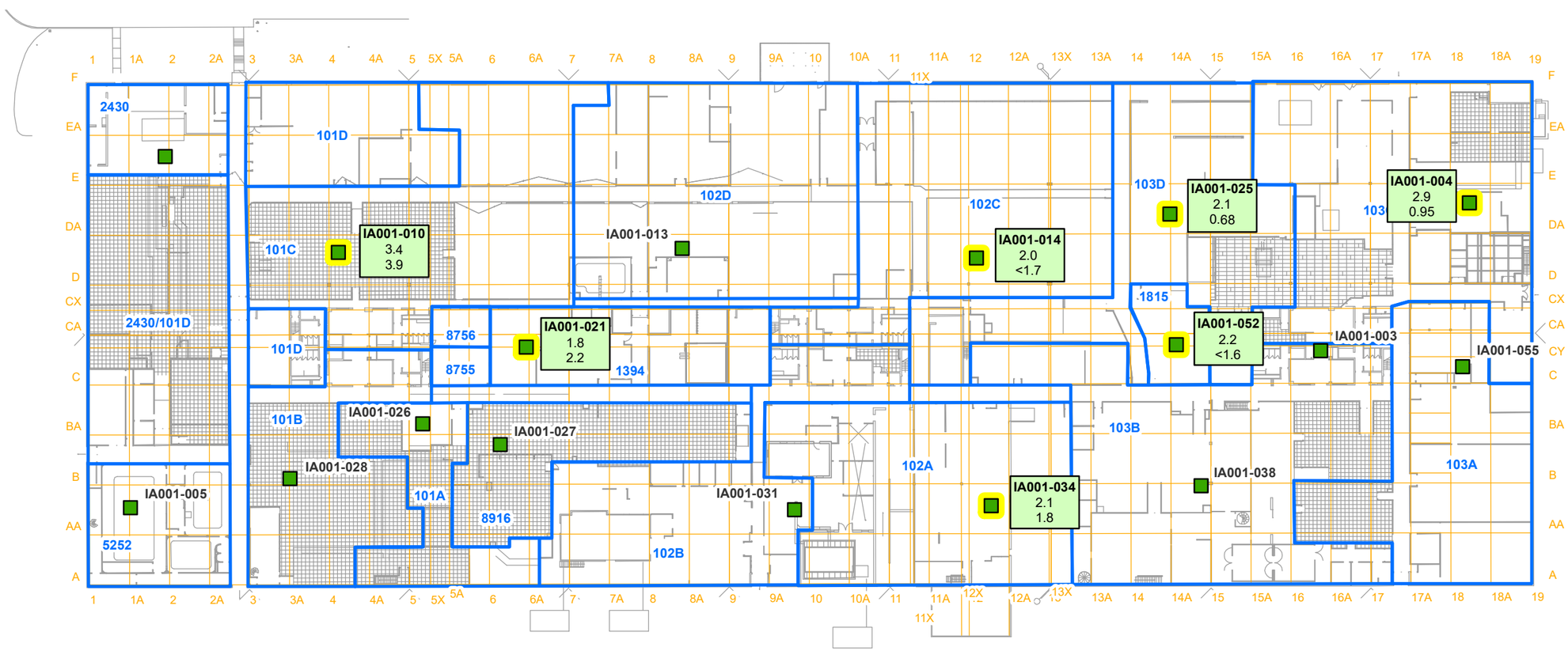


Figure 4

Summary of 8-hour Confirmatory Sampling Results - B001

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility

Owego, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows trichloroethene (TCE) results for indoor air confirmatory laboratory analytical sampling with SUMMA canisters. A description of each sampling event is included in the legend and in the text of this report. The confirmatory laboratory samples were collected as 8-hour time-weighted samples using 2.7L SUMMA canisters. Results are shown in micrograms per cubic meter ($\mu g/m^3$). Refer to Table 2 of this report for the full list of sampling results.

Legend

IA001-004 — Indoor Air Screening Location (see Figure 3 for results)

Summa Canister Indoor Air Sampling Location

102A — HVAC Zone and Designation

Portable GC / ECD Result ($\mu g/m^3$)

IA001-004 — Location and Designation

3.0 — TCE Confirmatory SUMMA Result October 2017 ($\mu g/m^3$)

1.3 — TCE Confirmatory SUMMA Result December 2018 ($\mu g/m^3$)

30 15 0 30 60 Feet

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Last Edited By: hpothier

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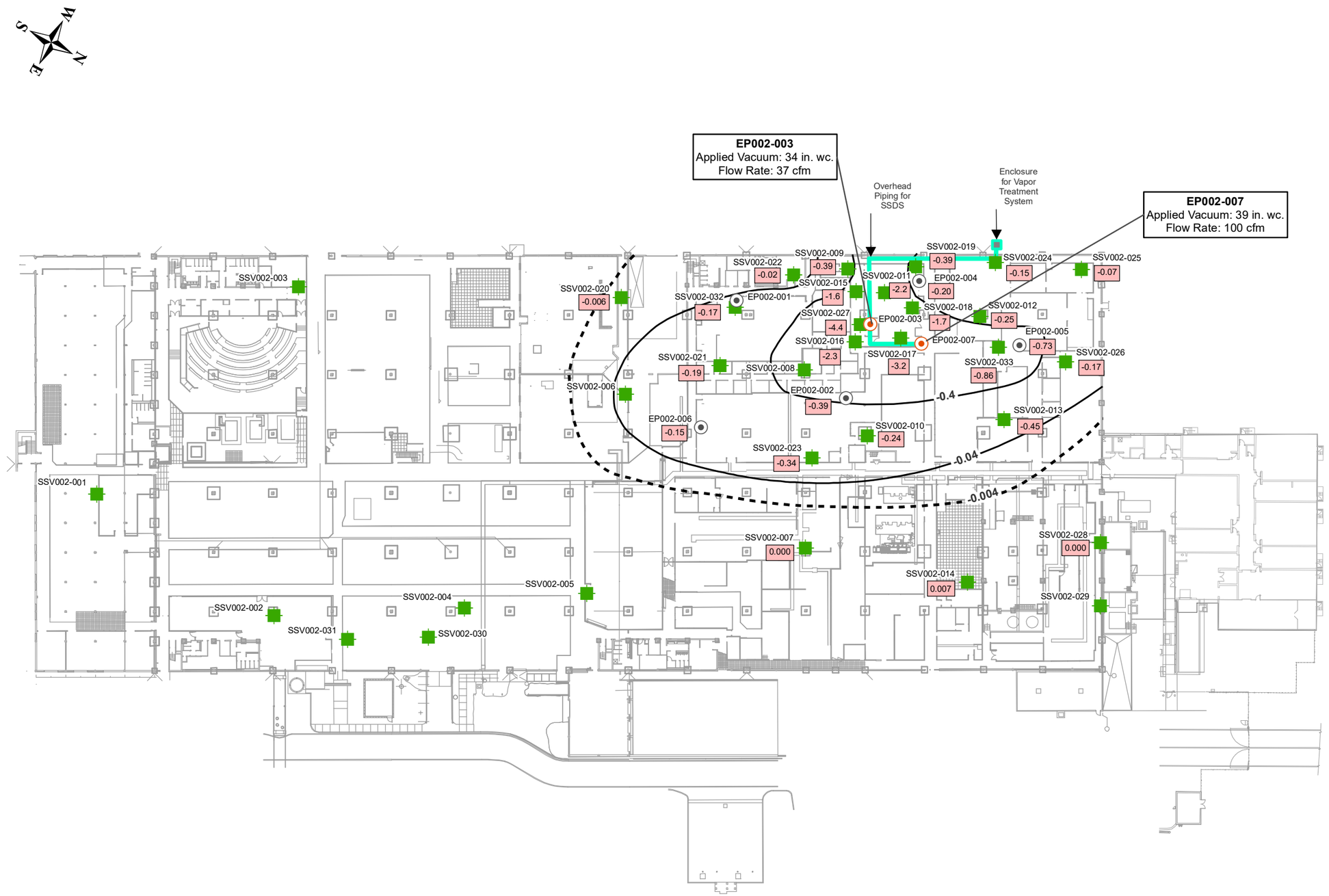


Figure 5

Extent of Subslab Depressurization

Building 002

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows measurements of differential pressure between indoor air and subslab vapor in units of inches of water column (in. wc) and the measurements recorded at each extraction port on June 20, 2018. Negative values indicate subslab pressures less than indoor pressure, or under vacuum, at the time of recording.

The -0.004 in wc contour represents the inferred apparent extent of subslab vacuum response. Actual vacuum conditions include components of vertical flow and are likely more complex than shown. Other interpretations are possible.

Legend

- Subslab Vapor Monitoring Point
- Subslab Extraction Port connected to depressurization (SSD) system
- Subslab Extraction Port not connected to SSD system
- -0.004 — Differential pressure contour (inches of water column). Dashed where less constrained.
- **EP002-003** — Extraction Port
  - in. wc — Applied Vacuum (extraction port) inches of water column (in. wc)
  - cfm — Flow Rate (cu. ft. per min.)
- -0.17 — Observed pressure differential between the indoor or outdoor air and deep locations during soil vapor extraction testing (in. wc.). Negative values indicate subsurface pressure is less than the indoor or outdoor air pressure. "NA" indicates the reading was not attainable.

35 17.5 0 35 70 Feet

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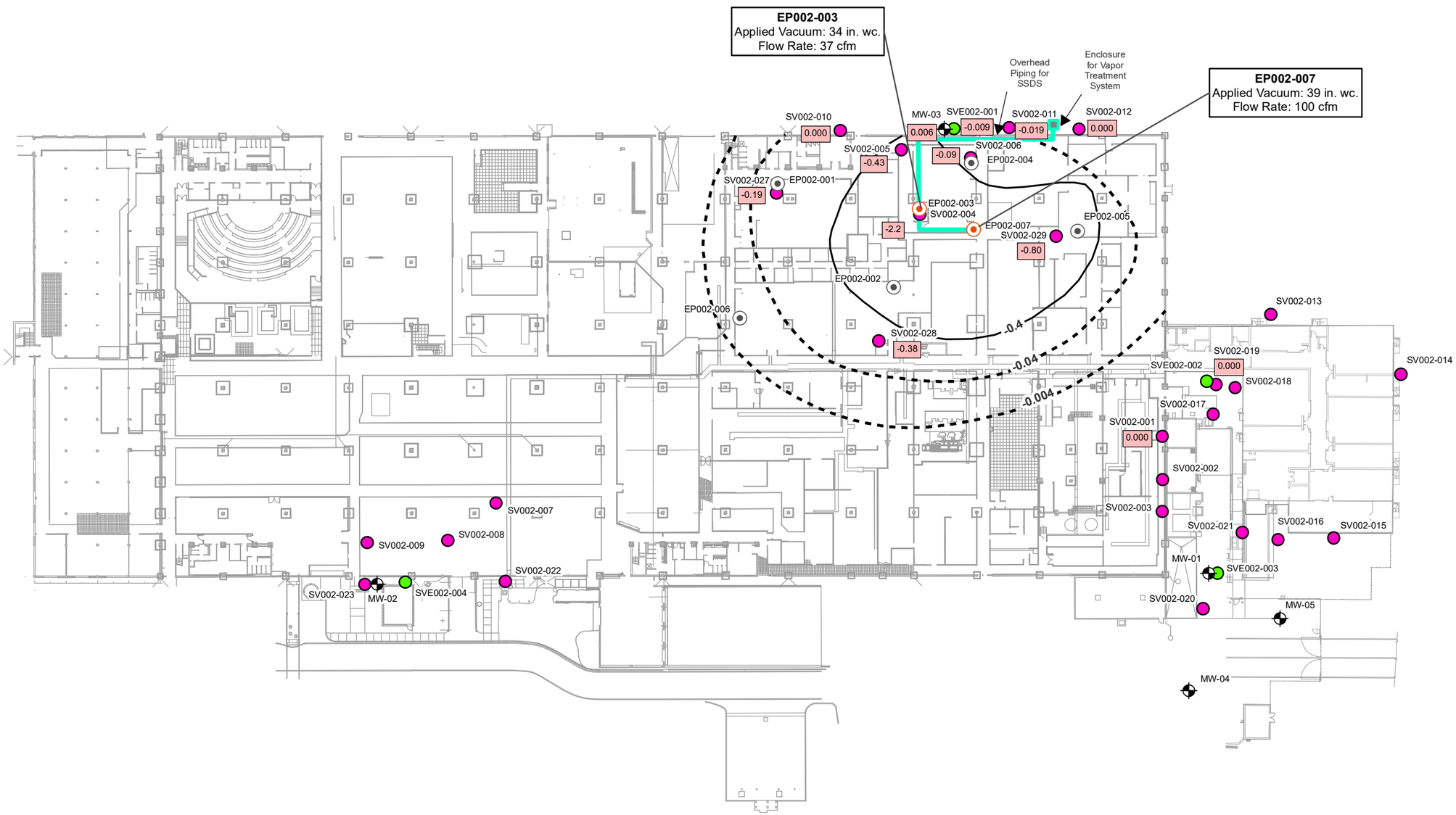


Figure 6

Extent of Intermediate Depressurization

Building 002

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows measurements of differential pressure between indoor air and intermediate subslab vapor in units of inches of water column (in. wc) and the measurements recorded at each extraction port on June 20, 2018. Negative values indicate intermediate subslab pressures less than indoor pressure, or under vacuum, at the time of recording.

The -0.004 in wc contour represents the inferred apparent extent of intermediate (defined as 2 to 6 ft below ground surface, which is typically above the depth of an intermittently present layer of asphalt) subslab vacuum response. Actual vacuum conditions include components of vertical flow and are likely more complex than shown. Other interpretations are possible.

Legend

- Subslab Extraction Port connected to depressurization (SSD) system
- Subslab Extraction Port not connected to SSD system
- Soil Vapor Monitoring Point
- Soil Vapor Extraction Well
- Monitoring Well
- -0.004 — Differential pressure contour (inches of water column). Dashed where less constrained.
- **EP002-003** / in. wc / cfm — Extraction Port; Applied Vacuum (extraction port) inches of water column (in. wc); Flow Rate (cu. ft. per min.)
- -0.38 — Observed pressure differential between the indoor or outdoor air and deep locations during soil vapor extraction testing (in. wc.). Negative values indicate subsurface pressure is less than the indoor or outdoor air pressure. "NA" indicates the reading was not attainable.

35 17.5 0 35 70 Feet

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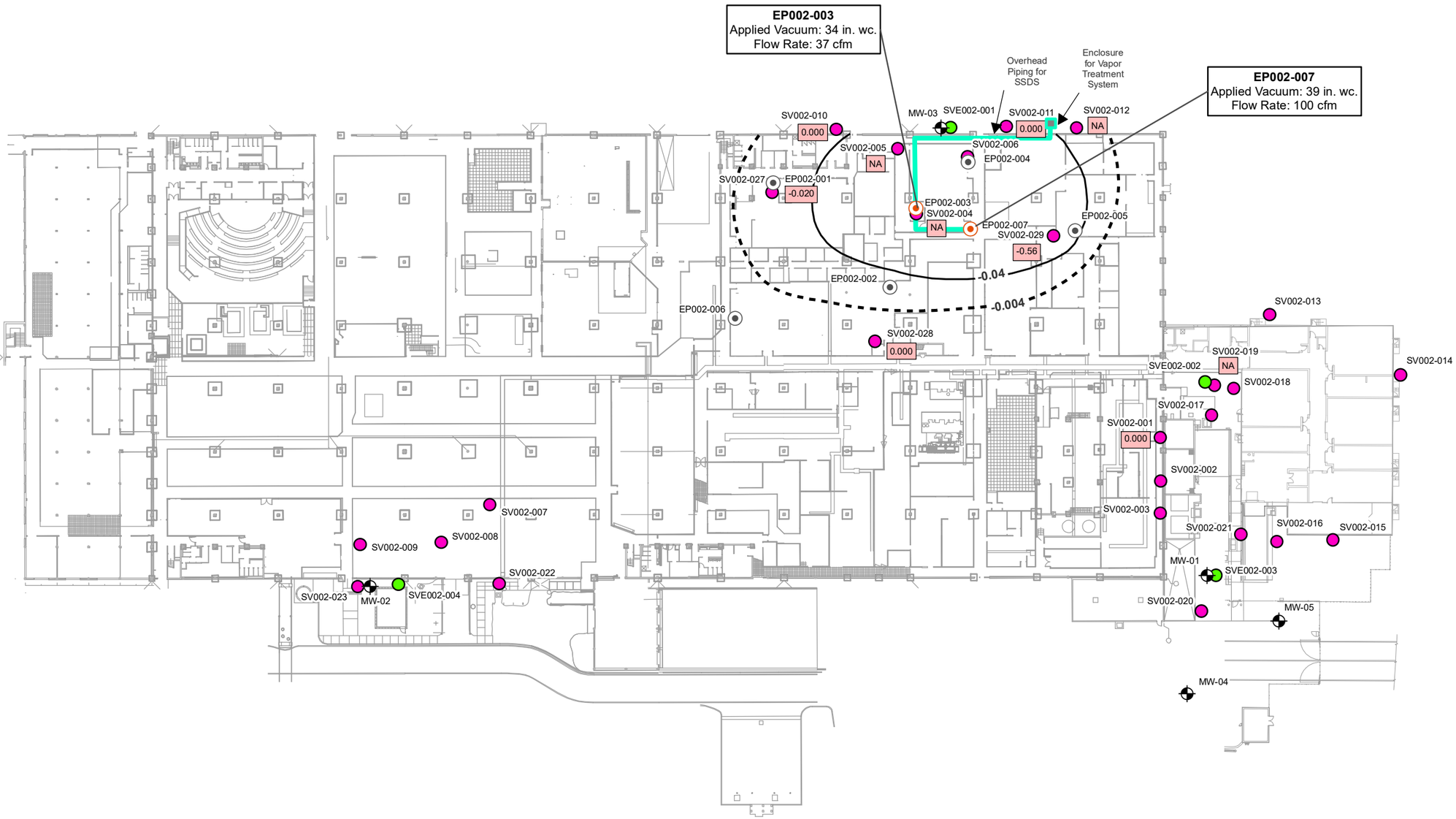


Figure 7

Extent of Deep Depressurization

Building 002

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows measurements of differential pressure between indoor air and deep subslab vapor in units of inches of water column (in. wc) and the measurements recorded at each extraction port on June 20, 2018. Negative values indicate deep subslab pressures less than indoor pressure, or under vacuum, at the time of recording.

The -0.004 in wc contour represents the inferred apparent extent of deep (defined as >6 ft below ground surface, which is typically below the depth of an intermittently present layer of asphalt) subslab vacuum response. Actual vacuum conditions include components of vertical flow and are likely more complex than shown. Other interpretations are possible.

Legend

- Subslab Extraction Port connected to depressurization (SSD) system
- Subslab Extraction Port not connected to SSD system
- Soil Vapor Monitoring Point
- Soil Vapor Extraction Well
- Monitoring Well
- -0.004 — Differential pressure contour (inches of water column). Dashed where less constrained.
- **EP002-003** / in. wc / cfm — Extraction Port; Applied Vacuum (extraction port) inches of water column (in. wc); Flow Rate (cu. ft. per min.)
- -0.56 — Observed pressure differential between the indoor or outdoor air and deep locations during soil vapor extraction testing (in. wc.). Negative values indicate subsurface pressure is less than the indoor or outdoor air pressure. "NA" indicates the reading was not attainable.

35 17.5 0 35 70 Feet

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Last Edited By: hpothier

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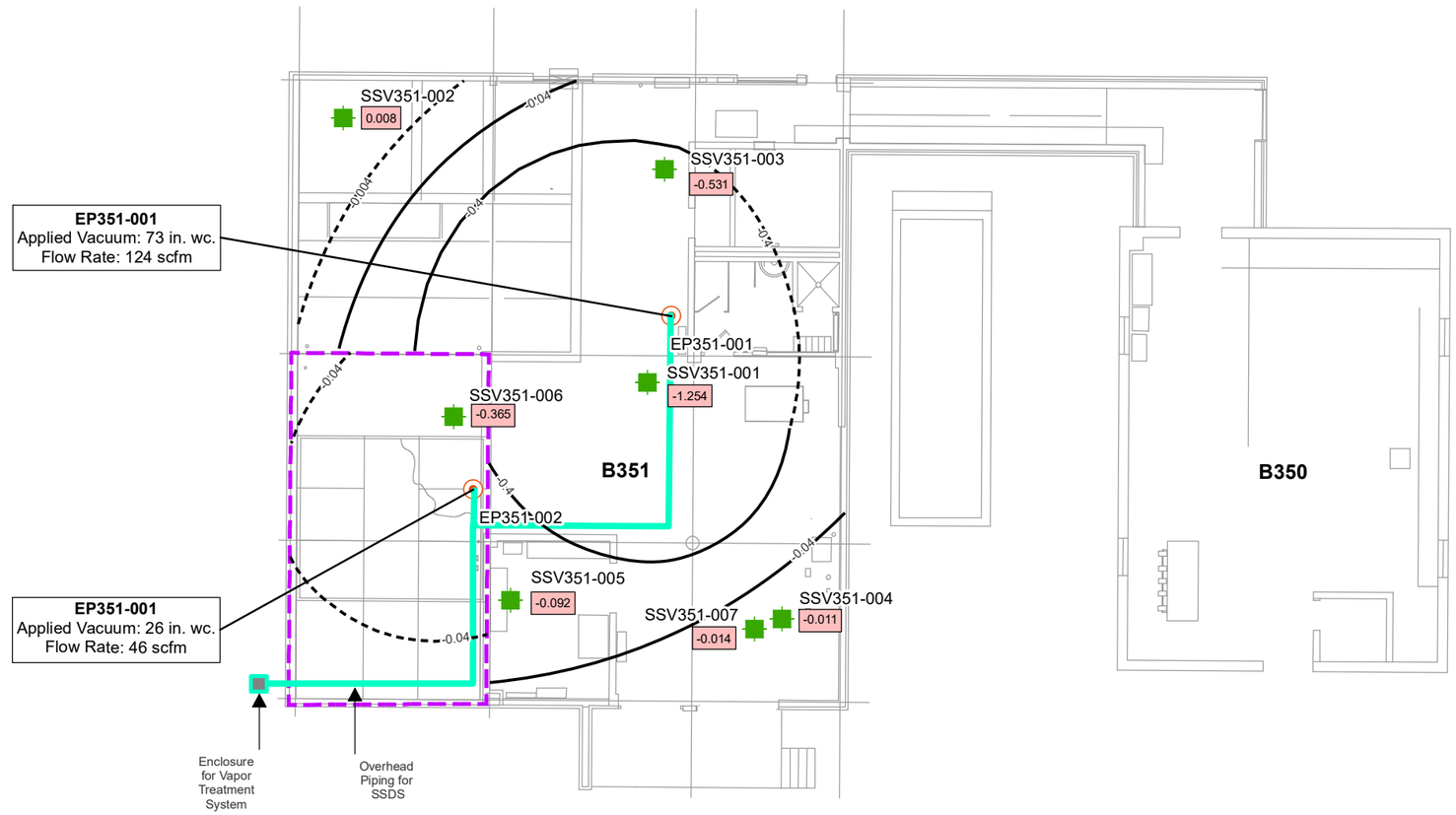


Figure 8

Extent of Subslab Depressurization

Building 351

Vapor Intrusion Assessment 2018 Annual Report

Former IBM Owego Facility
Owego, New York

Drawn By:	H. Pothier
Designed By:	J. Corsello
Reviewed By:	B. Green
Project No:	4136.02
Date:	February 2019

Figure Narrative

This figure shows measurements of differential pressure between indoor air and subslab vapor in units of inches of water column (in. wc) and the measurements recorded at each extraction port on July 12, 2018. Negative values indicate subslab pressures less than indoor pressure, or under vacuum, at the time of recording.

The -0.004 in wc contour represents the inferred apparent extent of subslab vacuum response. Actual vacuum conditions include components of vertical flow and are likely more complex than shown. Other interpretations are possible.

Legend

- Subslab Vapor Monitoring Point
- Subslab Vapor Extraction Port connected to subslab depressurization (SSD) system
- -0:004 — Differential pressure contour (inches of water column). Dashed where less constrained.
- EP351-001 — Extraction Port
  - in. wc — Applied Vacuum (extraction port) inches of water column (in. wc)
  - scfm — Flow Rate (std. cu. ft. per min.)
- -0.014 — Observed pressure differential between the subslab and room during subslab vapor extraction test (in. wc). Negative values indicate subslab pressure is less than indoor air pressure.
- Approximate Extent of the Basement

7.5 3.75 0 7.5 15 Feet

SANBORN HEAD ENGINEERING

APPENDIX A

LIMITATIONS

APPENDIX A
SHPC LIMITATIONS

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

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

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

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

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APPENDIX B

ANALYTICAL LABORATORY AND DATA USABILITY REPORTS

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1/18/2019
Ms. Erica Bosse
Sanborn, Head & Associates
24 Wade Road

Latham NY

Project Name: Owego B001 IA
Project #: 4136.02
Workorder #: 1812373R1

Dear Ms. Erica Bosse

The following report includes the data for the above referenced project for sample(s) received on 12/18/2018 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 SIM are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1812373R1

Work Order Summary

CLIENT:	Ms. Erica Bosse Sanborn, Head & Associates 24 Wade Road Latham, NY	**BILL TO:**	Accounts Payable Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301
PHONE:	518-207-0769	**P.O. #**	2732.00
FAX:		**PROJECT #**	4136.02 Owego B001 IA
DATE RECEIVED:	12/18/2018	**CONTACT:**	Ausha Scott
DATE COMPLETED:	01/04/2019		
DATE REISSUED:	01/18/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA-01_20181212	Modified TO-15 SIM	3.3 "Hg	5.4 psi
01AA	AA-01_20181212 Lab Duplicate	Modified TO-15 SIM	3.3 "Hg	5.4 psi
02A	Dup-1_20181212	Modified TO-15 SIM	4.9 "Hg	4.9 psi
03A	EB-01_20181212	Modified TO-15 SIM	5.9 "Hg	4.9 psi
04A	IA001-004_20181212	Modified TO-15 SIM	4.9 "Hg	5.4 psi
05A	IA001-010_20181212	Modified TO-15 SIM	5.9 "Hg	4.8 psi
06A	IA001-014_20181212	Modified TO-15 SIM	4.7 "Hg	5 psi
07A	IA001-021_20181212	Modified TO-15 SIM	5.5 "Hg	4.5 psi
08A	IA001-025_20181212	Modified TO-15 SIM	5.3 "Hg	4.6 psi
09A	IA001-034_20181212	Modified TO-15 SIM	5.9 "Hg	5.1 psi
10A	IA001-052_20181212	Modified TO-15 SIM	3.5 "Hg	5.2 psi
11A	Lab Blank	Modified TO-15 SIM	NA	NA
12A	CCV	Modified TO-15 SIM	NA	NA
13A	LCS	Modified TO-15 SIM	NA	NA
13AA	LCSD	Modified TO-15 SIM	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 01/18/19

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP - E8 , LA NELAP - 02089, NH NELAP - 209218, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-18-13, UT NELAP CA009332018-10, VA NELAP - 9505, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-011, Effective date: 10/18/2018, Expiration date: 10/17/2019.
Eurofins Air Toxics LLC. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics LLC.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15 SIM
Sanborn, Head & Associates
Workorder# 1812373R1

Ten 6 Liter Summa Canister (SIM Certified) samples were received on December 18, 2018. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

Due to omission of the sampling date from the ID format on the sample tag, the information on the Chain of Custody (COC) was used to process and report the samples

Analytical Notes

Dilution was performed on samples Dup-1_20181212, IA001-004_20181212, IA001-010_20181212, IA001-014_20181212, IA001-021_20181212, IA001-025_20181212, IA001-034_20181212, and IA001-052_20181212 due to the presence of high level non-target species.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: AA-01_20181212

Lab ID#: 1812373R1-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2-Dichloroethane	0.031	0.058	0.12	0.23

Client Sample ID: AA-01_20181212 Lab Duplicate

Lab ID#: 1812373R1-01AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2-Dichloroethane	0.031	0.060	0.12	0.24

Client Sample ID: Dup-1_20181212

Lab ID#: 1812373R1-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2-Dichloroethane	0.32	3.2	1.3	13
Trichloroethene	0.32	0.73	1.7	3.9

Client Sample ID: EB-01_20181212

Lab ID#: 1812373R1-03A

No Detections Were Found.

Client Sample ID: IA001-004_20181212

Lab ID#: 1812373R1-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.16	0.18	0.88	0.95

Client Sample ID: IA001-010_20181212

Lab ID#: 1812373R1-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.33	0.73	1.8	3.9

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Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA001-014_20181212

Lab ID#: 1812373R1-06A

No Detections Were Found.

Client Sample ID: IA001-021_20181212

Lab ID#: 1812373R1-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.16	0.40	0.86	2.2

Client Sample ID: IA001-025_20181212

Lab ID#: 1812373R1-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.080	0.12	0.43	0.68

Client Sample ID: IA001-034_20181212

Lab ID#: 1812373R1-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.084	0.32	0.45	1.8

Client Sample ID: IA001-052_20181212

Lab ID#: 1812373R1-10A

No Detections Were Found.

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Client Sample ID: AA-01_20181212

Lab ID#: 1812373R1-01A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122006sim**	**Date of Collection:**	**12/12/18 6:16:00 PM**
Dil. Factor:	**1.53**	**Date of Analysis:**	**12/20/18 11:53 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.015	Not Detected	0.039	Not Detected
1,1-Dichloroethane	0.031	Not Detected	0.12	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.061	Not Detected
cis-1,2-Dichloroethene	0.031	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.031	Not Detected	0.17	Not Detected
1,2-Dichloroethane	0.031	0.058	0.12	0.23
Trichloroethene	0.031	Not Detected	0.16	Not Detected
Tetrachloroethene	0.031	Not Detected	0.21	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: AA-01_20181212 Lab Duplicate

Lab ID#: 1812373R1-01AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122007sim**	**Date of Collection: 12/12/18 6:16:00 PM**	
Dil. Factor:	**1.53**	**Date of Analysis: 12/20/18 12:29 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.015	Not Detected	0.039	Not Detected
1,1-Dichloroethane	0.031	Not Detected	0.12	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.061	Not Detected
cis-1,2-Dichloroethene	0.031	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.031	Not Detected	0.17	Not Detected
1,2-Dichloroethane	0.031	0.060	0.12	0.24
Trichloroethene	0.031	Not Detected	0.16	Not Detected
Tetrachloroethene	0.031	Not Detected	0.21	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: Dup-1_20181212

Lab ID#: 1812373R1-02A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122008sim**	**Date of Collection: 12/12/18 6:09:00 PM**	
Dil. Factor:	**15.9**	**Date of Analysis: 12/20/18 01:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.16	Not Detected	0.41	Not Detected
1,1-Dichloroethane	0.32	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
cis-1,2-Dichloroethene	0.32	Not Detected	1.3	Not Detected
1,1,1-Trichloroethane	0.32	Not Detected	1.7	Not Detected
1,2-Dichloroethane	0.32	3.2	1.3	13
Trichloroethene	0.32	0.73	1.7	3.9
Tetrachloroethene	0.32	Not Detected	2.2	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: EB-01_20181212

Lab ID#: 1812373R1-03A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122009sim**	**Date of Collection: 12/12/18 3:12:00 PM**	
Dil. Factor:	**1.66**	**Date of Analysis: 12/20/18 01:41 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.042	Not Detected
1,1-Dichloroethane	0.033	Not Detected	0.13	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.066	Not Detected
cis-1,2-Dichloroethene	0.033	Not Detected	0.13	Not Detected
1,1,1-Trichloroethane	0.033	Not Detected	0.18	Not Detected
1,2-Dichloroethane	0.033	Not Detected	0.13	Not Detected
Trichloroethene	0.033	Not Detected	0.18	Not Detected
Tetrachloroethene	0.033	Not Detected	0.22	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: IA001-004_20181212

Lab ID#: 1812373R1-04A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122010sim**	**Date of Collection: 12/12/18 5:57:00 PM**	
Dil. Factor:	**8.15**	**Date of Analysis: 12/20/18 02:23 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.082	Not Detected	0.21	Not Detected
1,1-Dichloroethane	0.16	Not Detected	0.66	Not Detected
1,1-Dichloroethene	0.082	Not Detected	0.32	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.89	Not Detected
1,2-Dichloroethane	0.16	Not Detected	0.66	Not Detected
Trichloroethene	0.16	0.18	0.88	0.95
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	99	70-130

eurofins | Air Toxics

Client Sample ID: IA001-010_20181212

Lab ID#: 1812373R1-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122011sim**	**Date of Collection: 12/12/18 6:09:00 PM**	
Dil. Factor:	**16.5**	**Date of Analysis: 12/20/18 02:59 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.16	Not Detected	0.42	Not Detected
1,1-Dichloroethane	0.33	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
cis-1,2-Dichloroethene	0.33	Not Detected	1.3	Not Detected
1,1,1-Trichloroethane	0.33	Not Detected	1.8	Not Detected
1,2-Dichloroethane	0.33	Not Detected	1.3	Not Detected
Trichloroethene	0.33	0.73	1.8	3.9
Tetrachloroethene	0.33	Not Detected	2.2	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: IA001-014_20181212

Lab ID#: 1812373R1-06A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122012sim**	**Date of Collection: 12/12/18 6:07:00 PM**	
Dil. Factor:	**15.9**	**Date of Analysis: 12/20/18 03:35 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.16	Not Detected	0.41	Not Detected
1,1-Dichloroethane	0.32	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
cis-1,2-Dichloroethene	0.32	Not Detected	1.3	Not Detected
1,1,1-Trichloroethane	0.32	Not Detected	1.7	Not Detected
1,2-Dichloroethane	0.32	Not Detected	1.3	Not Detected
Trichloroethene	0.32	Not Detected	1.7	Not Detected
Tetrachloroethene	0.32	Not Detected	2.2	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IA001-021_20181212

Lab ID#: 1812373R1-07A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122013sim**	**Date of Collection: 12/12/18 6:12:00 PM**	
Dil. Factor:	**8.00**	**Date of Analysis: 12/20/18 04:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.080	Not Detected	0.20	Not Detected
1,1-Dichloroethane	0.16	Not Detected	0.65	Not Detected
1,1-Dichloroethene	0.080	Not Detected	0.32	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.87	Not Detected
1,2-Dichloroethane	0.16	Not Detected	0.65	Not Detected
Trichloroethene	0.16	0.40	0.86	2.2
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA001-025_20181212

Lab ID#: 1812373R1-08A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122014sim**	**Date of Collection: 12/12/18 5:59:00 PM**	
Dil. Factor:	**4.00**	**Date of Analysis: 12/20/18 04:47 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.040	Not Detected	0.10	Not Detected
1,1-Dichloroethane	0.080	Not Detected	0.32	Not Detected
1,1-Dichloroethene	0.040	Not Detected	0.16	Not Detected
cis-1,2-Dichloroethene	0.080	Not Detected	0.32	Not Detected
1,1,1-Trichloroethane	0.080	Not Detected	0.44	Not Detected
1,2-Dichloroethane	0.080	Not Detected	0.32	Not Detected
Trichloroethene	0.080	0.12	0.43	0.68
Tetrachloroethene	0.080	Not Detected	0.54	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IA001-034_20181212

Lab ID#: 1812373R1-09A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122015sim**	**Date of Collection: 12/12/18 6:04:00 PM**	
Dil. Factor:	**4.20**	**Date of Analysis: 12/20/18 05:24 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.042	Not Detected	0.11	Not Detected
1,1-Dichloroethane	0.084	Not Detected	0.34	Not Detected
1,1-Dichloroethene	0.042	Not Detected	0.17	Not Detected
cis-1,2-Dichloroethene	0.084	Not Detected	0.33	Not Detected
1,1,1-Trichloroethane	0.084	Not Detected	0.46	Not Detected
1,2-Dichloroethane	0.084	Not Detected	0.34	Not Detected
Trichloroethene	0.084	0.32	0.45	1.8
Tetrachloroethene	0.084	Not Detected	0.57	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA001-052_20181212

Lab ID#: 1812373R1-10A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122016sim**	**Date of Collection: 12/12/18 6:26:00 PM**	
Dil. Factor:	**15.3**	**Date of Analysis: 12/20/18 06:01 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.15	Not Detected	0.39	Not Detected
1,1-Dichloroethane	0.31	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.15	Not Detected	0.61	Not Detected
cis-1,2-Dichloroethene	0.31	Not Detected	1.2	Not Detected
1,1,1-Trichloroethane	0.31	Not Detected	1.7	Not Detected
1,2-Dichloroethane	0.31	Not Detected	1.2	Not Detected
Trichloroethene	0.31	Not Detected	1.6	Not Detected
Tetrachloroethene	0.31	Not Detected	2.1	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1812373R1-11A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122005sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/20/18 11:01 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	105	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1812373R1-12A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122002sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/20/18 08:55 AM**	

Compound	%Recovery
Vinyl Chloride	95
1,1-Dichloroethane	91
1,1-Dichloroethene	88
cis-1,2-Dichloroethene	93
1,1,1-Trichloroethane	88
1,2-Dichloroethane	81
Trichloroethene	86
Tetrachloroethene	84

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	106	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1812373R1-13A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122003sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/20/18 09:39 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	97	70-130
1,1-Dichloroethane	90	70-130
1,1-Dichloroethene	87	70-130
cis-1,2-Dichloroethene	86	70-130
1,1,1-Trichloroethane	88	70-130
1,2-Dichloroethane	79	70-130
Trichloroethene	86	70-130
Tetrachloroethene	84	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	106	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1812373R1-13AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**22122004sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/20/18 10:23 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	98	70-130
1,1-Dichloroethane	89	70-130
1,1-Dichloroethene	89	70-130
cis-1,2-Dichloroethene	88	70-130
1,1,1-Trichloroethane	88	70-130
1,2-Dichloroethane	78	70-130
Trichloroethene	87	70-130
Tetrachloroethene	84	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	110	70-130

Data Usability Summary Report (DUSR)

NYSDEC ASP Category B

Client/Company:	Sanborn, Head & Associates, Inc., Concord, New Hampshire (SHA)
Site/Project Name:	Former IBM Owego Facility, Owego, NY Owego B001 IA Sampling
Laboratory:	Eurofins Air Toxics Inc., Folsom, CA
Work Order #:	1812373
Date(s) of Collection:	December 12, 2018
Number and type Samples & analyses:	8 Indoor Air, 1 Ambient Air, and 1 Equipment Blank for 8 project-specific Volatile Organic Compounds (VOCs) by Method TO-15 SIM
Senior Data Reviewers:	Dr. Nancy C. Rothman, New Environmental Horizons, Inc. Susan D. Chapnick, New Environmental Horizons, Inc.
Date Completed:	January 29, 2019

This Data Usability Summary Report (DUSR) is based on guidance developed by the New York State Department of Conservation (NYSDEC), June 1999, for technical review of analytical data in lieu of a full third party data validation. The objective of the DUSR is to determine whether or not the data as presented meet NYSDEC ASP 2005 or EPA method QC acceptance criteria.

2 Farmers Circle, Arlington, Massachusetts 02474 781-643-4294 schapnick@neh-inc.com
34 Pheasant Run Drive, Skillman, New Jersey 08558 908-874-5686 nrothman@neh-inc.com

I. Required DUSR Questions

1. ***Is the data package complete as defined under the requirements for the most current NYSDEC ASP Category B or USEPA CLP deliverables?***

   Yes.

2. ***Have all holding times been met?***

   Yes.

3. ***Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?***

   Yes.

4. ***Have all of the data been generated using established and agreed upon analytical protocols?***

   Yes. Analytical data were generated using established EPA Methods (see analytical references in Section II below). Deviations from EPA and NYSDEC ASP 2005 QC protocols are discussed in the DV Checklists of this DUSR.

5. ***Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?***

   Yes. The raw data were checked to verify that detected results met retention time and mass spectral criteria, where applicable, for qualitative identification. A spot check was performed to verify quantitative accuracy for reporting of all results (see the DV Checklists).

6. ***Have the correct data qualifiers been used and are they consistent with the most current NYSDEC ASP?***

   Yes. The laboratory used the correct data qualifiers in reporting of results. The data were unchanged as a consequence of this review.

7. ***Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?***

   Yes. QC exceedances are specified in the DV Checklists. QC summary sheets from the data package have not been attached since the only QC exceedance was a documentation issue on the Chain-of-Custody.

II. Sample Descriptions and Analytical Parameters

The sample IDs, date of sampling, identification of MS/MSD, LD, FD, EB, TB, if applicable and the analytical parameters reviewed in this DUSR are listed in Table 1. Any deviations noted for sample collection or receipt (*e.g.*, temperature or preservation issues) are included in Section III, below.

Table 1. Sample Descriptions and Analytical Parameters

Sample ID	Collection Date	Matrix	Analytical Parameters	Sample Type
AA-01_20181212	12/12/2018	Ambient Air	VOCs	Field Sample [used for LD]
Dup-1_20181212	12/12/2018	Indoor Air	VOCs	Field Duplicate of IA001-010_20181212
EB-01_20181212	12/12/2018	Air	VOCs	Equipment Blank
IA001-004_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-010_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-014_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-021_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-025_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-034_20181212	12/12/2018	Indoor Air	VOCs	Field Sample
IA001-052_20181212	12/12/2018	Indoor Air	VOCs	Field Sample

Analytical method reference:
VOC: Method TO-15 operated in the Selected Ion Monitoring (SIM) mode for eight project-specific VOCs (1,1,1-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethane, cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene, and Vinyl Chloride)

III. Data Deficiencies, Analytical Protocol Deviations, and Quality Control Problems

The following QC elements, as applicable to the analytical methods, were reviewed during this DUSR:

- Data package completeness and reporting protocols
- Sample receipt, holding times, and preservation criteria
- Calibration criteria (instrument tuning, initial and continuing calibration verifications)
- Method, field, and instrument blank results
- Laboratory Control Sample (LCS), Blank Spike (BS), or Matrix Spike Blank (MSB) recoveries
- Surrogate or Internal Standard (IS) Recoveries
- Sample/Laboratory Duplicate (LD) or sample/Field Duplicate (FD) Relative Percent Differences (RPDs)
- Sample result reporting (including reporting limits and units)
- Other method-specific QC if applicable and reported (e.g., internal standard areas)
- Deficiencies or protocol deviations as noted in the Laboratory Narrative

During this review of VOCs, there were no rejections of data. Two results were estimated (J or UJ) due to QC issues. Table 2 summarizes the actions taken during this review. NEH generated a validated data spreadsheet based on the electronic project database file received from SHA for this Work Order. All results were considered acceptable compared to NYSDEC ASP 2005, method, and Work Plan criteria and usable for project decisions with the understanding of the potential uncertainty (bias) in the qualified results and uncertainty in non-detected results with reporting limits (RLs) that exceed sensitivity requirements.

As required by the DUSR, the DV Checklist attached to this DUSR documents the QC reviewed and the issues that required action or affected the data certainty in terms of the project data quality objectives (DQO) of accuracy, precision, representativeness, comparability, and sensitivity. The DQO of completeness can be evaluated by the project manager after all data are generated.

The narrative indicated that the sampling date was omitted from the canister sample tags (e.g., "AA-01_20181212" was listed as "AA-01" on the canister tag). The lab reported the sample ID's in the EDD and hardcopy data as they appeared on the Chain-of-Custody.

The laboratory was unable to perform the flow controller checks since the flow controllers were detached from the cylinders for transit from the field back to the laboratory. Since the sample collection times (8 hours for all samples except the Equipment Blank, which was ~5 hours) and initial, field final, and lab receipt vacuums were acceptable, sample collection was considered acceptable and the lack of the flow controller check does not affect data usability.

The Method and Equipment Blanks were non-detect for all target compounds; therefore, blank action was not required.

Precision was acceptable for all target VOCs in the Field Duplicate pair IA001-010_20181212 and DUP-1_20181212 except for 1,2-dichloroethane. The result for 1,2-dichloroethane was estimated (J or UJ) in the FD pair as sown in Table 2 with indeterminate bias due to FD

imprecision. These results are an indication of acceptable precision from sample collection through analysis for the target VOCs except for 1,2-dichloroethane in these samples.

All samples except AA-01_20181212 were diluted at the instrument level (Dilution Factor (DF) = 2.5, 5, or 10) due to the presence of high non-target compounds in the samples, according to the narrative. All non-detects for the 8 target VOCs were below the Project required reporting limits except: tetrachloroethene, cis-1,2-dichloroethene, 1,1-dichloroethene, 1,1,1-trichloroethane, and 1,1-dichloeoethane in samples Dup-1_2018122, IA001-010_20181212, IA001-014_20181212, and IA001-052_20181212; trichloroethene in samples IA001-014_20181212 and IA001-052_20181212; vinyl chloride in all samples except AA-01_20181212; and 1,2-dichloroethane in samples IA001-010_20181212, IA001-014_20181212, and IA001-052_20181212. Data users will need to evaluate these elevated non-detects for project uses.

All other quality control information associated with accuracy, precision, and sensitivity for the VOCs reported met method and Work Plan criteria for the samples in this Work Order with the exceptions included in Table 2.

Table 2. Summary of Data Validation Actions

Field Sample ID	Analyte	Qualifier	Bias	Validation Comments
Dup-1_20181212 IA001-010_20181212	1,2-Dichloroethane	J or UJ	I	FD imprecision

Qualifiers: U = Analyte is non-detect at or above the sample-specific reporting limit (RL); UJ = Non-detect is estimated at the RL; J = Result is estimated; EB = Analyte was also present in a Field Equipment Blank; R = Result is rejected and is unusable for project decisions.

Bias: L = Low; H = High; I = Indeterminate

Lab: Eurofins Air Toxics Inc.

Air Data Review Checklist - Method TO-15

SDG# 1812373

SHA: Soil Vapor Intrusion Assessment, Former IBM Owego Facility, Owego, NY

Date Sampled: 12/12/18

No. Samples 7 IA + 1 AA + 1 FD + 1EB

Method of Analysis: TO-15 SIM

Data Element Acceptable	Canister Receipt	HT	GC/MS Tunes + Calibrations	Internal Stds + Surrogates	LCS	Lab Dup (LCS and LD)	Field Duplicates	RL & Quant.
Yes	√	√	√	√	√	√		
No							Estimate (J or UJ) 2 results	Several non-detects exceeded sensitivity requirements

Other Issues : None

The data package consisted of a NYDEC Category B deliverable. A full validation review was performed using result forms, Quality Control forms, preparation/analysis logs, and raw instrument data associated with this data package, which involved evaluation of the following (where applicable): agreement of analyses conducted with COC requests; Holding times and sample preservation; Laboratory blanks and Field blank results compared to field sample results; Field duplicate results; Quantitation limits and sample results; LCS/LCSD results; Laboratory duplicate results; instrument tunes and instrument initial and continuing calibrations; evaluation of laboratory qualifiers applied to the dataset; and selected result calculation verification. The laboratory narrative was also reviewed to determine whether additional issues were found that were not reported in the QC evaluated. Data users should reference the RFI Work Plan for further details.

Data Package Completeness:

1. Were all required forms (results, summary QC, COC), as required to validate the data in accordance with the EPA DV guidance present in the data package? Yes. A full data deliverable, including results, summary QC, and all raw data, was provided for review.
2. Were all result forms for all samples listed on the chain-of-custody present in data package? Yes.

Sample receipt: The 10 6-L canisters were received intact and in good condition on 12/18/18. The Chain-of-Custody (COC) indicates the project is Owego B001 IA. The narrative indicated that the sampling date was omitted from the canister sample tag (e.g., "AA-01_20181212" was listed as "AA-01" on the canister tag). The lab reported the sample ID's reported in the data as they appeared on the COC.

Certification: Canisters were individually certified pre-cleaned on 12/3/18-12/4/18 prior to shipment to the field for all target VOCs - No Action required.

Date: ***1/25/19***

Data Reviewer: ***Nancy C. Rothman, Ph.D.***

New Environmental Horizons, Inc.

Associated Blanks: Method Blank: 22122005sim
EB = EB-01_20181212

Blank ID	Contaminant / Level (µg/m^3)		Action Level DF=		Sample and reported result (µg/m3)	Corrected Database Result
22122005sim	None				No Blank Action Required	
EB-01_20181212	None				No Blank Action Required	

Additional Notes:

Sample Integrity: For these samples, the field receipt vacuums (-26.5 to -30 ”Hg), field final vacuums (- 3 to -6.5 "Hg) and lab receipt vacuums (-3.3 to -5.9 "Hg) were acceptable. COC indicated vacuums as positive pressures rather than negative "Hg, which is acceptable. All field final and lab receipt vacuums agree within ± 5 "Hg. The flow controllers were removed from the canisters for shipment so it was not possible for the lab to do a flow controller check. These samples were an approximate 8 hour collection (except for the EB which was collected in 5 hours). Since the final vacuums upon receipt for the canisters were acceptable, the flow controllers must have been operating properly. No action required. Upon receipt at the lab, all samples were over-pressurized to 4.5-5.4 psi.

Holding Time (HT): Samples were analyzed by 12/20/18; therefore HT was met. No Action required.

BFB Tunes: Instrument msd22 2 tunes (1 ICAL + 1 CCV). Method TO-15 tune criteria used and tunes were acquired properly (average of 3 scans across BFB peak with background subtraction). All criteria in both tunes were met and all samples were analyzed within 12 hours of tune; therefore, No Action Required.

ICAL : SIM performed on 12/4/18. Lab performed SIM for all compounds of interest even though Full Scan RLs would have satisfied the QA/QC requirements of Table B.1 of Appendix B to the RFI Work Plan. ICAL shows more compounds than requested. For VC, 10 level ICAL from 0.002 to 20 ppbV; 1,1=DCE and 1,2-DCA 9 level ICAL from 0.004 to 20 ppbV, and for the remaining 5 compounds, 8-level ICAL from 0.01 to 20 ppbV. %RSD ≤ 30% for all 8 Target Compounds. RLs reported for all 8 compounds were 0.01 to 0.02 ppbV for DF=1 (levels reported for the Method Blank), which were supported by the ICAL.

CCV: 12/20/18 - %Recovery was within 70-130% (i.e., %D ≤ ± 30%) for all 8 Target compounds - No Action required.

Surrogates & Internal Standards **:** All 3 surrogates (1,2-Dichloroethane-d4, Toluene-d8, ad 4-Bromofluorobenzene) were recovered within 70-130% and all 3 IS' (Chlorobenzene-d5, 1,4-Difluorobenzene, and Bromochloromethane) had areas and RTs within criteria in all analyses; therefore, No Action Required.

LCS/LCSD : 22122003sim/22122004sim. %Recovery for all 8 Targets in LCS & LCSD and LCS/LCSD RPDs were all acceptable; therefore, acceptable accuracy and precision demonstrated for analysis of the 8 VOCs by TO-15 SIM analysis.

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Additional Notes:

LD: analysis performed on sample AA-01_20181212. RPD between sample/LD was within 20% for all results; therefore, Sample/LD precision acceptable. No Action required.

FD: IA001-010_20181212 & DUP-1_20181212. A comparison between these two samples is shown below.

Field Duplicate Evaluation_ Sample IDs: Sample = IA001-010_20181212 FD = DUP-1_20181212

Analyte Name	DF=16.5* QL (µg/m^3)	Sample µg/m^3	Q	Sample Result Level	FD µg/m^3	Q	FD Result Level	RPD	Action *
Trichloroethene	1.8	3.9		< 5 x QL	3.9		< 5 x QL	0.0	None
Vinyl Chloride	0.42	0.42	U	QL	0.41	U	QL	NA	None
1,1-Dichloroethane	1.3	1.3	U	QL	1.3	U	QL	NA	None
1,1-Dichloroethene	0.65	0.65	U	QL	0.63	U	QL	NA	None
cis-1,2-Dichloroethene	1.3	1.3	U	QL	1.3	U	QL	NA	None
1,1,1-Trichloroethane	1.8	1.8	U	QL	1.7	U	QL	NA	None
1,2-Dichloroethane	1.3	1.3	U	QL	13		> 5 x QL	NA	**J or UJ**
Tetrachloroethene	2.2	2.2	U	QL	2.2	U	QL	NA	None

* FD DF = 16.5 so FD RLs were RLs shown X 15.9/16.5

**Action only taken for RPD > 20% if one or both results are > 5 x QL; Q = Validator Qualifier

FD precision was acceptable for all 8 target VOCs in IA001-010_20181212 & DUP-1_20181212 except for 1,2-Dichloroethane which was reported > 5 x RL in FD and was non-detect in sample.

****ACTION: 1,2-Dichloroethane estimated (J or UJ) in IA001-010_20181212 & DUP-1_20181212 with indeterminate bias due to FD imprecision.***

Compound Reporting: the lab reported results for 8 Target VOCs, as requested in the Table B.1 (Appendix B, RFI Work Plan) and on the COC.

Qualifier Action: There were no qualifiers other than "U" placed on the data (i.e., no "J" results reported). All data were reported within the instrument calibration range.

Sensitivity: All results were reported in units of µg/m^3 and ppbV. All samples except AA-01_20181212 were diluted at the instrument level (DF=2.5, 5, or 10) due to the presence of high non-target compounds, according to the narrative. Instrument log indicates isopropanol and/or acetone were high in these samples. All non-detects for the 8 target VOCs were below the Project required reporting limits shown on page 6 except: tetrachloroethene, cis-1,2-dichloroethene, 1,1-dichloroethene, 1,1,1-trichloroethane, and 1,1-dichloeoethane in samples Dup-1_2018122, IA001-010_20181212, IA001-014_20181212, and IA001-052_20181212; trichloroethene in samples IA001-014_20181212 and IA001-052_20181212; vinyl chloride in all samples except AA-01_20181212; and 1,2-dichloroethane in samples IA001-010_20181212, IA001-014_20181212, and IA001-052_20181212. The data users will need to evaluate these elevated non-detects for project uses.

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Additional Notes:

The sample chromatograms and quantitation reports were scanned and data appeared to have been reported correctly. The quantitation reports reported results for trans-1,2-dichloroethene, in addition to the 8 target compounds; however, trans-1,2-dichloroethene was not reported in the final data.

Narrative: The narrative indicated the lab's inability to perform the flow controller check when the canisters were returned to the lab. There were no other issues noted that would have affected sample data quality or which have not already been addressed in this review.

Calculation Verification Checks:

Initial Calibration : Verification msd22 SIM ICAL on 12/4/18 for Trichloroethene with IS 1,4-Difluorobenzene:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Std Conc.	0.01	0.02	0.1	0.5	1	5
Cpd Resp	472	886	5005	21879	42647	260352
IS Conc.	5	5	5	5	5	5
IS Resp	399742	382934	402664	380602	360114	468052
RRF	0.5904	0.5784	0.6215	0.5749	0.5921	0.5562

	Level 7	Level 8	Avg. RRF	%RSD
Std Conc.	10	20		
Cpd Resp	488764	892764		
IS Conc.	5	5		
IS Resp	485350	480088		
RRF	0.5035	0.4649	0.5602	9.19%

√

ICAL verified, no action required

CCV : Verification msd22 12/20/18 for 10 ppbV Standard of 1,2-Dichloroethane: Response for Compound =273363; IS Response = 401237 @5 ppbV; RRF from ICAL = 0.42219

$$\text{Conc.} = \frac{273363 \times 5}{401237 \times 0.42219} = 8.07 \text{ ppbV} \qquad \%\text{ Rec} = \frac{100 \text{ X } (8.07)}{10} = 80.7\% = 81\%$$ √

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QL & Result Verification: IA001-010_20181212; Trichloroethene

Canister was received at 5.9 "Hg and over-pressurized to 4.8 psi so DF=1.65 due to over-pressurization only; only 25 mL of sample analyzed compared to normal volume of 250 mL so dilution at instrument was DF = 10 and overall DF = 1.65 x 10 = 16.5; MWt = 131.4

Sample Response = 1508; IS Response = 303794@ 5; RRF ICAL = 0.5602

$$\text{Conc.} = \frac{1508 \times 5 \times 16.5}{303794 \times 0.5602} = 0.7310 \text{ ppbV}$$

$\mu g/m^3$ = (ppbv x Mwt x DF) / 24.45 = (0.7310 x 131.4 x 1)/24.45 = 3.93 = 3.9 $\mu g/m^3$ √

QL based on 0.020 ppbV level = (0.020 x 16.5 x 131.4)/24.45 = 1.77 = 1.8 $\mu g/m^3$ √

Compound List and Project-required Reporting Limits (RL) - from Table B.1 from Appendix B, QA/QC Plan for RFI Work Plan

Target Analyte Name	Full Scan (Full) or SIM	RL (µg/m^3)
Tetrachloroethene (PCE)	Full	1.4
Trichloroethene (TCE)	SIM	0.22
cis-1,2-Dichloroethene (cDCE)	Full	0.8
1,1-Dichloroethene (DCE)	Full	0.8
Vinyl chloride (VC)	SIM	0.052
1,1,1-Trichloroethane (TCA)	Full	1.1
1,1-Dichloroethane (1,1-DCA)	Full	0.81
1,2-Dichloroethane (1,2-DCA)	Full	0.81

Actions (see references below):

Canister Integrity:	If narrative indicates issues, J/U or UJ results in samples based on professional judgment; if Flow controller RPD > 20% for pre- and post-flow calibrations, J detect/UJ non-detects
Canister Vacuum (Vac):	Initial Field Vac < 25" Hg, J/UJ all results; Lab Receipt Vac > 15" Hg, J/UJ results; Lab Receipt Vac > ± 5" Hg of Final Field Vac, J/UJ results
Hold Time (HT):	HT > 30 days, J detects/ UJ non-detects
Blank Actions:	Sample-specific Blank Action Level = Action Level x (Sample DF/Blank DF)
	If MB < RL and sample result < RL, negate(U) sample result at RL. If MB > RL and sample result < RL, negate(U) sample result at RL; if sample result > RL but < Level in MB, negate (U) result in sample at level reported
	Equipment Blank (EB): If sample result < EB, qualify (EB) sample result at level reported
BFB Tune:	SW-846 method 8260B or TO-15 tune criteria not met, professional judgment on R of all data; samples analyzed > 12-hours after tune; professional judgment on J/UJ or R of results
LCS and CCV:	Percent Recovery (%Rec) <10%, J- detects, R non-detects; 10% < %Rec <70%; J-/UJ all associated data; %Rec >130%, J+ detects - no action for non-detects
Initial Calibration (ICAL):	%RSD > 30%, J/UJ associated results
Internal Standard (IS):	RT > ±0.33 min of IS RT in daily CCV, J/UJ associated results;
	Area < 25% Area in CCV, J detects, R non-detects (or professional judgment); 25%< Area < 60% of CCV Area, J/UJ associated results; Area > 140% of CCV Area, J detects, no action for non-detects

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Actions continued (see references below):

Surrogates:	%Rec <10%, J- detects, R non-detects; 10% < %Rec <70%; J-/UJ all associated data; %Rec >130%, J+ detects - no action for non-detects
Laboratory Duplicates:	LCS/LCSD RPD or Sample/LD RPD > 20% for detects > 5x RL, J associated data; professional judgment for results < 5 x RL
Field Duplicates:	RPD > 20% for detects > 5x RL, J associated data; professional judgment for results < 5 x RL
RLs + Quant:	Compound reported outside calibration range (< RL or at ppbV level > sample-specific highest ICAL standard for compound), J data. Note if RL > expected RL from Table B.1 of Assessment Plan (see page 5)
DV Qualifier Definitions:	U = analyte is non-detect at the sample-specific Quantitation Limit (usable); UJ = non-detect is usable as an estimated value; J = result is usable as an estimated value with indeterminate bias; J+ = result is usable as an estimated value with possible high bias; J- = result is usable as an estimated value with possible low bias; NJ = the analyte has been "tentatively identified" and the result is usable as an estimated value with indeterminate bias; EB = compound also found in an associated Equipment Blank and result may be biased high; and R = result is rejected due to severe QC exceedance and unusable for project objectives. Bias: L = Low; H = High; I = Indeterminate.
References:	*RFI Work Plan - Soil Vapor Intrusion Assessment, Former IBM Owego Facility, Owego, New York,* prepared by Sanborn, Head & Associates, February 2017; NYSDOH*, Guidance for Evaluating Soil Vapor Intrusion in the State of New York,* October 2006 with updates through 2015*;* NYSDEC Analytical Services Protocol, June 2005 with NYSDEC Modifications to the EPA Region 9 TO-15 QA/QC Criteria, February 2008; USEPA Region II SOP HW-31, Validating Air Samples, Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, Rev. 6, June 2014; and Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), Publication EPA/625/R-96/010b, January 1999.