GROUNDWATER MONITORING PLAN

PLANT HAMMOND – ASH POND 3 (AP-3)
FLOYD COUNTY, GEORGIA

FOR

Georgia Power

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Approved

Solid Waste Management Program

Approved By: John Sayer Digitally signed by John Sayer Date: 2021.06.11 16:23:29 -04'00'

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I. CERTIFICATION

This *Groundwater Monitoring Plan, Georgia Power Company - Plant Hammond Ash Pond 3 (AP-3)* has been prepared by a qualified groundwater scientist or engineer with Geosyntec Consultants, Inc. (Geosyntec) to meet the requirements contained in Chapter 391-3-4-.10 of the Georgia Environmental Protection Division Rules of Georgia, Solid Waste Management, Coal Combustion Residuals (i.e., State CCR Rule). References to the appropriate sections of the State CCR Rule are incorporated throughout this document.

I hereby certify that this Groundwater Monitoring Plan was prepared by, or under the direct supervision of, a "Qualified Groundwater Scientist," in accordance with the State of Georgia Rules of Solid Waste Management. According to 391-3-4-.01(57), a Qualified Groundwater Scientist is "a professional engineer or geologist registered to practice in Georgia who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields that enable individuals to make sound professional judgments regarding groundwater monitoring, contaminant fate and transport, and corrective action." The design of the groundwater monitoring system was developed in compliance with Georgia Environmental Protection Division (EPD) Rules of Solid Waste Management, Chapter 391-3-4.10(6).

Signature: _____

Date: January 28, 2021

Signature: _____

Date: January 28, 2021

1. INTRODUCTION

Groundwater monitoring is required by the Georgia Environmental Protection Division (EPD) to detect and quantify potential changes in groundwater chemistry. This Groundwater Monitoring Plan (plan) describes the groundwater and surface water monitoring program for Ash Pond 3 (AP-3 or Site) at Georgia Power Company's (Georgia Power's) Plant Hammond. This plan meets the requirements of EPD rules and uses EPD's *Manual for Ground Water Monitoring* dated September 1991 as a guide. Groundwater monitoring well and surface water monitoring locations are presented on **Figure A-1** of **Appendix A** and well construction details on **Table A-1** of **Appendix A**.

Groundwater monitoring will occur in accordance with 391-3-4-.10 of the Georgia Solid Waste Management Rules. If the monitoring requirements specified in this plan conflict with EPD rules (391-3-4), the EPD rules will take precedent.

In accordance with the United States Environmental Protection Agency (USEPA) Coal Combustion Rule (40 CFR § 257.90), which is incorporated by Georgia State CCR Rule by reference, a detection monitoring well network for AP-3 has been installed and certified by a qualified professional engineer. This certification has been placed in the facility's operating record and is included in Part B of the permit application. The existing monitoring wells were installed following the guidelines presented herein. Additionally, this plan documents the methods for future monitoring well installation and/or replacement, and procedures for well abandonment. As required by 391-3-4.10(6)(g), a minor modification will be submitted to the EPD prior to the unscheduled installation or abandonment of monitoring wells. Well installation and/or abandonment must be directed by a qualified groundwater scientist.

2. GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

The following section presents the geologic and hydrogeologic conditions for the Site as described in the "*Hydrogeologic Assessment Report (Revision 1)"* (HAR) tab in Section 2 of Part B of this permit application.

2.1 SITE GEOLOGY

AP-3 is located within the Great Valley and Ridge Physiographic Province (Valley and Ridge) in northwest Georgia, which is characterized by Paleozoic sedimentary rocks that have been folded and faulted into the ridges and valleys that gave this region its name. Geologic mapping performed at the Site by Petrologic Solutions, Inc. (Golder, 2018) indicates that the Site is underlain by the middle units of the Cambrian age Conasauga Formation (Ccls), consisting of mostly shaley limestone. Based on review of site-specific subsurface investigations, the bedrock at the Site was identified as limestone or shaley limestone. AP-3 is underlain primarily by five lithologic units; (i) fill material and CCR, (ii) terrace alluvium, (iii) residuum, (iv) highly weathered limestone bedrock, and (v) unweathered limestone bedrock.

Based on subsurface investigations the fill is composed of lean clay or gravelly lean clay with sand, sometimes identified by the presence of wood or roots. The terrace alluvium consists of unconsolidated sediments with high sand and gravel content associated with deposition from the Coosa River and Cabin Creek. Residual or native soils have been derived from the in-place weathering of the shaley limestone bedrock. The residuum is generally described as fat clay with typically only trace amounts of sand, and rarely gravel. Just below the residuum clay layer is a gradational zone of varying proportions of clayey residuum and sand, gravel, and cobble-sized angular pieces of partially weathered limestone, grading into a zone of fractured limestone, before grading into unweathered, fresh limestone. The upper highly weathered zone appears more as residuum with various sized rock fragments. The lower zone becomes less clayey with depth and is estimated to be approximately 5 feet thick. Most of the limestone is described as medium to dark gray with a slabby or flaggy habit when broken in pieces by the sonic drilling. The limestone is very finely laminated with lighter and darker gray layers, and also contains interbeds of calcareous shale.

2.2 SITE HYDROGEOLOGY

The uppermost aquifer at the Site is an unconfined regional groundwater aquifer that occurs within the residuum and highly weathered and fractured bedrock. The aquifer is recharged from infiltration of precipitation and from release of stored water in the lower permeability residuum to the underlying units. Groundwater flow in the uppermost aquifer occurs primarily in the highly weathered limestone and in the solution-enhanced joints in the competent bedrock. Localized preferential flow may also occur in the coarse facies of the terrace alluvium, but this unit is not laterally extensive across AP-3. Groundwater flow direction is controlled primarily by the regional groundwater flow regime. Flow is generally from west to east as shown in the potentiometric surface map in **Appendix A**. The potentiometric surface map represents data recorded in September 2020.

Aquifer testing was conducted by SCS and contracted consulting firms in 1977, 2014, and 2017 to evaluate hydraulic conditions in the vicinity of AP-3. Results of these field events are discussed in detail in the HAR. The representative groundwater hydraulic gradient for AP-3 in September 2020 is 0.009 feet/foot (ft/ft), measured across the AP-3 site along the direction of groundwater flow between well pair MW-21 and

HGWC-125. Hydraulic conductivity values estimated by the Bouwer-Rice method were used to calculate the mean hydraulic conductivity for each lithologic unit. Horizontal hydraulic conductivity (K_h) testing was conducted using slug testing for units above the top of bedrock. Single packer testing was used to estimate K_h for bedrock intervals. Undisturbed soil samples were collected for the purpose of hydraulic conductivity testing, representing vertical hydraulic conductivity (K_v).

The K_h measured in the residuum ranged from 6.1×10^{-7} to 3.6×10^{-3} cm/s, with a geometric mean of 1.5×10^{-4} cm/s. The K_v measurements ranged from 1.0×10^{-7} to 1.4×10^{-6} cm/s, with a geometric mean of 2.9×10^{-7} cm/s. The K_h values of the highly weathered/fractured bedrock range from 5.1×10^{-5} to 2.4×10^{-2} cm/s, with a geometric mean of 9.8×10^{-4} cm/s. This zone of fractured limestone just between the highly-weathered residuum/limestone horizon and the unweathered limestone, is likely the zone of predominant groundwater flow in the subsurface.

3. SELECTION OF WELL LOCATIONS

Groundwater monitoring wells were installed to monitor the uppermost occurrence of groundwater beneath the Site. Locations were selected based on the AP-3 footprint and geologic and hydrogeologic considerations. Georgia Power follows the recommendation as stated in Chapter 2 of the *Manual for Groundwater Monitoring* (1991) to establish well spacings based on site-specific conditions. A map depicting the monitoring well network for AP-3 is included in **Appendix A**, Monitoring System Details. A more detailed discussion of the hydrogeological investigation conducted in support of monitoring well placement is provided in the HAR.

The groundwater monitoring network locations were chosen to monitor upgradient (HGWA), and downgradient (HGWC) conditions at the Site based on groundwater flow direction determined by potentiometric evaluation. The potentiometric surface map in **Appendix A** depicts the groundwater flow direction beneath AP-3, based on September 2020 conditions. Seven wells (i.e., HGWA-1, HGWA-2, HGWA-3, HGWA-43D, HGWA-44D, HGWA-45D, and HGWA-122) are designated for monitoring of upgradient conditions and five wells (i.e., HGWC-120, HGWC-121A, HGWC-124, HGWC-125, and HGWC-126) are designated for monitoring of downgradient conditions. Wells are positioned to provide adequate coverage to detect potential impacts from the CCR impoundment. Both upgradient and downgradient wells are screened in the highly weathered bedrock and upper portion of the bedrock.

Monitoring wells are generally located outside of areas with frequent auto traffic; however, wells may be installed in heavily trafficked areas when necessary to meet the groundwater monitoring objectives of the EPD rules. In addition to the potentiometric surface map, **Appendix A** also includes a tabulated list of location coordinates for the individual monitoring wells. Additional well construction details (i.e., top-of-casing elevation, well depths and screened intervals) are also provided on this table. Well survey data certified by a Georgia-registered professional surveyor are included in **Appendix A**.

4. MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT AND REPORTING

The AP-3 monitoring well network described in this plan is already in place. The existing monitoring wells were installed following USEPA Region 4 Science and Ecosystem Support Division (SESD) *Operating Procedure for Design and Installation of Monitoring Wells* (USEPA, SESDGUID-101-R1) as a general guide for best practices. The monitoring wells were installed by SCS in 2014, 2016, 2017, 2019, and 2020; the boring and well construction logs associated with these field efforts are included in **Appendix A**. Additional monitoring wells, if necessary, will be installed in accordance with the following procedures.

4.1 DRILLING

A variety of well drilling methods are available for the purpose of installing groundwater monitoring wells. Drilling methodologies include but are not limited to: hollow stem augers, direct push, air rotary, mud rotary, and rotosonic techniques. The drilling method will be selected to minimize the disturbance of subsurface materials and not cause impacts to groundwater. Borings will be advanced using an appropriate drilling technology capable of drilling and installing a well in the site-specific geology. Monitoring wells will be installed using the most current version of the USEPA SESD SESDGUID-101-R# as a general guide for best practices. Also, drilling equipment will be decontaminated before use and between borehole locations using the procedures described in the most current version of USEPA SESD *Operating Procedure for Field Equipment Cleaning and Decontamination* (EPA, SESDGUID-205-R#). Well installation will be directed by a qualified groundwater scientist.

Sampling and/or coring may be used to help determine the stratigraphy and geology at the well location. Samples and cores will be logged by a qualified groundwater scientist. Screen depths will be chosen based on the depth to the uppermost aquifer.

All drilling for any subsurface hydrologic investigation, or for installation or abandonment of groundwater monitoring wells, will be performed by a driller that has, at the time of installation, a performance bond on file with the Water Well Standards Advisory Council.

4.2 DESIGN AND CONSTRUCTION

Well construction materials will be sufficiently durable to resist chemical and physical degradation and will not interfere with the quality of groundwater samples.

WELL CASINGS AND SCREENS

American Society for Testing and Materials (ASTM), National Science Foundation (NSF) rated, Schedule 40, 2-inch diameter polyvinyl chloride (PVC) pipe with flush threaded connections will be used for the well riser and screens. Compounds that can cause PVC to deteriorate (e.g., organic compounds) are not expected at this facility. If conditions warrant, other appropriate materials may be used for construction with prior written approval from the EPD.

WELL INTAKE DESIGN

Intake for groundwater monitoring wells will be designed and constructed to: (1) allow sufficient groundwater flow to the well for sampling; (2) minimize the passage of formation materials (turbidity) into the well; and (3) ensure sufficient structural integrity to prevent the collapse of the intake structure.

Each groundwater monitoring well will include a well screen designed to limit the amount of formation material passing into the well when it is purged and sampled. Screens with 0.010-inch slots have proven effective for the earth materials at the Site and will be used unless geologic conditions discovered at the time of installation dictate a different size. Screen length will not exceed 10 feet without justification as to why a longer screen is necessary (e.g., significant variation in groundwater level). If these specifications prove ineffective for developing a well with sufficient yield or acceptable turbidity, further steps will be taken to assure that the well screen is appropriately sized for the formation material. This may include performing sieve analysis of the formation material and determining well screen slot size based on the grain size distribution.

Pre-packed dual-wall well screens may be used for well construction. Pre-packed well screens combine a centralized inner well screen, a developed filter sand pack, and an outer conductor screen in one integrated unit composed of inert materials. If utilized, pre-packed well screens will be installed following general industry standards and using the current version of USEPA SESDGUID-101-R# as a general guide. If the dual-wall pre-packed-screened wells do not yield sufficient water or are excessively turbid after development, further steps will be taken to assure that the well screen is appropriately sized for the formation material. This may include performing sieve analysis of the formation material and determining well screen slot size based on the grain size distribution.

FILTER PACK AND ANNULAR SEAL

The materials used to construct the filter pack will be clean quartz sand of a size that is appropriate for the screened formation. Fabric filters will not be used as filter pack material. Sufficient filter material will be placed in the boring and measurements taken to ensure that no bridging occurs. Upon placement of the filter pack, the well may be pumped to assure settlement of the pack. If pumping is performed, the top elevation of filter pack depth will be monitored, and additional sand added if necessary. The filter pack will extend approximately one to two feet above the top of the well screen.

The materials used to seal the annular space in the boring above the well pack must prevent hydraulic communication between strata and prevent migration from overlying areas into the well screen interval. A minimum of two feet of bentonite (chips, pellets, or slurry) will be placed immediately above the filter pack. The bentonite seal will extend up to the base of any overlying confining zone or the top of the water-bearing zone to prevent cementitious grout from entering the water-bearing or screened zones. If dry bentonite is used, the bentonite must be hydrated with potable water prior to grouting the remaining annulus.

The annulus above the bentonite seal will be grouted with a cement and bentonite mixture (approximately 94 pounds cement / 3 to 5 pounds bentonite / 6.5 gallons of potable water) placed via tremie pipe from the top of the bentonite seal. During grouting, care will be taken to assure that the bentonite seal is not disturbed by locating the base of the tremie pipe approximately two feet above the bentonite seal and injecting grout at low pressure/velocity.

PROTECTIVE CASING AND WELL COMPLETION

After allowing the grout to settle, the well will be finished by installing a flush-mount or above-ground protective casing as appropriate, and building a surface cap. The use of flush-mount wells will generally be limited to paved surfaces unless Site operations warrant otherwise. The surface cap will extend from the top of the cementitious grout to ground surface, where it will become a concrete apron extending outward with a radius of at least 2 feet from the edge of the well casing and sloped to drain water away from the well.

Each well will be fitted with a cap that contains a hole or opening to allow the air pressure in the well to equalize with atmospheric pressure. In wells with above-ground protection, the space between the well casing and the protective casing will be filled with coarse sand or pea-gravel to within approximately 6 inches of the top of the well casing. A small weep hole will be drilled at the base of the metal casing for the drainage of moisture from the casing. Above ground protective covers will be locked.

Protective bollards will be installed around each above-grade groundwater monitoring well. Well construction in high traffic areas will generally be limited unless Site conditions warrant otherwise.

The groundwater monitoring well detail attached in **Appendix B**, Groundwater Monitoring Well Detail, illustrates the general design and construction details for a monitoring well.

WELL DEVELOPMENT

After well construction is completed, wells will be developed by alternately purging and surging until relatively clear discharge water with little turbidity is observed. The goal will be to achieve a turbidity of less than 5 nephelometric turbidity units (NTUs); however, formation-specific conditions may not allow this target to be accomplished. Additionally, the stabilization criteria contained in **Appendix C** should be met. A variety of techniques may be used to develop Site groundwater monitoring wells. The method used must create reversals or surges in flow to eliminate bridging by particles around the well screen. These reversals or surges can be created by using surge blocks, bailers, or pumps. The wells will be developed using a pump capable of inducing the stress necessary to achieve the development goals. All development equipment will be decontaminated prior to first use and between wells.

In low-yielding wells, potable water may be added to the well to facilitate surging of the well screen interval and removal of fine-grained sediment. If water is added, the volume will be documented and at minimum, an equal volume purged from the well.

Many geologic formations contain clay and silt particles that are small enough to work their way through a well's filter pack over time. Therefore, the turbidity of the groundwater from the monitoring wells may gradually increase over time after initial well development. As a result, monitoring wells may need to be redeveloped periodically to remove the silt and clay that has worked its way into the filter packs of the wells. Each monitoring well should be redeveloped when sample turbidity values have significantly increased since initial development or since prior redevelopment. The redevelopment should be performed as described above.

4.3 ABANDONMENT

Monitoring wells will be abandoned using industry-accepted practices and using the EPD *Manual for Groundwater Monitoring* (1991) and Georgia's Well Water Standards Act of 1985 [Official Code of Georgia Annotated (O.C.G.A.) § 12-5-120, 1985] as guides. The wells will be abandoned under the direction of a professional geologist (P.G.) or engineer (P.E.) registered in Georgia. Neat Portland cement or bentonite will be used as appropriate to complete abandonment and seal the well borehole. Any piezometers or groundwater wells located within the footprint of AP-3 will be over-drilled prior to abandonment.

4.4 DOCUMENTATION

Within 60 days of the construction, development, and survey of each new groundwater monitoring well, or the abandonment of an existing monitoring well, completed under the direction of a qualified groundwater scientist or engineer, a well installation/abandonment report will be submitted to the EPD. The following information will be documented in this report.

- Well identification
- Name of drilling contractor and type of drill rig
- Documentation that the driller, at the time the monitoring wells were installed, had a bond on file with the Water Well Advisory Council
- Narrative of drilling technique applied, well construction details, and well development procedures, including dates, drilling fluids used (if applicable), well casing and screen materials, screen slot size, and joint type
- Details of filter pack material/size, emplacement method (narrative), and volume
- Seal emplacement method and type/volume of sealant
- Borehole diameter and well casing diameter
- Type of protective well cap
- Surface seal and volumes/mix of annular seal material
- Screen length and interval reported in feet below ground surface and elevation
- Well location given to within an accuracy of 0.5 feet based on survey data recorded from an acceptable survey point datum by a Georgia-registered professional surveyor
- Well depth given to within an accuracy of 0.01 feet based on survey data recorded from an acceptable survey point datum by a Georgia-registered professional surveyor
- Lithologic logs
- Documentation that water quality field parameters meet well development criteria (Section 4.2)
- Documentation of ground surface elevation (±0.01 feet)
- Documentation of top of casing elevation (±0.01 feet)
- Schematic of the well with dimensions for all components (e.g., casing, screen, sump, well pad)

5. GROUNDWATER MONITORING PARAMETERS AND FREQUENCY

The following describes groundwater sampling requirements with respect to parameters for analysis, sampling frequency, sample preservation and shipment, and analytical methods. Groundwater samples used to provide compliance monitoring data will not be filtered prior to collection.

Table 1, Groundwater Monitoring Parameters and Frequency, presents the groundwater monitoring parameters and sampling frequency. A minimum of eight independent samples were collected from each groundwater well of the AP-3 network between August 2016 and October 2018, except for wells HGWA-43D, HGWA-44D, HGWA-45D, HGWC-125 and HGWC-126 which were installed after 2018, and analyzed for 40 CFR § 257, Subpart D, Appendix III and Appendix IV test parameters to establish a background statistical dataset. For wells HGWC-125 and HGWC-126, the first of eight independent sampling events occurred in May 2020; for wells HGWA-43D, HGWA-44D, and HGWA-45D, the first of eight sampling events occurred in September 2020. In accordance with 391-3-4-.10(6), the monitoring frequency for the Appendix III parameters will be at least semi-annual during the active life of the facility and, if applicable, during the post-closure care period. Pursuant to Chapter 391-3-4-.10(6), an assessment monitoring program was established for AP-3 based on statistically significant increases documented in the *2019 Annual Groundwater Monitoring and Corrective Action Report* (Geosyntec, 2019). Georgia Power will conduct assessment monitoring in accordance with Chapter 391-3-4-.10(6).

When referenced throughout this plan, Appendix III and Appendix IV parameters refer to the parameters contained in Appendix III and Appendix IV of 40 CFR § 257, Subpart D, 80 Fed. Reg. 21468 (April 17, 2015).

As shown on **Table 2**, Analytical Methods, the groundwater samples will be analyzed using methods specified in EPA Manual SW-846, EPA 600/4-79-020, Standard Methods for the Examination of Water and Wastewater (SM18-20), EPA Methods for the Chemical Analysis of Water and Wastes (MCAWW), ASTM, or other suitable analytical methods approved by EPD. The method used will be able to reach a suitable practical quantification limit to detect natural background conditions at the facility. The groundwater samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Conference (NELAC). Field instruments used to measure pH must be accurate and reproducible to within 0.1 Standard Units (S.U.).

TABLE 1
GROUNDWATER MONITORING PARAMETERS & FREQUENCY

MONITORING PARAMETER		GROUNDWATER MONITORING	
		Background	Semi-Annual Events
Field Parameters	Temperature	X	X
	pH	X	X
	ORP	X	X
	Turbidity	X	X
	Specific Conductance	X	X
	Dissolved Oxygen	X	X
Appendix III (Detection)	Boron	X	X
	Calcium	X	X
	Chloride	X	X
	Fluoride	X	X
	pH	X	X
	Sulfate	X	X
	Total Dissolved Solids	X	X
Appendix IV (Assessment)	Antimony	X	Assessment sampling frequency and parameter list determined in accordance with Georgia Chapter 391-3-4.10(6).
	Arsenic	X	
	Barium	X	
	Beryllium	X	
	Cadmium	X	
	Chromium	X	
	Cobalt	X	
	Fluoride	X	
	Lead	X	
	Lithium	X	
	Mercury	X	
	Molybdenum	X	
	Selenium	X	
	Thallium	X	
	Radium 226 & 228	X	

TABLE 2
ANALYTICAL METHODS

Parameters	USEPA Method Number
Boron	6010B/6020B
Calcium	6010B/6020B
Chloride	300.0/300.1/9250/9251/9253/9056A
Fluoride	300.0/300.1/9214/9056A
pH	150.1 field
Sulfate	9035/9036/9038/300.0/300.1/9056A
Total Dissolved Solids (TDS)	160/2540C
Antimony	EPA 7040/7041/6010B/6020B
Arsenic	EPA 7060A/7061A/6010B/6020B
Barium	EPA 7080A/7081/6010B/6020B
Beryllium	EPA 7090/7091/6010B/6020B
Cadmium	EPA 7130/7131A/6020B
Chromium	EPA 7190/7191/6010B/6020B
Cobalt	EPA 7200/7201/6010B/6020B
Fluoride	300.0/300.1/9214/9056A
Lead	EPA 7420/7421/6010B/6020B
Lithium	6010/6020B
Mercury	7470
Molybdenum	6010/6020B
Selenium	EPA 7740/7741A/6010B/6020B
Thallium	EPA 7840/7841/6010/6020B
Radium 226 and 228 combined	EPA 903/9320/9315

6. GROUNDWATER SAMPLE COLLECTION

During each sampling event, samples will be collected and handled in accordance with the procedures specified in **Appendix C**, Groundwater Sampling Procedure. Sampling procedures were developed using standard industry practice and USEPA Region 4 *Field Branches Quality System and Technical Procedures* as a guide. Low-flow sampling methodology will be utilized for sample collection. Alternative industry accepted sampling techniques may be used when appropriate with prior EPD approval. The applied groundwater purging and sampling methodologies will be discussed in the groundwater semi-annual monitoring reports submitted to EPD.

For groundwater sampling, positive gas displacement Teflon or stainless-steel bladder pumps will be used for purging. If dedicated bladder pumps are not used, portable bladder pumps or peristaltic pumps (with dedicated or disposable tubing) may be used. When non-dedicated equipment is used, it will be decontaminated prior to use and between wells.

Per Georgia Rule 391-3-4-.10(6)(g) monitoring wells require replacement after two consecutive dry sampling events. Well installation must be directed by a qualified groundwater scientist. A minor modification shall be submitted in accordance with Rule 391-3-4-.02 prior to the installation or decommissioning of monitoring wells.

7. SURFACE WATER MONITORING PLAN

During each semi-annual groundwater sampling event, surface water samples will be collected from each of three stormwater downchutes constructed around AP-3; sample locations are identified on **Figure A-1**. The surface water monitoring is conducted separate from any requirements of existing industrial, industrial stormwater, and/or construction stormwater discharge permitting which are regulated by the National Pollutant Discharge Elimination System (NPDES) requirements of Section 402 of the Clean Water Act, outside of the Solid Waste Management Program. Semi-annual sampling of the surface water locations will commence once final construction certification of the AP-3 permitted closure design has been received by GA EPD. As these downchutes are designed to shed water away from the AP-3 cover system during and immediately after rain events, it is possible that water will not be present at these locations during the time of the semi-annual sampling events. In the event that no flowing water is present at the sampling locations, it will be noted in the field sampling documents associated with that event.

Surface water samples will be collected and handled in accordance with standard industry practice and USEPA Region 4 *Field Branches Quality System and Technical Procedures* as a guide. When possible, the sample should be collected directly into the appropriate sample container provided by the analytical laboratory. If the sample location cannot be physically reached, an intermediate collection device may be used (e.g., a "swing sampler" with a 12-foot handle and a single use container) as presented in the current USEPA field guidance document. When non-dedicated equipment is used, it will be decontaminated prior to use and between surface water sampling locations.

Surface water samples will be analyzed for Appendix IV constituents as listed in **Table 1** and by the methods listed in **Table 2**.

8. CHAIN-OF-CUSTODY

All samples will be handled under chain-of-custody (COC) procedures beginning in the field. The COC record will contain the following information:

- Sample identification numbers
- Signature of collector
- Date and time of collection
- Sample type
- Sample point identification
- Number of sample containers
- Signature of person(s) involved in the chain of possession
- Dates of possession by each individual
- Notated date(s) and time(s) of sample transfer between individuals

The samples will remain in the custody of assigned personnel, an assigned agent, or the laboratory. If the samples are transferred to other employees for delivery or transport, the sampler or possessor will relinquish possession and the samples must be received by the new owner.

If the samples are being shipped, a hard copy COC will be signed and enclosed within the shipping container.

Samplers will use COC forms provided by the analytical laboratory or use a COC form similarly formatted and containing the information listed above.

9. FIELD QUALITY ASSURANCE / QUALITY CONTROL

All field quality control samples will be prepared the same as compliance samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected during each sampling event:

Field Equipment Rinsate Blanks - Where sampling equipment is not new or dedicated, an equipment rinsate blank will be collected at a rate of one blank per 10 samples using non-dedicated equipment.

Field Duplicates - Field duplicates are collected by filling additional containers at the same location, and the field duplicate is assigned a unique sample identification number. One blind field duplicate will be collected for every 20 samples.

Field Blanks - Field blanks are collected in the field using the same water source that is used for decontamination. The water is poured directly into the supplied sample containers in the field and submitted to the laboratory for analysis of target constituents. One field blank will be collected for every 20 samples.

The groundwater and surface water samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Program (NELAP).

Calibration of field instruments will occur daily and follow the recommended (specific) instrument calibration procedures provided by the manufacturer and/or equipment manual specific to each instrument. Daily calibration will be documented on field forms and these field forms will be included in all groundwater monitoring reports. Instruments will be recalibrated as necessary (e.g., when calibration checks indicate significant variability), and all checks and recalibration steps will be documented on field calibration forms. Calibration of the instruments will also be checked if any readings during sampling activities are suspect. Replacement probes and meters will be obtained as a corrective action in the event that recalibration does not improve instrument function. Completed calibration field forms will be provided with the semi-annual groundwater monitoring reports.

10. REPORTING RESULTS

A semi-annual groundwater report that documents the results of sampling and analysis will be submitted to EPD. Semi-annual groundwater monitoring reports will be submitted to the EPD within 90 days of receipt of the groundwater analytical data from the laboratory. At a minimum, semi-annual reports will include:

1. A narrative describing sampling activities and findings including a summary of the number of samples collected, the dates the samples were collected and whether the samples were required by the detection or assessment monitoring programs.

2. A narrative of purging/sampling methodologies, which will include the type of sampling equipment used.

3. Discussion of results.

4. Recommendations for the future monitoring consistent with the Rules.

5. Potentiometric surface contour map for the aquifer(s) being monitored, signed and sealed by a Georgia-registered P.G. or P.E.

6. Table of as-built information for groundwater monitoring wells including top of casing elevations, ground elevations, screened elevations, current groundwater elevations and depth to water measurements.

7. Groundwater flow rate and direction calculations.

8. Identification of any groundwater wells that were installed or abandoned during the preceding year, along with a narrative description of why these actions were taken.

9. A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels).

10. If applicable, semi-annual assessment monitoring results.

11. Any alternate source demonstration completed during the previous monitoring period, if applicable.

12. Laboratory Reports.

13. COC documentation.

14. Field sampling logs including field instrument calibration, indicator parameters and parameter stabilization data.

15. Field logs and forms will be kept for each sampling event, and will include the following, but not be limited to, well signage, well access, sampling and purging equipment condition, and any site conditions that may affect sampling.

16. Documentation of non-functioning wells.

17. Table of current analytical results for each well, highlighting statistically significant increases and concentrations above maximum contaminant level (MCL).

18. Tabulated water quality results for the samples of discharging surface water collected semi-annually from the designated surface water sampling locations shown on Figure A-1. The table presents data for the current reporting period and all historical monitoring events associated with the surface water monitoring program.

19. Statistical analyses.

20. Certification by a qualified groundwater scientist.

11. STATISTICAL ANALYSIS

Groundwater quality data from each sampling event will be statistically evaluated to determine if there has been a statistically significant change in groundwater chemistry. Historical background data will be used to establish statistical limits. Statistical analysis techniques will be consistent with the USEPA document *Statistical Analysis of Groundwater Data at RCRA Facilities Unified Guidance* (Unified Guidance) (USEPA, 2009).

According to EPD rules (391-3-4-.10(6)(a)), the Site must specify in the operating record the statistical methods to be used in evaluating groundwater monitoring data for each hazardous constituent. The statistical test chosen will be conducted separately for each hazardous constituent in each well. As authorized by the rule, statistical tests that will be used include:

1. A prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit. [40 CFR § 257.93(f)(3)];

2. A control chart approach that gives control limits for each constituent. [40 CFR § 257.93(f)(4)]; and

3. Another statistical test method (such as prediction limits or control charts) that meets the performance standards of 40 CFR § 257.93(g) [§ 257.93(f)(5)]. A justification for an alternative method will be placed in the operating record and the Director notified of the use of an alternative test. The justification will demonstrate that the alternative method meets the performance standards of 40 CFR § 257.93(g).

An interwell statistical method will be used to compare Appendix III groundwater monitoring data to background conditions. Confidence intervals will be constructed for each downgradient well and used to compare Appendix IV groundwater monitoring data to groundwater protection standards.

A site-specific statistical analysis plan that provides details regarding the statistical methods to be used will be placed in the Site's operating record pursuant to 391-3-4-.10(6). **Figure 1**, *Statistical Analysis Plan Overview*, presents a flowchart that depicts the process that will be followed to develop the site-specific plan. **Figure 2**, *Decision Logic for Computing Prediction Limits*, presents the logic that will be used to calculate site-specific statistical limits and test groundwater results from compliance monitoring wells against those limits.

FIGURE 1. STATISTICAL ANALYSIS PLAN OVERVIEW

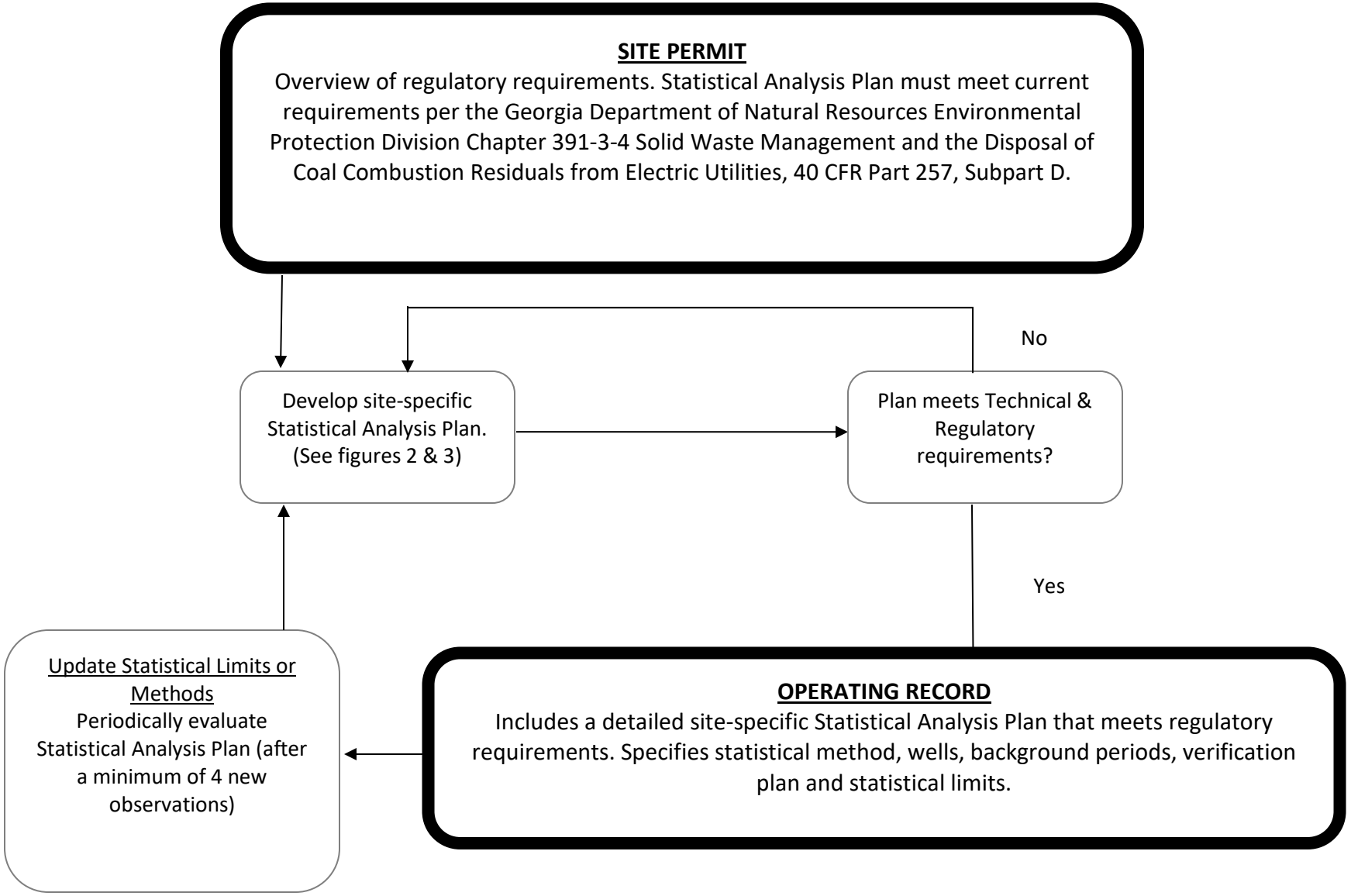
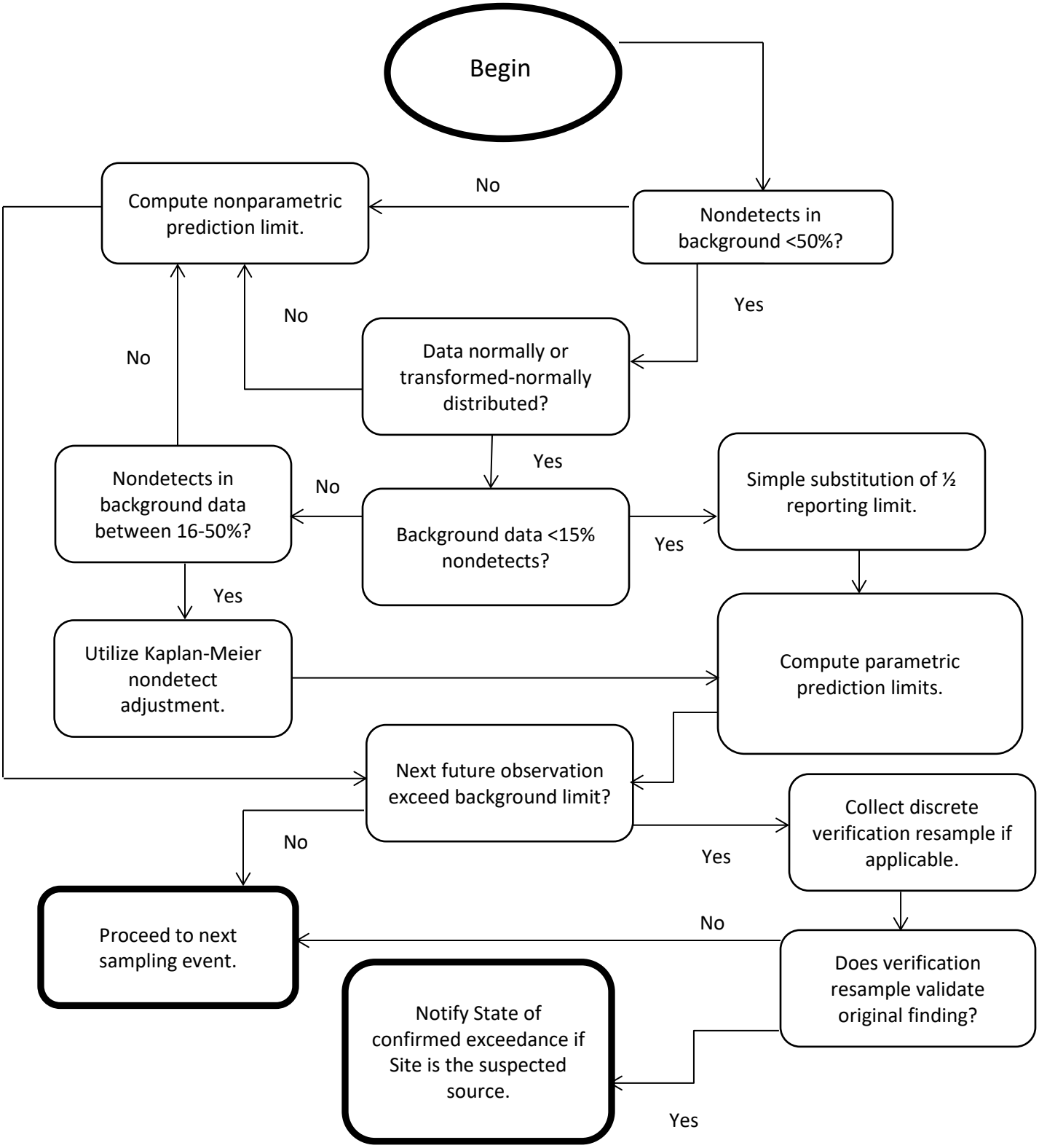


FIGURE 2. DECISION LOGIC FOR COMPUTING TOLERANCE OR PREDICTION INTERVALS



12. REFERENCES

Georgia Environmental Protection Division (EPD), 1991. *Manual for Groundwater Monitoring.* (PP. 38).

Georgia Rules and Regulations, 2018. *Rule Subject 391-3-4, Solid Waste Management*. Revised March 28, 2018.

Geosyntec Consultants, 2019. *2019 Annual Groundwater Monitoring & Corrective Action Report.* July 2019.

Golder Associates, 2018. *Geologic and Hydrogeologic Report - Georgia Power Plant Hammond Floyd County, Georgia*.

Official Code of Georgia Annotated, 1985. *O.C.G.A. § 12-5-120. Water Well Standards Act of 1985*.

United States Environmental Protection Agency, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Resource Conservation and Recovery – Program Implementation and Information Division.

United States Environmental Protection Agency, Region 4 Science and Ecosystem Support Division, 2013. *Operating Procedure for Design and Installation of Monitoring Wells*. SESDGUID-101-R1.

United States Environmental Protection Agency, Region 4 Science and Ecosystem Support Division, 2015. *Operating Procedure for Field Equipment Cleaning and Decontamination*. SESDPROC-205-R3.

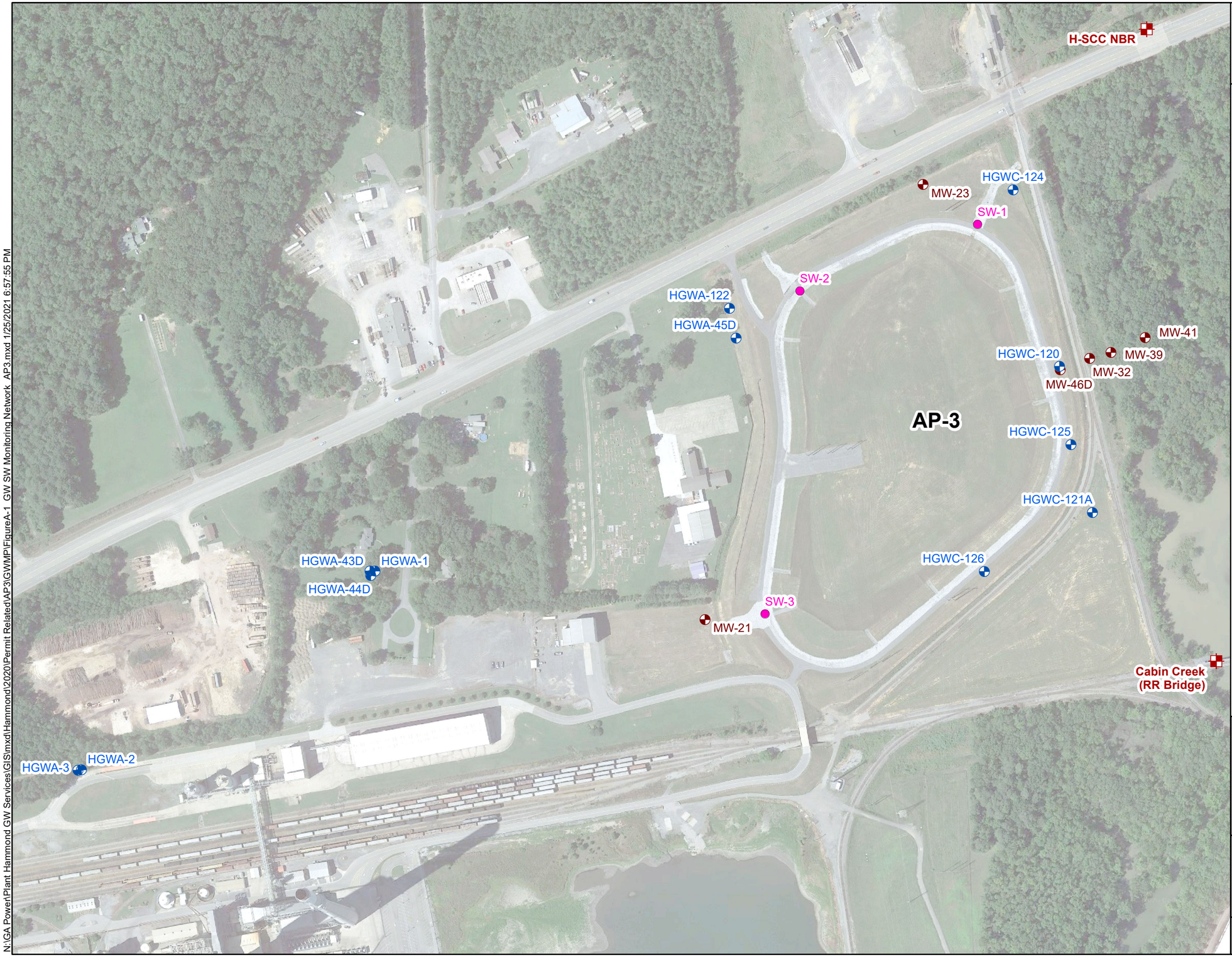
United States Environmental Protection Agency, Region 4 Science and Ecosystem Support Division, 2017. *Operating Procedure for Groundwater Sampling*. SESDPROC-304-R4.

United States Environmental Protection Agency, 2015. *40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.*

APPENDIX

A. MONITORING SYSTEM DETAILS
B. GROUNDWATER MONITORING WELL DETAIL
C. GROUNDWATER SAMPLING PROCEDURE

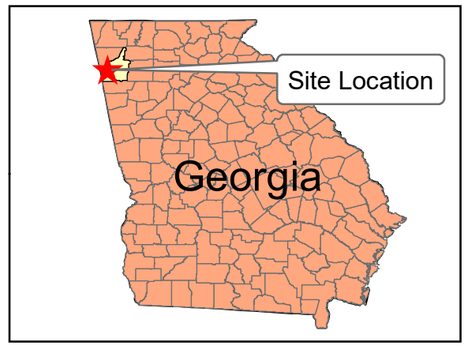
A. MONITORING SYSTEM DETAILS



N

LEGEND

- Compliance Monitoring Well
- Piezometer
- Surface Water Level Gauge Point
- Surface Water Sample Location



Note:
1. Aerial photograph source: Google Earth Pro, August 2019.

0 300 600

SCALE IN FEET

COMPLIANCE MONITORING NETWORK

GEORGIA POWER COMPANY
PLANT HAMMOND AP-3
FLOYD COUNTY, GEORGIA

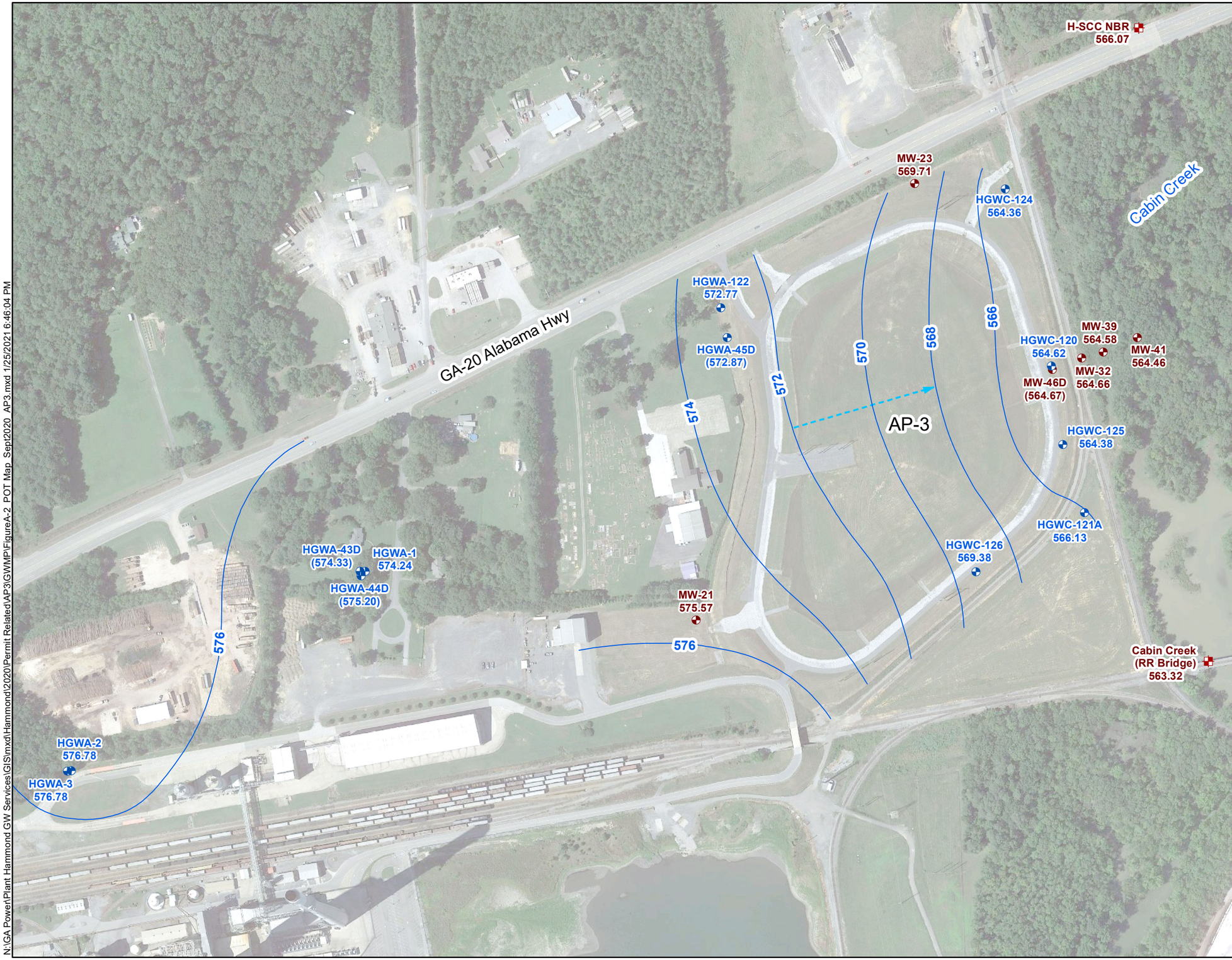
Prepared For: Georgia Power

Prepared By: Geosyntec consultants

KENNESAW, GA | JANUARY 2021

FIGURE A-1

N:\GA Power\Plant Hammond GW Services\GIS\mxd\Hammond\2020\Permit Related\AP3\GWMP\FigureA-1_GW SW Monitoring Network_AP3.mxd 1/25/2021 6:57:55 PM



N

LEGEND

- Compliance Monitoring Well
- Piezometer
- Surface Water Level Gauge Point
- Groundwater Elevation Iso-Contour
- Approximate Groundwater Flow Direction

Notes:
1. Water level elevation recorded on September 14, 2020. Elevation provided in feet (ft) referenced to the North American Vertical Datum (NAVD) 88.
2. Water elevation in parentheses were not used in development of groundwater contours due to wells being screened at a different elevation in the formation/aquifer.
3. Aerial photograph source: Google Earth Pro, August 2019.

0 150 300 600

SCALE IN FEET

POTENTIOMETRIC SURFACE CONTOUR MAP – SEPTEMBER 2020

GEORGIA POWER COMPANY
PLANT HAMMOND AP-3
FLOYD COUNTY, GEORGIA

Prepared For: Georgia Power

Prepared By: Geosyntec consultants

KENNESAW, GA | JANUARY 2021

FIGURE A-2

N:\GA Power\Plant Hammond GW Services\GIS\mxd\Hammond\2020\Permit Related\AP3\GWMP\FigureA-2_POT Map_Sept2020_AP3.mxd 1/25/2021 6:46:04 PM

Table A-1
AP-3 Monitoring Network Well Details
Plant Hammond, Floyd County, Georgia

Well ID	Purpose	Northing [1]	Easting [1]	Ground Surface Elevation [2] (ft NAVD88)	Top of Casing Elevation (ft NAVD88)	Well Depth [3] (ft BTOC)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Screened Media
HGWA-1	Monitoring, upgradient	1550423.32	1940770.00	592.32	595.21	32.49	573.12	563.12	Highly weathered shaley limestone, competent shaley limestone
HGWA-2	Monitoring, upgradient	1549796.87	1939845.15	585.29	587.92	27.95	570.29	560.29	Terrace alluvium
HGWA-3	Monitoring, upgradient	1549794.41	1939833.39	585.23	587.74	44.51	553.23	543.23	Highly weathered shaley limestone
HGWA-43D	Monitoring, upgradient	1550422.85	1940753.80	592.08	595.08	61.25	544.08	534.08	Limestone
HGWA-44D	Monitoring, upgradient	1550409.13	1940756.18	592.01	594.79	113.28	491.76	481.76	Limestone
HGWA-45D	Monitoring, upgradient	1551157.68	1941907.54	584.08	586.95	62.87	535.23	525.23	Limestone
HGWA-122	Monitoring, upgradient	1551251.42	1941887.11	585.04	587.90	27.76	570.54	560.54	Residuum, highly weathered limestone, and limestone
HGWC-120	Monitoring, downgradient	1551067.24	1942926.62	602.83	605.82	67.00	548.83	538.83	Limestone
HGWC-121A	Monitoring, downgradient	1550607.97	1943030.44	582.31	584.69	37.98	556.71	546.71	Residuum, highly weathered limestone, and limestone
HGWC-124	Monitoring, downgradient	1551624.93	1942781.05	579.80	582.52	35.12	557.80	547.80	Highly weathered limestone and limestone
HGWC-125	Monitoring, downgradient	1550821.41	1942962.87	605.70	608.89	63.19	556.20	546.20	Highly weathered limestone
HGWC-126	Monitoring, downgradient	1550422.03	1942689.40	608.72	611.24	68.52	552.72	542.72	Highly weathered limestone and limestone

Notes:
ft = feet
ft BTOC = feet below top of casing
(1) Coordinates in North American Datum (NAD) 1983, State Plane, Georgia West Zone, feet. Survey data certified May 19, 2020. Wells HGWA-43D, HGWA-44D, and HGWA-45D survey data certified September 10, 2020.
(2) Vertical elevations are in feet relative to the North American Vertical Datum 1988 (ft NAVD88). "Ground surface" elevation defined at the survey nail installed within the well pad.
(3) Total well depth accounts for sump if data provided on well construction logs.

Table A-2
AP-3 Water Level Monitoring Network Piezometer Details
Plant Hammond, Floyd County, Georgia

Well ID	Northing [1]	Easting [1]	Ground Surface Elevation [2] (ft NAVD88)	Top of Casing Elevation (ft NAVD88)	Well Depth [3] (ft BTOC)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Screened Media
MW-21	1550270.15	1941809.76	583.60	586.27	26.28	570.40	560.40	Residuum, highly weathered limestone, and limestone
MW-23	1551641.44	1942496.83	582.13	584.91	32.28	563.03	553.03	Highly weathered limestone and limestone
MW-32	1551092.83	1943021.47	583.10	585.46	36.16	559.30	549.30	Residuum, highly weathered limestone, and limestone
MW-39	1551111.45	1943089.26	577.60	580.42	25.82	264.93	554.93	Residuum, highly weathered limestone, and limestone
MW-41	1551158.16	1943196.47	574.87	577.25	24.38	563.20	553.20	Residuum (clay)
MW-46D	1551056.48	1942929.10	603.17	605.72	102.05	513.92	503.92	Limestone

Notes:
ft = feet
ft BTOC = feet below top of casing
(1) Coordinates in North American Datum (NAD) 1983, State Plane, Georgia West Zone, feet. Survey data certified May 19, 2020. Well MW-46D survey data certified September 10, 2020.
(2) Vertical elevations are in feet relative to the North American Vertical Datum (NAVD) 1988. "Ground surface" elevation defined at the survey nail installed within the well pad.
(3) Total well depth accounts for sump if data provided on well construction logs.

Log updated with revised survey certified 5/19/2020.

BORING HGWA-1

SOUTHERN COMPANY

LOG OF TEST BORING

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 12/3/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 592.32 **COORDINATES:** N:1550423.32 E:1940770.00
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____
BORING DEPTH 29.7 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** 17.1 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
		Clayey Gravel (GC)					
5		- brown and light brown, dry, dense		SS -1	3.5-5.0	7-13-18 (**31**)	
			586.32				
		Silty Clay (CL)					
10		- pale gray-brown, dry, very stiff, with red and yellow-brown mottling		SS -2	8.5-10.0	7-10-12 (**22**)	
15		- brown, dry, stiff, with gray mottling		SS -3	13.5-15.0	6-6-6 (**12**)	
			573.82)				
20		**SHALEY LIMESTONE**					Auger refusal at 18.5 ft.
25		- gray and dark gray, not to highly weathered, shale seams less than 1/2 inch, shear/fracture zone fabric, near vertical bedding, water staining		RC -1	18.7-25.2	**95** (23)	
				RC -2	25.2-29.7	**98** (9)	
			562.62				

Bottom of borehole at 29.7 feet.

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

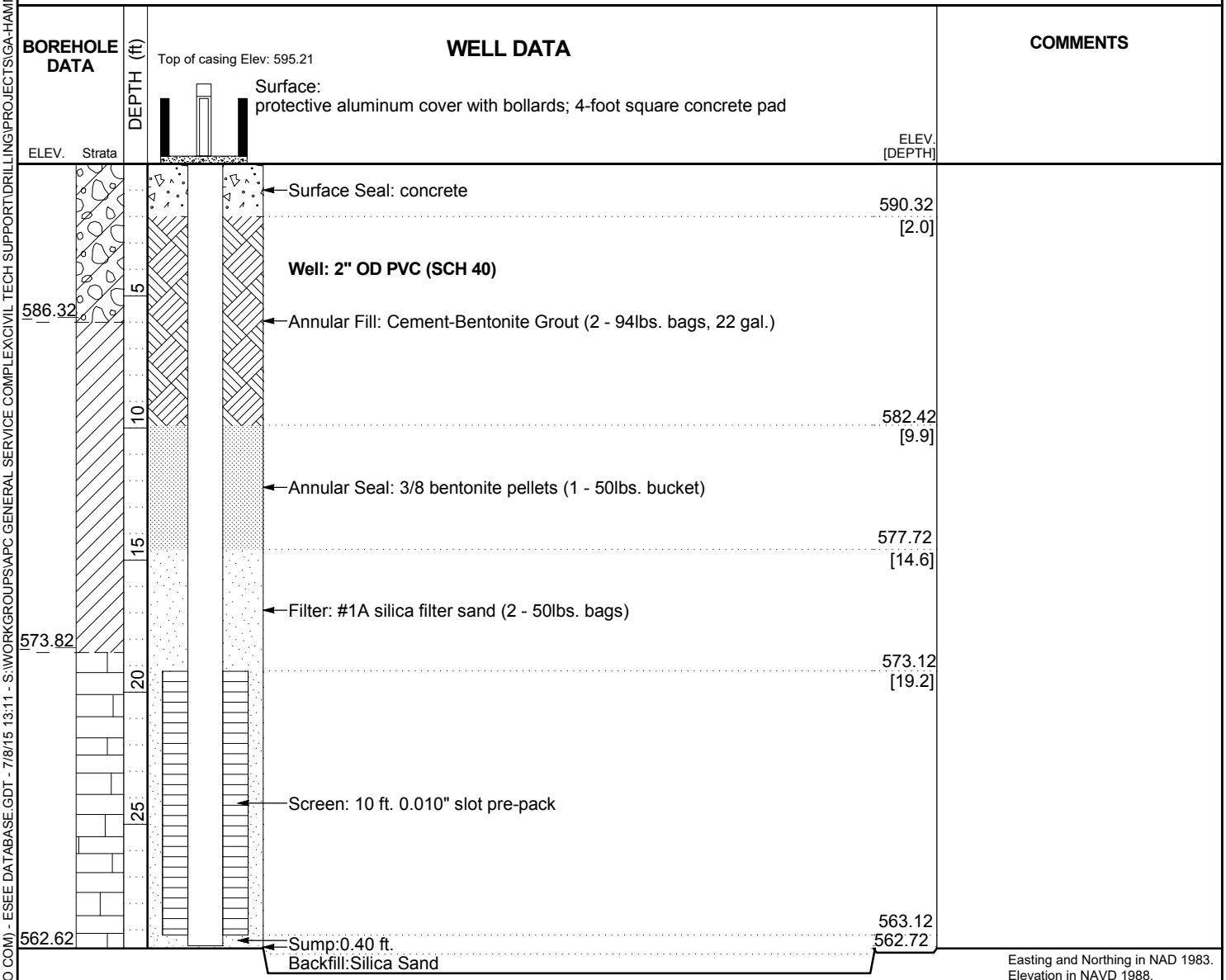
WELL: HGWA-1

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 12/3/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 592.32 **COORDINATES:** N:1550423.32 E:1940770.00
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 29.7 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 17.1 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.



Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

RECORD OF BOREHOLE HGWA-2

SHEET 1 of 1

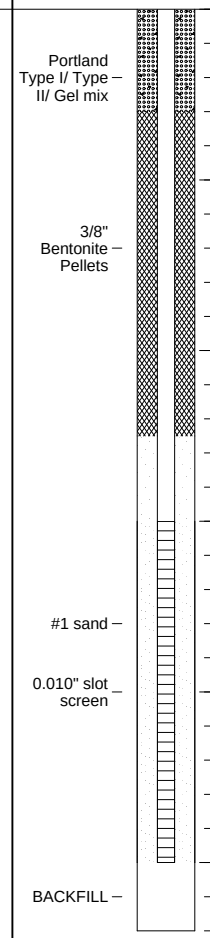
PROJECT: SCS Hammond
PROJECT NUMBER: 1545812
DRILLED DEPTH: 27.00 ft
LOCATION: Rome, GA

DRILL RIG: Pro Sonic 150
DATE STARTED: 12/2/15
DATE COMPLETED: 12/2/15

NORTHING: 1,549,796.87
EASTING: 1,939,845.15
GS ELEVATION: 585.29 ft
TOC ELEVATION: 587.92 ft

DEPTH W.L.:8.19
DATE W.L.:12/2/15
TIME W.L.:11:10

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
0	585	0.00 - 3.00 CLAY; light brown/grey silty clay, trace organic material, soft	CL		582.29			
		3.00 - 7.00 SILTY CLAY; grey/orange/light brown silty clay, mottled, stiff to very stiff, some black streaking from 3'-4', moist	CL		3.00 578.29			
5	580	7.00 - 8.00 CLAY; light brown/orange/grey sandy, gravelly clay, mottled, moist	CL		7.00 577.29			
		8.00 - 12.00 SANDY GRAVEL; orange/light brown sandy gravel, coarse grained, sub-angular gravel,	GP		8.00 573.29			
10	575	12.00 - 17.00 light brown/orange sandy gravel, coarse grain, loosely compacted, moist			12.00 568.29			
		17.00 - 18.00 GRAVELLY CLAY; orange/light brown gravelly clay, sub-angular gravel, moist	CLG		17.00 567.29 (567.23)			
15	570	18.00 - 24.00 SANDY GRAVEL; orange/light brown sandy gravel, coarse grained, trace clay lenses, wet	GP		18.00 561.29			
20	565	24.00 - 26.00 SILT; orange/light brown layered silt, soft, wet	ML		24.00 559.29			
		26.00 - 27.00 grey silt with trace limestone shale and clay, foliated, soft, wet			26.00 558.29			
25	560	Boring completed at 27.00 ft						
30	555							
35	550							
40	545							
45								



WELL CASING
Interval: -3'-15'
Material: Schedule 40 PVC
Diameter: 6"
Joint Type: Screw/Flush

SURFACE CASING
Interval: N/A
Material: N/A
Diameter: N/A

WELL SCREEN
Interval: 15'-25'
Material: Schedule 40 PVC
Diameter: 2'
Slot Size: 0.010"
End Cap: Schedule 40 PVC

FILTER PACK
Interval: 12.5'-25'
Type: #1 sand/ Prepack Filter

FILTER PACK SEAL
Interval: 3'-12.5'
Type: 3/8" Bentonite Pellets

ANNULUS SEAL
Interval: 0'-3'
Type: Portland Type I/Type II/Gel Mix

WELL COMPLETION
Pad: 4'x4'x4"
Protective Casing: Anodized Aluminum

DRILLING METHODS
Soil Drill: 6-inch diameter Sonic
Rock Drill: 6-inch diameter Sonic

LOG SCALE: 1 in = 5.5 ft
DRILLING COMPANY: Cascade
DRILLER: Tom Ardito

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

GA INSPECTOR: James Mullooly
CHECKED BY: Rachel P. Kirkman, P.G.
DATE: 2/24/16

Golder Associates

BOREHOLE RECORD HAMMOND BORING LOGS.GPJ PIEDMONT.GDT 3/1/16

Log updated with revised survey certified 5/19/2020.

RECORD OF BOREHOLE HGWA-3

SHEET 1 of 1

PROJECT: SCS Hammond
PROJECT NUMBER: 1545812
DRILLED DEPTH: 42.00 ft
LOCATION: Rome, GA

DRILL RIG: Pro Sonic 150
DATE STARTED: 12/1/15
DATE COMPLETED: 12/2/15

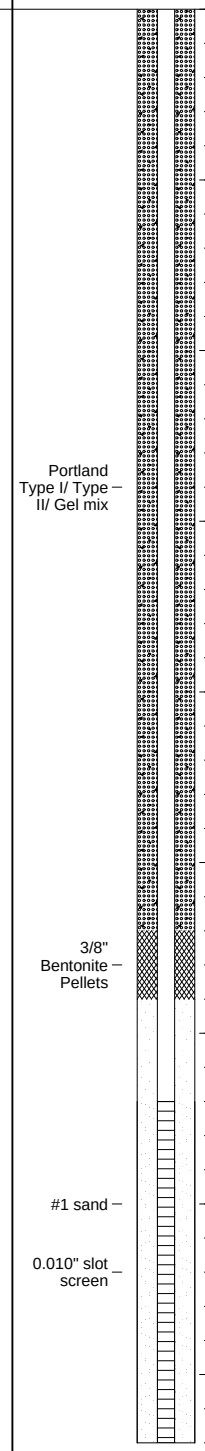
NORTHING: 1,549,794.41
EASTING: 1,939,833.39
GS ELEVATION: 585.23 ff
TOC ELEVATION: 587.74 ft

DEPTH W.L.:2.68
DATE W.L.:12/2/15
TIME W.L.:07:30

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)
0	585	0.00 - 5.00 SANDY CLAY; grey/brown/orange mottled sandy clay, fine grained, medium density, stiff, moist	CLS	580.23
5	580	5.00 - 13.00 CLAYEY GRAVEL; orange/brown clayey gravel with some sand, poorly sorted and angular pieces, gravel becomes more rounded at 9 feet, medium density compaction	GC	5.00 572.23
10	575	13.00 - 14.00 wet around 13.5 feet	GC	13.00 571.23 (571.19)
15	570	14.00 - 17.00 SANDY GRAVEL; brown/grey poorly sorted, well rounded sandy gravel, wet	GP	14.00 568.23
20	565	17.00 - 25.00 orange/brown sandy gravel, well rounded, poorly sorted, wet		17.00 560.23
25	560	25.00 - 26.00 some larger rock fragments and coarse grained sand		25.00 559.23
30	555	26.00 - 31.00 CLAY; brown/grey sandy gravel, changes to grey weathered limestone and clay, medium density, firm, moist	CL	26.00 554.23
35	550	31.00 - 37.00 PARTIALLY WEATHERED ROCK; partially weathered limestone and trace clay, angular rock fragments, clay is mottled light and dark grey, wet	PWR	31.00 548.23
40	545	37.00 - 42.00 partially weathered dark grey shaly limestone, poorly sorted and angular, some gravel, bottom 3 inches are solid limestone, wet (saturated)		37.00 543.23
45		Boring completed at 42.00 ft		

SAMPLES: SAMPLE NO., TYPE, REC

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval:
Material: Schedule 40 PVC
Diameter: 6"
Joint Type: Screw/Flush

SURFACE CASING
Interval: N/A
Material: N/A
Diameter: N/A

WELL SCREEN
Interval: 32'-42'
Material: Schedule 40 PVC
Diameter: 2'
Slot Size: 0.010"
End Cap: Schedule 40 PVC

FILTER PACK
Interval: 29'-42'
Type: #1 sand/ Prepack Filter

FILTER PACK SEAL
Interval: 27'-29'
Type: 3/8" Bentonite Pellets

ANNULUS SEAL
Interval: 0'-27'
Type: Portland Type I/Type II/Gel Mix

WELL COMPLETION
Pad: 4'x4'x4"
Protective Casing: Anodized Aluminum

DRILLING METHODS
Soil Drill: 6-inch diameter Sonic
Rock Drill: 6-inch diameter Sonic

LOG SCALE: 1 in = 5.5 ft
DRILLING COMPANY: Cascade
DRILLER: Tom Ardito

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

GA INSPECTOR: James Mullooly
CHECKED BY: Rachel P. Kirkman, P.G.
DATE: 2/24/16

Golder Associates

BOREHOLE RECORD HAMMOND BORING LOGS.GPJ PIEDMONT.GDT 3/1/16

Geosyntec consultants
engineers | scientists | innovators
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWA-43D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/26/20 **COMPLETED** 8/26/20
NORTHING 1550422.85 ft **EASTING** 1940753.80 ft
DRILLER Cascade Drilling
GROUND ELEVATION 592.08 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 595.08 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	590			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	585			
10	580			582.1 CLAY, Yellowish red and light gray mottling, medium plasticity, trace coarse sand, hard, moist.
15	575			576.6 CLAY, Reddish yellow with light gray mottling, laminated brown, with organic material, trace limestone gravel, hard, moist. 17 ft: Trace of limestone gravel.
20	570			573.1 HIGHLY WEATHERED ROCK, Light brown, recovered as angular gravelly clay with trace limestone cobbles, non plastic to low plasticity, soft, wet.
25	565			569.1 LIMESTONE, Grayish blue to white, some white calcite healed fractures, 1 in clay filled fractures, mostly pulverized by drilling, powder reacts with HCl, hard, dry. 27 ft: Wet. 562.1

CONSTRUCTION DIAGRAM

- Schedule 40 PVC 2"
- Aquaguard Sodium Bentonite Grout
- Bentonite coated 3/8" pellets

SCS MONITORING WELLS PLANT HAMMOND HGWA7 TO HGWA114 AND MW46D_AUGUST 2020.GPJ ACP GINT LIBRARY CH.GLB 9/23/20

(Continued Next Page)

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Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWA-43D

CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
30	560	30 ft to 50 ft: No voids reported.		30 ft to 34.5 ft: No recovery.	
				557.6	
35	555			LIMESTONE, Grayish blue to white, hard, dry, some white calcite healed fractures, 1 in clay filled fractures, 38 ft to 39 ft pulverized by drilling, powder reacts with HCl, wet.	
40	550			40 ft: Up to 1 in thick calcite healed fractures.	Bentonite coated 3/8" pellets
				548.1	
45	545			44 ft to 50 ft: No recovery.	
50	540			542.1	20/40 Silica Sand
				LIMESTONE, Grayish blue to white, hard, dry, up to 1 in thick calcite healed fractures, trace 1 in clay filled fractures, mostly pulverized by drilling, powder reacts with HCl.	0.010 slot size 2" Pre Pack, U-Pack Screen
55	535				Bottom of well: 58.25 ft
				533.8	

Bottom of borehole at 58.3 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

SCS MONITORING WELLS PLANT HAMMOND HGWA7 TO HGWA114 AND MW46D_AUGUST 2020.GPJ ACP GINT LIBRARY CH.GLB 9/23/20

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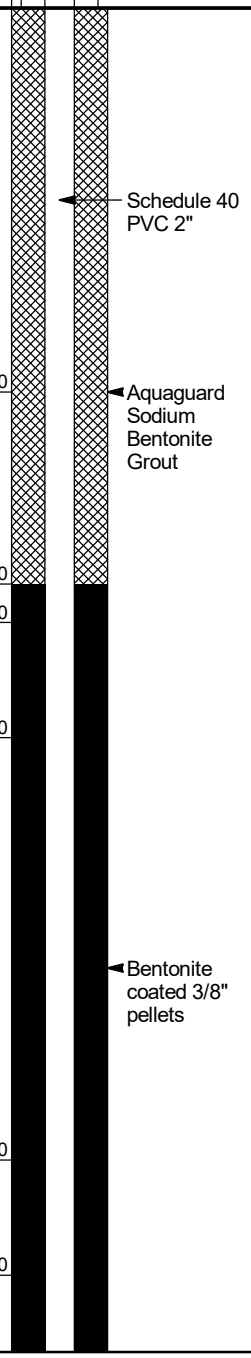
engineers | scientists | innovators
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWA-44D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/24/20 **COMPLETED** 8/25/20
NORTHING 1550409.13 ft **EASTING** 1940756.18 ft
DRILLER Cascade Drilling
GROUND ELEVATION 592.01 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 594.79 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	592			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	590			
10	585			582.0 CLAY, Red with yellowish red and light gray mottling, medium plasticity, trace coarse sand, hard, moist. 12 ft: Yellowish red and light gray mottling.
15	580			577.0 CLAY, Reddish yellow with light gray mottling, some brown organic matter, trace limestone gravel, medium to low plasticity, hard, moist.
20	575			576.0 HIGHLY WEATHER ROCK, Light brown, gravelley clay with some angular cobbles, gravel and cobbles are limestone, non to low plasticity, soft, wet.
25	570			573.0 LIMESTONE, Dark bluish gray, reacts with HCl when powdered, partially pulverized by drilling, hard, dry to moist. 20 ft: With abundant white calcite healed fractures.
30	565	Driller reports void between 30 ft and 31 ft. No returns. 31 ft to 33 ft no recovery, but returns coming back. Driller reports 'soft' material, potentially washed away.		562.0 30 ft to 31 ft: Void. 31 ft to 33 ft: No recovery.
	560			559.0 LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized and dry.

CONSTRUCTION DIAGRAM



SCS MONITORING WELLS PLANT HAMMOND HGWA7 TO HGWA114 AND MW46D_AUGUST 2020.GPJ ACP GINT LIBRARY CH.GLB 9/23/20

(Continued Next Page)

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CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
35	555	40 ft: Driller reports no returns.		LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized and dry. *(continued)*	
40				552.0 40 ft to 42 ft: No recovery.	
	550			550.0 LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized by drilling.	
45	545				
50				542.0 50 ft to 52 ft: No recovery.	
	540			540.0 LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized by drilling.	
55	535				Bentonite coated 3/8" pellets
60				532.0 60 ft to 61 ft: No recovery.	
	530			531.0 LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures.	
65	525				
70				522.0 70 ft to 71 ft: No recovery.	
	520			521.0 LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white hite 0.1 in to 2 in thick calcite healed fractures.	

SCS MONITORING WELLS PLANT HAMMOND HGWA7 TO HGWA114 AND MW46D_AUGUST 2020.GPJ ACP GINT LIBRARY CH.GLB 9/23/20

(Continued Next Page)

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CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
75	515			LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white hite 0.1 in to 2 in thick calcite healed fractures. *(continued)*	
				512.0	
80	510			80 ft to 84 ft: No recovery.	
				508.0	
85	505			LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures.	Bentonite coated 3/8" pellets
				502.0	
90	500			90 ft to 94 ft: No recovery.	
				498.0	
95	495			LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures.	
				492.0	
100	490			100 ft to 102 ft: No recovery.	20/40 Silica Sand
				490.0	
105	485			LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures.	0.010 slot size 2" Pre Pack, U-Pack Screen
110					Bottom of well: 110.5 ft
				480.0	

Bottom of borehole at 112.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

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HGWA-45D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/19/20 **COMPLETED** 8/19/20
NORTHING 1551157.68 ft **EASTING** 1941907.54 ft
DRILLER Cascade Drilling
GROUND ELEVATION 584.08 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 586.95 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
0				Hydro Excavation (0 ft to 10 ft) NO SAMPLE	
	580				
5					Schedule 40 PVC 2"
	575				
10				574.1 GRAVELLEY SAND, Light gray, loose, trace clay, fine to coarse sand, angular gravel, moist. 12 ft: Dry.	Aquaguard Sodium Bentonite Grout
	570			570.1 CLAY, Light brown, mottled with light gray and yellowish red, laminar dark brown organic material throughout, firm, non plastic to low plasticity, moist.	
15				569.1 CLAY, Light brown, some reddish yellow, moist, soft, medium to high plasticity, with some angular, fine grained gravel increasing in concentration with depth.	
	565				
20				20 ft: Wet.	
		22.5 ft: Increased rig chatter.		561.6 LIMESTONE, Light gray to white, hard, strong reaction with HCl, dry.	
	560			561.1 LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.	
25					
	555				
		30 ft to 40 ft: Very slow drilling (hard formation).		554.6 HIGHLY WEATHERED ROCK, Dark bluish gray, recovered as gravelly clay and silt, non plastic, hard, wet.	
30				554.1 30 ft to 37 ft: No recovery.	Bentonite coated 3/8" pellets
	550				

SCS MONITORING WELLS PLANT HAMMOND HGWA7 TO HGWA114 AND MW46D_AUGUST 2020.GPJ ACP GINT LIBRARY CH.GLB 9/23/20

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CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
35				30 ft to 37 ft: No recovery. *(continued)*	
				547.1	
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.	
	545				
40				544.1	Bentonite coated 3/8" pellets
				40 ft to 43 ft: No recovery.	
				541.1	
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.	
	540				
45					
	535				20/40 Silica Sand
50					
	530				0.010 slot size 2" Pre Pack, U-Pack Screen
55					
	525				Bottom of well: 60 ft
60				524.1	

Bottom of borehole at 60.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

BORING HGWA-122

SOUTHERN COMPANY

LOG OF TEST BORING

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/20/2014 **COMPLETED** 11/20/2014 **SURF. ELEV.** 585.04 **COORDINATES:** N:1551251.42 E:1941887.11
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____
BORING DEPTH 25.2 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** _____ **DELAYED** 11.1 ft. after 100 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
		Clayey Sand (SC)					
5		- yellow-brown, dry, medium dense, medium to coarse grain, with yellow-red mottling		SS -1	3.5-5.0	3-7-5 (**12**)	
			577.04				
10		**Lean Clay (CL)** - yellow-brown, damp, stiff, no to low plasticity, with red-yellow mottling, some sand		SS -2	8.5-10.0	7-7-5 (**12**)	
			572.04				
15		**Fat Clay (CH)** - brown, wet, soft, gravelly, angular gravel, weathered bedrock		SS -3	13.5-15.0	2-2-1 (**3**)	
			566.74				
20		**SHALEY LIMESTONE**		RC -1	18.3-20.2	**89** (21)	Auger refusal at 18.3 ft.
		- gray and dark gray, few weathered shale seams 1/8 to 1/4 inch thick, strong HCl reaction					
25		- shale seams thicker (up to 1 inch thick) and less weathered		RC -2	20.2-25.2	**96** (24)	
			555.84				

Bottom of borehole at 25.2 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

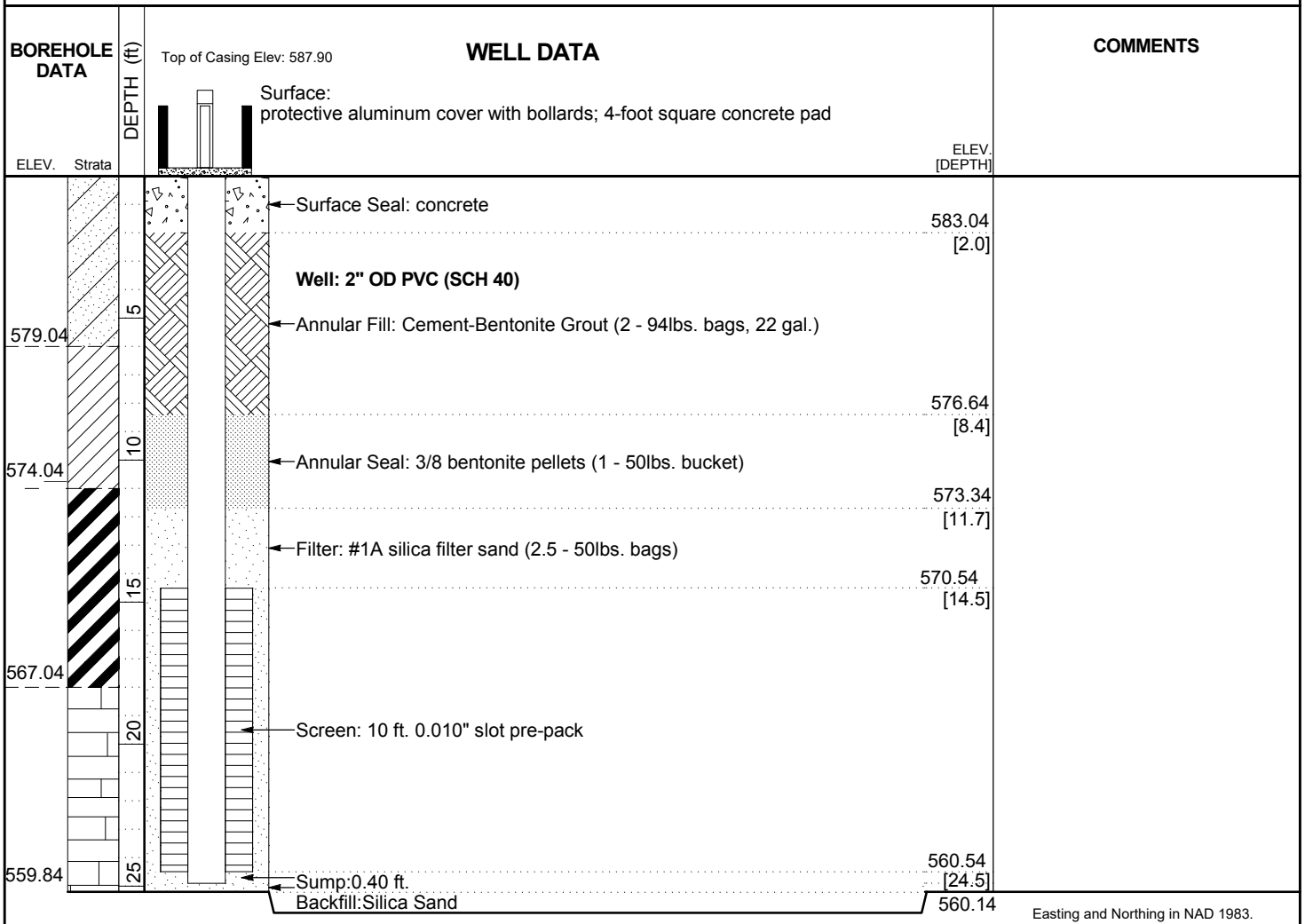
WELL: HGWA-122

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/20/2014 **COMPLETED** 11/20/2014 **SURF. ELEV.** 585.04 **COORDINATES:** N:1551251.42 E:1941887.11
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 25.2 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 11.1 ft. after 100 hrs.
NOTES Well installed. Refer to well data sheet.



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

BORING LOG

BORING HGWC-120

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DATE STARTED 6/27/2016 **COMPLETED** 6/27/2016 **SURF. ELEV.** 602.83 **COORDINATES:** N: 1551067.24 E: 1942926.62
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Ardito **LOGGED BY** W. Newton **CHECKED BY**
BORING DEPTH 67 ft. **GROUND WATER DEPTHDURING** 47 ft. **COMP.** 42.6 ft. **DELAYED** 42.6 ft.
NOTES Begin Engineering Log at 47 ft. Well installed. Refer to well data sheet.

DEPTH (ft)	MATERIAL DESCRIPTION	Elev: 602.83	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 605.82 ft)
	Topsoil (TOPSOIL)			**Surface Seal**
		559.83		
	Lean Clay (CL)			
5				
	Gravelly Lean Clay (CLG) mottled			
10				
15				
	Low Plastic Organic Silt or Clay (OL)			
	Lean Clay (CL)			
20				**Annular Fill**
25				
	Coal Combustion Byproduct (ASH)			
	Lean Clay (CL)	575.83		
	Gravelly Lean Clay (CLG)			
30				
		571.83		
35				
	Gravelly Lean Clay (CLG)	565.83		
	Fat Clay (CH)			
40				

(Continued Next Page)

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

BORING LOG

BORING HGWC-120

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev:	Natural Gamma 75 150 225	WELL DATA
					Top of casing Elev. = 605.82
					(CONTINUED)
		Fat Clay (CH) *(Con't)*			
45					**Annular Fill**
			555.83		
		DOLOSTONE			
		CLS			
50			552.83		**Annular Seal**
					Filter Pack
			548.83		Screen top elevation: 548.83
55		**DOLOSTONE**			
60					
65					**Screen bottom Elevation:** 538.83
			535.83		

Bottom of borehole at 67.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/4/17 08:35 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HAMMOND AP-3.GPJ

Log updated with revised survey certified 5/19/2020.

ERM
3200 Windy Hill Rd Ste 1500W
Atlanta, GA 30339
Telephone: 678-486-2700

WELL NUMBER HGWC-121A

CLIENT Southern Company Services, Inc.
PROJECT NAME Plant Hammond
PROJECT NUMBER 0372394
PROJECT LOCATION Ash Disposal Site #3
DATE STARTED 7/17/17 **COMPLETED** 7/17/17
GROUND ELEVATION 582.31 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Southern Comparny Services, Inc
COORDINATES N: 1550607.97 E: 1943030.44
DRILLING METHOD Hollow Stem Auger 2"
AT TIME OF DRILLING 13.20 ft
LOGGED BY WV **CHECKED BY** GEJ
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 11.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev: 582.31
0						
5	SS	70	CL-ML		(CL-ML) Silty CLAY: reddish with yellow mottling, some large angular gravel, medium stiff, low plasticity, dry	
						5.0 / 577.31
10	SS	63	CL		(CL) CLAY: reddish with yellow mottling, some gravel, medium dense, low plasticity, dry	
						10.0 / 572.31
15	SS	80	CL		(CL) CLAY: gray, some coarse sand, medium dense, moderate plasticity, moist	
20	SS	78	CL		(CL) SAA	
25	SS	53	CL		(CL) SAA, wet	
						25.0 / 557.31
30	SS	32	CL		(CL) CLAY, gray/brown, some gravel, wet	
						30.0 / 552.31
35	SS	0			No recovery	
						35.0 / 547.31
						546.71

Bottom of borehole at 35.6 feet.

WELL DIAGRAM
Top of casing elevation: 584.69
Casing Type: 2" PVC
bentonite
Top screen elevation: 556.71
20/30 sand UPACK
0.01 slot screen
Bottom screen elevation: 546.71

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

LOG OF TEST BORING

BORING HGWC-124

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/13/2014 **COMPLETED** 11/13/2014 **SURF. ELEV.** 579.80 **COORDINATES:** N:1551624.93 E:1942781.05
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 32.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 14.2 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
5		**Fill (ML)**					
		- red-yellow, dry, very stiff, clayey, with pale brown mottling		SS -1	3.5-5.0	8-8-9 (**17**)	
			573.80				
10		**Silty Clay (CL)**					
		- brown-yellow and brown, dry, stiff, with black mottling		SS -2	8.5-10.0	5-3-5 (**8**)	
15		- brown-yellow and brown, dry, medium stiff, with black mottling		SS -3	13.5-15.0	2-3-2 (**5**)	
			562.80				
20		**Clayey Gravel (GC)**					
		- brown, wet, very loose, with pale yellow-brown mottling		SS -4	18.5-20.0	2-2-2 (**4**)	
			558.10				
25		**SHALEY LIMESTONE**		RC -1	21.7-25.1	**94** (0)	Auger refusal at 21.7 ft.
		- inclined, separates at shale bedding planes, brown-red iron staining, strong to weak HCl reaction, medium grained pyrite (Dark gray and gray Formation)		RC -2	25.1-30.1	**96** (36)	
30			547.30				

Bottom of borehole at 32.5 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

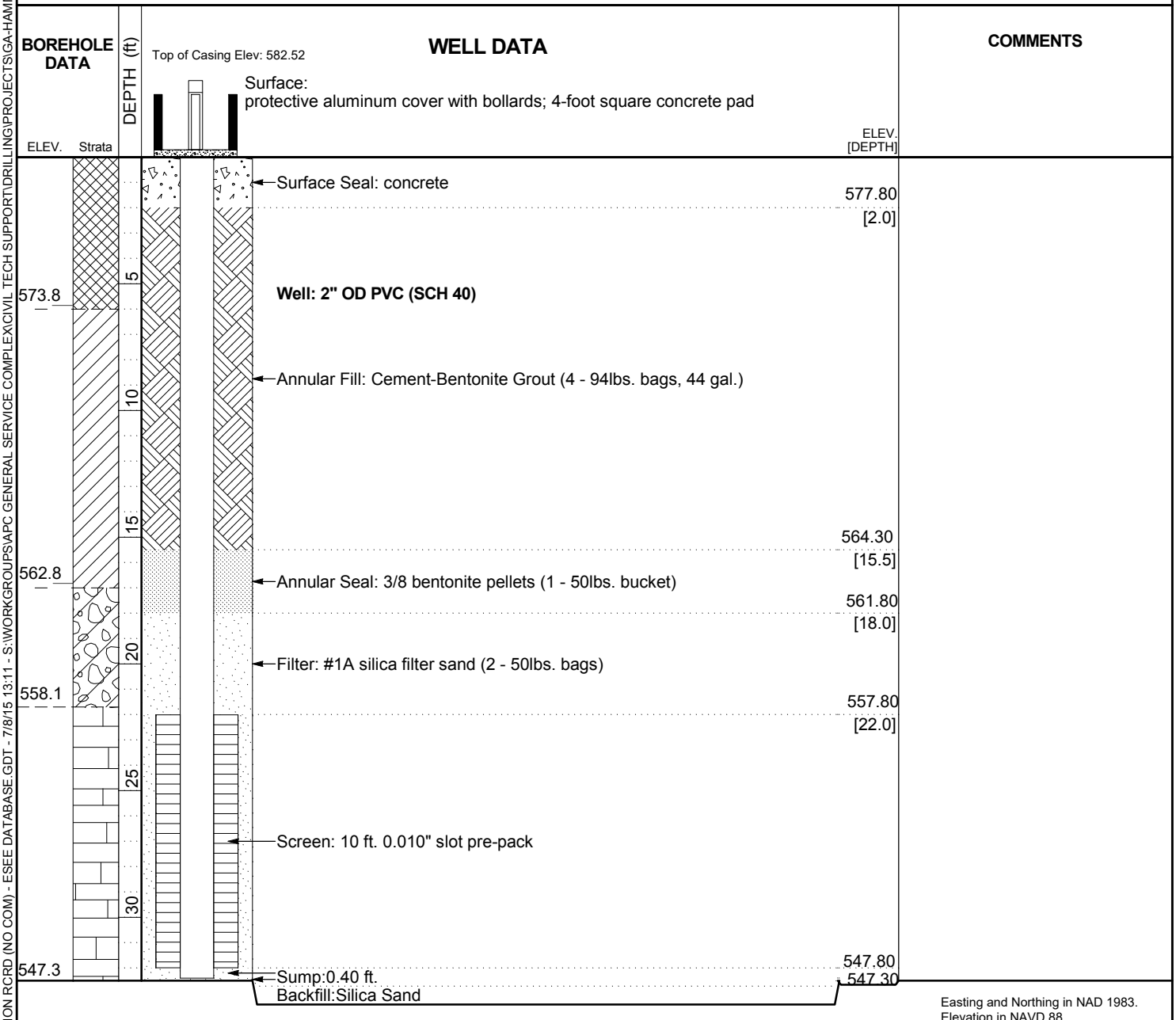
WELL: HGWC-124

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/13/2014 **COMPLETED** 11/13/2014 **SURF. ELEV.** 579.80 **COORDINATES:** N: 1551624.93 E: 1942781.05
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 32.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 14.2 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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HGWC-125

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 5/4/20 **COMPLETED** 5/4/20
NORTHING 1550821.41 ft **EASTING** 1942962.87 ft
DRILLER Cascade Drilling
GROUND ELEVATION 605.70 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 608.89 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terra Sonic Compact Crawler
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
0	605			Hydro Excavation (0 ft to 10 ft) NO SAMPLE	
5	600				
10	595			595.7 CLAY, Light to dark brown, low to medium plasticity, trace fine to medium sand, few fine to coarse angular gravel, few silt, soft to firm, moist.	Schedule 40 PVC 2"
15	590				Aquaguard Sodium Bentonite Grout
20	585			20 ft: Trace black mottles.	
25	580				
30	575				
35	570			566.2	

SCS MONITORING WELLS PLANT HAMMOND MW34D TO MW41_MAY 2020.GPJ ACP GINT LIBRARY CH.GLB 7/8/20

(Continued Next Page)

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HGWC-125

CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
40	565			CLAY, Yellowish brown, medium to high plasticity, trace fine sand, few silt, firm, moist. *(continued)* 40 ft: Soft, with black mottles.	
45	560				Bentonite coated 3/8" pellets
				557.7 SANDY CLAY, Dark brown to brown, low plasticity, some fine to coarse sand, trace rock fragments at the bottom, black mottles, soft.	
50	555	51 ft to 65 ft: Very soft drilling.		555.7 PARTIALLY WEATHERED ROCK, Dark brown, limestone rock fragments, fine grained, platy. 554.7 (CLAY FILLED) VOID (51 ft to 65 ft)	
55	550				20/40 Silica Sand 0.010 slot size 2" Pre Pack, U-Pack Screen
60	545				
65	540			540.7 LIMESTONE, Dark gray, crushed from drilling, dry, platy rock fragments, hard drilling.	Cave in.
70				535.7	

Bottom of borehole at 70.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

SCS MONITORING WELLS PLANT HAMMOND MW34D TO MW41_MAY 2020.GPJ ACP GINT LIBRARY CH.GLB 7/8/20

Log updated with revised survey certified 5/19/2020.

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HGWC-126

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 11/25/19 **COMPLETED** 11/26/19
NORTHING 1550422.03 **EASTING** 1942689.40
DRILLER SCS Field Services
GROUND ELEVATION 608.72 **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 611.24
SAMPLING METHOD Core Barrel (4")
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Sonic TS-150
LOGGED BY B. Weinmann **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
				ELEV: 608.72	
				Hydro excavation (0-10') - No sample.	
5	605				
	600				Bentonite grout
10				598.72	
	595			CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay.	
15					Schedule 40 PVC 2"
	590				
20				20': With gravel.	
	585				
25					
	580				
30					
	575				

SCS MONITORING WELLS PLANT HAMMOND MW31 TO MW33_DECEMBER 2019.GPJ ACP GINT LIBRARY CH.GLB 1/10/20

(Continued Next Page)

Log updated with revised survey certified 5/19/2020.

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HGWC-126

CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
35				CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay. *(continued)*	
	570				
40					
				566.22	
	565			CLAY with SAND, light gray and yellow to red, medium plasticity, sand is fine grained, laminated, stiff, moist.	
45					
	560				
50				54': With rock fragments, fine to medium grained sand, brown to gray.	Bentonite 3/8" chips
	555			554.72	
55				PARTIALLY WEATHERED ROCK (PWR), Gray, fine to coarse gravel sized limestone fragments and fine to medium grained sand.	
	550				
60				547.72	20/40 Silica Sand; 0.010 slot size 2" Pre Pack, U-Pack Screen
				LIMESTONE, Pale gray, limestone.	
	545				
65				542.72	

Bottom of borehole at 66.0 feet.

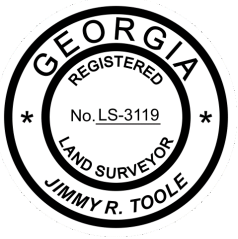
Easting and Northing in NAD 1983.
Elevation in NAVD 88.

SCS MONITORING WELLS PLANT HAMMOND MW31 TO MW33_DECEMBER 2019.GPJ ACP GINT LIBRARY CH.GLB 1/10/20

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-122	1551251.4160	1941887.1090	587.90	1551251.7520	1941888.4640	585.04
HGWC-120	1551067.2410	1942926.6150	605.82	1551066.9570	1942925.1140	602.83
HGWC-121A	1550607.9660	1943030.4370	584.69	1550606.4290	1943030.8200	582.31
HGWC-124	1551624.9330	1942781.0450	582.52	1551624.4970	1942779.7590	579.80
HGWC-125	1550821.4090	1942962.8700	608.89	1550821.3950	1942961.7570	605.70
HGWC-126	1550422.0250	1942689.3960	611.24	1550422.8480	1942688.6340	608.72
MW-21	1550270.1530	1941809.7590	586.27	1550268.6820	1941809.7320	583.60
MW-23	1551641.4430	1942496.8320	584.91	1551642.7910	1942496.2560	582.13
MW-32	1551092.8320	1943021.4650	585.46	1551094.5220	1943021.1080	583.10
MW-39	1551111.4510	1943089.2570	580.42	1551110.6190	1943087.9290	577.60
MW-41	1551158.1600	1943196.4740	577.25	1551157.3150	1943195.3930	574.87

Benchmark	Northing	Easting	Elevation
BM H-4	1549952.4470	1941611.3640	585.71

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 05/11/2020-05/14/2020 FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88 EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARK BM H-4 SET BY GEL SOLUTIONS USING A TRIMBLE DINI LEVEL

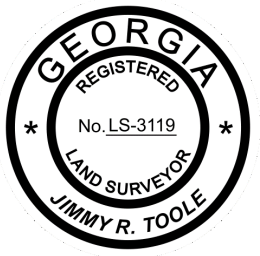


5/19/2020

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-1	1550423.3150	1940770.0000	595.21	1550424.4790	1940770.0550	592.32
HGWA-2	1549796.8670	1939845.1520	587.92	1549796.5130	1939845.2880	585.29
HGWA-3	1549794.4080	1939833.3900	587.74	1549794.0880	1939833.5600	585.23

Benchmark	Northing	Easting	Elevation
BM H-3	1548237.4130	1941013.5710	574.63

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 05/11/2020-05/14/2020 FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88 EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARK BM H-3 SET BY GEL SOLUTIONS USING A TRIMBLE DINI LEVEL

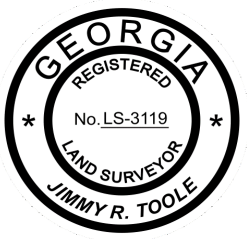


5/19/2020

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-42D	1549363.7180	1938443.8590	586.17	1549362.3140	1938444.3210	583.39
HGWA-43D	1550422.8480	1940753.8050	595.08	1550422.8120	1940754.9980	592.08
HGWA-44D	1550409.1260	1940756.1850	594.79	1550409.2230	1940757.6150	592.01
HGWA-45D	1551157.6780	1941907.5370	586.95	1551159.2250	1941907.4670	584.08
MW-46D	1551056.4780	1942929.1010	605.72	1551055.9530	1942927.8210	603.17
HGWA-47	1548990.9600	1934171.8440	580.33	1548989.2780	1934171.6440	577.39
HGWA-48D	1548989.3900	1934178.1460	580.26	1548988.1150	1934177.8070	577.29

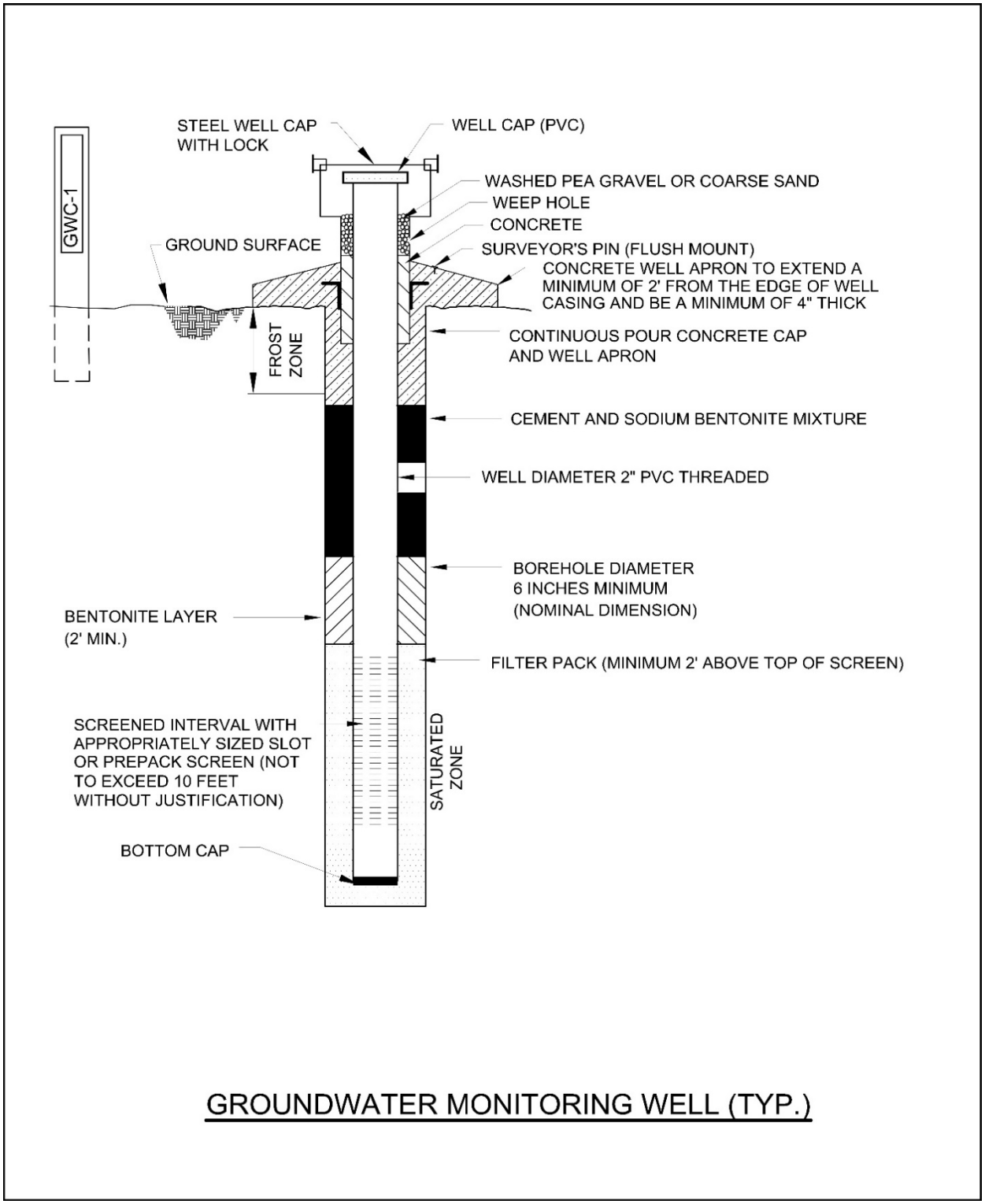
Benchmark	Northing	Easting	Elevation
BM H-1	1547964.9650	1937219.0690	579.02
BM H-2	1548149.4490	1938960.2220	590.68
BM H-4	1549952.4470	1941611.3640	585.71

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 09/01/2020-09/02/2020. FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88. EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARKS BM H-1, BM-H2 & BM-H4 SET BY GEL SOLUTIONS DURING PREVIOUS SURVEYS USING A TRIMBLE DINI LEVEL



9/10/2020

B. GROUNDWATER MONITORING WELL DETAIL



C. GROUNDWATER SAMPLING PROCEDURE

Groundwater sampling will be conducted using the most current applicable USEPA Region 4 SESD Field Branches Quality System and Technical Procedures as a guide (https://www.epa.gov/quality/quality-system-and-technical-procedures-sesd-field-branches). The following procedures describe the general methods associated with groundwater sampling at the Site. Prior to sampling, the well must be evacuated (purged) to ensure that representative groundwater is obtained. Any item coming in contact with the inside of the well casing or the well water will be kept in a clean container and handled only with gloved hands.

Georgia Power will follow the procedures below at each well to ensure that a representative sample is collected:

1. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations and notify Georgia Power if it appears that the well has been compromised.

2. Measure and record the depth to water in all wells to be sampled prior to purging using a water measuring device consisting of probe and measuring tape capable of measuring water levels with accuracy to 0.01 foot. Static water levels will be measured from each well, within a 24-hour period. The water level measuring device will be decontaminated prior to lowering in each well.

3. Install Pump: If a dedicated pump is not present, slowly lower the pump into the well to the midpoint of the well screen or a depth otherwise approved by the hydrogeologist or project scientist. The pump intake must be kept at least two feet above the bottom of the well to prevent disturbance and suspension of any sediment present in the bottom of the well. Record the depth to which the pump is lowered. All non-dedicated pumps and wiring will be decontaminated before use and between well locations in general accordance with USEPA Region 4 SESD guidance document, *Operating Procedure - Field Equipment Cleaning and Decontamination* (EPA, SESDGUID-205-R3), or the latest version of the document.

4. Measure Water Level: Immediately prior to purging, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

5. Purge Well: Begin pumping the well at approximately 100 to 500 milliliters per minute (mL/min). Monitor the water level continually. Maintain a steady flow rate that results in a stabilized water level with 0.3 feet or less of variability. Avoid entraining air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

6. Monitor Indicator Parameters: Monitor and record the field indicator parameters [turbidity, temperature, specific conductance, pH, oxidation-reduction potential (ORP), and dissolved oxygen (DO)] approximately every three to five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings at a minimum:

   ±0.1 for pH

   ±5% for specific conductance (conductivity)

±10% or ±0.2 mg/L (whichever is greater) for DO where DO>0.5mg/L. If DO<0.5mg/L no stabilization criteria apply

<5 NTU for turbidity

Temperature – Record only, not used for stabilization criteria

ORP – Record only, not used for stabilization criteria.

7. Collect samples at a flow rate between 100 and 200 mL/min according to the most current version of USEPA Region 4 SESD guidance document, *Operating Procedure – Groundwater Sampling* (EPA, SESDPROC-301-R#), and such that drawdown of the water level within the well is stable. Flow rate must be reduced if excessive drawdown is observed during sampling. All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container.

8. Compliance samples will be unfiltered; however, to determine if turbidity is affecting sample results (i.e., >10 NTU), duplicate samples may be filtered in the field prior to being placed in a sample container, clearly marked as filtered and preserved. Filtering will be accomplished by the use of 0.45-micron filters on the sampling line. At least two filter volumes of sample will pass through before filling sample containers. A new filter must be used for each well and each sampling event. Filtered samples are not considered compliance samples and are only used to evaluate the effects of turbidity. Additional details related to managing for elevated turbidity is discussed below.

9. All sample bottles will be filled, capped, and placed in an ice containing cooler immediately after sampling where temperature control is required. Samples that do not require temperature control will be placed in a clean and secure container.

10. Sample containers and preservative will be appropriate for the analytical method being used.

11. Information contained on sample container labels will include:

    a. Name of facility

    b. Date and time of sampling

    c. Sample description (well number)

    d. Sampler's initials

    e. Preservatives

    f. Analytical method(s)

12. After samples are collected, samplers will remove all non-dedicated equipment. Upon completion of all activity the well will be closed and locked.

13. Samples will be delivered to the laboratory following appropriate COC and temperature control requirements. The goal for sample delivery will be within 48 hours of collection; however, at no time will samples be analyzed after the method-prescribed hold time.

Throughout the sampling process new latex or nitrile gloves will be worn by the sampling personnel. A clean pair of new, disposable gloves will be worn each time a different location is sampled, and new gloves donned prior to filling sample bottles. Gloves will be discarded after sampling each well and before sampling the next well.

The goal when sampling is to attain a turbidity of less than 5 NTU; however, samples may be collected where turbidity is less than 10 NTU and the stabilization criteria described above are met.

If sample turbidity is greater than 5 NTU and all other stabilization criteria have been met, samplers will continue purging for 3 additional hours in order to reduce the turbidity to 5 NTU or less.

- If turbidity remains above 5 NTU but is less than 10 NTU, and all other parameters are stabilized, the well can be sampled.
- Where turbidity remains above 10 NTU, an unfiltered sample will be collected followed by a filtered sample that has passed through an in-line 0.45-micron filter attached to the discharge (sample collection) tube. Data from filtered samples will only be used to quantify the effects of turbidity on sample results.

Samplers will identify the sample bottle as containing a filtered sample on the sample bottle label and on the COC form.