

FIFTEEN-YEAR GROUNDWATER MONITORING SUMMARY
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

by Haley & Aldrich of New York
Rochester, New York

for New York State Electric & Gas Corporation
Binghamton, New York

File No. 40490-004
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HALEY & ALDRICH OF NEW YORK
200 Town Centre Drive
Suite 2
Rochester, NY 14623
585.359.9000

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File No. 40490-004

New York State Department of Environmental Conservation
Division of Environmental Remediation, 11th Floor
625 Broadway
Albany, New York 12223

Attention: Mr. Scott Deyette

Subject: Fifteen-Year Groundwater Monitoring Summary Report
Owego Former MGP Site
Owego, New York

Dear Mr. Deyette:

On behalf of our client, New York State Electric & Gas Corporation (NYSEG), Haley & Aldrich of New York (Haley & Aldrich) has prepared this Fifteen-Year Groundwater Monitoring Summary Report to document activities associated with groundwater quality sampling and monitoring at NYSEG's Owego Former Manufactured Gas Plant (MGP) Site (Site) located in Owego, New York. The work was performed in accordance with the monitoring plan described in the "Work Plan for Groundwater Monitoring at the Owego Former MGP Site" (Work Plan) prepared by Ish Inc. and dated February 2003. The analytes of interest for this groundwater monitoring program include total cyanide and benzene.

Please do not hesitate to contact Doug Allen at Haley & Aldrich (603.391.3320) if you have any questions.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Douglas C. Allen, P.G.
Senior Hydrogeologist

Colin R. Sweeney
Principal

Enclosures

c: NYSEG; Attn: Tracy Blazicek

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1. Introduction

1.1 SCOPE AND OBJECTIVES

This Fifteen Year Groundwater Monitoring Summary Report (Fifteen-Year Report) contains a summary of the results and provides an evaluation of the data collected during the past fifteen years of groundwater monitoring performed at the Owego Former Manufactured Gas Plant (MGP) Site located in Owego, New York for New York State Electric & Gas Corporation (NYSEG). The groundwater monitoring work was conducted in accordance with the New York State Department of Environmental Conservation (NYSDEC) approved “Work Plan for Groundwater Monitoring at the Owego Former MGP Site” (Work Plan), prepared by Ish Inc. and META Environmental, Inc. (META) in February 2003. The Work Plan scope was based upon conclusions from the “Technical Report for the Focused Investigation of Cyanide in Groundwater at the Owego Former MGP Site” (Technical Report) prepared by Ish Inc. and META (August 2002) and additional correspondence with NYSDEC related to the Technical Report.

In June 2006, results from the first three years of groundwater monitoring were presented in the “Final Three-Year Groundwater Monitoring Report for the Owego Former MGP Site” (Three-Year Report), prepared by Ish Inc. and META and approved by NYSDEC. Similarly, in January 2008 results from the first five years of the groundwater monitoring program were presented in the “Final Five-Year Groundwater Monitoring Report for the Owego Former MGP Site” (Five-Year Report), prepared by Ish Inc. and META and approved by NYSDEC. In July 2013, results from the first ten years of the groundwater monitoring program were presented in the “Ten-Year Groundwater Monitoring Report for the Owego Former MGP Site” (Ten-Year Report), prepared by Ish Inc. and META and approved by NYSDEC. This Fifteen-Year Report was prepared by Haley & Aldrich of New York (Haley & Aldrich) for submittal to NYSDEC with recommendations on future groundwater monitoring for the Site.

The primary objectives of the fifteen-year groundwater monitoring program are summarized below:

- From 2003 to 2007, the objective of the groundwater monitoring program was to sample and analyze groundwater from nine wells and piezometers for total cyanide, free cyanide, and metal cyanide complexes to determine if groundwater concentrations were consistent with the transport and fate modeling performed during the August 2002 focused cyanide investigation.
- From 2008 to 2012, the first objective of the groundwater monitoring program was to sample and analyze groundwater from five wells and piezometers to further confirm the decreasing or stable conditions of total cyanide concentrations in groundwater. Additionally, total cyanide concentrations at MW-7 (an immediate off-site location) were monitored over time to determine if a “significant increase” in total cyanide concentrations had occurred during the five-year monitoring period that would warrant an engineering study focused on additional remedial approaches, as indicated in the April 1994 Record of Decision (ROD) for the Site.
- From 2008 to 2012, the second objective of the groundwater monitoring program was to develop a more robust data set of benzene concentrations at flow path centerline wells and piezometers to allow for a more detailed evaluation of benzene concentrations in groundwater.
- From 2013 to the present, the objective of the groundwater monitoring program was to sample and analyze groundwater from two wells and one piezometer for total cyanide and from one

well and one piezometer for benzene, on a once every fifth quarter frequency. The goal of this five-year sampling period was to collect data to perform a statistical trend analysis and provide NYSDEC recommendations for future groundwater monitoring.

1.2 REPORT ORGANIZATION

After this introductory section, this Fifteen-Year Report has five remaining sections.

- Section 2 provides a description of and background information about the Site, including previous investigations and remedial actions;
- Section 3 describes the project approach including historical groundwater concentrations and the current monitoring program;
- Section 4 presents a summary of the field methods and activities;
- Section 5 presents the groundwater monitoring results, including a statistical evaluation of total cyanide and benzene in groundwater; and,
- Section 6 presents the conclusions and recommendations for future monitoring.

References, tables, figures, and appendices are included after the report text. Appendix A presents the low-flow sampling forms from the August 2017 sampling event and Appendix B contains the Data Usability Summary Report and the TestAmerica Laboratories, Inc. (TestAmerica) analytical report for the August 2017 sampling event. Appendix C presents time series plots for total cyanide and benzene for the groundwater monitoring program and Appendix D presents the statistical evaluation of the total cyanide and benzene concentrations in groundwater.

2. Site Description and History

This section provides a description of the Site setting, a summary of the operational history, and a summary of previous investigations and remedial activities. The operational history and summary of previous investigations are transcribed from previous reports prepared by Ish Inc.

2.1 SITE SETTING

The former MGP Site is located north of the Susquehanna River in Owego, New York between East Beecher Hill and the Susquehanna River as shown on Figure 1. The Susquehanna River is approximately 1,200 feet (ft) due south of the Site.

Figure 2 shows that the 1-acre Site is a triangular parcel bounded by East Main Street to the north, with an active rail line to the southwest, and a former lumber mill to the east, which currently operates as an automotive repair facility. Adjacent to the Site, Forsythe Street intersects East Main Street from the north. In addition, Erie Street, which parallels the railroad tracks to the northwest of the Site, intersects East Main Street just to the north of the western corner of the Site, before East Main Street turns into Main Street. John Street runs almost parallel to the southwestern property boundary of the Site and intersects Main Street just south of the railway right-of-way. The surrounding area, except for the automotive repair facility to the east, is generally residential.

The Site and surrounding areas are underlain by alluvial deposits, a deeper glacial till, and shale, siltstone, or sandstone of Devonian age (United States Geological Survey (USGS), 1989). Groundwater beneath the Site and surrounding area is typically encountered approximately 20 feet below ground surface. Water levels measured in Site monitoring wells and piezometers indicate that the hydraulic gradient is relatively flat with little change in groundwater elevation between locations. Based on the Site setting and published reports (USGS, 1989), the overall groundwater flow direction is expected to be to the south towards the Susquehanna River.

During the historical Site monitoring period, major flood events in the Susquehanna River were documented by the National Oceanic and Atmospheric Administration (NOAA) in April 2005, June 2006, and September 2011. The September 2011 flood event was the highest river stage event on record (33.62 feet), with over 90 percent of Owego village inundated by flood waters.

2.2 OPERATIONAL HISTORY

The following general history of the Owego former MGP operations is based on information contained in reports prepared by Atlantic Environmental Services, Inc. (Atlantic) in 1994, E.C. Jordan (Jordan) in 1986, and ABB Environmental (formerly E.C. Jordan) (ABB) in 1991 and summarized previously by Ish Inc.

The MGP operated from 1856 to 1935. Although no direct references to the initial process used to manufacture gas at this plant exist in the records, it is believed that the plant originally operated using a coal carbonization process. The gas manufacturing process was likely altered to a carbureted water gas process sometime between 1890 and 1928 (based on selected historical evidence uncovered by Jordan, 1986), although there appears to be no historical evidence of an oil or naphtha storage vessel on-site.

Historic plant maps indicate that three gas holders were used during operation (Jordan, 1986). The first gas holder was the only one shown on the earliest Sanborn map reviewed for the Site (1889) and was a brick sub-grade holder installed to a depth of approximately 15 ft below grade, believed to be constructed in 1856. Both the second and third holders were above ground structures that were constructed in approximately 1900 and 1923, respectively.

Reportedly (Jordan, 1986), there was a coal tar storage vessel on-site that was used to store by-product tar until it was emptied periodically into rail cars for transportation off-site for reuse. The report completed by Jordan in 1986 also made reference to the possibility that some purifier wastes might have been buried on-site in the area directly south of the above ground gas holder that was built in about 1923. This information was based on photographs taken during the years of gas production and the results of ground penetrating radar (GPR) surveys completed by others.

2.3 PREVIOUS INVESTIGATIONS AND REMEDIAL MEASURES

In 1986, Jordan was contracted to perform a Phase I site investigation (Task I). The scope of the investigation included a review of the Site history, a localized air quality impact assessment, and a geophysical investigation using GPR. In addition, interviews were performed with town residents, scientists, regulators, and employees of NYSEG. Subsequent to the Task I work, Jordan performed an initial field investigation (Task II) at the Site (Jordan, 1988). The field effort included the excavation of eleven test pits, collection of surface soil samples, installation of shallow (3.5 ft) soil borings and seven deeper soil borings (six were finished as monitoring wells, MW-1 through MW-6), performance of limited hydraulic conductivity tests, and collection and analysis of one round of groundwater samples. Also included in this work was a risk assessment and evaluation of potential remedial alternatives (Task IV).

In 1991, ABB was contracted to perform a supplemental field investigation (Task III) to provide additional physical, chemical, and regional data to those collected in previous Tasks I, II, and IV. This Task III work included an assessment of background concentrations of polycyclic aromatic hydrocarbons (PAHs) throughout the village of Owego, collection of 20 shallow subsurface soil samples at properties adjacent to the Site, installation of two off-site piezometers (P-1 and P-2), installation of four downgradient wells (MW-7, MW-8, MW-9S, and MW-9D), hydraulic conductivity testing, and the collection and analysis of two rounds of groundwater samples.

In January 1993, the remedial investigation/feasibility study (RI/FS) was completed. The ROD for the Site was issued by NYSDEC on 31 March 1994 which led to the remedial actions described below.

Active remediation was conducted between September 1994 and July 1995. During the remediation, the contents of the former sub-grade gas holder were removed, and soils adjacent to the holder were excavated. Soils in the area were excavated to the water table, which was encountered at 18 to 20 ft below grade. Verification samples were collected at the limits of the excavation, which demonstrated that the unsaturated zone samples were within the clean-up objective of 500 parts per million (ppm or mg/kg) of total PAHs (Atlantic, 1995). In addition to the deep excavation, the upper 2 ft of soil over the entire Site was removed and replaced with clean material.

Two additional monitoring wells (MW-10S and MW-10D) were installed in 1996 after the remedial work was completed.

3. Project Approach

This section provides a brief summary of the historical groundwater monitoring data from the Site and the approach to monitoring groundwater during the 2013 through 2017 period.

3.1 HISTORICAL GROUNDWATER CONCENTRATIONS

Historical total cyanide and benzene concentrations measured in the existing monitoring wells and piezometers are tabulated on Table I. The monitoring program for groundwater sampling up to 2012 is described in the following sections.

3.1.1 Total Cyanide in Groundwater

Based on the concentration data presented in Table II and monitoring well and piezometer locations relative to the dissolved cyanide plume, the Technical Report completed in 2002 recommended that nine key sampling locations (MW-2, MW-4, MW-7, MW-9S, MW-11, PZ-2, PZ-3, PZ-10, and PZ-11) be included in the first five years of the groundwater monitoring program to be analyzed for total cyanide, free cyanide, and metal cyanide complexes. Based on the review and evaluation of the collected data from the first five years of monitoring, five key sampling locations (MW-2, MW-4, MW-7, MW-9S, and PZ-2) were recommended for continued annual monitoring for another five years from 2008 through 2012 for total cyanide analysis. Due to flooding in 2011, an additional sampling event was completed in March 2012 to measure the total cyanide in three key wells and piezometers. During the last five years (2013 to 2017) of monitoring, locations MW-4, MW-9S, and PZ-2 were selected for collection and analysis of groundwater samples for total cyanide on a five-quarter schedule.

3.1.2 Benzene in Groundwater

While the NYSEG quarterly monitoring program and the focused cyanide investigation yielded a relatively large database of total cyanide concentrations in groundwater at the Site, the historical groundwater concentration data for benzene, another MGP-residual related constituent, were not as complete. Table II summarizes the historical benzene concentrations that have been measured in monitoring wells since the July 1995 remediation.

Prior to the groundwater monitoring program initiated in 2003, benzene was detected at concentrations exceeding the NYSDEC Class GA groundwater standard of 1 microgram per liter ($\mu\text{g/L}$) at MW-2 and MW-7 only. Additionally, prior to this program, samples had not been collected and analyzed for benzene since April 1999.

Groundwater sampling and analysis procedures were changed in 2003, which may affect the comparability of analytical results collected before 2003 and those collected after 2003. The groundwater samples analyzed for benzene prior to 2003 were previously collected using bailers, which are not recommended for the collection of samples for volatile organic compound (VOC) analysis. In addition, the bailing procedure can act to surge the well during sampling, causing suspended particulate matter to be included in the sample, which may yield higher concentrations of constituents being monitored. In addition to potential sampling artifacts, groundwater samples collected during several rounds of monitoring were non-detect for benzene at laboratory detection limits above the NYSDEC Class GA groundwater standard due to the analytical method used to analyze the samples. For example,

the results for benzene at MW-7, collected between 1995 and 1999, included seven results reported as non-detect values at a detection limit of either 5 or 10 µg/L (compared to the Class GA groundwater standard of 1 µg/L).

Groundwater sampling and analysis for benzene completed from 2003 to the present has used low-flow sampling techniques and analytical detection limits below the NYSDEC Class GA groundwater standard to enable a precise evaluation of benzene concentrations in groundwater.

During the first five years of monitoring from 2003 through 2007, monitoring locations MW-2, MW-4, MW-7, MW-9S, PZ-6, PZ-8, and PZ11 were selected for collection and analysis of groundwater samples for benzene analysis on a semi-annual and then annual frequency. During the second five years (2008 to 2012) of monitoring, locations MW-2, MW-4, MW-7, and PZ-8 were selected for collection and analysis of groundwater samples for benzene analysis on an annual frequency. During the last five years (2013 to 2017) of monitoring, locations MW-2 and PZ-8 were selected for collection and analysis of groundwater samples on a five-quarter schedule. MW-2 was not sampled in 2017 due to an obstruction in the well.

3.1.3 Groundwater Grab Sample from 32 John Street

In August 2004, NYSEG received permission from the property owner of 32 John Street to collect a single groundwater sample from the property, to assess the groundwater quality at a spatial location upgradient of MW-7. The groundwater grab sample was collected using direct push techniques. The groundwater grab sample was analyzed for benzene and cyanide species, including total cyanide, diffusible cyanide, and metal cyanide complexes. A split sample of groundwater was collected for total cyanide analysis. A filtered sample for total cyanide analysis was also collected to assess whether the grab sampling technique contributed to excess turbidity in the samples.

3.2 CURRENT MONITORING PROGRAM

Haley & Aldrich staff completed static water level measurements and monitored for the presence of non-aqueous phase liquid (NAPL) at the monitoring wells and piezometers shown on Figure 2 during each sampling event from 2013 to 2017. During the period from 2013 through 2017, three locations (MW-4, MW-9S, and PZ-2) were sampled and analyzed for total cyanide and two locations (MW-2 and PZ-8) were sampled and analyzed for benzene.

At the request of the property owner, monitoring well MW-9S was decommissioned on 28 May 2016 by Parratt-Wolff, Inc. of East Syracuse, New York (Parratt-Wolff). Per a NYSDEC 12 May 2016 decommissioning approval letter, piezometer PZ-10, located along Front Street to the south of MW-9S, was sampled in place of MW-9S to confirm groundwater plume stability during the May/June 2016 and August 2017 sampling events. Groundwater samples collected from PZ-10 were analyzed for total cyanide and benzene.

The Work Plan for the most recent groundwater monitoring program (2013 through 2017) indicated that groundwater monitoring activities would be completed on an approximate five-quarter frequency with data reported in brief letter reports followed by a comprehensive evaluation of the fifteen years of monitoring data, presented in this report.

4. Field Methods

This section provides a summary of the field monitoring approach during the 2013 to 2017 period.

4.1 MONITORING SCHEDULE

The groundwater monitoring activities from 2013 to 2017 were completed on an approximate five-quarter frequency according to the schedule below:

- Second Quarter 2014;
- First Quarter 2015;
- Second Quarter 2016; and,
- Third Quarter 2017.

4.2 MONITORING WELL/PIEZOMETER GAUGING

Prior to sampling, the monitoring wells and piezometers were gauged to measure the depth to groundwater and the depth to the bottom of the well. Depth to groundwater data were used to generate a Site plan with groundwater elevations, as shown on Figure 2. In addition, the measured depths to the well and piezometer bottoms were compared to previous measurements. If there was evidence of significant siltation in a well or piezometer, those locations would be redeveloped prior to sampling. Redevelopment of wells was not necessary during the past fifteen years of monitoring.

During August 2017 monitoring, an unknown obstruction was noted in monitoring well MW-2 at approximately 12 ft below ground surface. The well could not be sampled due to the obstruction.

4.3 MONITORING WELL/PIEZOMETER SAMPLING

Groundwater samples were collected from the piezometers and monitoring wells with submersible bladder pumps. A low flow rate (approximately 150 milliliters per minute) was used during purging and sampling. Monitoring wells and piezometers were purged and sampled in accordance with the general procedures outlined in the Work Plan. The submersible pump was decontaminated between each sampling location and dedicated tubing was used for each well and piezometer.

During monitoring well and piezometer purging, water quality measurements, such as pH, conductivity, temperature, dissolved oxygen, and oxidation reduction potential (ORP) were recorded. Locations were considered ready for sampling after temperature, conductivity, and pH had stabilized to within 10% for three consecutive readings, collected every half well volume, and a minimum of two well volumes had been removed. Low-Flow Groundwater Sampling Forms from the August 2017 sampling event are included in Appendix A.

Appropriate sample preservation and shipping methods were utilized during collection and transportation of samples. For details on the sample handling methods, please refer to the Quality Assurance Project Plan (QAPP), which is attached to the Work Plan.

4.4 ANALYTICAL PROCEDURES

4.4.1 Laboratory Methods

During the focused cyanide investigation from 2003 to 2007, cyanide speciation analysis of groundwater samples from the Site was performed by Clarkson University. Although Clarkson University is not certified by the New York State Department of Health (NYSDOH), they are premier experts on cyanide analyses and speciation and have engaged in research and scientific studies for evaluation of cyanide in soil and groundwater samples from many hazardous waste sites within and outside of the State of New York, in particular at several MGP sites. The accuracy of their results was confirmed by sending one split sample per sampling round to Chemtech Laboratories (Chemtech), a NYSDOH-certified laboratory for total cyanide analysis.

The cyanide analysis methods that were used in the laboratory are as follows: Total cyanide was determined using *Standard Methods* 4500-CN-C, "Total Cyanide after Distillation"; and finished using *Standard Methods* 4500-CN-E, "Colorimetric Method", which is equivalent to EPA Method 9010. Free (diffusible) cyanide was determined using ASTM 4282-95, "Standard Test Method for Determination of Free Cyanide in Water and Wastewater by Microdiffusion". Metal complex cyanides were analyzed using Dionex Application Note AN 55, "Determination of Metal Cyanides", with pre-concentration of samples to achieve lower detection limits. The stock cyanide standard solution was calibrated using *Standard Methods* 4500-CN-D, "Titrimetric Method".

Following the first five years of monitoring, the cyanide analyte list was reduced to total cyanide only and TestAmerica, a NYSDOH-certified laboratory, was retained to complete the analyses from 2008 to 2017.

The benzene analyses for groundwater samples from the Site for the first five years (2003 to 2007) of monitoring were performed by Chemtech, using EPA Method 602, "Purgeable Aromatics". A reporting limit of less than 1 µg/L for benzene was attained to achieve reliable concentrations for comparison with the NYSDEC Class GA groundwater standard of 1 µg/L. From 2008 to 2017, TestAmerica was retained to complete the analyses for benzene using the same method.

4.5 MONITORING WELL ABANDONMENT

At the request of the property owner at 395 Front Street, on 28 May 2016 monitoring well MW-9S was decommissioned by Parratt-Wolff. The well was decommissioned to accommodate a backyard swimming pool which the property owners planned to install later in the summer of 2016. The monitoring well decommissioning was approved by NYSDEC in a letter dated 12 May 2016. Following groundwater sample collection, MW-9S was decommissioned by perforating and removing the PVC riser approximately 3.5 ft below ground surface and backfilling the well screen and remaining riser with cement-bentonite grout, in accordance with NYSDEC Policy CP-43 "Groundwater Monitoring Well Decommissioning Policy". The ground surface was restored with topsoil to match the surrounding grade.

4.6 INVESTIGATION DERIVED WASTE MANAGEMENT

Waste materials generated during the groundwater monitoring field events consisted of groundwater purged during the sampling of existing monitoring wells and piezometers and wastewater from decontamination of the submersible bladder. Groundwater purged from wells and decontamination water was containerized in Department of Transportation approved 55-gallon drums, sampled for disposal characteristics as necessary, and disposed of properly by NYSEG.

4.7 HEALTH & SAFETY

A detailed project-specific Health and Safety Plan (HASP) was prepared for this work. This plan contains site-specific information including emergency contacts, the route to the nearest hospital, and site-specific hazards. Groundwater monitoring was conducted with modified Level D personal protection. There was no need to upgrade to Level C during well sampling activities.

5. Monitoring Results

This section provides a summary of the August 2017 groundwater monitoring and a statistical evaluation of the analytical results over the past five years.

5.1 AUGUST 2017 GROUNDWATER ELEVATION MONITORING

On 23 August 2017, Haley & Aldrich staff completed static water level measurements and monitoring for the presence of NAPL at four monitoring wells and nine piezometers as shown on Figure 2.

During the August 2017 gauging event, light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) were not observed in the groundwater monitoring wells or piezometers. The measured depths to water in monitoring wells and resulting groundwater elevations are presented in Table I. The groundwater elevations are also shown on Figure 2. The groundwater elevations varied between 796.39 ft at PZ-8 located on-site to 792.56 ft at PZ-10 located adjacent to Front Street, indicating an approximately north to south hydraulic gradient which is consistent with previous observations. MW-2 was inaccessible due to a blockage at approximately 12 ft below ground surface.

5.2 AUGUST 2017 GROUNDWATER ANALYTICAL RESULTS

The August 2017 groundwater quality sampling results from one monitoring well and three piezometers are presented in Table II, along with analytical results from previous groundwater sampling events. The tabulated groundwater analytical data are compared to NYSDEC Class GA groundwater quality standards. Groundwater sampling locations and analytical results are also shown on Figure 3. The analytical laboratory report is provided in Appendix B.

Time series plots for total cyanide and benzene in groundwater are provided in Appendix C. Appendix D provides a statistical evaluation of total cyanide and benzene data from the groundwater monitoring program.

5.2.1 Total Cyanide in Groundwater

During the August 2017 sampling event, total cyanide was detected at concentrations exceeding the NYSDEC Class GA groundwater quality standard (200 µg/L) in groundwater samples collected from on-site monitoring well MW-4 (5,700 µg/L) and on-site piezometer PZ-2 (3,600 µg/L). Total cyanide was not detected in the sample collected from piezometer PZ-10, located downgradient from decommissioned well location MW-9S. Appendix C provides a time series plot of historical total cyanide analytical results for three sampling locations (MW-4, MW-9S, and PZ-2) relative to one another. According to these data, concentrations of total cyanide detected in MW-4 and PZ-2 have followed a similar trend, especially during the past five years of monitoring.

5.2.2 Benzene in Groundwater

During the August 2017 sampling event, benzene was detected at a concentration exceeding the NYSDEC Class GA groundwater quality standard (1 µg/L) in the groundwater sample collected from the on-site piezometer PZ-8 (380 µg/L). Benzene was not detected in the sample collected from downgradient piezometer PZ-10. MW-2 was not sampled during the August 2017 sampling event due to

a blockage in the well. Appendix C provides a time series plot of the historical benzene analytical results for two sampling locations (MW-2 and PZ-8) relative to one another. According to these data, concentrations detected in PZ-8 have been consistently greater than those detected in MW-2 throughout the groundwater monitoring program.

5.2.3 Quality Assurance/Quality Control

TestAmerica performed the QA/QC procedures required for a NYSDEC Analytical Service Protocol (ASP) Category B deliverable package. Data usability evaluations were performed on the analytical data package and the data were judged suitable for their intended purpose. The Data Usability Summary Report (DUSR) concluded that the usability of the data is 100%. The analytical results from TestAmerica are provided as Appendix B along with the DUSR.

5.3 STATISTICAL EVALUATION

5.3.1 Total Cyanide in Groundwater

Based on the recommendations of the Ten-Year Groundwater Report finalized in July 2013, monitoring locations MW-4, MW-9S, and PZ-2 were retained for sampling and analysis of total cyanide for an additional five-year monitoring period (2013 to 2017) to continue to support and evaluate the Conceptual Site Model for total cyanide impacts to Site groundwater. Monitoring locations MW-4 and PZ-2 provide data for residual and elevated impacts of total cyanide that continue to be mobilized to on-site groundwater from the diffuse source of cyanide compounds present in the subsurface. Monitoring well MW-9S was historically used to monitor downgradient impacts of total cyanide transported off-site in groundwater. Monitoring well MW-9S, located on private property, was last sampled for total cyanide in May 2016. The well was decommissioned after the May 2016 sampling event at the property owner's request. In May 2016 and August 2017, total cyanide analyzed in groundwater sampled at the substitute downgradient location PZ-10.

For the fifteen-year period from April 2003 to August 2017, location-specific monitoring data for total cyanide concentrations in groundwater at MW-4 (on-site), PZ-2 (on-site), and MW-9S (downgradient) were evaluated for increasing or decreasing trends using USEPA *Statistical Software for Environmental Applications for Data Sets With and Without Nondetect Observations*, ProUCL Version 5.1.00 (ProUCL) developed for, and managed by, the USEPA Office of Research and Development, Site Characterization and Monitoring Technical Support Center.

Using ProUCL, the Mann-Kendall (M-K) Trend Test was performed on the time-series data for total cyanide at each location. Documentation of the ProUCL M-K Test results are provided in Appendix D. The M-K Test is a nonparametric test used to determine increasing or decreasing trends in the measurement response variable over time at a designated level of statistical confidence, which does not require the underlying data to follow a specific distribution. It is particularly applicable to time-series environmental monitoring data. The M-K Test requires distinct values for the time variable (i.e., one measurement value at each sampling event time). Per convention, when paired data for field duplicate samples exist, the higher result of the field duplicate pair is selected as the measurement value (as opposed to the average) for the sampling event.

A confidence coefficient of 95 percent was selected to test for the presence of a trend in the monitoring data. Ninety-five percent statistical confidence indicates there is a 5 percent chance of a Type 1 error, whereby a trend (increasing or decreasing) would be identified when none exists.

5.3.1.1 On-Site Impacts of Total Cyanide in Groundwater

Documentation of the ProUCL M-K Test results for total cyanide in impacted on-site monitoring wells MW-4 and PZ-2 is provided in Appendix D. Documentation includes a time-series plot of the location-specific total cyanide concentrations collected from 2003 to 2017 with the Ordinary Least Squares (OLS) linear regression line shown; general statistics for the time-series dataset (including but not limited to: the number of sampling events in the fifteen year period; minimum, maximum, and mean concentrations; and coefficients of variation in the data); M-K Test statistics; and the indication for a statistically confident trend. The OLS regression determines the potential increasing (positive slope) or decreasing (negative slope) trend in the mean concentration of an analyte (total cyanide) over time. The ProUCL M-K Test results for on-site monitoring locations indicated the following:

- The OLS regression slope of total cyanide concentrations in groundwater at MW-4 and PZ-2 is positive, suggesting potential increasing trends in total cyanide in groundwater at both on-site locations. The OLS slope for total cyanide at MW-4 is more positive than at PZ-2, suggesting a higher potential for a significant increasing trend.
- The coefficient of variation for total cyanide at both locations is high (ranging from 90 to 100 percent of the mean), as is evident in frequent and significant spikes in temporal concentrations.
- At both MW-4 and PZ-2, the M-K test statistic (the p-value) is positive, again indicating a potential increasing trend. However, at both MW-4 and PZ-2 there is “insufficient evidence” in the fifteen-year record of total cyanide monitoring results “to identify a significant trend” with 95 percent confidence (i.e., 0.05 level of significance).
- At MW-4 and PZ-2, the maximum result for total cyanide (5,700 µg/L and 3,600 µg/L, respectively) over the past fifteen years was detected in the August 2017 sampling event.

5.3.1.2 Off-Site Impacts of Total Cyanide in Groundwater

A statistical evaluation of total cyanide trends in off-site downgradient groundwater at MW-9S was performed for the fifteen-year monitoring period from 2003 to 2017. Well MW-9S was removed from the groundwater monitoring program after the 2016 sampling event. As such, the number of sampling events evaluated for MW-9S in the fifteen-year period was 17, with the last total cyanide result obtained at MW-9S on 26 May 2016. Documentation of the statistical evaluations performed for total cyanide at MW-9S is provided in Appendix D. The ProUCL M-K Test results for the off-site monitoring location indicated the following:

- The slope of the OLS regression line of total cyanide concentrations in off-site downgradient groundwater at MW-9S is weakly positive, indicating a weak and uncertain significance for identifying a trend in total cyanide concentrations in off-site groundwater at MW-9S over time.
- The coefficient of variation in total cyanide time-series data at MW-9S is relatively high, approximately 64 percent of the mean.

- There is insufficient evidence in the total cyanide data at MW-9S to identify a significant trend, increasing or decreasing, with a significant level of confidence.
- The fifteen-year maximum of total cyanide (230 µg/L) in off-site groundwater at MW-9S occurred in October 2011. This data point was identified as a statistical outlier for the time-series data with 95 percent confidence using the Dixon's Outlier Test in ProUCL (Appendix D). This statistical outlier value was the only result in 17 samples of groundwater collected at MW-9S over the past fifteen years which exceeded the NYSDEC Class GA groundwater standard for total cyanide (200 µg/L). Excluding this 2011 statistical outlier, 100 percent of the results for total cyanide in off-site downgradient groundwater at MW-9S collected over the past fifteen years have been compliant with the Class GA groundwater standard for total cyanide.

5.3.2 Benzene in Groundwater

Based on the recommendations of the Ten-Year Groundwater Report finalized in July 2013, monitoring locations MW-2 and PZ-8 were retained for sampling and analysis of benzene for an additional five-year monitoring period (2013 to 2017). Monitoring locations MW-2 and PZ-8 provide data for residual impacts of benzene detected in on-site groundwater.

5.3.2.1 Benzene in On-Site Groundwater at MW-2

Time-series data for benzene in on-site groundwater at MW-2 were evaluated for significant trends, increasing or decreasing. Benzene concentrations obtained for 17 sampling events from April 2003 to June 2016 are plotted in the statistical evaluation documentation (page 6 of 7) provided in Appendix D.

MW-2 could not be successfully sampled in 2017 due to an apparent obstruction in the well.

The record of groundwater monitoring data for benzene concentrations at MW-2 indicates:

- A high coefficient of variation, with benzene concentrations ranging widely (relative to the NYSDEC Class GA standard of 1 µg/L) in the monitoring period from October 2005 to July 2014. General statistics for the dataset identify a maximum result of 34 µg/L (October 2008), a calculated mean concentration of 7.9 µg/L, and a median concentration (nearly compliant with the Class GA standard for benzene) of 1.3 µg/L.
- There is insufficient evidence in the time-series data for benzene concentrations at MW-2 to identify a confident trend, increasing or decreasing.

5.3.2.2 Benzene in On-Site Groundwater at PZ-8

On-site Piezometer PZ-8 is hydrologically upgradient of MW-2. Time-series data for benzene concentrations in groundwater at PZ-8 were evaluated for significant trends, increasing or decreasing. Benzene concentrations for 13 sampling events at PZ-8 from April 2003 to August 2017 are plotted in the statistical evaluation documentation (page 7 of 7) provided in Appendix D.

The record of groundwater monitoring data for benzene concentrations at PZ-8 indicate:

- A significant negative slope to the OLS regression of the time-series data suggests a decreasing trend in the mean concentration of benzene in groundwater at PZ-8 over the fifteen-year monitoring period.
- The M-K Test identifies statistically significant evidence of a decreasing trend with 95 percent confidence.
- The time-series plot of benzene concentrations at PZ-8 graphically illustrate sporadic temporal rebound spikes in the dissolved benzene concentrations at this Site location, with an overall trend in the recovering benzene concentrations over time toward improving groundwater quality. However, benzene concentrations in Site groundwater at PZ-8 remain consistently elevated above the NYSDEC Class GA water quality standard for benzene (1 µg/L).

6. Conclusions and Recommendations

Haley & Aldrich has made the following conclusions, based on the past fifteen years of groundwater sampling and analysis data:

- Over the past fifteen years of monitoring, the concentrations of benzene and total cyanide have exceeded the NYSDEC Class GA groundwater quality standards in samples collected from on-site monitoring wells and piezometers. The concentration data do not demonstrate a strong upward or downward trend.
- The concentration of total cyanide detected in samples collected from on-site monitoring well MW-4 and nearby location PZ-2 have been similar over time, with no statistically significant trend in the data largely due to variability in the concentration data
- Benzene and total cyanide concentrations have consistently been below NYSDEC Class GA groundwater quality standards in samples collected from off-site monitoring wells and piezometers with the exception of the 2011 sampling event where an elevated concentration of total cyanide was likely related to a major flooding event that occurred shortly prior to the sampling event. This demonstrates there is not a “sustained off-site exceedance of groundwater standards which warrants remediation”, as described in the April 1994 ROD.
- Benzene and total cyanide concentrations have not been detected in samples from downgradient location PZ-10, which was substituted into the monitoring program after monitoring well MW-9S was decommissioned. The absence of benzene and total cyanide at downgradient location PZ-10 suggest a stable plume.

Based on the conclusions listed above and information provided in this report, Haley & Aldrich recommends discontinuing groundwater monitoring at the Site. Pending NYSDEC approval of this recommendation, a brief work plan will be developed for monitoring well and piezometer decommissioning in accordance with NYSDEC’s CP-43 Groundwater Monitoring Well Decommissioning Policy.

References

1. United States Geological Survey (USGS), 1989. Hydrogeology of the Valley-Fill Aquifer at Owego, Tioga County, New York.
2. Ish Inc. and META Environmental, Inc. July 2013. Ten-Year Groundwater Monitoring Report for the Owego Former MGP Site.

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TABLES

**TABLE I
GROUNDWATER ELEVATIONS AND NAPL MEASUREMENTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK**

Well ID	Top of Casing Elevation (ft-msl)	Date of Measurement	Depth to Water (ft)	Water Level Elevation (ft-msl)	LNAPL Thickness (ft)	DNAPL Thickness (ft)
MW-1	811.48	4/22/2003	11.80	799.68	NP	NP
	811.48	10/22/2003	NM	-	-	-
	811.48	4/14/2004	NM	-	-	-
	811.48	10/27/2004	NM	-	-	-
	811.48	4/5/2005	NM	-	-	-
	811.48	10/3/2005	NM	-	-	-
	811.48	2/13/2006	13.72	797.76	NP	NP
	811.48	10/2/2006	NM	-	-	-
	811.48	10/22/2007	NM	-	-	-
	811.48	10/27/2008	NM	-	-	-
	811.48	10/26/2009	NM	-	-	-
	811.48	10/25/2010	NM	-	-	-
	811.48	10/24/2011	11.81	799.67	NP	NP
	811.48	10/15/2012	18.90	792.58	NP	NP
	811.48	7/11/2014	Could not locate	-	-	-
	811.48	4/21/2015	Could not locate	-	-	-
811.48	5/26/2016	16.48	795.00	NP	NP	
811.48	8/23/2017	15.24	796.24	NP	NP	
MW-2	818.37	4/22/2003	19.46	798.91	NP	NP
	818.37	10/22/2003	23.15	795.22	NP	NP
	818.37	4/14/2004	21.14	797.23	NP	NP
	818.37	10/27/2004	22.00	796.37	NP	NP
	818.37	4/5/2005	15.16	803.21	NP	NP
	818.37	10/3/2005	25.63	792.74	NP	NP
	818.37	2/13/2006	21.12	797.25	NP	NP
	818.37	10/2/2006	22.73	795.64	NP	NP
	818.37	10/22/2007	26.10	792.27	NP	NP
	818.37	10/27/2008	26.35	792.02	NP	NP
	818.37	10/26/2009	25.31	793.06	NP	NP
	818.37	10/25/2010	24.07	794.30	NP	NP
	818.37	10/24/2011	19.70	798.67	NP	NP
	818.37	10/15/2012	25.95	792.42	NP	NP
	818.37	7/11/2014	23.16	795.21	NP	NP
	818.37	4/21/2015	22.41	795.96	NP	NP
818.37	5/26/2016	Obstruction	-	-	-	
818.37	6/10/2016	24.72	793.65	NP	NP	
818.37	8/23/2017	Obstruction	-	-	-	
MW-4	816.57	4/22/2003	17.41	799.16	NP	NP
	816.57	10/22/2003	21.13	795.44	NP	NP
	816.57	4/14/2004	19.59	796.98	NP	NP
	816.57	10/27/2004	19.92	796.65	NP	NP
	816.57	4/5/2005	14.39	802.18	NP	NP
	816.57	10/3/2005	23.40	793.17	NP	NP
	816.57	2/13/2006	18.97	797.60	NP	NP
	816.57	10/2/2006	20.37	796.20	NP	NP
	816.57	10/22/2007	23.96	792.61	NP	NP
	816.57	10/27/2008	24.34	792.23	NP	NP
	816.57	10/26/2009	23.22	793.35	NP	NP
	816.57	10/25/2010	22.17	794.40	NP	NP
	816.57	10/24/2011	17.52	799.05	NP	NP
	816.57	10/15/2012	23.95	792.62	NP	NP
	816.57	7/11/2014	21.07	795.50	NP	NP
	816.57	4/21/2015	20.08	796.49	NP	NP
816.57	5/26/2016	21.80	794.77	NP	NP	
816.57	8/23/2017	20.86	795.71	NP	NP	

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Well ID	Top of Casing Elevation (ft-msl)	Date of Measurement	Depth to Water (ft)	Water Level Elevation (ft-msl)	LNAPL Thickness (ft)	DNAPL Thickness (ft)
MW-7	816.54	4/22/2003	17.98	798.56	NP	NP
	816.54	10/22/2003	21.56	794.98	NP	NP
	816.54	4/14/2004	18.91	797.63	NP	NP
	816.54	10/27/2004	18.95	797.59	NP	NP
	816.54	4/5/2005	14.04	802.50	NP	NP
	816.54	10/3/2005	22.78	793.76	NP	NP
	816.54	2/13/2006	19.38	797.16	NP	NP
	816.54	10/2/2006	21.06	795.48	NP	NP
	816.54	10/22/2007	24.09	792.45	NP	NP
	816.54	10/27/2008	24.62	791.92	NP	NP
	816.54	10/26/2009	23.31	793.23	NP	NP
	816.54	10/25/2010	22.26	794.28	NP	NP
	816.54	10/24/2011	18.38	798.16	NP	NP
	816.54	10/15/2012	24.20	792.34	NP	NP
	816.54	7/11/2014	21.56	794.98	NP	NP
	816.54	4/21/2015	19.64	796.90	NP	NP
	816.54	5/26/2016	22.14	794.40	NP	NP
816.54	8/23/2017	21.53	795.01	NP	NP	
MW-9S	817.61	4/22/2003	21.19	796.42	NP	NP
	817.61	10/22/2003	23.97	793.64	NP	NP
	817.61	4/14/2004	22.25	795.36	NP	NP
	817.61	10/27/2004	23.57	794.04	NP	NP
	817.61	4/5/2005	12.92	804.69	NP	NP
	817.61	10/3/2005	22.82	794.79	NP	NP
	817.61	2/13/2006	21.85	795.76	NP	NP
	817.61	10/2/2006	23.82	793.79	NP	NP
	817.61	10/22/2007	25.62	791.99	NP	NP
	817.61	10/27/2008	26.22	791.39	NP	NP
	817.61	10/26/2009	24.40	793.21	NP	NP
	817.61	10/25/2010	23.92	793.69	NP	NP
	817.61	10/24/2011	22.01	795.60	NP	NP
	817.61	10/15/2012	26.38	791.23	NP	NP
	817.61	7/11/2014	24.14	793.47	NP	NP
817.61	4/21/2015	20.55	797.06	NP	NP	
817.61	5/26/2016	24.82	792.79	NP	NP	
817.61	5/28/2016	Well Decommissioned				
MW-11	815.90	4/22/2003	16.49	799.41	NP	NP
	815.90	10/22/2003	20.25	795.65	NP	NP
	815.90	4/14/2004	18.82	797.08	NP	NP
	815.90	10/27/2004	19.00	796.90	NP	NP
	815.90	4/5/2005	14.24	801.66	NP	NP
	815.90	10/3/2005	26.39	789.51	NP	NP
	815.90	2/13/2006	18.25	797.65	NP	NP
	815.90	10/2/2006	19.62	796.28	NP	NP
	815.90	10/22/2007	23.27	792.63	NP	NP
	815.90	10/27/2008	23.49	792.41	NP	NP
	815.90	10/26/2009	22.52	793.38	NP	NP
	815.90	10/25/2010	21.37	794.53	NP	NP
	815.90	10/24/2011	16.44	799.46	NP	NP
	815.90	10/15/2012	23.08	792.82	NP	NP
	815.90	7/11/2014	20.11	795.79	NP	NP
815.90	4/21/2015	19.44	796.46	NP	NP	
815.90	5/26/2016	20.90	795.00	NP	NP	
815.90	8/23/2017	19.86	796.04	NP	NP	

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Well ID	Top of Casing Elevation (ft-msl)	Date of Measurement	Depth to Water (ft)	Water Level Elevation (ft-msl)	LNAPL Thickness (ft)	DNAPL Thickness (ft)
PZ-1	817.01	4/22/2003	17.79	799.22	NP	NP
	817.01	10/22/2003	NM	-	-	-
	817.01	4/14/2004	NM	-	-	-
	817.01	10/27/2004	NM	-	-	-
	817.01	4/5/2005	NM	-	-	-
	817.01	10/3/2005	NM	-	-	-
	817.01	2/13/2006	19.57	797.44	NP	NP
	817.01	10/2/2006	NM	-	-	-
	817.01	10/22/2007	NM	-	-	-
	817.01	10/27/2008	NM	-	-	-
	817.01	10/26/2009	NM	-	-	-
	817.01	10/25/2010	NM	-	-	-
	817.01	10/24/2011	17.75	799.26	NP	NP
	817.01	10/15/2012	24.38	792.63	NP	NP
	817.01	7/11/2014	21.46	795.55	NP	NP
	817.01	4/21/2015	20.69	796.32	NP	NP
817.01	5/26/2016	22.19	794.82	NP	NP	
817.01	8/23/2017	21.15	795.86	NP	NP	
PZ-2	816.58	4/22/2003	17.58	799.00	NP	NP
	816.58	10/22/2003	21.32	795.26	NP	NP
	816.58	4/14/2004	19.90	796.68	NP	NP
	816.58	10/27/2004	20.13	796.45	NP	NP
	816.58	4/5/2005	14.28	802.30	NP	NP
	816.58	10/3/2005	23.94	792.64	NP	NP
	816.58	2/13/2006	19.35	797.23	NP	NP
	816.58	10/2/2006	20.78	795.80	NP	NP
	816.58	10/22/2007	24.40	792.18	NP	NP
	816.58	10/27/2008	24.67	791.91	NP	NP
	816.58	10/26/2009	23.75	792.83	NP	NP
	816.58	10/25/2010	22.47	794.11	NP	NP
	816.58	10/24/2011	17.78	798.80	NP	NP
	816.58	10/15/2012	24.30	792.28	NP	NP
	816.58	7/11/2014	21.41	795.17	NP	NP
	816.58	4/21/2015	20.57	796.01	NP	NP
816.58	5/26/2016	22.15	794.43	NP	NP	
816.58	8/23/2017	21.23	795.35	NP	NP	
PZ-3	817.70	4/22/2003	18.46	799.24	NP	NP
	817.70	10/22/2003	22.22	795.48	NP	NP
	817.70	4/14/2004	20.74	796.96	NP	NP
	817.70	10/27/2004	21.03	796.67	NP	NP
	817.70	4/5/2005	13.08	804.62	NP	NP
	817.70	10/3/2005	24.74	792.96	NP	NP
	817.70	2/13/2006	20.13	797.57	NP	NP
	817.70	10/2/2006	20.41	797.29	NP	NP
	817.70	10/22/2007	23.10	794.60	NP	NP
	817.70	10/27/2008	25.34	792.36	NP	NP
	817.70	10/26/2009	24.33	793.37	NP	NP
	817.70	10/25/2010	23.12	794.58	NP	NP
	817.70	10/24/2011	18.47	799.23	NP	NP
	817.70	10/15/2012	25.00	792.70	NP	NP
	817.70	7/11/2014	22.03	795.67	NP	NP
	817.70	4/21/2015	20.49	797.21	0.01	NP
817.70	5/26/2016	22.76	794.94	NP	NP	
817.70	8/23/2017	21.85	795.85	NP	NP	

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Well ID	Top of Casing Elevation (ft-msl)	Date of Measurement	Depth to Water (ft)	Water Level Elevation (ft-msl)	LNAPL Thickness (ft)	DNAPL Thickness (ft)
PZ-6	817.54	4/22/2003	19.10	798.44	NP	NP
	817.54	10/22/2003	NM	-	-	-
	817.54	4/14/2004	NM	-	-	-
	817.54	10/27/2004	NM	-	-	-
	817.54	4/5/2005	NM	-	-	-
	817.54	10/3/2005	NM	-	-	-
	817.54	2/13/2006	20.47	797.07	NP	NP
	817.54	10/2/2006	22.30	795.24	NP	NP
	817.54	10/22/2007	25.32	792.22	NP	NP
	817.54	10/27/2008	25.69	791.85	NP	NP
	817.54	10/26/2009	24.35	793.19	NP	NP
	817.54	10/25/2010	23.30	794.24	NP	NP
	817.54	10/24/2011	19.41	798.13	NP	NP
	817.54	10/15/2012	25.35	792.19	NP	NP
	817.54	7/11/2014	22.71	794.83	NP	NP
	817.54	4/21/2015	20.62	796.92	NP	NP
	817.54	5/26/2016	23.24	794.30	NP	NP
817.54	8/23/2017	22.75	794.79	NP	NP	
PZ-7	817.60	4/22/2003	19.11	798.49	NP	NP
	817.60	10/22/2003	NM	-	-	-
	817.60	4/14/2004	NM	-	-	-
	817.60	10/27/2004	NM	-	-	-
	817.60	4/5/2005	NM	-	-	-
	817.60	10/3/2005	NM	-	-	-
	817.60	2/13/2006	20.54	797.06	NP	NP
	817.60	10/2/2006	22.32	795.28	NP	NP
	817.60	10/22/2007	25.30	792.30	NP	NP
	817.60	10/27/2008	25.76	791.84	NP	NP
	817.60	10/26/2009	24.52	793.08	NP	NP
	817.60	10/25/2010	23.50	794.10	NP	NP
	817.60	10/24/2011	19.50	798.10	NP	NP
	817.60	10/15/2012	25.40	792.20	NP	NP
	817.60	7/11/2014	22.74	794.86	NP	NP
	817.60	4/21/2015	20.69	796.91	NP	NP
	817.60	5/26/2016	23.31	794.29	NP	NP
817.60	8/23/2017	22.75	794.85	NP	NP	
PZ-8	815.38	4/22/2003	15.83	799.55	NP	NP
	815.38	10/22/2003	NM	-	-	-
	815.38	4/14/2004	NM	-	-	-
	815.38	10/27/2004	NM	-	-	-
	815.38	4/5/2005	NM	-	-	-
	815.38	10/3/2005	NM	-	-	-
	815.38	2/13/2006	17.47	797.91	NP	NP
	815.38	10/2/2006	18.67	796.71	NP	NP
	815.38	10/22/2007	22.08	793.30	NP	NP
	815.38	10/27/2008	20.66	794.72	NP	NP
	815.38	10/26/2009	20.83	794.55	NP	NP
	815.38	10/25/2010	20.74	794.64	NP	NP
	815.38	10/24/2011	15.32	800.06	NP	NP
	815.38	10/15/2012	22.44	792.94	NP	NP
	815.38	7/11/2014	19.29	796.09	NP	NP
	815.38	4/21/2015	16.61	798.77	NP	NP
	815.38	5/26/2016	20.14	795.24	NP	NP
815.38	8/23/2017	18.99	796.39	NP	NP	

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Well ID	Top of Casing Elevation (ft-msl)	Date of Measurement	Depth to Water (ft)	Water Level Elevation (ft-msl)	LNAPL Thickness (ft)	DNAPL Thickness (ft)
PZ-10	813.31	4/22/2003	17.11	796.20	NP	NP
	813.31	10/22/2003	19.74	793.57	NP	NP
	813.31	4/14/2004	18.30	795.01	NP	NP
	813.31	10/27/2004	19.51	793.80	NP	NP
	813.31	4/5/2005	8.32	804.99	NP	NP
	813.31	10/3/2005	22.29	791.02	NP	NP
	813.31	2/13/2006	17.64	795.67	NP	NP
	813.31	10/2/2006	19.65	793.66	NP	NP
	813.31	10/22/2007	21.52	791.79	NP	NP
	813.31	10/27/2008	22.24	791.07	NP	NP
	813.31	10/26/2009	20.07	793.24	NP	NP
	813.31	10/25/2010	19.55	793.76	NP	NP
	813.31	10/24/2011	18.05	795.26	NP	NP
	813.31	10/15/2012	22.15	791.16	NP	NP
	813.31	7/11/2014	19.95	793.36	NP	NP
	813.31	4/21/2015	16.32	796.99	NP	NP
	813.31	5/26/2016	20.61	792.70	NP	NP
813.31	8/23/2017	20.75	792.56	NP	NP	
PZ-11	820.15	4/22/2003	22.86	797.29	NP	NP
	820.15	10/22/2003	26.05	794.10	NP	NP
	820.15	4/14/2004	24.45	795.70	NP	NP
	820.15	10/27/2004	25.53	794.62	NP	NP
	820.15	4/5/2005	16.87	803.28	NP	NP
	820.15	10/3/2005	28.58	791.57	NP	NP
	820.15	2/13/2006	23.80	796.35	NP	NP
	820.15	10/2/2006	25.89	794.26	NP	NP
	820.15	10/22/2007	28.20	791.95	NP	NP
	820.15	10/27/2008	28.71	791.44	NP	NP
	820.15	10/26/2009	NM	-	-	-
	820.15	10/25/2010	NM	-	-	-
	820.15	10/24/2011	NM	-	-	-
	820.15	10/15/2012	NM	-	-	-
	820.15	7/11/2014	26.22	793.93	NP	NP
	820.15	4/21/2015	23.00	797.15	NP	NP
	820.15	5/26/2016	26.75	793.40	NP	NP
820.15	8/23/2017	26.65	793.50	NP	NP	
PZ-12	819.24	4/22/2003	21.29	797.95	NP	NP
	819.24	10/22/2003	NM	-	-	-
	819.24	4/14/2004	NM	-	-	-
	819.24	10/27/2004	NM	-	-	-
	819.24	4/5/2005	NM	-	-	-
	819.24	10/3/2005	NM	-	-	-
	819.24	2/13/2006	22.46	796.78	NP	NP
	819.24	10/2/2006	NM	-	-	-
	819.24	10/22/2007	NM	-	-	-
	819.24	10/27/2008	NM	-	-	-
	819.24	10/26/2009	NM	-	-	-
	819.24	10/25/2010	NM	-	-	-
	819.24	10/24/2011	21.90	797.34	NP	NP
	819.24	10/15/2012	27.31	791.93	NP	NP
	819.24	7/11/2014	23.89	795.35	NP	NP
	819.24	4/21/2015	22.12	797.12	NP	NP
	819.24	5/26/2016	25.28	793.96	NP	NP
819.24	8/23/2017	25.00	794.24	NP	NP	

Notes and Abbreviations:

1. Water level measurements collected prior to July 2014 were obtained by Ish Inc.
2. NM: Not measured; NP: Indicates NAPL not present; ft-msl: feet above mean sea level.

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

NYSDEC TOGS 1.1.1 Class GA Water Quality Standards			Chemical Name Cyanide, Total 200 Units ug/L	Benzene 1 ug/L
Sample Type	Sample Name			
MW-1				
08/28/1995	N	MW-1-082895	< 10	< 5
10/16/1995	N	MW-1-101695	< 10	< 5
01/24/1996	N	MW-1-012496	< 10	< 5
04/15/1996	N	MW-1-041596	< 10	< 5
07/25/1996	N	MW-1-072596	< 10	< 5
10/15/1996	N	MW-1-101596	< 10	< 5
01/20/1997	N	MW-1-012097	< 10	< 10
05/07/1997	N	MW-1-050797	< 10	< 10
04/29/1998	N	MW-1-042998	< 20	< 0.2
10/19/1998	N	MW-1-101998	< 10	< 0.5
04/16/1999	N	MW-1-041699	< 100	< 0.2
12/14/1999	N	MW-1-121499	< 20	-
04/26/2000	N	MW-1-042600	< 20	-
09/28/2000	N	MW-1-092800	< 20	-
04/22/2003	N	MW-1-042203	-	< 0.1
MW-11				
01/24/2001	N	MW-11-012401	544	-
06/20/2001	N	MW-11-062001	542	-
04/22/2003	N	MW-11-042203	-	< 0.1
04/23/2003	N	MW-11-042303	148	-
10/22/2003	N	MW-11-102203	352	-
04/14/2004	N	MW-11-041404	192	< 0.1
10/29/2004	N	MW-11-102904	328	-
04/08/2005	N	MW-11-040805	96	-
10/04/2005	N	MW-11-100405	181	-
10/03/2006	N	MW-11-100306	204	-
10/23/2007	N	MW-11-102307	79.9	-
MW-2				
08/28/1995	N	MW-2-082895	1900	88
10/16/1995	N	MW-2-101695	2180	44
01/24/1996	N	MW-2-012496	1700	< 5
04/15/1996	N	MW-2-041596	457	70
07/25/1996	N	MW-2-072596	566	48
10/15/1996	N	MW-2-101596	1490	120
01/20/1997	N	MW-2-012097	496	74
04/29/1997	N	MW-2-042997	798	40
04/29/1998	N	MW-2-042998	290	47
10/19/1998	N	MW-2-101998	3150	47
04/16/1999	N	MW-2-041699	1210	1
12/14/1999	N	MW-2-121499	1230	-
04/26/2000	N	MW-2-042600	540	-
06/20/2000	N	MW-2-062000	550	-
06/20/2000	FD	MW-2-062000-DUP	460	-
09/28/2000	N	MW-2-092800	2750	-
01/24/2001	N	MW-2-012401	248	-
01/24/2001	FD	MW-2-012401-DUP	238	-
06/20/2001	N	MW-2-062001	181	-
04/22/2003	N	MW-2-042203	-	0.9
04/23/2003	N	MW-2-042303	274	-
04/23/2003	FD	MW-2-042303-DUP	279	-
10/22/2003	N	MW-2-102203	79	0.5
10/22/2003	FD	MW-2-102203-DUP	80	-

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

		Chemical Name	Cyanide, Total	Benzene
NYSDEC TOGS 1.1.1 Class GA Water Quality Standards			200	1
		Units	ug/L	ug/L
	Sample Type	Sample Name		
MW-2 (continued)				
04/14/2004	N	MW-2-041404	183	1.3
04/14/2004	FD	MW-2-041404-DUP	173	-
10/29/2004	N	MW-2-102904	256	1.1
10/29/2004	FD	MW-2-102904-DUP	250	-
04/08/2005	N	MW-2-040805	43	< 0.2
04/08/2005	FD	MW-2-040805-DUP	49	-
10/04/2005	N	MW-2-100405	58	13
10/04/2005	FD	MW-2-100405-DUP	59	-
02/14/2006	N	MW-2-021406	-	1.2
10/03/2006	N	MW-2-100306	115	5.6
10/03/2006	FD	MW-2-100306-DUP	110	-
10/23/2007	N	MW-2-102307	36.1	11
10/23/2007	FD	MW-2-102307-DUP	39.9	-
10/28/2008	N	MW-2-102808	85.6	34
10/28/2008	FD	MW-2-102808-DUP	12.6	-
10/26/2009	N	MW-2-102609	84	23
10/26/2010	N	MW-2-102610	51.9	1.2
10/25/2011	N	MW-2-102511	9.6	5.1
10/16/2012	N	MW-2-101612	98	21
07/11/2014	N	2293-071114-1510	-	13
07/11/2014	FD	2293-071114-0001	-	11
04/21/2015	N	MW02-042115-1325	-	0.82 J
04/21/2015	FD	0123-042115-0001	-	0.85 J
06/10/2016	N	MW02-061016-1200	-	< 1
MW-4				
08/28/1995	N	MW-4-082895	797	< 5
10/16/1995	N	MW-4-101695	996	< 5
01/24/1996	N	MW-4-012496	797	< 5
04/15/1996	N	MW-4-041596	1190	< 5
07/25/1996	N	MW-4-072596	3900	< 5
10/15/1996	N	MW-4-101596	1380	< 5
01/20/1997	N	MW-4-012097	757	< 10
04/29/1997	N	MW-4-042997	4180	< 10
04/29/1998	N	MW-4-042998	1600	-
10/19/1998	N	MW-4-101998	998	-
04/16/1999	N	MW-4-041699	630	-
12/14/1999	N	MW-4-121499	330	-
04/26/2000	N	MW-4-042600	570	-
09/28/2000	N	MW-4-092800	620	-
01/24/2001	N	MW-4-012401	725	-
06/20/2001	N	MW-4-062001	2240	-
04/22/2003	N	MW-4-042203	-	< 0.1
04/23/2003	N	MW-4-042303	2010	-
10/22/2003	N	MW-4-102203	1150	< 0.1
04/14/2004	N	MW-4-041404	1010	< 0.1
10/29/2004	N	MW-4-102904	1690	< 0.1
04/08/2005	N	MW-4-040805	744	< 0.2
10/04/2005	N	MW-4-100405	404	270
02/14/2006	N	MW-4-021406	-	1.7
10/03/2006	N	MW-4-100306	2240	1.3
10/23/2007	N	MW-4-102307	234	< 0.2
10/28/2008	N	MW-4-102808	90.4	< 1

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

		Chemical Name	Cyanide, Total	Benzene
NYSDEC TOGS 1.1.1 Class GA Water Quality Standards			200	1
		Units	ug/L	ug/L
	Sample Type	Sample Name		
MW-4 (continued)				
10/26/2009	N	MW-4-102609	145	0.64
10/26/2009	FD	MW-4-102609-DUP	211	0.45
10/26/2010	N	MW-4-102610	180	< 1
10/26/2010	FD	MW-4-102610-DUP	207	< 1
10/25/2011	N	MW-4-102511	2700	< 1
10/25/2011	FD	MW-4-102511-DUP	2900	< 1
03/12/2012	N	MW-4-031212	810	-
03/12/2012	FD	MW-4-031212-DUP	990	-
10/16/2012	N	MW-4-101612	610	0.7
10/16/2012	FD	MW-4-101612-DUP	650	0.47
07/11/2014	N	2293-071114-1355	1700	-
04/21/2015	N	MW04-042115-1135	400	-
05/26/2016	N	MW04-052616-1325	3300 J	-
08/23/2017	N	MW04-082317-1245	5700	-
MW-7				
08/28/1995	N	MW-7-082895	196	< 5
10/16/1995	N	MW-7-101695	462	< 5
01/24/1996	N	MW-7-012496	443	< 5
04/15/1996	N	MW-7-041596	84	< 5
07/25/1996	N	MW-7-072596	228	< 5
10/15/1996	N	MW-7-101596	126	190
01/20/1997	N	MW-7-012097	102	< 10
04/29/1997	N	MW-7-042997	182	< 10
04/29/1998	N	MW-7-042998	100	0.3
10/19/1998	N	MW-7-101998	318	19
04/16/1999	N	MW-7-041699	160	3.3
12/14/1999	N	MW-7-121499	60	-
04/26/2000	N	MW-7-042600	90	-
09/28/2000	N	MW-7-092800	180	-
01/24/2001	N	MW-7-012401	200	-
06/20/2001	N	MW-7-062001	99	-
04/22/2003	N	MW-7-042203	-	< 0.1
04/23/2003	N	MW-7-042303	159	-
10/22/2003	N	MW-7-102203	184	< 0.1
04/14/2004	N	MW-7-041404	132	< 0.1
10/29/2004	N	MW-7-102904	227	< 0.1
04/08/2005	N	MW-7-040805	82	3.8
10/04/2005	N	MW-7-100405	68	32
02/14/2006	N	MW-7-021406	-	< 0.2
10/03/2006	N	MW-7-100306	148	< 0.2
10/23/2007	N	MW-7-102307	49.5	< 0.2
10/28/2008	N	MW-7-102808	59.5	6.1
10/26/2009	N	MW-7-102609	60.2	< 1
10/26/2010	N	MW-7-102610	23.7	< 1
10/25/2011	N	MW-7-102511	55	< 1
10/16/2012	N	MW-7-101612	50	< 1
MW-9D				
08/28/1995	N	MW-9D-082895	< 10	< 5
10/16/1995	N	MW-9D-101695	< 10	< 5
01/24/1996	N	MW-9D-012496	< 10	< 5
04/15/1996	N	MW-9D-041596	18	< 5
07/25/1996	N	MW-9D-072596	< 10	< 5

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

NYSDEC TOGS 1.1.1 Class GA Water Quality Standards		Chemical Name	Cyanide, Total	Benzene
		Units	200 ug/L	1 ug/L
Sample Type	Sample Name			
MW-9D (continued)				
10/15/1996	N	MW-9D-101596	11	< 5
01/20/1997	N	MW-9D-012097	< 10	< 10
04/29/1997	N	MW-9D-042997	< 10	< 10
04/29/1998	N	MW-9D-042998	-	< 0.2
MW-9S				
08/28/1995	N	MW-9S-082895	180	< 5
10/16/1995	N	MW-9S-101695	118	< 5
01/24/1996	N	MW-9S-012496	62	< 5
04/15/1996	N	MW-9S-041596	60	< 5
07/25/1996	N	MW-9S-072596	76	< 5
10/15/1996	N	MW-9S-101596	62	< 5
01/20/1997	N	MW-9S-012097	49	< 10
04/29/1997	N	MW-9S-042997	77	< 10
04/29/1998	N	MW-9S-042998	50	< 0.2
10/19/1998	N	MW-9S-101998	113	-
04/16/1999	N	MW-9S-041699	50	-
12/14/1999	N	MW-9S-121499	80	-
04/26/2000	N	MW-9S-042600	30	-
09/28/2000	N	MW-9S-092800	70	-
01/24/2001	N	MW-9S-012401	53	-
06/20/2001	N	MW-9S-062001	48	-
04/22/2003	N	MW-9S-042203	-	< 0.1
04/23/2003	N	MW-9S-042303	28	-
10/22/2003	N	MW-9S-102203	85	< 0.1
04/14/2004	N	MW-9S-041404	63	< 0.1
10/29/2004	N	MW-9S-102904	114	< 0.1
04/08/2005	N	MW-9S-040805	44	< 0.2
10/04/2005	N	MW-9S-100405	94	< 0.2
10/03/2006	N	MW-9S-100306	81	< 0.2
10/23/2007	N	MW-9S-102307	65.2	< 0.2
10/28/2008	N	MW-9S-102808	68.9	-
10/26/2009	N	MW-9S-102609	46.9	-
10/26/2010	N	MW-9S-102610	24.4	-
10/25/2011	N	MW-9S-102511	230	-
03/12/2012	N	MW-9S-031212	130	-
10/16/2012	N	MW-9S-101612	120	-
07/11/2014	N	3159-071114-1750	140	-
04/21/2015	N	MW9S-042115-1440	18	-
05/26/2016	N	MW9S-052616-1125	51 J	-
PZ-1				
12/15/1999	N	PZ-1-121599	< 5	-
06/19/2000	N	PZ-1-061900	67	-
09/28/2000	N	PZ-1-092800	< 20	-
04/22/2003	N	PZ-1-042203	-	< 0.1
PZ-2				
12/15/1999	N	PZ-2-121599	241	-
06/19/2000	N	PZ-2-061900	9800	-
09/28/2000	N	PZ-2-092800	1550	-
01/24/2001	N	PZ-2-012401	1320	-
06/20/2001	N	PZ-2-062001	1540	-
06/20/2001	FD	PZ-2-062001-DUP	1650	-

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

NYSDEC TOGS 1.1.1 Class GA Water Quality Standards		Chemical Name	Cyanide, Total	Benzene
		Units	200 ug/L	1 ug/L
Sample Type	Sample Name			
PZ-2 (continued)				
04/22/2003	N	PZ-2-042203	-	< 0.1
04/23/2003	N	PZ-2-042303	3230	-
10/22/2003	N	PZ-2-102203	1860	-
04/14/2004	N	PZ-2-041404	1470	-
08/03/2004	N	PZ-2-080304	804	-
10/29/2004	N	PZ-2-102904	1410	-
04/08/2005	N	PZ-2-040805	1020	-
10/04/2005	N	PZ-2-100405	535	-
10/03/2006	N	PZ-2-100306	989	-
10/23/2007	N	PZ-2-102307	352	-
10/28/2008	N	PZ-2-102808	242	-
10/26/2009	N	PZ-2-102609	< 10	-
10/26/2010	N	PZ-2-102610	262	-
10/25/2011	N	PZ-2-102511	270	-
03/12/2012	N	PZ-2-031212	730	-
10/16/2012	N	PZ-2-101612	460	-
07/11/2014	N	3159-071114-1520	2900 J	-
04/21/2015	N	PZ02-042115-1155	580	-
05/26/2016	N	PZ02-052616-1635	2700 J	-
08/23/2017	N	PZ02-082317-1430	3600	-
PZ-3				
12/15/1999	N	PZ-3-121599	696	-
12/15/1999	FD	PZ-3-121599-DUP	682	-
06/19/2000	N	PZ-3-061900	380	-
06/19/2000	FD	PZ-3-061900-DUP	440	-
09/28/2000	N	PZ-3-092800	200	-
01/24/2001	N	PZ-3-012401	265	-
06/20/2001	N	PZ-3-062001	400	-
04/22/2003	N	PZ-3-042203	-	12
04/23/2003	N	PZ-3-042303	646	-
10/22/2003	N	PZ-3-102203	210	-
04/14/2004	N	PZ-3-041404	327	-
10/29/2004	N	PZ-3-102904	167	-
04/08/2005	N	PZ-3-040805	22	-
10/04/2005	N	PZ-3-100405	190	-
10/03/2006	N	PZ-3-100306	213	-
10/23/2007	N	PZ-3-102307	166	-
PZ-6				
12/15/1999	N	PZ-6-121599	14	-
06/19/2000	N	PZ-6-061900	21	-
01/24/2001	N	PZ-6-012401	< 3	-
04/22/2003	N	PZ-6-042203	-	< 0.1
02/14/2006	N	PZ-6-021406	-	< 0.2
10/03/2006	N	PZ-6-100306	-	< 0.2
10/23/2007	N	PZ-6-102307	-	< 0.2
PZ-7				
12/15/1999	N	PZ-7-121599	65	-
06/19/2000	N	PZ-7-061900	49	-
09/28/2000	N	PZ-7-092800	80	-
01/24/2001	N	PZ-7-012401	73	-
06/20/2001	N	PZ-7-062001	30	-

TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

NYSDEC TOGS 1.1.1 Class GA Water Quality Standards		Chemical Name	Cyanide, Total	Benzene
		Units	200	1
			ug/L	ug/L
	Sample Type	Sample Name		
PZ-7 (continued)				
04/22/2003	N	PZ-7-042203	-	< 0.1
02/14/2006	N	PZ-7-021406	-	< 0.2
10/03/2006	N	PZ-7-100306	-	< 0.2
10/23/2007	N	PZ-7-102307	-	< 0.2
PZ-8				
12/15/1999	N	PZ-8-121599	296	-
12/15/1999	FD	PZ-8-121599-DUP	296	-
06/19/2000	N	PZ-8-061900	94	-
09/28/2000	N	PZ-8-092800	300	-
01/24/2001	N	PZ-8-012401	358	-
04/22/2003	N	PZ-8-042203	-	1200
02/14/2006	N	PZ-8-021406	-	580
10/03/2006	N	PZ-8-100306	-	500
10/23/2007	N	PZ-8-102307	-	670
10/28/2008	N	PZ-8-102808	-	590
10/26/2009	N	PZ-8-102609	-	1100
10/26/2010	N	PZ-8-102610	-	770
10/25/2011	N	PZ-8-102511	-	150
10/16/2012	N	PZ-8-101612	-	530
07/11/2014	N	3159-071114-1640	-	810
04/21/2015	N	PZ08-042115-1315	-	140
05/26/2016	N	PZ08-052616-1515	-	65 J
05/26/2016	FD	4527-052616-0001	-	57 J
08/23/2017	N	PZ08-082317-1300	-	380
08/23/2017	FD	1234-082317-0002	-	380
PZ-10				
06/19/2000	N	PZ-10-061900	60	-
09/28/2000	N	PZ-10-092800	< 20	-
01/24/2001	N	PZ-10-012401	< 3	-
06/20/2001	N	PZ-10-062001	< 3	-
04/22/2003	N	PZ-10-042203	-	< 0.1
04/23/2003	N	PZ-10-042303	< 3	-
10/22/2003	N	PZ-10-102203	< 3	-
04/14/2004	N	PZ-10-041404	< 3	-
10/29/2004	N	PZ-10-102904	8	-
04/08/2005	N	PZ-10-040805	5	-
10/04/2005	N	PZ-10-100405	< 3	-
10/03/2006	N	PZ-10-100306	< 3	-
10/23/2007	N	PZ-10-102307	< 3	-
05/26/2016	N	PZ10-052616-1335	< 10 J	0.11 R
08/23/2017	N	PZ10-082317-1545	< 10	< 1
PZ-11				
06/19/2000	N	PZ-11-061900	120	-
09/28/2000	N	PZ-11-092800	160	-
01/24/2001	N	PZ-11-012401	78	-
06/20/2001	N	PZ-11-062001	162	-
04/22/2003	N	PZ-11-042203	-	< 0.1
04/23/2003	N	PZ-11-042303	84	-
10/22/2003	N	PZ-11-102203	91	< 0.1
04/14/2004	N	PZ-11-041404	74	< 0.1
10/29/2004	N	PZ-11-102904	137	< 0.1

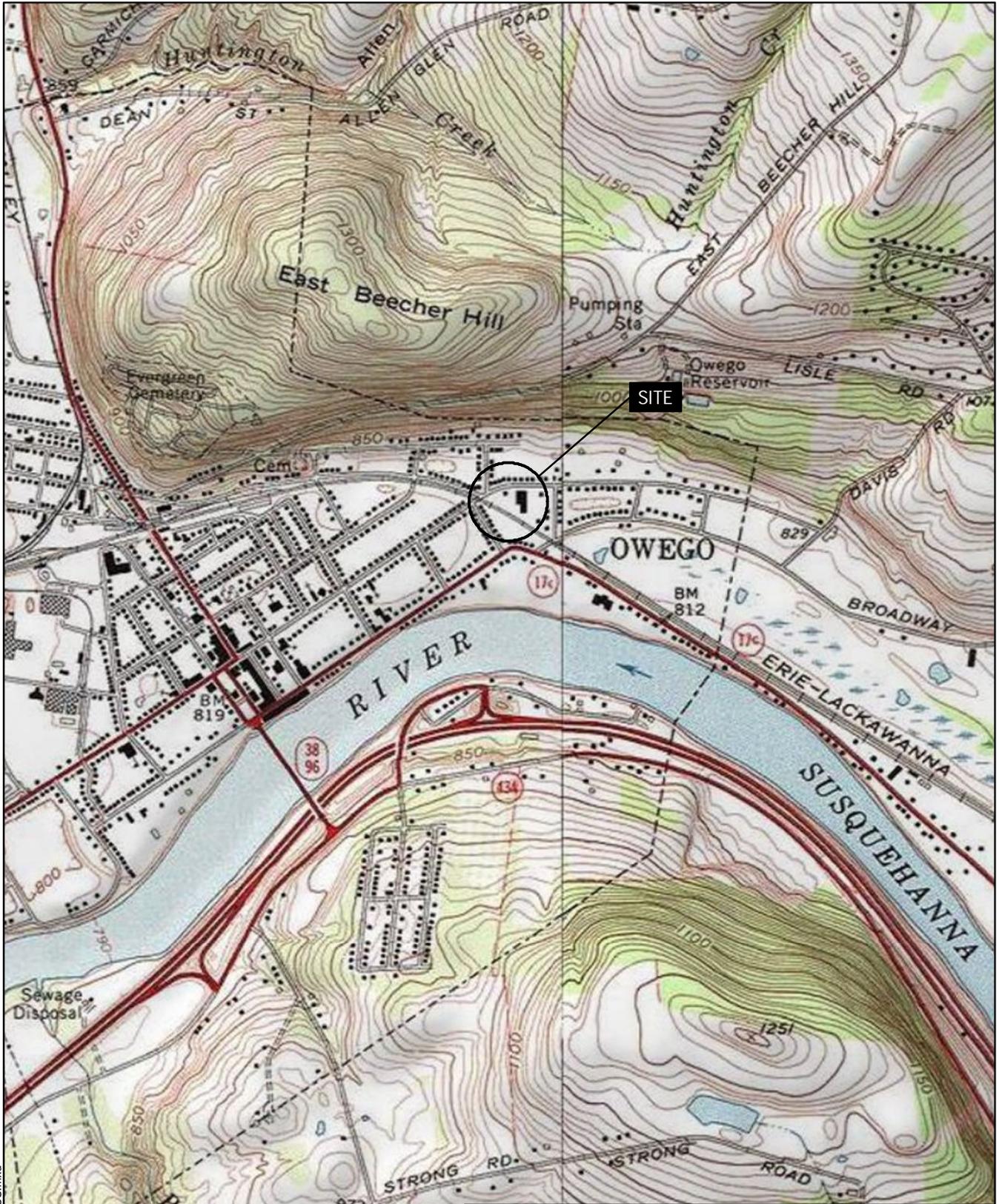
TABLE II
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NEW YORK STATE ELECTRIC & GAS
OWEGO FORMER MGP SITE
OWEGO, NEW YORK

NYSDEC TOGS 1.1.1 Class GA Water Quality Standards		Chemical Name	Cyanide, Total	Benzene
		Units	200 ug/L	1 ug/L
	Sample Type	Sample Name		
PZ-11 (continued)				
04/08/2005	N	PZ-11-040805	95	< 0.2
10/04/2005	N	PZ-11-100405	39	< 0.2
10/03/2006	N	PZ-11-100306	111	0.5
10/23/2007	N	PZ-11-102307	41.5	< 0.2
PZ-12				
06/19/2000	N	PZ-12-061900	45	-
01/24/2001	N	PZ-12-012401	< 3	-
04/22/2003	N	PZ-12-042203	-	< 0.1
PZ-14				
06/19/2000	N	PZ-14-061900	< 10	-
PZ-15				
06/19/2000	N	PZ-15-061900	< 10	-

Notes and Abbreviations:

- Results were compared to TOGS Water Quality Standards, Table 1, Class GA (June 1998). Exceedances are shaded.
- <: Result is not detected above the indicated reporting limit.
J: Estimated result.
R: Rejected during validation.
- Results in **bold** are detected.
- Sample type codes: N - Normal, FD - Field Duplicate.
- Samples collected prior to July 2014 were obtained from Ish Inc.

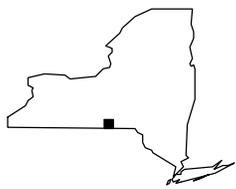
FIGURES



G:\40490_Owego\GIS\40490-SITE-LOCUS.mxd

MAP SOURCE: ESRI

SITE COORDINATES : 42°06'29"N,76°15'09"W



**HALEY
ALDRICH**

OWEGO FORMER MGP SITE
NEW YORK STATE ELECTRIC & GAS
OWEGO, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2,000 FT
APRIL 2018

FIGURE 1



LEGEND

-  MONITORING WELL
-  PIEZOMETER

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. GROUNDWATER ELEVATIONS WERE MEASURED ON 23 AUGUST 2017.
3. MW-2 WAS NOT MEASURED DUE TO AN OBSTRUCTION INSIDE THE WELL CASING.
4. MW-9S WAS NOT MEASURED.



OWEGO FORMER MGP SITE
 NEW YORK STATE ELECTRIC & GAS
 OWEGO, NEW YORK

**SITE PLAN WITH
 GROUNDWATER ELEVATIONS**

SCALE: AS SHOWN
 APRIL 2018



LEGEND

-  MONITORING WELL
-  PIEZOMETER

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DATABOX RESULT UNITS ARE UG/L.
3. J: ESTIMATED RESULT
4. R: REJECTED DURING VALIDATION
5. /: INDICATES DUPLICATE SAMPLE RESULT
6. RESULTS WERE COMPARED AGAINST TOGS WATER QUALITY STANDARDS. EXCEEDANCES ARE SHOWN IN RED.



OWEGO FORMER MGP SITE
 NEW YORK STATE ELECTRIC & GAS
 OWEGO, NEW YORK

**TOTAL CYANIDE AND BENZENE
 IN GROUNDWATER**

SCALE: AS SHOWN
 APRIL 2018

FIGURE 3

APPENDIX A

Low-Flow Groundwater Sampling Forms (August 2017)



LOW FLOW/MNA FIELD SAMPLING FORM

PROJECT OWEGO FORMER MGP SITE
 LOCATION OWEGO, NEW YORK
 CLIENT NYSEG

H&A FILE NO. 40490-003
 PROJECT MGR. D. ALLEN
 FIELD REP. D. KELLER
 DATE 08/23/17

Sampling Data:

Well ID: PZ-08 Well Depth: 27.6 ft Initial Depth To Water: 18.99 ft Purging Device: Bladder Pump
 Start time: 12:06 Depth To Top Of Screen: unknown ft Depth Of Pump Intake: 22 ft Tubing Present In Well: Yes No
 Finish Time: 13:25 Depth To Bottom Of Screeer: unknown ft Tubing Type: TruPoly

Elapsed Time (min)	Depth To Water From Casing (ft)	Pump Setting (sec/sec)	Purge Rate (ml/min)	Cumulative Purge Vol. (gal)	Temperature (°C) +/- 10%	pH +/- 0.1	Conductivity (us/cm) +/- 3%	Dissolved Oxygen (mg/L) +/- 10%	Turbidity (NTU) <50	ORP/eH (mv) +/- 10 mv	Comments
0	18.91	10/5	70	0	-	-	-	-	-	-	
10	19.11	5/5	100	0.4	16.3	6.69	817	0.69	3.06	-55.5	
15	19.11	5/5	100	0.5	16.0	6.69	818	0.84	1.84	-56.8	
20	19.11	5/5	100	0.6	16.0	6.69	817	1.00	1.21	-56.7	
25	19.11	5/5	100	0.7	16.1	6.69	819	1.06	1.13	-57.1	
30	19.11	5/5	100	0.8	16.1	6.69	822	1.12	0.82	-57.7	
35	19.11	5/5	100	0.9	16.0	6.69	822	1.14	0.80	-58.0	
40	19.11	5/5	100	1.0	15.7	6.69	823	1.13	0.72	-58.0	OK to sample
											Samples:
											PZ08-082317-1300 Normal (Benzene)
											1234-082317-0002 Field Duplicate

APPENDIX B

Data Usability Summary Report and Analytical Report (August 2017)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Buffalo

10 Hazelwood Drive

Amherst, NY 14228-2298

Tel: (716)691-2600

TestAmerica Job ID: 480-123192-1

Client Project/Site: NYSEG - Owego Former MGP

For:

New York State Electric & Gas

PO BOX 5224

Binghamton, New York 13902

Attn: Tracy L. Blazicek



Authorized for release by:

9/7/2017 10:18:16 AM

Rebecca Jones, Project Management Assistant I

rebecca.jones@testamericainc.com

Designee for

Melissa Deyo, Project Manager I

(716)504-9874

melissa.deyo@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Lab Chronicle	12
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Sample Summary	16
Chain of Custody	17
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Definitions/Glossary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Job ID: 480-123192-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative 480-123192-1

Receipt

The samples were received on 8/24/2017 10:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

GC VOA

Method(s) 602: The following samples were diluted to bring the concentration of target analytes within the calibration range: PZ08-082317-1300 (480-123192-3) and 1234-082317-0002 (480-123192-6). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry

Method(s) 335.4, 9012B, SM 4500 CN E: The laboratory control sample (LCS) for preparation batch 480-375031 recovered outside control limits for the following analytes: Cyanide. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported. 1234-082317-0003 (480-123192-7), 1234-082317-0004 (480-123192-8) and (480-123192-A-8-B DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Client Sample ID: MW04-082317-1245

Lab Sample ID: 480-123192-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cyanide, Total	5.7		0.20	0.10	mg/L	20		9012B	Total/NA

Client Sample ID: PZ02-082317-1430

Lab Sample ID: 480-123192-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cyanide, Total	3.6		0.10	0.050	mg/L	10		9012B	Total/NA

Client Sample ID: PZ08-082317-1300

Lab Sample ID: 480-123192-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	380		100	35	ug/L	100		602	Total/NA

Client Sample ID: PZ10-082317-1545

Lab Sample ID: 480-123192-4

No Detections.

Client Sample ID: 1234-082317-0001

Lab Sample ID: 480-123192-5

No Detections.

Client Sample ID: 1234-082317-0002

Lab Sample ID: 480-123192-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	380		100	35	ug/L	100		602	Total/NA

Client Sample ID: 1234-082317-0003

Lab Sample ID: 480-123192-7

No Detections.

Client Sample ID: 1234-082317-0004

Lab Sample ID: 480-123192-8

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

Client Sample Results

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Client Sample ID: MW04-082317-1245

Lab Sample ID: 480-123192-1

Date Collected: 08/23/17 12:45

Matrix: Water

Date Received: 08/24/17 10:40

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	5.7		0.20	0.10	mg/L		08/31/17 10:36	09/01/17 12:12	20

Client Sample ID: PZ02-082317-1430

Lab Sample ID: 480-123192-2

Date Collected: 08/23/17 14:30

Matrix: Water

Date Received: 08/24/17 10:40

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	3.6		0.10	0.050	mg/L		08/31/17 10:36	09/01/17 12:10	10

Client Sample ID: PZ08-082317-1300

Lab Sample ID: 480-123192-3

Date Collected: 08/23/17 13:00

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	380		100	35	ug/L			08/25/17 00:42	100

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	91		78 - 120		08/25/17 00:42	100

Client Sample ID: PZ10-082317-1545

Lab Sample ID: 480-123192-4

Date Collected: 08/23/17 15:45

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.35	ug/L			08/24/17 23:06	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	91		78 - 120		08/24/17 23:06	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.010	0.0050	mg/L		08/31/17 10:36	09/01/17 10:10	1

Client Sample ID: 1234-082317-0001

Lab Sample ID: 480-123192-5

Date Collected: 08/23/17 00:00

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.35	ug/L			08/24/17 22:34	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	96		78 - 120		08/24/17 22:34	1

TestAmerica Buffalo

Client Sample Results

Client: New York State Electric & Gas
 Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Client Sample ID: 1234-082317-0002

Lab Sample ID: 480-123192-6

Date Collected: 08/23/17 00:00

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	380		100	35	ug/L			08/25/17 01:14	100
Surrogate	%Recovery	Qualifier	Limits						
a,a,a-Trifluorotoluene	90		78 - 120						
							Prepared	Analyzed	Dil Fac
								08/25/17 01:14	100

Client Sample ID: 1234-082317-0003

Lab Sample ID: 480-123192-7

Date Collected: 08/24/17 08:50

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.35	ug/L			08/24/17 23:38	1
Surrogate	%Recovery	Qualifier	Limits						
a,a,a-Trifluorotoluene	91		78 - 120						
							Prepared	Analyzed	Dil Fac
								08/24/17 23:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND	F1 *	0.010	0.0050	mg/L		09/01/17 14:02	09/05/17 11:36	1

Client Sample ID: 1234-082317-0004

Lab Sample ID: 480-123192-8

Date Collected: 08/24/17 08:55

Matrix: Water

Date Received: 08/24/17 10:40

Method: 602 - Purgeable Aromatics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.35	ug/L			08/25/17 00:11	1
Surrogate	%Recovery	Qualifier	Limits						
a,a,a-Trifluorotoluene	98		78 - 120						
							Prepared	Analyzed	Dil Fac
								08/25/17 00:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND	*	0.010	0.0050	mg/L		09/01/17 14:02	09/05/17 11:39	1

Surrogate Summary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Method: 602 - Purgeable Aromatics (GC)

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	TFT1 (78-120)
480-123192-3	PZ08-082317-1300	91
480-123192-4	PZ10-082317-1545	91
480-123192-5	1234-082317-0001	96
480-123192-6	1234-082317-0002	90
480-123192-7	1234-082317-0003	91
480-123192-8	1234-082317-0004	98
LCS 480-373829/5	Lab Control Sample	91
LCSD 480-373829/6	Lab Control Sample Dup	91
MB 480-373829/4	Method Blank	95

Surrogate Legend

TFT = a,a,a-Trifluorotoluene

QC Sample Results

Client: New York State Electric & Gas
 Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Method: 602 - Purgeable Aromatics (GC)

Lab Sample ID: MB 480-373829/4

Matrix: Water

Analysis Batch: 373829

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.35	ug/L			08/24/17 19:47	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	95		78 - 120					08/24/17 19:47	1

Lab Sample ID: LCS 480-373829/5

Matrix: Water

Analysis Batch: 373829

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene	4.00	4.07		ug/L		102	43 - 155		
Surrogate	LCS %Recovery	LCS Qualifier	Limits						
a,a,a-Trifluorotoluene	91		78 - 120						

Lab Sample ID: LCSD 480-373829/6

Matrix: Water

Analysis Batch: 373829

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	4.00	3.98		ug/L		99	43 - 155	2	30
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
a,a,a-Trifluorotoluene	91		78 - 120						

Method: 9012B - Cyanide, Total and/or Amenable

Lab Sample ID: MB 480-374795/1-A

Matrix: Water

Analysis Batch: 375018

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 374795

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.010	0.0050	mg/L		08/31/17 10:36	09/01/17 09:47	1

Lab Sample ID: LCS 480-374795/2-A

Matrix: Water

Analysis Batch: 375018

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 374795

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cyanide, Total	0.250	0.261		mg/L		104	90 - 110		

Lab Sample ID: 480-123192-1 MS

Matrix: Water

Analysis Batch: 375018

Client Sample ID: MW04-082317-1245

Prep Type: Total/NA

Prep Batch: 374795

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	5.7		0.100	4.49	4	mg/L		-1230	90 - 110

TestAmerica Buffalo

QC Sample Results

Client: New York State Electric & Gas
 Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Method: 9012B - Cyanide, Total and/or Amenable (Continued)

Lab Sample ID: 480-123192-1 MSD

Matrix: Water

Analysis Batch: 375018

Client Sample ID: MW04-082317-1245

Prep Type: Total/NA

Prep Batch: 374795

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD		Unit	D	%Rec	%Rec.		RPD	Limit
				Result	Qualifier				Limits	RPD		
Cyanide, Total	5.7		0.100	4.19	4	mg/L		-1530	90 - 110	7	15	

Lab Sample ID: MB 480-375031/1-A

Matrix: Water

Analysis Batch: 375242

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 375031

Analyte	MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cyanide, Total	ND		0.010	0.0050	mg/L		09/01/17 14:02	09/05/17 11:29	1

Lab Sample ID: LCS 480-375031/2-A

Matrix: Water

Analysis Batch: 375242

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 375031

Analyte	Spike Added	LCS		Unit	D	%Rec	%Rec.	
		Result	Qualifier				Limits	RPD
Cyanide, Total	0.250	0.291	*	mg/L		116	90 - 110	

Lab Sample ID: 480-123192-7 MS

Matrix: Water

Analysis Batch: 375242

Client Sample ID: 1234-082317-0003

Prep Type: Total/NA

Prep Batch: 375031

Analyte	Sample Result	Sample Qualifier	Spike Added	MS		Unit	D	%Rec	%Rec.	
				Result	Qualifier				Limits	RPD
Cyanide, Total	ND	F1 *	0.100	0.111	F1	mg/L		111	90 - 110	

Lab Sample ID: 480-123192-8 DU

Matrix: Water

Analysis Batch: 375242

Client Sample ID: 1234-082317-0004

Prep Type: Total/NA

Prep Batch: 375031

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD	
								Limit	Limit
Cyanide, Total	ND	*	ND	*	mg/L			NC	15

QC Association Summary

Client: New York State Electric & Gas
 Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

GC VOA

Analysis Batch: 373829

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-123192-3	PZ08-082317-1300	Total/NA	Water	602	
480-123192-4	PZ10-082317-1545	Total/NA	Water	602	
480-123192-5	1234-082317-0001	Total/NA	Water	602	
480-123192-6	1234-082317-0002	Total/NA	Water	602	
480-123192-7	1234-082317-0003	Total/NA	Water	602	
480-123192-8	1234-082317-0004	Total/NA	Water	602	
MB 480-373829/4	Method Blank	Total/NA	Water	602	
LCS 480-373829/5	Lab Control Sample	Total/NA	Water	602	
LCS 480-373829/6	Lab Control Sample Dup	Total/NA	Water	602	

General Chemistry

Prep Batch: 374795

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-123192-1	MW04-082317-1245	Total/NA	Water	9012B	
480-123192-2	PZ02-082317-1430	Total/NA	Water	9012B	
480-123192-4	PZ10-082317-1545	Total/NA	Water	9012B	
MB 480-374795/1-A	Method Blank	Total/NA	Water	9012B	
LCS 480-374795/2-A	Lab Control Sample	Total/NA	Water	9012B	
480-123192-1 MS	MW04-082317-1245	Total/NA	Water	9012B	
480-123192-1 MSD	MW04-082317-1245	Total/NA	Water	9012B	

Analysis Batch: 375018

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-123192-1	MW04-082317-1245	Total/NA	Water	9012B	374795
480-123192-2	PZ02-082317-1430	Total/NA	Water	9012B	374795
480-123192-4	PZ10-082317-1545	Total/NA	Water	9012B	374795
MB 480-374795/1-A	Method Blank	Total/NA	Water	9012B	374795
LCS 480-374795/2-A	Lab Control Sample	Total/NA	Water	9012B	374795
480-123192-1 MS	MW04-082317-1245	Total/NA	Water	9012B	374795
480-123192-1 MSD	MW04-082317-1245	Total/NA	Water	9012B	374795

Prep Batch: 375031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-123192-7	1234-082317-0003	Total/NA	Water	9012B	
480-123192-8	1234-082317-0004	Total/NA	Water	9012B	
MB 480-375031/1-A	Method Blank	Total/NA	Water	9012B	
LCS 480-375031/2-A	Lab Control Sample	Total/NA	Water	9012B	
480-123192-7 MS	1234-082317-0003	Total/NA	Water	9012B	
480-123192-8 DU	1234-082317-0004	Total/NA	Water	9012B	

Analysis Batch: 375242

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-123192-7	1234-082317-0003	Total/NA	Water	9012B	375031
480-123192-8	1234-082317-0004	Total/NA	Water	9012B	375031
MB 480-375031/1-A	Method Blank	Total/NA	Water	9012B	375031
LCS 480-375031/2-A	Lab Control Sample	Total/NA	Water	9012B	375031
480-123192-7 MS	1234-082317-0003	Total/NA	Water	9012B	375031
480-123192-8 DU	1234-082317-0004	Total/NA	Water	9012B	375031

TestAmerica Buffalo

Lab Chronicle

Client: New York State Electric & Gas
 Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Client Sample ID: MW04-082317-1245

Lab Sample ID: 480-123192-1

Date Collected: 08/23/17 12:45

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	9012B			374795	08/31/17 10:36	JCL	TAL BUF
Total/NA	Analysis	9012B		20	375018	09/01/17 12:12	KRT	TAL BUF

Client Sample ID: PZ02-082317-1430

Lab Sample ID: 480-123192-2

Date Collected: 08/23/17 14:30

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	9012B			374795	08/31/17 10:36	JCL	TAL BUF
Total/NA	Analysis	9012B		10	375018	09/01/17 12:10	KRT	TAL BUF

Client Sample ID: PZ08-082317-1300

Lab Sample ID: 480-123192-3

Date Collected: 08/23/17 13:00

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		100	373829	08/25/17 00:42	MRB	TAL BUF

Client Sample ID: PZ10-082317-1545

Lab Sample ID: 480-123192-4

Date Collected: 08/23/17 15:45

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		1	373829	08/24/17 23:06	MRB	TAL BUF
Total/NA	Prep	9012B			374795	08/31/17 10:36	JCL	TAL BUF
Total/NA	Analysis	9012B		1	375018	09/01/17 10:10	KRT	TAL BUF

Client Sample ID: 1234-082317-0001

Lab Sample ID: 480-123192-5

Date Collected: 08/23/17 00:00

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		1	373829	08/24/17 22:34	MRB	TAL BUF

Client Sample ID: 1234-082317-0002

Lab Sample ID: 480-123192-6

Date Collected: 08/23/17 00:00

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		100	373829	08/25/17 01:14	MRB	TAL BUF

Lab Chronicle

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Client Sample ID: 1234-082317-0003

Lab Sample ID: 480-123192-7

Date Collected: 08/24/17 08:50

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		1	373829	08/24/17 23:38	MRB	TAL BUF
Total/NA	Prep	9012B			375031	09/01/17 14:02	JCL	TAL BUF
Total/NA	Analysis	9012B		1	375242	09/05/17 11:36	MDL	TAL BUF

Client Sample ID: 1234-082317-0004

Lab Sample ID: 480-123192-8

Date Collected: 08/24/17 08:55

Matrix: Water

Date Received: 08/24/17 10:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	602		1	373829	08/25/17 00:11	MRB	TAL BUF
Total/NA	Prep	9012B			375031	09/01/17 14:02	JCL	TAL BUF
Total/NA	Analysis	9012B		1	375242	09/05/17 11:39	MDL	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Accreditation/Certification Summary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Laboratory: TestAmerica Buffalo

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	10026	03-31-18

1

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15

Method Summary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Method	Method Description	Protocol	Laboratory
602	Purgeable Aromatics (GC)	40CFR136A	TAL BUF
9012B	Cyanide, Total and/or Amenable	SW846	TAL BUF

Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600



Sample Summary

Client: New York State Electric & Gas
Project/Site: NYSEG - Owego Former MGP

TestAmerica Job ID: 480-123192-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-123192-1	MW04-082317-1245	Water	08/23/17 12:45	08/24/17 10:40
480-123192-2	PZ02-082317-1430	Water	08/23/17 14:30	08/24/17 10:40
480-123192-3	PZ08-082317-1300	Water	08/23/17 13:00	08/24/17 10:40
480-123192-4	PZ10-082317-1545	Water	08/23/17 15:45	08/24/17 10:40
480-123192-5	1234-082317-0001	Water	08/23/17 00:00	08/24/17 10:40
480-123192-6	1234-082317-0002	Water	08/23/17 00:00	08/24/17 10:40
480-123192-7	1234-082317-0003	Water	08/24/17 08:50	08/24/17 10:40
480-123192-8	1234-082317-0004	Water	08/24/17 08:55	08/24/17 10:40



Company Name: Haley + Adrich Address: 200 Town Center Dr. City/State/Zip: Buffalo NY 14223 Phone: 716-391-3320 Fax:		Client Contact Company Name: NYSEG - Owego Site Site: Owego former MGP P O #: 4098-003		Regulatory Program: <input type="checkbox"/> DW <input type="checkbox"/> NPDES <input type="checkbox"/> RCRA <input type="checkbox"/> Other:		Project Manager: Doug Allen Tel/Fax:		Site Contact: D. Keller Lab Contact: M. Deyo Date: 08/24/17 Carrier:		COC No.: 1 of 1 COCs			
Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below:		2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day <input checked="" type="checkbox"/>		Sample Type (C=Comp, G=Grab)		Sample Time		Sample Date		Matrix		# of Cont.	
standard		G		12:45		8/23		W		3		NY X	
		G		14:30		8/23		W		1		NN X	
		G		13:00		8/23		W		3		NN X	
		G		15:45		8/23		W		4		NN X	
		G		-		8/23		W		1		NN X	
		G		-		8/23		W		3		NN X	
		G		08:50		8/24		W		4		NN X	
		G		08:55		8/24		W		4		NN X	
Sample Identification												Sample Specific Notes: N/MS/MSD Trip Blank Field Dup Equip Blank-Zin Equip Blank-1 in	
Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4= HNO3, 5= NaOH, 6= Other												5	
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.												Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input checked="" type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown												<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months	
Special Instructions/QC Requirements & Comments:												3.5 #1	
Relinquished by: DR Keller		Relinquished by: J. Deyo		Relinquished by: J. Deyo		Relinquished by: J. Deyo		Relinquished by: J. Deyo		Relinquished by: J. Deyo		Relinquished by: J. Deyo	
Custody Seal No.:		Yes <input type="checkbox"/> No <input type="checkbox"/>		Custody Seal No.:		Yes <input type="checkbox"/> No <input type="checkbox"/>		Custody Seal No.:		Yes <input type="checkbox"/> No <input type="checkbox"/>		Custody Seal No.:	
Date/Time: 8/24 10:10		Date/Time: 8/24 10:10		Date/Time: 8/24 10:10		Date/Time: 8/24 10:10		Date/Time: 8/24 10:10		Date/Time: 8/24 10:10		Date/Time: 8/24 10:10	
Company: HTA		Company: HTA		Company: HTA		Company: HTA		Company: HTA		Company: HTA		Company: HTA	
Date/Time: 8/24 12:10		Date/Time: 8/24 12:10		Date/Time: 8/24 12:10		Date/Time: 8/24 12:10		Date/Time: 8/24 12:10		Date/Time: 8/24 12:10		Date/Time: 8/24 12:10	
Company: THA		Company: THA		Company: THA		Company: THA		Company: THA		Company: THA		Company: THA	
Date/Time: 8-24-1210		Date/Time: 8-24-1210		Date/Time: 8-24-1210		Date/Time: 8-24-1210		Date/Time: 8-24-1210		Date/Time: 8-24-1210		Date/Time: 8-24-1210	
Company: JAB		Company: JAB		Company: JAB		Company: JAB		Company: JAB		Company: JAB		Company: JAB	



Login Sample Receipt Checklist

Client: New York State Electric & Gas

Job Number: 480-123192-1

Login Number: 123192

List Source: TestAmerica Buffalo

List Number: 1

Creator: Conway, Curtis R

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time (Excluding tests with immediate HTs)..	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	H+A
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	





**Data Usability Summary Report (DUSR)
 NYSEG - Owego Former MGP
 Analytical Laboratory: TestAmerica, Inc. - Buffalo, NY
 Sample Delivery Group # 4801231921
 Level II Review**

Analytical results for the project samples were reviewed to evaluate the data usability. Data was assessed in accordance with guidance from the following Federal and/or State guidance documents:

- USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA 540-R-2017-001)
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review (EPA 540-R-2017-002)
- NYSDEC “Guidance for the Development of Quality Assurance Plans and Data Usability Summary Reports (DUSR)”, September 1997

and method protocol criteria where applicable as prescribed by “Test Methods for Evaluating Solid Waste”, SW846, Update III, 1996, or Standard Methods for the Examination of Water and Wastewater, Eds 18-20.

This DUSR pertains to the following samples:

Sample ID
MW04-082317-1245
PZ02-082317-1430
PZ08-082317-1300
PZ10-082317-1545
1234-082317-0001
1234-082317-0002
1234-082317-0003
1234-082317-0004

Project Samples were analyzed according to the following analytical methods:

	Parameter	Analytical Method	Holding Time Criteria
1.	VOCs	EPA 8260B/624/602	14 days
2.	Cyanide, Total	EPA 9012B	14 days

The following items/criteria applicable to the analysis of project samples and associated QA/QC procedures were reviewed.

- Holding Times
- Project-specific Reporting Limits
- Blank Sample Analysis
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Duplicate Sample Analysis
- Field Duplicate Sample Analysis
- Sample Data Reporting Format
- Data Qualifiers
- Summary

Preservation and Holding Times

Maximum allowable holding times, measured from the time of sample collection to the time of sample preparation or analysis, were met for each project sample analyzed as part of this sample delivery group. No qualification of the data is recommended.

Project-specific Reporting Limits

The reporting limits for the samples within this Sample Delivery Group (SDG) met or exceeded the minimum reporting limit requirements specified by the Project-specific Quality Assurance Project Plan (QAPP). If a QAPP does not exist, all dilutions were still reviewed and found to be justified. Any non-detects with elevated reported limits are noted and explained below. In cases when multiple dilutions are reported per sample, the reviewer chose the lowest dilution with results still within the calibration range and rejected the alternative result.

During the analysis of VOCs (EPA Method 8260B) the reporting limits were greater than the Project-specific Quality Assurance Project Plan (QAPP) criteria. The following project sample data as specified in the following table were affected:

Target Analyte(s)	QAPP RL	Sample ID	Lab Package RL	Reason	Action
Target VOCs	1x	PZ08-082317-1300	100x	Abundance of target analyte	No further action
Target VOCs	1x	1234-082317-0002	100x	Abundance of target analyte	No further action

Action:

No further action - another target analyte was detected within the sample matrix that required dilution therefore no further action is necessary.

Request Reanalysis - Contact lab to inquire on the reason for the higher reporting limit and whether the sample can be resampled within the maximum allowable holding time.

During the analysis of general parameters the reporting limits were greater than the Project-specific Quality Assurance Project Plan (QAPP) criteria. The following project sample data as specified in the following table were affected:

Target Analyte(s)	QAPP RL	Sample ID	Lab Package RL	Reason	Action
Cyanide, Total	1x	MW04-082317-1245	20x	Abundance of target analyte	No further action
Cyanide, Total	1x	PZ02-082317-1430	10x	Abundance of target analyte	No further action

Action:

No further action - another target analyte was detected within the sample matrix that required dilution therefore no further action is necessary.

Request Reanalysis - Contact lab to inquire on the reason for the higher reporting limit and whether the sample can be resampled within the maximum allowable holding time.

Blank Sample Analysis

In accordance with cited USEPA guidelines, positive sample results should be reported unless the concentration of the compound in the project sample is found to be influenced by the amount found in any associated blank. USEPA method specific guidelines are followed when evaluating any detect found in a blank. Common laboratory contaminants include methylene chloride, acetone, 2-butanone, cyclohexane, and phthalate esters. Target analytes were not detected in associated blank samples (trip, equipment, or method) collected, prepared and/or analyzed concurrently with the project samples. No qualification of the data is recommended.

Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries

Analytical precision and accuracy was evaluated based on the laboratory control and matrix spike sample analyses performed concurrently with the project samples. For matrix spike samples, after the addition of a known amount of each target analyte to the sample matrix, the sample was analyzed to confirm the ability to identify these compounds within the sample matrix. For LCS analyses, after the addition of a known amount of each target analyte into laboratory reagent water, the sample was analyzed to confirm the ability of the analytical system to accurately quantify the compounds. The reported recovery of MS/MSD and LCS analyses fell within the laboratory QA acceptance criteria, with the following exception(s):

LCS ID / Project Sample MS	Type	Target Analyte(s)	%R	Affected Sample(s)	Positive	Non Detect
					Results	(ND)
MW04-082317-1245	MS	Cyanide, Total	-1230	None, native sample >4x spike		
	MSD	Cyanide, Total	-1530	None, native sample >4x spike		

Duplicate Sample Analysis

The replicate percent difference (RPD) was evaluated for each duplicate sample pair to monitor the reproducibility of the data. The RPD for each sample pair was within the QA/QC limit of 30% for aqueous samples and 50% for solid matrices, for those target analytes with sample concentrations >5X the MDL. No qualification of the data is recommended.

Field Duplicate Sample Analysis

The overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures, was evaluated by assessing the relative percent difference (RPD) data from field duplicate samples. All calculated RPD values were within matrix specific data quality objectives, with the exception of results qualified "J" as shown in the table(s) below:

Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	PZ08-082317-1300	1234-082317-0002		
Benzene	380	380	0%	None, RPD < 35%

Action:

If the sample matrix is solid and the %RPD is greater than 50%, the original sample results are qualified "J". If the sample matrix is water or air and the %RPD is greater than 35%, the original sample results are qualified "J".

Sample Data Reporting Format

The sample data are presented using USEPA Contract Laboratory Protocol (CLP) format or equivalent. The data package has been reviewed for completeness and found to contain each required sample result and associated QA/QC report form. The reporting format is complete and compliant with the objectives of the project. No qualification of the data is recommended.

Data Qualifiers

Samples that contain results between the MDL and RL were flagged as estimated, "J", by the laboratory. The data user should be aware that there is a possibility of false positive or mis-identification at the quantitation levels. The laboratory also qualified results when target analytes were detected in the associated method/preparation blank sample. Based on a spot check of the data qualifiers used, these flags appeared to be applied to the reported results in accordance with EPA guidance.

Summary

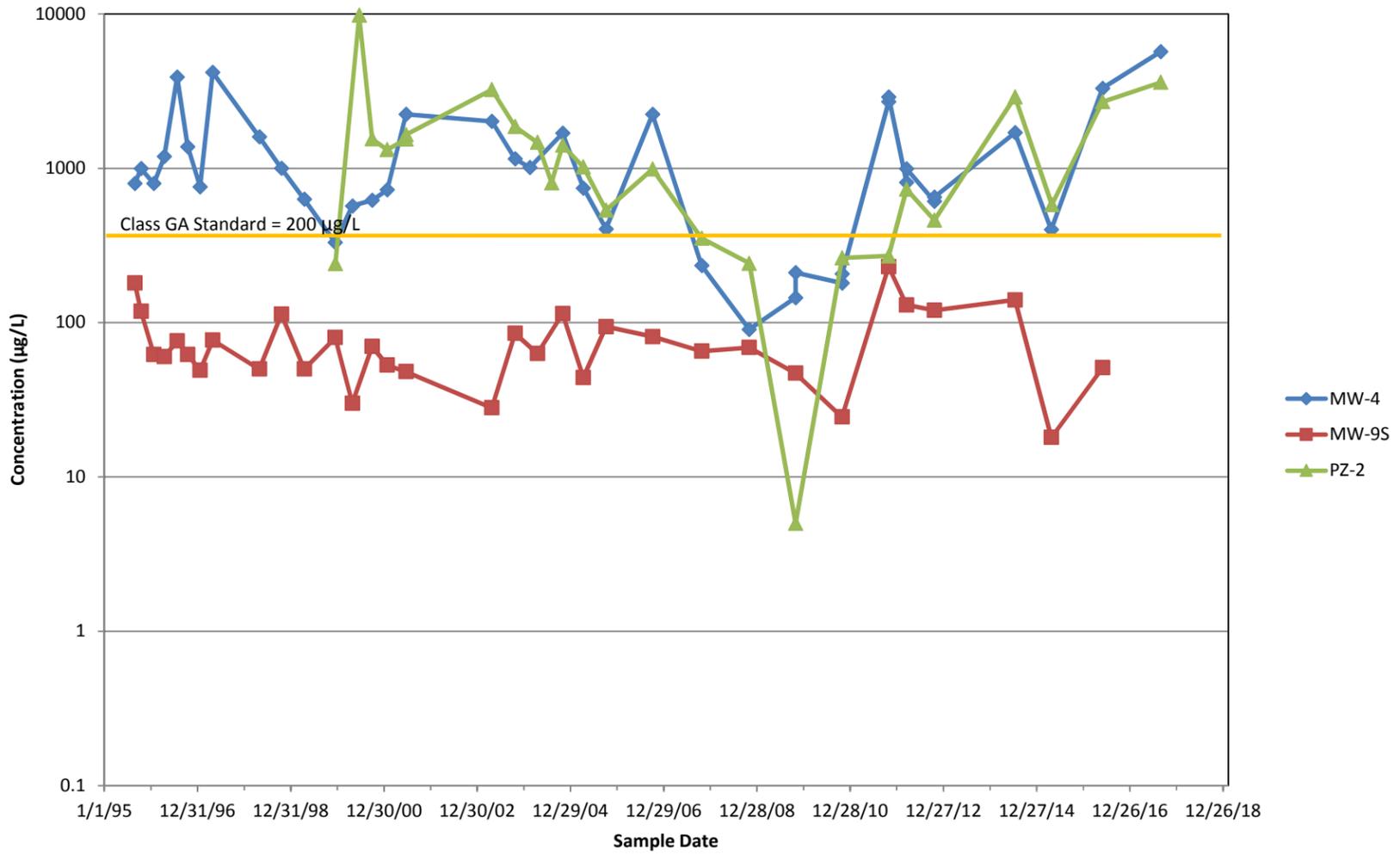
The results presented in each report were found to be compliant with the data quality objectives for the project and usable. Based on our review, the usability of the data is 100%, with the few exceptions noted above.

Date: 11/21/2017

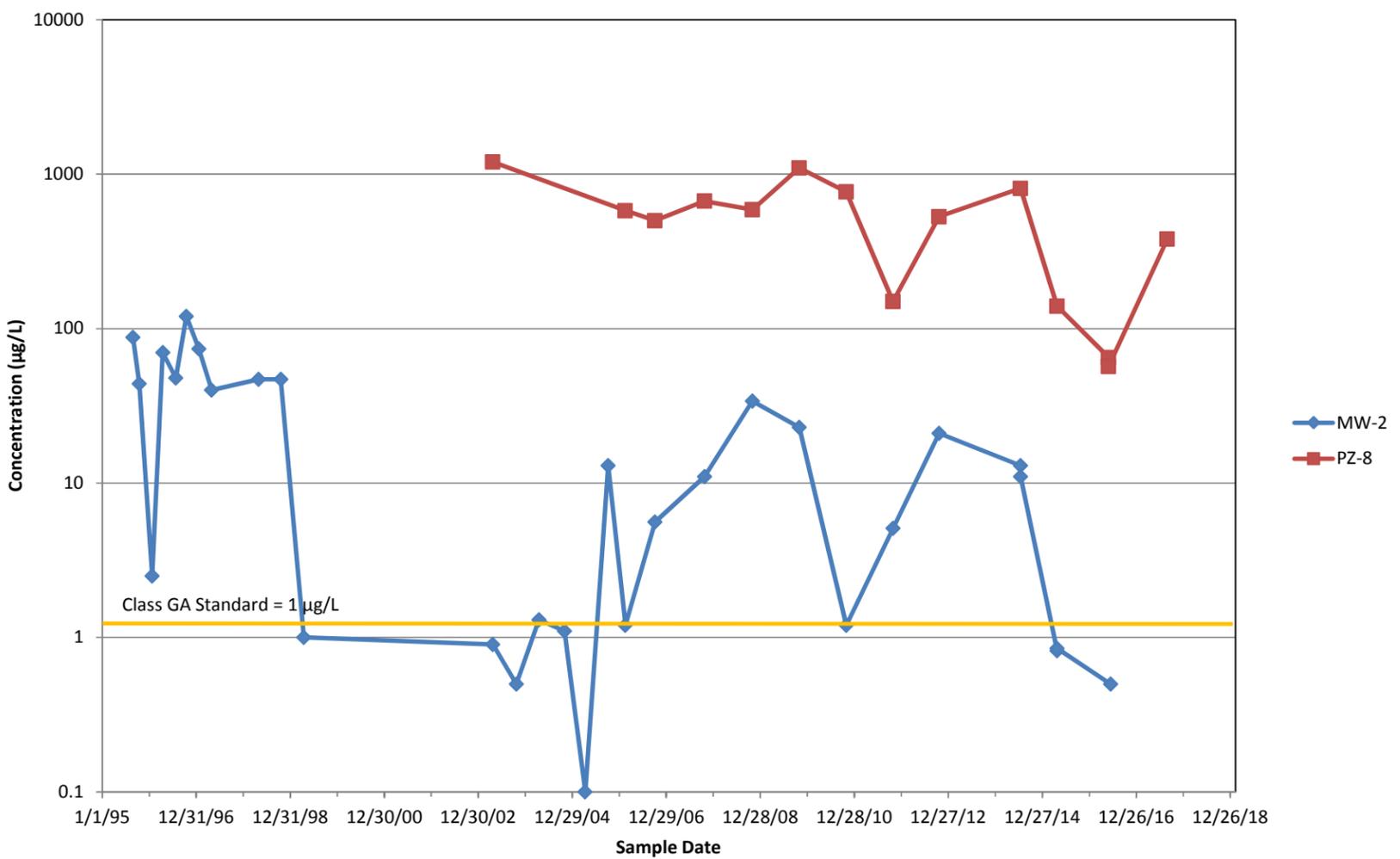
APPENDIX C

Time Series for Total Cyanide and Benzene in Groundwater

Total Cyanide in Groundwater

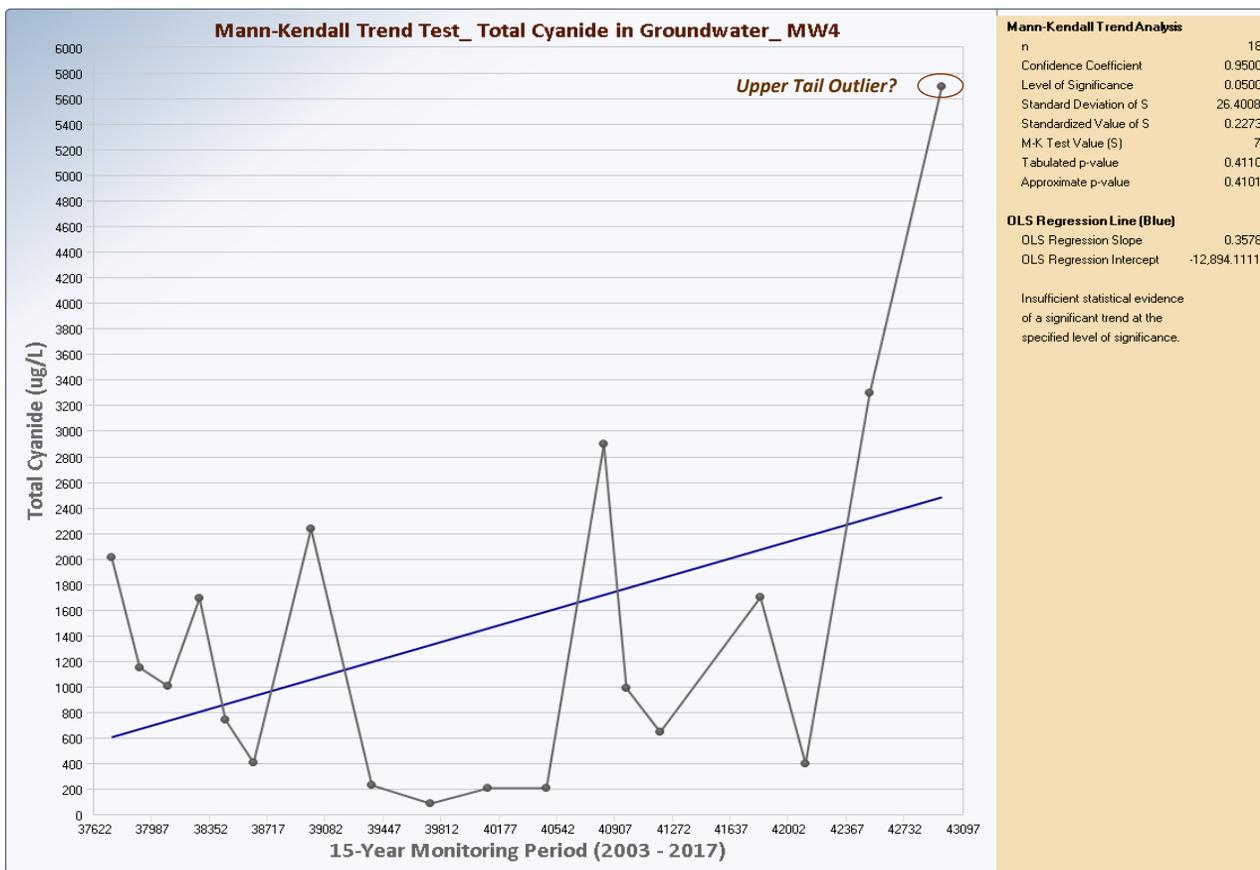


Benzene in Groundwater



APPENDIX D

Statistical Evaluations



Mann-Kendall Trend Test Analysis
 Date/Time Stamp ProUCL 5.1_11/16/2017_1:20:56 PM
 From File Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN.xlsx
Confidence Coefficient 0.95
 Level of Significance 0.05

MW-4_total cyanide_results_ug/L (APRIL 2003 - AUGUST 2017)

General Statistics

Number of Events Reported (m) 18
 Number of Reported Events Used 18
 Number Values Reported (n) 18
 Minimum 90.4
 Maximum 5700
 Mean 1424
 Geometric Mean 854.2
 Median 1000
 Standard Deviation 1432
 Coefficient of Variation 1.006

Mann-Kendall Test

M-K Test Value (S) 7
 Tabulated p-value 0.411
 Standard Deviation of S 26.4
 Standardized Value of S 0.227
 Approximate p-value 0.41

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

IS THERE A POTENTIAL (UPPER TAIL) OUTLIER IN TOTAL CYANIDE IN GROUNDWATER AT MW-4?

Total Cyanide in Groundwater_ ug/L
15-Year Monitoring Period (2003 - 2017)

Outlier Tests for Selected Uncensored Variables

User Selected Options
Date/Time Stamp ProUCL 5.1_11/22/2017_10:54:55 AM
From File Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN_.xlsx

MW-4_ Dixon's Outlier Test for total cyanide_result_ug/L

Number of Observations = 18
10% critical value: 0.424
5% critical value: 0.475
1% critical value: 0.561

1. Observation Value 5700 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.510

For 10% significance level, 5700 is an outlier.

For 5% significance level, 5700 is an outlier.

For 1% significance level, 5700 is not an outlier.

Level of Confidence = 90%

Level of Confidence = 95%

Level of Confidence = 99%

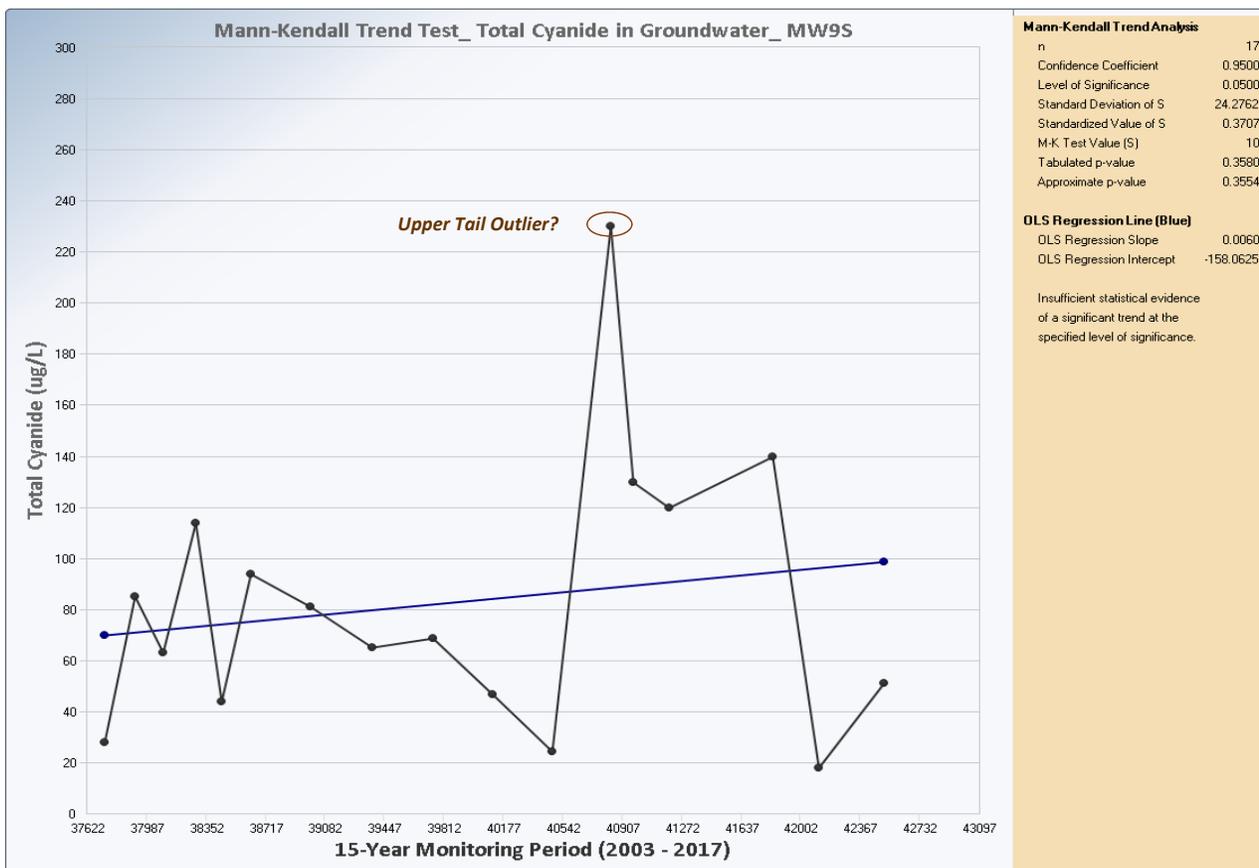
2. Observation Value 90.4 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.043

For 10% significance level, 90.4 is not an outlier.

For 5% significance level, 90.4 is not an outlier.

For 1% significance level, 90.4 is not an outlier.



Mann-Kendall Trend Test Analysis
 Date/Time Stamp ProUCL 5.1_11/16/2017_1:20:56 PM
 From File Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN.xlsx
Confidence Coefficient 0.95
 Level of Significance 0.05

MW-9S_total cyanide_results_ug/L (APRIL 2003 - AUGUST 2017)

General Statistics

Number of Events Reported (m)	17
Number of Reported Events Used	17
Number Values Reported (n)	17
Minimum	18
Maximum	230
Mean	82.55
Geometric Mean	67.82
Median	68.9
Standard Deviation	53.02
Coefficient of Variation	0.642

Mann-Kendall Test

M-K Test Value (S)	10
Tabulated p-value	0.358
Standard Deviation of S	24.28
Standardized Value of S	0.371
Approximate p-value	0.355

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

IS THERE A POTENTIAL (UPPER TAIL) OUTLIER IN TOTAL CYANIDE IN GROUNDWATER AT MW-9S?

Total Cyanide in Groundwater_ ug/L
15-Year Monitoirng Period (2003 - 2017)

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time Stamp

ProUCL 5.1_ 11/22/2017_ 10:54:55 AM

From File

Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN_.xlsx

MW-9S_ Dixon's Outlier Test for total cyanide_result_ug/L

Number of Observations = 17

10% critical value: 0.438

5% critical value: 0.49

1% critical value: 0.577

1. Observation Value 230 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.495

For 10% significance level, 230 is an outlier.

Level of Confidence = 90%

For 5% significance level, 230 is an outlier.

Level of Confidence = 95%

For 1% significance level, 230 is not an outlier.

Level of Confidence = 99%

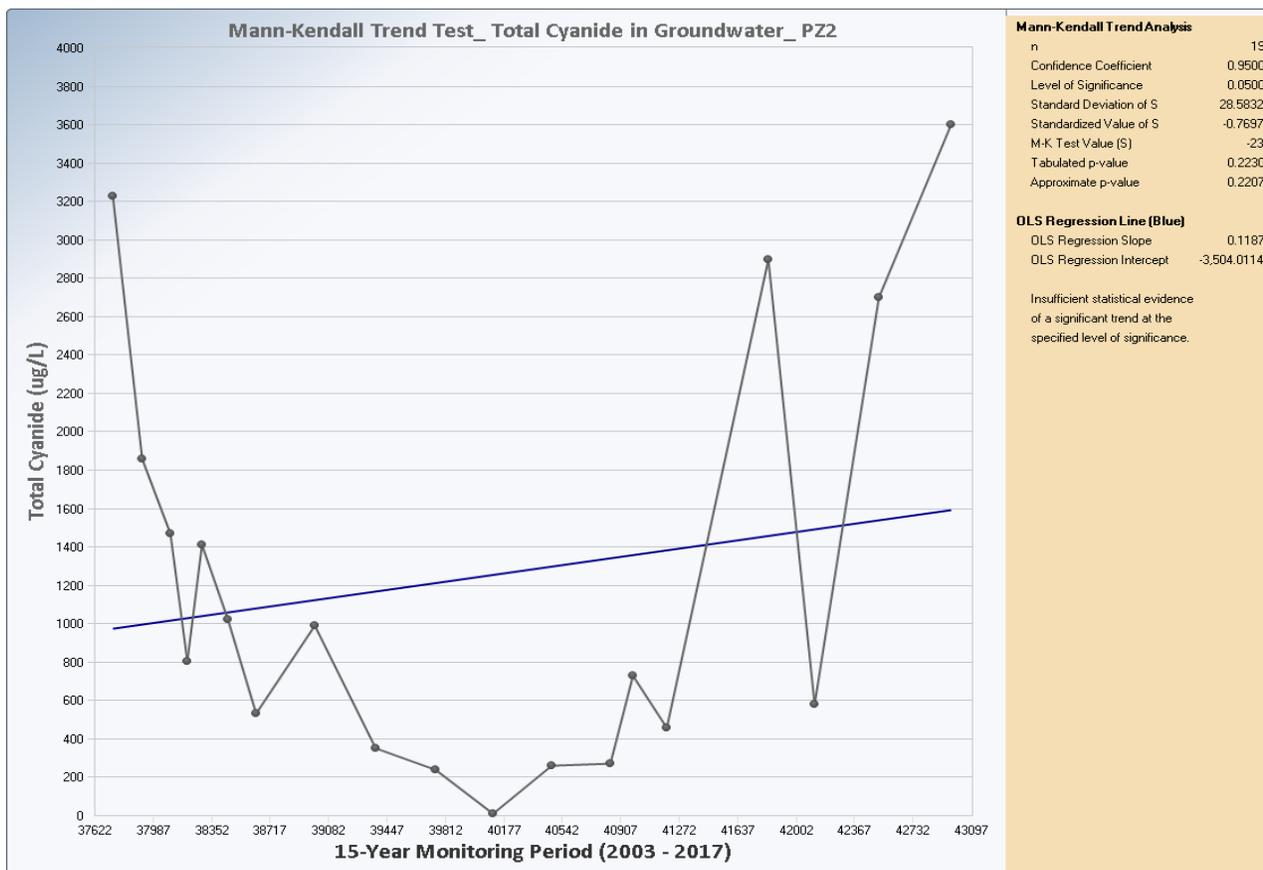
2. Observation Value 18 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.089

For 10% significance level, 18 is not an outlier.

For 5% significance level, 18 is not an outlier.

For 1% significance level, 18 is not an outlier.



Mann-Kendall Trend Test Analysis
 Date/Time Stamp ProUCL 5.1_11/16/2017_1:20:56 PM
 From File Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN.xlsx
Confidence Coefficient 0.95
 Level of Significance 0.05

PZ-2_total cyanide_results_ug/L (APRIL 2003 - AUGUST 2017)

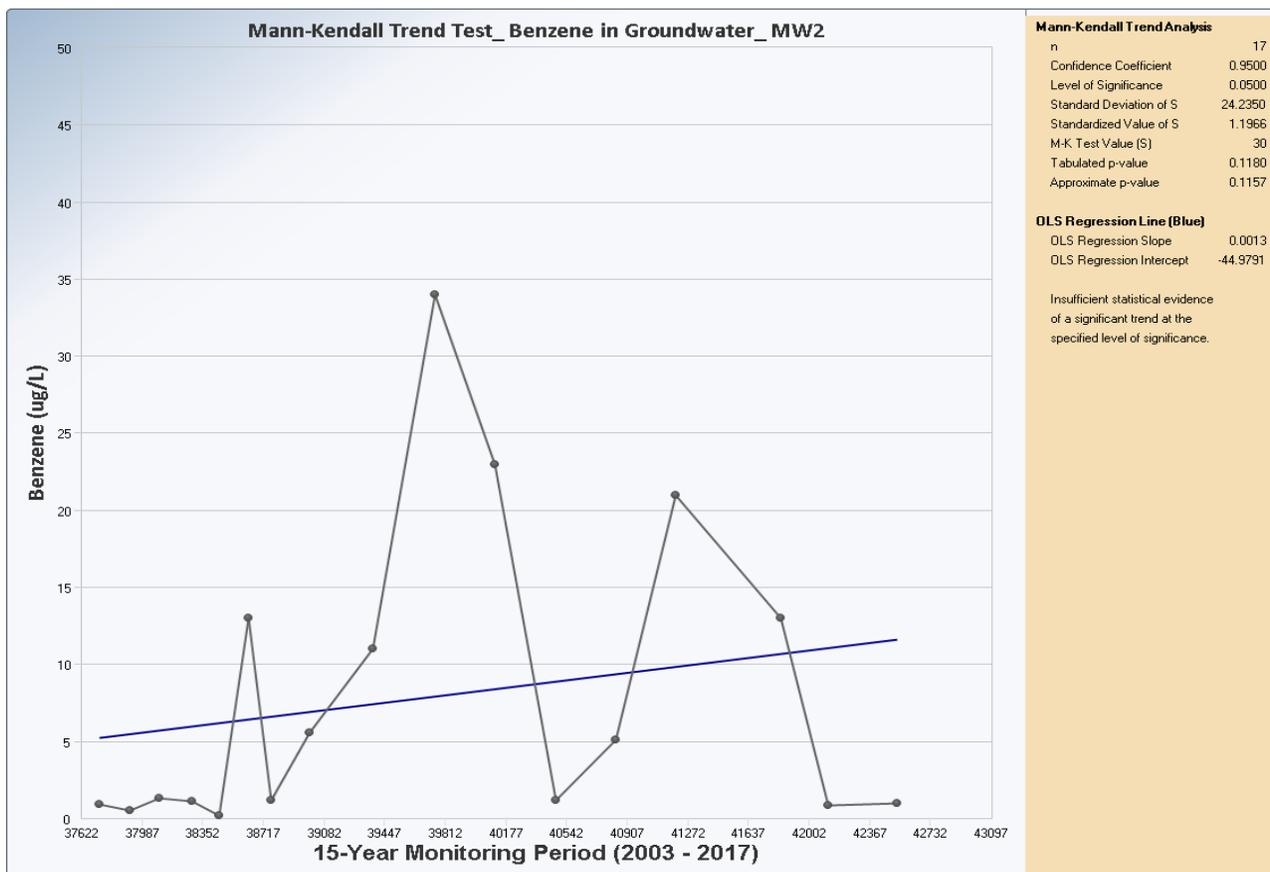
General Statistics

Number of Events Reported (m) 19
 Number of Reported Events Used 19
 Number Values Reported (n) 19
 Minimum 10
 Maximum 3600
 Mean 1233
 Geometric Mean 716.8
 Median 804
 Standard Deviation 1110
 Coefficient of Variation 0.9

Mann-Kendall Test

M-K Test Value (S) -23
 Tabulated p-value 0.223
 Standard Deviation of S 28.58
 Standardized Value of S -0.77
 Approximate p-value 0.221

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



Mann-Kendall Trend Test Analysis
 Date/Time Stamp: ProUCL 5.1_11/22/2017_9:53:48 AM
 From File: Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN.xlsx
Confidence Coefficient 0.95
 Level of Significance 0.05

MW-2 benzene results ug/L (APRIL 2003 - AUGUST 2017)

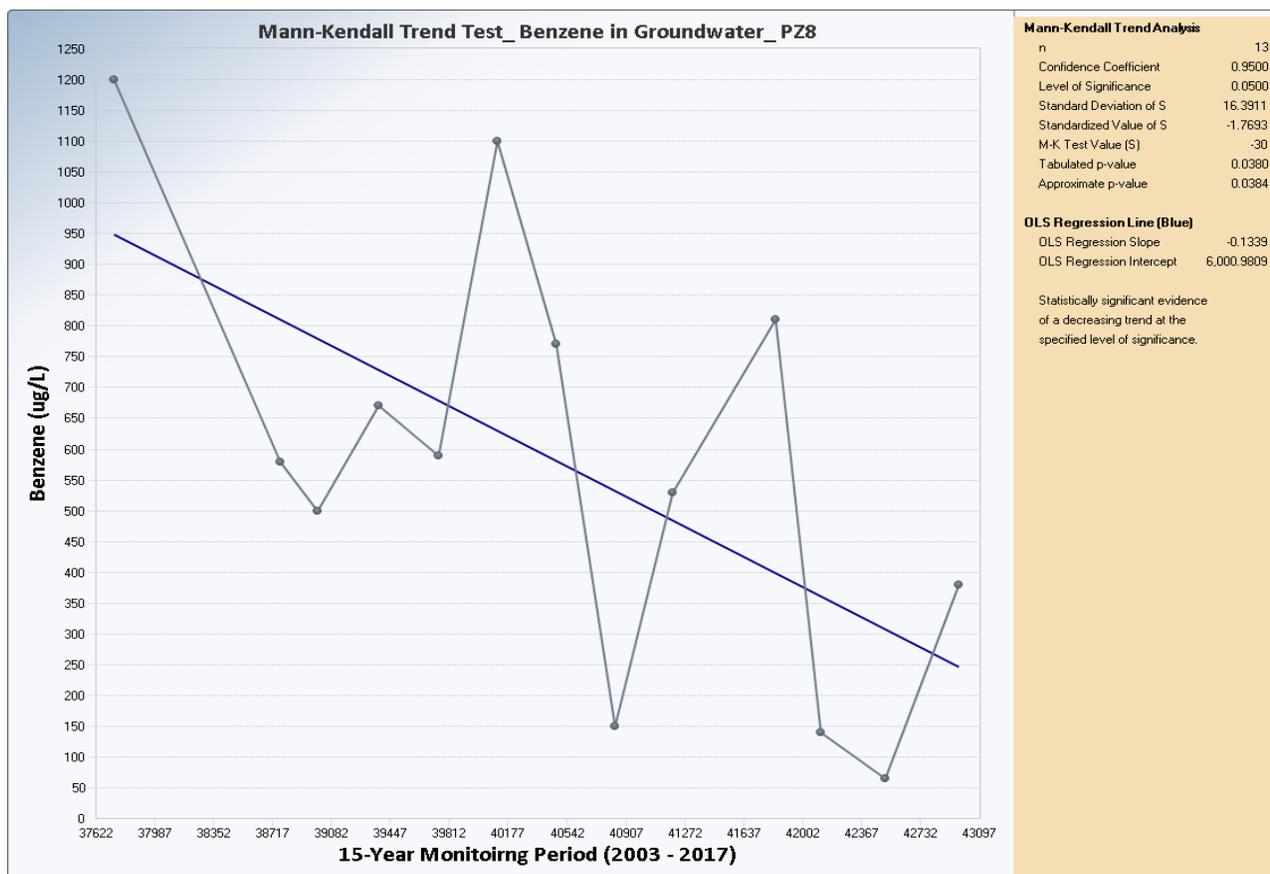
General Statistics

Number of Events Reported (m)	17
Number of Reported Events Used	17
Number Values Reported (n)	17
Minimum	0.2
Maximum	34
Mean	7.879
Geometric Mean	3.011
Median	1.3
Standard Deviation	9.986
Coefficient of Variation	1.267

Mann-Kendall Test

M-K Test Value (S)	30
Tabulated p-value	0.118
Standard Deviation of S	24.23
Standardized Value of S	1.197
Approximate p-value	0.116

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



Mann-Kendall Trend Test Analysis

Date/Time Stamp ProUCL 5.1_11/22/2017_9:53:48 AM
 From File Copy of 2017-1115-HAI-FlatFile_GW_Benzene_CN.xlsx
Confidence Coefficient 0.95
 Level of Significance 0.05

PZ-8_benzene_results_ug/L (APRIL 2003 - AUGUST 2017)

General Statistics

Number of Events Reported (m) 13
 Number of Reported Events Used 13
 Number Values Reported (n) 13
 Minimum 65
 Maximum 1200
 Mean 575.8
 Geometric Mean 443.8
 Median 580
 Standard Deviation 346.9
 Coefficient of Variation 0.603

Mann-Kendall Test

M-K Test Value (S) -30
 Tabulated p-value 0.038
 Standard Deviation of S 16.39
 Standardized Value of S -1.769
 Approximate p-value 0.0384

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