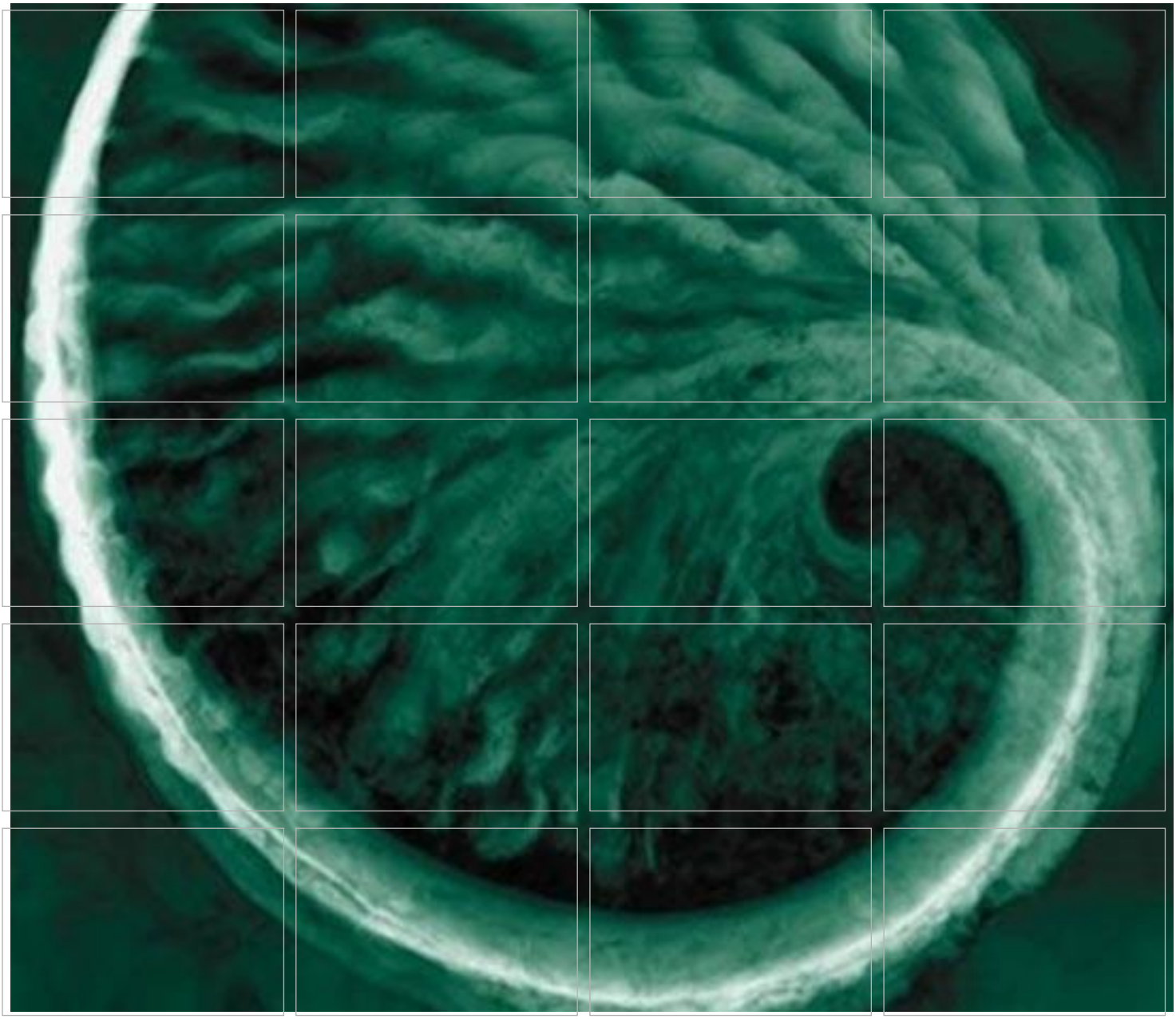

5th Semiannual Progress Report

Atlanta Gas Light Company
Former Manufactured Gas Plant Site
Macon, Georgia HSI #10511

November 21, 2017

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Atlanta Gas Light Company

5th Semiannual Progress Report

Former Manufactured Gas Plant Site
Macon, Georgia HSI #10511

November 21, 2017

ERM Project No. 0366660

Jorge Salcedo, PG
Partner-In-Charge

Adria Reimer, PG
Project Manager

Environmental Resources Management
3200 Windy Hill Road, SE
Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700
www.erm.com

PROFESSIONAL CERTIFICATION PAGE

5TH SEMIANNUAL PROGRESS REPORT
ATLANTA GAS LIGHT COMPANY
FORMER MANUFACTURED GAS PLANT SITE
MACON, GEORGIA
HSI NO. 10511

I certify that I am a qualified ground-water scientist who has received a baccalaureate or post-graduate degree in the natural sciences or engineering, and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by me or by a subordinate working under my direction.

Adria L. Reimer, P.G. #002004

November 21, 2017

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ACRONYMS AND ABBREVIATIONS

AGLC	Atlanta Gas Light Company
AGMWP	Alluvial Groundwater Monitoring Work Plan
BGMP	Bedrock Groundwater Monitoring Plan
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
BPLM	By-Product Like Material
CACR	Corrective Action Completion Report
CAP	Corrective Action Plan
COI	Constituent of Interest
CSM	Conceptual Site Model
CSR	Compliance Status Report
DNAPL	Dense Non-Aqueous Phase Liquid
EPD	Environmental Protection Division
ERM	Environmental Resources Management
ft	Feet or Foot
ft/bgs	Feet Below Ground Surface
ft btoc	Feet Below Top of Casing
ft/day	Feet per Day
HSI	Hazardous Site Inventory
HSRA	Hazardous Site Response Act
ISCO	In-situ Chemical Oxidation
ISS	In-Situ Solidification
K	Hydraulic Conductivity
MGP	Manufactured Gas Plant
MUDA	Macon Urban Development Authority
NAPL	Non-Aqueous Phase Liquid
NTU	Nephelometric Turbidity Units
RRS	Risk Reduction Standards
ROW	Right-of-Way
SVOCs	Semivolatile Organic Compounds
UEC	Uniform Environmental Covenant
USEPA	United States Environmental Protection Agency
VI	Vapor Intrusion
VIRP	Voluntary Investigation and Remediation Plan
VEFR	Vacuum Enhanced Fluid Recovery
VOCs	Volatile Organic Compounds
VRP	Voluntary Remediation Program
ug/L	Micrograms per Liter

1.0 INTRODUCTION

This *5th Semiannual Progress Report* is being submitted on behalf of Atlanta Gas Light Company (AGLC) for the Macon former Manufactured Gas Plant (MGP) site located in Macon, Bibb County, Georgia (Figure 1). Two MGP facilities formerly operated in the area of Mulberry Street and 6th Street in Macon. The former MGP located at 137 Mulberry Street (southeast of 6th Street) has been the subject of numerous investigation and corrective actions since the 1980s. This portion of the Macon MGP site is referred to as the Mulberry Street former MGP (also referred to as the Eastern Portion MGP in previous correspondence) and also includes those parcels affected by a release from the former operations. The property where the Mulberry Street former MGP facility operations were conducted is bounded by Walnut Street, 7th Street, Mulberry Street, and 6th Street, and is currently owned by Macon Urban Development Authority (MUDA). Investigation of the Mulberry Street former MGP began in 1986 and soil remediation was completed in 2004.

The second MGP was located northwest of 6th Street and is bounded by Terminal Avenue on the north side. Investigation of this property began in 2005. Soil and groundwater impacts requiring additional investigation were identified during the installation of injection wells for the in-situ chemical oxidation (ISCO) remedy and demolition of structures on the property. The results of investigations and additional historical research established that this location was a separate former MGP site that used different MGP production processes than the Mulberry MGP. This former MGP is referred to as the Western Portion MGP (Figure 2). For the purposes of this document, the term "Site" is defined as the portion of AGLC's contiguous property and any other owner's property potentially impacted by the former MGP operations.

AGLC and the Georgia Environmental Protection Division (EPD) entered into Consent Order EPD-HSR-227 on July 11, 2000. The Consent Order was administered under the Hazardous Site Response Act (HSRA) and the Site was listed on the EPD Hazardous Site Inventory (HSI) as number 10511. AGLC completed a series of investigations and implemented numerous EPD-approved corrective actions while under the HSRA program to address residual MGP impacts in the unsaturated and saturated materials at the Site and on neighboring parcels.

AGLC submitted an application to enter the Georgia Voluntary Remediation Program (VRP) and a *Voluntary Investigation and Remediation Plan* (VIRP) to EPD in October 2014. On January 14, 2015, AGLC and EPD signed and executed Consent Order EPD-VRP-12, providing for transition of the Site from regulation under HSRA to the VRP. EPD acknowledged acceptance to the VRP in correspondence dated May 21, 2015 and provided comments on the VIRP in correspondence dated May 26, 2015. The Site, additional VRP-qualifying properties, and adjoining properties are shown on Figure 3.

Corrective actions were initiated at the former Western Portion MGP site in May 2015 in accordance with the VIRP. Activities consisted of excavation of unsaturated soils to remove MGP-derived byproduct-like material (BPLM) and/or source material, and in situ solidification (ISS) remediation of BPLM and/or source material below the groundwater table. ISS activities were completed in late 2015, excavation of unsaturated soil was completed in mid-April 2016, and restoration activities were completed in late April 2016. Details of the corrective actions were provided in the *Corrective Action Completion Report for Remediation of the Former Manufactured Gas Plant Site – Western Parcel* (CACR, dated May 21, 2016; submitted as Appendix A of the *2nd Semiannual Progress Report*).

Under the VRP, the schedule for submittal of progress reports is May 21st and November 21st annually. The purpose of this report is to provide EPD with an update of activities completed since submittal of the *4rd Semiannual Progress Report* in May 2017. In addition, the progress report describes upcoming planned activities.

2.0 ACTIVITIES COMPLETED SINCE 4TH SEMIANNUAL PROGRESS REPORT SUBMITTAL

This section describes activities that have been completed since the *4th Semiannual Progress Report* (ERM, 2017) was submitted in May 2017. These activities include:

- Meeting among EPD, AGLC, Georgia Power Company (GPC) and ERM personnel on June 22, 2017; and
- Completion of the August 2017 semiannual groundwater monitoring event.

2.1 REGULATORY CORRESPONDENCE

EPD, AGLC, GPC and ERM met on June 22, 2017 to discuss the February 21, 2017 correspondence from EPD (comments to the *1st*, *2nd* and *3rd Semiannual Progress Reports* and the *2016 Corrective Action Completion Report)* and subsequent response letter to EPD from AGLC (dated March 22, 2017). Both documents were provided in the *4th Semiannual Progress Report*.

2.2 SEMIANNUAL GROUNDWATER MONITORING

Groundwater monitoring events have been conducted quarterly or semiannually since completion of the first phase of ISS conducted on the Mulberry Street portion of the Site in 2002 (Figure 2), unless other phases of active remediation were ongoing. Currently, groundwater sampling at the Site is conducted semiannually, typically in February (annual event) and August (semiannual event). The August 2017 groundwater monitoring event represents the fifth monitoring event since ISS activities were completed in the Western Portion of the Site, the fourth since unsaturated soil excavation activities were completed, and the third since completion of Site restoration. . Sections 3 and 4 of this report summarize the groundwater monitoring objectives and August 2017 results.

2.3 REGISTERED PROFESSIONAL SUPPORTING DOCUMENTATION

To document the direct oversight of implementation of corrective action and long-term monitoring, a monthly summary of hours invoiced and description of services provided by Adria Reimer, P.G. (Georgia No. 002004) to the VRP participant since the previous submittal to EPD is shown in the following table:

Adria Reimer, P.G. (Georgia No. 002004)		
Month	Hours Invoiced	Work Completed
May 2017	28	Oversight of the work summarized in this report
June 2017	15	

Adria Reimer, P.G. (Georgia No. 002004)		
July 2017	38	
August 2017	35	
September 2017	26	
October 2017	15	

3.0 GROUNDWATER MONITORING METHODS

This section summarizes groundwater level measurement and groundwater sample collection methods utilized during the August 2017 semiannual groundwater monitoring event at the Site. Site features, property boundaries, the extent of ISS activities, and locations of groundwater monitoring wells are shown on Figure 2. Property ownership information is shown on Figure 3.

The volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) on the COI list (Table 1) were updated based on correspondence received from the EPD dated January 17, 2012 to include constituents listed in Table 2-1 of the January 2004 Compliance Status Report (CSR). The January 17, 2012 correspondence also requested that the COI list remain in use until COI delineation to background and certification of the Western Portion to the applicable risk-reduction standard (RRS) is completed and documented by submittal of an updated CSR. Per comments #5 and #6 of the February 21, 2017 EPD comment letter, laboratory analysis of groundwater samples for inorganic constituents is no longer required at the Site.

The August 2017 semiannual monitoring event for alluvial groundwater represents the third alluvial sampling event since the completion of Site remedial activities in April 2016. Sampling was conducted in accordance with *Alluvial Groundwater Monitoring Work Plan* (AGMWP) [Appendix H of the *Western Portion and MW-101 Area Groundwater Corrective Action Plan Addendum*] submitted to EPD on October 14, 2014 as Appendix C of the VIRP. The network of alluvial groundwater monitoring wells sampled in August 2017 is presented as Table 2, and is consistent with the list provided as Table B1-2 in the *4th Semiannual Progress Report*, with the exception that MW-105, MW-106 and MW-107 were added to the event. Expansion of the current facilities are anticipated at the property at the corner of Walnut Street and 6th Street (owned by Marillac Properties, LLC; Figure 3 and Figure 4), which may necessitate abandonment of these wells within the year; therefore, groundwater samples were collected to establish groundwater quality at the property prior to abandonment.

Groundwater samples collected from bedrock wells during the August 2017 monitoring event were obtained using methods described in the *Bedrock Groundwater Monitoring Plan* (BGMP) [Appendix I of the *Voluntary Investigation Remediation Plan* (VIRP)] submitted to the EPD on October 14, 2014. The bedrock groundwater monitoring schedule is presented in Table 3, and is consistent with the schedule proposed in Table B1-3 of the *4th Semiannual Progress Report*, with the exception that groundwater samples were collected from two additional wells (MW-206D and MW-301D) to supplement existing data and evaluate concentration trends.

3.1 SCOPE OF WORK

The August 2017 groundwater monitoring event, which represents the semiannual monitoring event, included the following tasks:

3.1.1 *Field Tasks*

- Groundwater level gauging;
- Monitoring for the presence of dense non-aqueous phase liquid (DNAPL);
- Groundwater sampling; and
- Waste management.

3.1.2 *Reporting Tasks*

- Tabulation of groundwater elevations;
- Tabulation of laboratory analytical results for COI;
- Preparation of alluvial groundwater elevation maps and bedrock groundwater flow potential maps;
- Evaluation of groundwater flow in the alluvial and bedrock aquifers;
- Evaluation of analytical results relative to Type 2 and Type 4 RRS; and
- Preparation of isoconcentration maps for benzene and naphthalene.

3.2 *GROUNDWATER MONITORING NETWORK*

The network of monitoring wells was developed over a series of investigations to determine on-site and off-site groundwater impacts. The annual event (February) represents the event with the greater number of wells to be sampled and the semiannual event (August) includes a subset of these wells. The alluvium groundwater monitoring well network is included as Table 2, the bedrock groundwater-monitoring network is included as Table 3, and locations of existing monitoring wells are shown on Figure 2.

3.3 *GROUNDWATER LEVEL GAUGINGAND WELL INSPECTION*

During the initial groundwater gauging task the condition of each well was noted, including the concrete surface seal, outer casing, inner expandable well cap, and lock. Any well caps, manhole cover bolts, or locks that were damaged or missing were noted and replaced during this reporting period. Groundwater levels were measured from the pre-existing surveyed reference point on the top of casing of each well. All wells were gauged with an oil-water interface meter to obtain depth to water data and to assess whether DNAPL was present. The interface meter was decontaminated between wells by wiping the line with a cloth containing isopropanol followed by a cloth containing deionized water. The probe was decontaminated using a wash of deionized water and a phosphate-free detergent followed by a deionized water rinse.

3.4 WELL PURGING AND GROUNDWATER SAMPLE COLLECTION METHODS

Before collection of groundwater samples, each well was purged using low-flow/ low-volume techniques conducted in accordance with ERM's standard operating procedures, which are based on technical guidelines from U.S. Environmental Protection Agency (USEPA) Region 4 Science and Ecosystem Support Division Operating Procedures March 2013 (SESD Operating Procedures), *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (Puls and Barcelona, 1995), and *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers* (Yeskis and Zavala, 2002). The purpose of purging the well is to draw formation water into the well so that the samples are representative of the portion of the aquifer surrounding the well. Low-flow methods are used for purging and sampling to avoid unnecessary disturbance to the well and formation surrounding the well, to reduce mixing within the well screen and well itself which may potentially lead to sample dilution, and to reduce the potential for sample aeration.

In wells where excessive drawdown occurred (> 0.3 feet or 0.1 meters), the method of purging the well was switched to a minimum of three well volumes at which point the well was sampled upon stabilization, or following removal of a maximum of five well volumes, unless well volume was over 10 gallons. Wells with greater than ten gallons of purge volume, which also exhibit drawdown of greater than 0.3 feet were still purged using low-flow/low-volume techniques due to the excessive amount of volume needed to purge by switching methods.

Field groundwater quality measurements included pH, conductivity, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. Field parameter values and corresponding purge volumes were recorded on groundwater sampling forms. Copies of these forms for the August 2017 sampling event are included in Appendix A.

Groundwater samples from the August 2017 event were analyzed for all COI (Table 1). Analytical Environmental Services, Inc. (AES; Georgia Certification ID 800) performed the analyses.

3.5 QUALITY CONTROL/QUALITY ASSURANCE SAMPLES

Field quality control (QC) samples were collected and analyzed to document the accuracy and precision of the laboratory. QC samples included:

- *Trip Blanks*: One trip blank accompanied each cooler containing VOC samples sent to the laboratory. Trip blanks were analyzed to determine if any contaminants were introduced while samples were stored or while in transit to the laboratory. Trip blanks were analyzed for VOCs on the COI list only.
- *Field Duplicates*: One alluvial well blind field duplicate (MW-101) and two bedrock well field duplicates (MW-204D and MW-205D) were collected during the August 2017 sampling event. Duplicates were collected to

determine the precision of groundwater sample analysis and the variability of collection procedures.

- *Matrix Spikes* and *Matrix Spike Duplicates*: Matrix Spike and Matrix Spike Duplicate (MS/MSD) sample sets were collected from MW-106 (alluvial) and MW-306D (bedrock) during the August 2017 sampling event, as part of the laboratory analytical batch QC.

3.6 MANAGEMENT OF INVESTIGATION DERIVED WASTE

All liquid wastes generated from sampling activities (i.e., purge water and decontamination water) were placed in on-site, labeled, steel 55-gallon drums or labeled plastic totes for storage on the AGLC property between Terminal Avenue and 6th Street prior to proper disposal. Personal protective equipment and other trash was placed in bags, and deposited in solid waste containers.

4.0 SITE HYDROGEOLOGY

4.1 GROUNDWATER ELEVATIONS

During the August 2017 sampling event, all alluvial and bedrock groundwater wells were inspected and the groundwater levels and total depths were gauged and recorded, with the exception of two wells that could not be located during the event. MW-23 is located in an unpaved area and could not be located in August 2017 due to extensive gravel cover in the area. Access to bedrock well MW-301D was determined to be a health and safety concern due to the presence of wasps. ERM personnel returned to the Site on September 1, 2017, and were able to locate MW-23 using a metal detector and were able to collect groundwater elevation measurements at MW-23 and MW-301D. Groundwater elevation data derived from water level measurements collected on August 14, 2017 and September 1, 2017 for the alluvial and bedrock wells are presented in Tables 4 and 5, respectively. DNAPL was detected at MW-111D, MW-302D and MW-309D in August 2017. Observed DNAPL thickness at the wells is noted in Table 5. The alluvium groundwater elevation map for August 14, 2017 is presented on Figure 4. Figure 5 shows the hydraulic potential in shallow bedrock wells for August 14, 2017.

4.2 GROUNDWATER GRADIENTS, HYDRAULIC CONDUCTIVITY AND SEEPAGE VELOCITY

Prior to ISS, groundwater flow in the alluvial aquifer was generally in an easterly direction. Consistent with historical data since completion of ISS activities at the Site, the August 2017 data demonstrate that alluvial groundwater continues to flow in an easterly direction, but around the ISS mass (Figure 4). Seepage velocity in the alluvial aquifer was estimated from the product of hydraulic conductivity (K) and horizontal hydraulic gradient (i), divided by effective porosity (n_e). The hydraulic conductivity and effective porosity from the GW CAP-A were used to estimate the seepage velocity. Based on these parameters, the August 2017 alluvial seepage velocity is approximately 1.1 ft/day in the Western Portion and approximately 0.25 ft/day in the Eastern Portion (see Table 6 for seepage velocity calculations and Appendix B for gradient calculations).

Rock formations have primary and secondary porosity. Primary porosity is the ability of the rock matrix to accept and transport fluids. Secondary porosity accounts for fluid movement in the formation by way of features other than the matrix. Fractures represent an example of secondary porosity. Groundwater flow in crystalline rock formations, such as the granitic gneiss underlying the Macon MGP Site, principally occurs in fractures as the matrix does not readily transport fluids. Groundwater flow and dissolved constituent transport are typically dominated by the orientation of the primary fracture system. Geophysical investigations conducted in 1999 (RETEC, 2004) and 2005 (RETEC, 2005) demonstrated primary fractures in bedrock at the Site are oriented to the east and southeast. The inferred (or apparent) bedrock groundwater flow

directions for data collected in August 2017 are presented on Figure 5. The hydraulic potential measured in shallow bedrock wells decreases toward the east and southeast, as shown on Figure 5. Calculated groundwater gradients, based on the hydraulic potential, indicate groundwater movement in bedrock is generally parallel to the fracture orientations.

Since fractured bedrock aquifers are inherently anisotropic and heterogeneous, calculation of seepage velocity may not be representative using bulk porosity estimates. However, a range of porosity estimates may provide bounds on the expected seepage velocity of the bedrock aquifer. Multiple seepage velocities were calculated using porosity estimates from the literature and by solving three-point problems for different areas of the Site. The seepage velocities are presented in Table 6. The calculated range of seepage velocities in the bedrock aquifer at the Western Portion of the Site was between 0.04 and 3.02 ft/day, and between 0.05 and 3.632.71 ft/day in August 2017 in the Eastern Portion of the Site (see Table 6 for seepage velocity calculations and Appendix B for gradient calculations).

5.0 GROUNDWATER ANALYTICAL RESULTS

Analytical results for alluvial and bedrock monitoring wells sampled in August 2017 are summarized in Tables 7 and 8, respectively. These results were compared to Type 4 RRS (i.e., non-residential standard) for monitoring wells in the City ROW, on-site, or in an industrial use area and Type 2 RRS (i.e., residential standard) for wells located off-site and/or in a residential use area. Groundwater monitoring well locations, parcel property boundaries and the cleanup goal type (i.e., non-residential or residential) are shown on Figure 6. Detected concentrations of benzene and naphthalene exceeding the Type 2 or Type 4 RRS (as applicable) are shaded in Tables 7 and 8.

Groundwater analytical results for alluvial monitoring wells sampled in August 2017 are presented in Table 7. The spatial distribution of benzene and naphthalene for alluvial wells sampled in August 2017 are shown in Figures 7 and 8, respectively. For alluvial wells not sampled in August 2017, the most recent benzene and naphthalene data, and month and year the data were collected, are shown in Figures 7 and 8. Groundwater analytical results for bedrock monitoring wells sampled in August 2017 are presented in Table 8. The spatial distribution of benzene and naphthalene in bedrock in August 2017 is depicted on Figures 9 and 10, respectively. For bedrock wells not sampled in August 2017, the most recent benzene and naphthalene data, and month and year the data were collected, are shown on Figures 9 and 10.

Groundwater purge logs are included herein as Appendix A, alluvial groundwater gradient calculation and bedrock hydraulic potential calculation figures as Appendix B, laboratory analytical reports in Appendix C, and data validation reports are attached as Appendix D. A complete summary of historical analytical data collected for the groundwater-monitoring program (since 2001) is provided as Appendix E. Benzene and naphthalene concentration and groundwater elevation trend graphs for bedrock monitoring wells are provided in Appendix F.

5.1 ALLUVIAL GROUNDWATER ANALYTICAL RESULTS

Analytical results for groundwater samples collected in August 2017 from alluvial monitoring wells were compared to the Type 2 or 4 RRS, and are presented in Table 7.

Volatile Organic Compound Results

Laboratory analysis of groundwater samples collected from alluvial groundwater wells in August 2017 indicates that all VOCs were either not detected at laboratory reporting limits or were detected at a concentration below the applicable RRS (Figure 7). As shown in Appendix E, benzene was detected at AMW-15 and MW-205 during the February 2017 monitoring event at concentrations above the applicable RRS of 9.0 µg/L (80 µg/L and 35 µg/L, respectively). Non-residential cleanup goals apply to the area adjacent to the ISS

mass along Terminal Avenue where AMW-15 and MW-205 are located (Figure 7). AMW-15 was not sampled in August 2017; however, MW-205 was sampled and the benzene detection was below the RRS (5.7 µg/L).

No other VOCs (carbon disulfide, ethylbenzene, toluene or xylenes) were detected above the laboratory detection limit of 5 µg/L in any alluvial monitoring well sampled in August 2017.

Semivolatile Organic Compound Results

No SVOCS were detected above applicable RRS in any alluvial monitoring wells sampled in August 2017. As shown in Appendix E, naphthalene was detected above 20 µg/L (Type 2 and Type 4 RRS) in MW-101 and MW-205 in February 2017. Both of these wells were sampled in August 2017 and naphthalene detections were below the RSS (0.80 µg/L and 1.1 µg/L).

5.2 *BEDROCK GROUNDWATER ANALYTICAL RESULTS*

Analytical results for groundwater samples collected from bedrock monitoring wells were compared to Type 2 or 4 RRS, as appropriate, and are presented in Table 8.

Eleven bedrock monitoring wells were sampled during the semiannual August 2017 sampling event to meet the objectives outlined in the BGMP. MW-111D and MW-309D were not sampled due to the presence of DNAPL in the wells. A sample was not collected from MW-302D due to the presence of trace DNAPL blebs observed adhering to sediment on the tip of the interface probe after collection of a total depth measurement at the well. Section 6.2.2 of this report presents details on the presence of DNAPL and DNAPL blebs at these wells in August 2017 and an evaluation of these observations in the context of previous observations.

Volatile Organic Compound Results

The distribution of benzene in bedrock wells sampled in August 2017, or the result of the most recent sampling event if not sampled in August 2017, is shown on Figure 9. In August 2017, benzene was detected in groundwater above the non-residential, Type 4 RRS of 9.0 µg/L in samples collected from nine bedrock monitoring wells:

- MW-12DRR
- MW-200DR
- MW-204D
- MW-205D
- MW-206D
- MW-302DD
- MW-305D
- MW-306D
- MW-308D

Benzene concentrations for the wells listed above ranged from 12 µg/L (MW-206D) to 16,000 µg/L (MW-305D) in August 2017. No other VOCs were detected in bedrock wells above respective RRS with the exception of ethylbenzene, which was detected at MW-205D (1,400 µg/L) and toluene, which was detected at MW-305D (7,700 µg/L). These results are consistent with previous data.

Semivolatile Organic Compound Results

The distribution of naphthalene in bedrock wells sampled in August 2017, or the result of the most recent sampling event if not sampled in August 2017, is shown on Figure 10. In August 2017, naphthalene was detected in groundwater above the non-residential, Type 4 RRS of 20 µg/L in samples collected from seven bedrock monitoring wells:

- MW-12DRR
- MW-200DR
- MW-204D
- MW-205D
- MW-206D
- MW-302DD
- MW-305D

Naphthalene concentrations at the groundwater monitoring well locations noted above ranged from 31 µg/L (MW-302DD) to 6,800 µg/L (MW-205D) in August 2017. No other SVOCs were detected above their respective cleanup goals in bedrock groundwater samples collected during the August 2017 sampling event.

5.3 *QUALITY ASSURANCE, QUALITY CONTROL, AND DATA VALIDATION*

All field QA/QC data, and at least 10 percent of the VOC and SVOC data presented in the analytical reports were reviewed by ERM's data validation expert. Laboratory analytical reports for all samples are provided in Appendix C, and the data validation reports for VOC and SVOC data are included in Appendix D. These data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Organic/Inorganic Data Review, Level 2 Evaluation [2008, 2011].

ERM performed a data validation review of sample order numbers 1708G89, 1708H71 and 1709100 for the August 2017 alluvial sampling event, which included the following parent and duplicate samples:

Alluvial Wells	
MW-101-20170816-01	DUP-03-20170816-01
Bedrock Wells	
MW-204D-20170815-01	DUP-01-20170815-01
MW-205D-20170815-01	DUP-02-20170815-01

The following items were included in the data validation review:

- Surrogate recoveries
- Relative percentage difference of primary/field duplicate samples
- Field and laboratory blank contamination
- Holding times, sample receipt conditions, dilution factors, chains of custody
- Trip blanks

- Sample duplicates

One alluvial and two bedrock field duplicate samples were collected during the August 2017 sampling event (see above) to determine the precision of the groundwater sample analysis and collection. As shown in Appendix D, the relative percent difference (RPD) calculations showed differences of less than 30 percent (%) between parent and duplicate sample results, indicating good correlation, with the following exception:

- MW-205D: acenaphthene (RPD = 31%; 110 µg/L compared to 150 µg/L)

MS/MSD sample sets were collected in August 2017 as part of the laboratory analytical batch QC. MS/MSD samples are used to assess matrix interference and reliability of the analytical processes and equipment. The samples were collected from MW-106 and MW-306D. All results for the MS/MSD QC samples were within the laboratory-established limits.

The parent and duplicate sample results with >30% RPD do not impede the usability of the data collected during the August 2017 event. All data results were within the QA/QC parameters utilized by the laboratory and no data were qualified. Acenaphthene detections in the parent and duplicate samples collected at MW-205D were within the limits of historical detections (Appendix E).

6.0 DISCUSSION OF GROUNDWATER SAMPLING OBJECTIVES

This section provides an evaluation of the results of the groundwater sampling events conducted in the context of variability and concentration trends over the past four years as they relate to the monitoring objectives defined in the BGMP and interim alluvial objectives prior to and during active remedy implementation. Historical groundwater monitoring results are summarized in Appendix E. Concentration trend graphs for the alluvial and bedrock wells with COI impacts are included in Appendix F.

6.1 ALLUVIAL GROUNDWATER

6.1.1 Document that the Plume is not Migrating off MUDA Type 5 Property

Results from monitoring wells MW-15, MW-101, and MW-102 were used to assess whether the alluvial groundwater plume may be migrating off the MUDA Type 5 property located at 137 Mulberry Street. Type 4 RRS apply to these wells.

- MW-101 is located adjacent to the earliest ISS mass on the MUDA property. No VOCs have been detected above the laboratory detection limit of 5.0 µg/L since April 2016 (benzene; 6.5 µg/L), and no VOCs have been reported above applicable Type 4 RRS since February 2015 (benzene, 49 µg/L). Naphthalene was detected above the Type 4 RRS at the well in February 2017 (43 µg/L), which was the first reported COI to exceed the Type 4 RRS in MW-101 since August 2015. In August 2017, naphthalene was reported at 0.80 µg/L, just slightly above the laboratory detection limit of 0.50 µg/L and below the Type 4 RRS of 20 µg/L. All other COI remain significantly below Type 4 RRS. As shown in Appendix E and in graphs in Appendix F, COI concentrations at the well show a stable or decreasing trend, indicating a stable to shrinking plume.
- MW-15 and MW-102 are located hydraulically downgradient of MW-101 along the property boundary. Both wells have historically had concentrations below detection limits for organic COI. Sufficient data exists for these wells to establish trends in COI concentrations; therefore, the wells were not part of the August semiannual monitoring event (Appendix E). No COI have been detected above the Type 4 RRS in MW-15 since sampling of the well began in 2001. No COI have been detected above the Type 4 RRS at MW-102 since 2002.

COI concentrations at MW-101 indicate a stable or shrinking plume, and no VOCs or SVOC have been detected at MW-15 or MW-102 for more than 15 years. The long history of absence of VOC and SVOC impacts at MW-15 and MW-102 prior to, during and after implementation of corrective actions at the MUDA property supports that the impacts are isolated to a small, localized area adjacent to the ISS (i.e., MW-101 area) and that the residual impacts are not migrating downgradient, and therefore are not migrating to downgradient properties.

6.1.2 *Collect Data Downgradient of the Footprint of Corrective Actions at the Western Portion MGP to Monitor Changes*

Results from monitoring wells MW-08 (sampled most recently in February 2017), MW-101 and MW-400 (sampled in February 2017 and August 2017) were used to assess groundwater concentrations in wells downgradient of the ISS footprint. Type 4 RRS apply to these wells. No VOCs were detected in these wells in February 2017 or August 2017. No SVOCs were detected above Type 4 RRS in any of the three wells in February 2017 or August 2017, except for naphthalene in MW-101 in February 2017, as noted above.

6.1.3 *Monitor Alluvial Groundwater Data Hydraulically Downgradient of the Eastern Portion ISS Mass to Assess Whether Concentrations Remain Below RRS*

MW-12R, MW-14I, MW-21, and MW-104 were not sampled in August 2017, but were sampled during the February 2017 sampling event to assess whether alluvial groundwater downgradient of the Eastern Portion ISS mass remains below Type 2 RRS (for MW-21) or Type 4 RRS (MW-12R, MW-14I, and MW-104). As noted in the *4th Semiannual Progress Report* (May 2017), no COI were detected at concentrations exceeding their respective RRS during the February 2017 sampling event at these wells. Furthermore, no organic COI have exceeded Type 2 or 4 RRS (as applicable based on well location) in any of the above alluvial monitoring wells for more than seven years, since naphthalene was detected at MW-12R at a concentration above the Type 4 RRS in February 2010, during the first sampling event following well installation.

The continued lack of VOC and SVOC detections at these four downgradient locations shows that there are no alluvial groundwater impacts in this area. The absence of impacts during the nearly 10 years of monitoring this area supports this conclusion.

6.1.4 *Detect Changes in Environmental Conditions*

The groundwater flow directions and seepage velocities for the August 2017 monitoring event were compared with previous results to identify any changes. The flow direction in the alluvium aquifer has historically been to the east. Alluvium groundwater flow during the August 2017 event was predominantly towards the east (Figure 4). The calculated horizontal hydraulic gradient for the alluvium in August 2016, February 2017 and August 2017 was 0.0570 ft/ft, 0.0600 ft/ft and 0.0568 ft/ft, respectively, at the Western Portion of the Site. The calculated horizontal hydraulic gradient for the alluvium at the Eastern Portion for August 2016, February 2017 and August 2017 was 0.0124 ft/ft, 0.0134 ft/ft and 0.0129 ft/ft No significant variations in environmental conditions are noted as August 2017 data are consistent with previous events.

6.1.5 *Statistical Analysis of Alluvial Groundwater Plume Stability*

Monitoring of dissolved phase impacts in the alluvial aquifer indicate that residual dissolved phase COI are present in isolated areas of the Site (i.e., AMW-15, MW-205 and MW-101), and are not migrating to downgradient locations. COI concentration trends at MW-205 and MW-101 were evaluated for statistical significance using Mann-Kendall procedures to assess plume stability in the isolated areas. The data set for AMW-15 is of insufficient size to perform the analysis, however MW-205 is located in proximity to AMW-15, and use of MW-205 to evaluate the area west of the ISS is acceptable. The statistical analysis for MW-101 and MW-205 indicate decreasing trends in benzene and naphthalene concentrations that are statistically significant at confidence intervals greater than 98% (Appendix G).

6.2 *BEDROCK GROUNDWATER*

6.2.1 *Perimeter Well Monitoring*

Data from perimeters wells (including MW-22D, MW-23D, MW-24D, MW-26D, and MW-27D) are used to assess any changes in the nature and extent of the bedrock groundwater quality. No VOCs or SVOCs have been detected at MW-22D (monitored since 2005), MW-23D (monitored since 2003), MW-26D (monitored since 2004) or MW-27D (monitored since 2001) demonstrating that the dissolved phase bedrock plume does not extend, and historically has not extended, more than 800 feet from the intersection of Walnut Street and 7th Street (Figure 9 and Figure 10; Appendix E). Based on the size of the data set for each of these wells, the consistency of the results, and the most recent sampling in February 2017, these four wells were not sampled in August 2017.

As discussed in previous semiannual progress reports, COI concentration detections and fluctuations occurring since 2014 at MW-24D may be the result of bedrock aquifer disturbances (i.e., drilling and/or DNAPL recovery activities) near the intersection of Walnut Street and 7th Street. Groundwater monitoring results for samples collected from MW-24D between the most recent disturbance (VEFR event in June 2016) and August 2016 were reported in the *3rd Semiannual Progress Report.* Data evaluation indicated the potential for drilling- and/or VEFR-induced bedrock aquifer disturbances near the intersection of Walnut Street and 7th Street to destabilize the groundwater plume, and for the effects of those disturbances to last at least three months.

No bedrock aquifer disturbances (drilling and/or DNAPL recovery events) have occurred since June 2016, and as reported in the *4th Semiannual Progress Report*, no VOCs or SVOCs were detected at MW-24D above the Type 2 RRS in February 2017 with the exception of benzo(a)pyrene at a concentration slightly above the applicable standard (0.98 µg/L compared to 0.2 µg/L). No VOCs or SVOCs were detected at MW-24D above the Type 2 RRS in August 2017. Data collected in 2016 and 2017 indicate that the time to reach steady-state conditions at MW-24D after a bedrock disturbance as described above may be as long as one year.

6.2.2 *Monitor for DNAPL accumulation and DNAPL Recovery*

The first VEFR event was performed in February 2011 to remove DNAPL in MW-111D. Subsequent events were performed in September 2013 (MW-111D and MW-302D), May 2015 (MW-111D), August 2015 (MW-111D, MW-309D and SW-1), and June 2016 (MW-111D, MW-309D and SW-1). Per the EPD comment letter dated February 21, 2017, VEFR is currently not required at the Site. Results of monitoring activities at MW-111D, MW-302D and MW-309D, wells where DNAPL has been observed from November 22, 2015 through August 14, 2017, are summarized below.

MW-302D

No DNAPL was observed during the April 2016 monitoring event; therefore, the well was not included in the June 2016 VEFR event. Observations of minor DNAPL blebs adhering to sediment on the tip of the interface probe after collection of total well depth measurements and minor blebs in groundwater during well purging have been reported historically. No blebs were observed on the probe tip in August 2017 and purging was initiated for groundwater sample collection; however, minor blebs were observed during purging and a sample was not collected . No DNAPL was observed and no blebs were detected at MW-302D during the February 2017 monitoring event; therefore, the most recent groundwater sample was collected in February 2017 (Appendix E). Sporadic observations of blebs do not indicate that DNAPL is accumulating in the well, and the relatively low concentrations of benzene and naphthalene detected at the well do not indicate a significant presence of DNAPL.

MW-111D

During the April 2016 event DNAPL was measured at a thickness of approximately 1.4 ft. The day of the June 2016 VEFR event DNAPL thickness was measured at 0.20 ft immediately prior to the event. DNAPL was not measured in the well immediately following the event. The variability in the reported thicknesses between the April 2016 and June 2016 events (prior to initiation of VEFR activities) is due to the inherent difficulty in obtaining a precise measurement of the DNAPL. The stickiness and high viscosity of the DNAPL can interfere with interface probe operation.

June 2016 represents the last time VEFR was completed at MW-111D. Approximately 1.25 ft of DNAPL was measured in MW-111D in August 2016 and in February 2017. Approximately 1.85 ft of DNAPL was measured in August 2017. As noted above, the stickiness and high viscosity of the DNAPL can interfere with interface probe operation and reported thicknesses are based on several lines of evidence, including changes in the sound emitted by the interface probe, observations of DNAPL on the probe and tape, and observations of changes in speed and resistance to lowering of the probe to the bottom of the well during water level and total well depth gauging.

DNAPL accumulation at MW-111D appears to be slow, as more than fourteen months after the VEFR event less than 2 ft of accumulation has occurred.

MW-309D

During the April 2016 event, DNAPL was detected at MW-309D. Due to the density, conductivity and tarry nature of the DNAPL, the thickness is difficult to measure. Immediately prior to the June 2016 VEFR event DNAPL was detected at a depth of approximately 38 feet below the top of casing (ft btoc), similar to the April 2016 measurement. Upon completion of the VEFR event, DNAPL was still detected at MW-309D at a depth of approximately 40 ft btoc, indicating a potential thickness of up to 5 ft. Although the well was completed to a total depth of 45 ft below ground surface (ft bgs), the accumulation of DNAPL makes it difficult to reach the true bottom of the well. It is possible that repeated VEFR events conducted at MW-309D have caused the material surrounding the open corehole to collapse into the corehole, and that the material has become bridged or solidified by the tar-like DNAPL. In this manner, an accurate reading of the actual accumulation of DNAPL is unachievable. In addition, it appears the DNAPL/sediment has solidified, making recovery difficult. Approximate depth to DNAPL reported in August 2016, February 2017 and August 2017 was 38 ft below the top of well casing, consistent with the April 2016 measurement, indicating stable conditions at the well.

6.2.3 Detect Changes in Environmental Conditions

The groundwater flow directions and seepage velocities for the August 2017 gauging event were compared with previous results to identify any changes. The hydraulic potential in the bedrock aquifer has historically been to the east, and the apparent hydraulic potential during the August 2017 event was also predominantly towards the east (Appendix B). The calculated horizontal hydraulic gradient for the bedrock aquifer in the Western Portion of the Site during the August 2016, February 2017 and August 2017 events was 0.0167 ft/ft, 0.0209 ft/ft and 0.0166 ft/ft, respectively. The calculated horizontal hydraulic gradient for the bedrock aquifer in the Eastern Portion of the Site during the same events noted above was 0.0150 ft/ft, 0.0220 ft/ft and 0.0205 ft/ft, respectively (Appendix B).

Compared to previous events, no significant variations in groundwater flow direction or calculated gradient are noted in the Eastern Portion or Western Portion for the bedrock aquifer.

COI concentrations in bedrock groundwater for the August 2017 event were compared with historical concentrations for consistency. No changes in environmental conditions were detected at the Site based on the evaluation of groundwater flow direction, seepage velocity, and the extents and concentrations of detected constituents.

6.2.4 *Detect New Releases (or other sources) of Contaminants to the Environment*

Comparison of historical data to that collected in August 2017 does not indicate a new release or other potential source of contaminants to the environment. All COI detected were consistent with historical analytes, and reported concentrations were consistent with historical data.

6.2.5 *Demonstrate the Effectiveness of Institutional Controls*

The qualifying properties associated with the former Macon MGP Site consist of:

- an AGLC-owned parcel located at 306 Terminal Avenue;
- parcels owned by MUDA located at 137 Mulberry Street and 122 Walnut Street (and an unnumbered utility parcel on 6th Street);
- parcels owned by the City of Macon;
- parcel owned by Prodigy Holdings, LLC at the corner of 6th Street and Mulberry Street; and
- parcels owned by Norfolk Southern Railroad (undefined addresses or parcel identifiers).

Agreements have been reached with MUDA, City of Macon, Prodigy Holdings and Norfolk Southern to implement institutional controls as needed to comply with VRP rules. Evaluation of several additional parcels for inclusion as qualifying properties is ongoing, and AGLC will notify EPD and revise the VIRP accordingly via semiannual progress reports.

Institutional controls that will be placed on qualifying properties will include the restriction of groundwater use as warranted. Although controls are not yet in place for all potential qualifying properties, a visual inspection was performed during the August 2017 sampling event for the existence of private wells on qualifying properties, and on neighboring properties. No evidence of private wells or shallow groundwater use was observed on any of the neighboring properties.

6.2.6 *Document Attainment of Remediation Objectives*

COI data trends were evaluated using Mann-Kendall trend analyses to assess whether concentrations were decreasing, increasing or stable, and to verify plume stability. COI impacts detected in monitoring wells are summarized below. Historical groundwater monitoring results are summarized in Appendix E and concentration trend graphs for the alluvial and bedrock wells with COI impacts are included in Appendix F.

There are no detections of benzene in the alluvium aquifer in areas where Type 2 (residential) cleanup standards are applicable. Alluvial groundwater COI detections are limited to an area along Terminal Avenue (Figure 7 and 8), where Type 4 (non-residential) standards apply. The area is west of the portion of the

Site addressed as part of the 2015-2016 ISS and soil excavation activities, in an area where corrective actions could not be performed due to proximity to existing Norfolk Southern railroad tracks. The data set for AMW-15 is not sufficiently robust to assess concentration trends; however the data set for MW-205, which is located within 60 ft of AMW-15, indicates that benzene and naphthalene concentrations in the area have decreased since completion of ISS and soil excavation in the Western Portion, and continue to display a decreasing trend (Appendix E and Appendix F).

Benzene was not detected at MW-101 on the MUDA property in February or August 2017. The naphthalene concentration detected in August 2017 (0.80 µg/L) is consistent with results since 2015, with the exception of the February 2017 event when naphthalene was detected above the Type 4 RRS of 20 µg/L (parent sample concentration of 43 µg/L, duplicate sample concentration of 21 µg/L). Overall, concentrations of benzene and naphthalene at MW-101 indicate a decreasing trend (Appendix F).

No VOCs or SVOCs were detected above applicable RRS in any alluvial wells in 2017, with the exception of AMW-15, MW-205 and MW-101, as noted above. The limited occurrences and low levels of COI at these locations indicate that corrective actions have been effective at reducing COI concentrations in the alluvial aquifer.

Plume stability monitoring of dissolved phase impacts in the alluvial aquifer indicate that residual dissolved phase COI are present in isolated areas of the Site (i.e., AMW-15, MW-205 and MW-101), and are not migrating.

Groundwater COI concentration trends for bedrock wells are evaluated in Table 9 and all bedrock groundwater analytical results are tabulated in Appendix E. Concentration trend graphs for the bedrock wells with COI impacts are included in Appendix F.

6.3 SUMMARY OF GROUNDWATER CONDITIONS

Results of all alluvial groundwater monitoring downgradient and cross-gradient to the ISS mass are below laboratory detection limits or applicable RRS. Statistical analysis of plume stability in areas where dissolved phase COI are present indicates statistically significant decreasing trends in benzene and naphthalene at confidence intervals greater than 98% at upgradient location MW-205 and at downgradient location MW-101 (Appendix F).

The August 2017 semiannual monitoring results, in conjunction with the historical monitoring results, do not indicate plume migration in the bedrock aquifer. Analytical results from bedrock groundwater monitoring wells exhibit some fluctuations in benzene and/or naphthalene concentrations near the Walnut Street and 7th Street intersection; however, downgradient and cross-gradient perimeter wells (i.e., MW-22D, MW-23D, MW-26D, MW-112D, MW-113D and MW-304D have all been non-detect for COI for more than ten years, with the exception of minor detections of one or more SVOCs (all below applicable RRS) at MW-113D (Appendix E).

6.4 VAPOR INTRUSION EVALUATIONS

The vapor intrusion (VI) pathway may be complete in the future should building construction take place where reported COI concentrations in alluvium groundwater are above applicable RRS. To assess the future potential for VOCs and SVOCs detected in groundwater at the Site to pose a VI risk, groundwater data were evaluated using the Vapor Intrusion Screening Level (VISL) Calculator (Version 3.5.2, June 2017) developed by the USEPA. VOCs and SVOCs detected above laboratory detection limits in groundwater at the Site that are sufficiently volatile and toxic to pose an inhalation risk via VI from groundwater are:

- VOCs – benzene, toluene, ethylbenzene and xylenes
- SVOCs – benzo(a)anthracene and naphthalene

Data collected in 2016 and 2017 since the completion of the Western portion alluvial corrective actions were evaluated using the VISL Calculator. Groundwater monitoring well locations near areas where buildings are not currently present and future construction is unlikely were excluded from the evaluation (i.e., on property owned and operated by railroads and within City of Macon right-of ways). As such, only results from MW-101 on the MUDA property were evaluated. Of the six COI listed above, only benzene and naphthalene have been detected in samples collected at MW-101 in 2016 and 2017. Benzene has only been detected once at MW-101 during the last two years, at a concentration of 6.5 µg/L in April 2016. The highest naphthalene detection during the same time period was 43 µg/L in February 2017. Although the future use of the property is expected to be non-residential, as a conservative measure a residential exposure scenario (with a target risk for carcinogens of 10^{-5} was used as input for the VISL Calculator. The VISL Calculator results (Appendix H) show that benzene and naphthalene in groundwater on the MUDA property would not cause VI exposure risk greater than 10^{-5}.

As discussed in Section 2.1, the VI pathway for the buildings located at 230 and 280 7th Street is considered incomplete due to the lack of COI in alluvial and intermediate wells in the immediate vicinity.

As noted in the *3rd Semiannual Progress Report*, the small unused building located on the corner of 6th Street and Mulberry Street (Prodigy Woodworks parcel) was demolished in 2016. A Uniform Environmental Covenant (UEC) will be placed on the parcel prohibiting construction of a building of any sort unless and until a VI evaluation is conducted. The UEC will require that in the event there is a VI concern that by law requires mitigation measures, the vapor mitigation measures shall be implemented prior to occupancy of the building.

7.0 PLANNED CORRECTIVE ACTIONS AND INVESTIGATIONS

The following sections describe corrective actions and investigations that will be initiated and/or completed during the next monitoring period. A projected milestone schedule is included as Figure 11.

7.1 GROUNDWATER INVESTIGATIONS AND MONITORING

7.1.1 Semiannual Groundwater Monitoring

The next groundwater monitoring event is scheduled for February 2018. During the event, groundwater samples will be collected from all existing alluvial and bedrock groundwater monitoring wells (Table 2 and Table 3). Note that depending on the schedule for expansion activities at the Marillac Property (see Section 3.0 and Section 7.7), MW-103, MW-105, MW-106 and MW-107 may be abandoned prior to the February 2018 event. In addition, AGLC is currently in discussions with Norfolk Southern to extend the expired Right of Entry Agreement allowing access to AMW-14 and AMW-15; groundwater samples will not be collected from these well if the agreement is not extended (see Section 7.7).

It is anticipated that the January 2018 will be the final groundwater monitoring event before submittal of the VRP Compliance Status Report (CSR).

7.1.2 Bedrock Investigations

As discussed in previous sections of this report, in comment #4 of the February 21, 2017 comment letter EPD agreed to suspend requirements for installation of any additional bedrock wells or sumps, therefore no additional bedrock investigations are planned at this time.

7.1.3 NAPL Recovery

The evidence of high viscosity and low mobility of the DNAPL at the Site, in combination with the geologic setting and limited spatial extent of DNAPL indicates that DNAPL is not migrating under steady-state conditions. As reported in the *3rd Semiannual Progress Report*, the application of vacuum to bedrock monitoring wells for the recovery of DNAPL from a single borehole appears to destabilize the COI plume, causing dissolved phase concentrations to fluctuate in areas where the plume would otherwise be stable.

Per the EPD comment letter dated February 21, 2017, VEFR is currently not required at the Site. DNAPL monitoring will be conducted during the January 2018 monitoring event.

7.2 VAPOR INTRUSION EVALUATIONS

As discussed in Section 6.4 of this report, a screening level assessment was completed to evaluate VI areas where a building may be located in the future. The assessment demonstrated that there are currently no known VI risks from groundwater. UECs would be used to impose control measures to reduce the potential for VI into future construction, as necessary.

7.3 SURFACE WATER EVALUATION

No surface water evaluations are planned, as discussed in Section 2.1.

7.4 MODELING AND POINT OF DEMONSTRATION WELLS

As discussed in Section 1.0 of this report, corrective actions for alluvial groundwater were completed in April 2016. In 2017, COI above target cleanup levels were only detected at three locations: two adjacent upgradient locations (AMW-15 and MW-205), and one downgradient location (MW-101). Mann-Kendall statistical analyses demonstrate that benzene and naphthalene concentrations are decreasing in these areas, indicating that the plumes are shrinking.

Groundwater fate and transport modeling for the alluvial aquifer is not warranted at the Macon former MGP Site as empirical data, in conjunction with statistical analyses, can be used to demonstrate that 1) COI concentrations are decreasing in the isolated areas where residual impacts remain in the alluvial aquifer, 2) migration is not occurring and 3) migration is unlikely to occur in the future. In addition, the data shows that in the upgradient area west of the ISS mass, benzene and naphthalene concentrations attenuate to below laboratory detection limits within 100 ft of remaining impacts (i.e., at AMW-2 and AMW-14). Likewise, historical data for MW-102, MW-15, MW-400 and MW-401 demonstrate that COI detected at MW-101 attenuate to below Type 1 (residential RRS) or laboratory detection limits within 150 ft of MW-101 (within the MUDA property boundary), providing evidence that groundwater with COI concentrations above RRS are not migrating off the MUDA property.

The VRP CSR will include a demonstration of groundwater plume stability using empirical data. The point of demonstration wells used in the empirical analyses to show evidence of no plume migration will be identified.

Current conditions in the fractured bedrock at the Site and potential for future migration of COI in the bedrock can also be assessed using empirical data. Data demonstrate that bedrock impacts are limited to the intersection of Walnut Street and 7th Street, and that COI are not detected above laboratory reporting limits in wells located within 250 ft of the intersection, or between the former MGP sites and the Ocmulgee River (e.g., MW-112, MW-113, and MW-114D). The implications of the presence of DNAPL in bedrock fractures on long-term dissolved phase plume conditions will also be addressed in the VRP CSR.

7.5 RISK ASSESSMENT AND REPRESENTATIVE EXPOSURE CONCENTRATIONS

The human health exposure pathway assessment and risk evaluation outlined conceptually in the VIRP will be included in the VRP CSR. If warranted based upon the results of these evaluations, additional properties may be entered into the VRP.

7.6 UNIFORM ENVIRONMENTAL COVENANTS

Continued monitoring and maintenance activities, and/or restrictions on disturbance of soil, and/or restrictions to groundwater use at VRP-qualifying properties will be implemented as needed in the form of UECs. Additionally, UECs will be executed as needed at the Prodigy property, as per the existing remediation agreement, that will prohibit construction of any buildings unless and until a VI evaluation has been conducted, and buildings shall not be occupied until mitigation measures are in place if a VI concern is determined to exist.

7.7 GROUNDWATER MONITORING WELL ABANDONMENT

As noted in Section 3.0, Marillac Properties, LLC, is considering expansion of operations, which will necessitate abandonment of alluvial wells MW-103, MW-105, MW-106 and MW-107. Groundwater samples have been collected from each of these wells for more than thirteen years, no VOCs have been detected above laboratory detection limits since 2003, and no SVOCs have ever been detected above Type 2 RRS (Appendix E). The wells will be abandoned in accordance with EPD guidance prior to expansion activities and well abandonment records will be provided to EPD.

The Right of Entry Agreement between AGLC and Norfolk Southern allowing access to AMW-14 and AMW-15 has expired and discussions to amend the agreement are ongoing. If the agreement is extended by February 2018 the wells will be sampled during the scheduled groundwater monitoring event.

8.0 REFERENCES

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Tables

Project No. 0366660
Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Figures

Project No. 0366660
Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Groundwater Sampling Logs (CD ONLY)

Appendix A

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Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Groundwater Gradient Estimation Figures

Appendix B

Project No. 0366660
Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Laboratory Analytical Reports (CD ONLY)

Appendix C

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Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Data Validation Evaluation

Appendix D

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Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Historical Data Summary (CD ONLY)

Appendix E

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Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

COI Concentration Trend Graphs (CD ONLY)

Appendix F

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Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Mann-Kendall Statistical Analyses

Appendix G

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Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700

Vapor Intrusion Screening Level Calculator Results

Appendix H

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Atlanta Gas Light Company

Environmental Resources Management
3200 Windy Hill Road SE, Suite 1500W
Atlanta, Georgia 30339
(678) 486-2700