

GROUNDWATER MONITORING PLAN

PLANT BOWEN COAL COMBUSTION RESIDUALS (CCR) LANDFILL

BARTOW COUNTY, GEORGIA

FOR



Georgia
Power

September 2022



GEORGIA
DEPARTMENT OF NATURAL RESOURCES

ENVIRONMENTAL PROTECTION DIVISION

Approved
Solid Waste Management Program

Approved By: _____

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I. CERTIFICATION

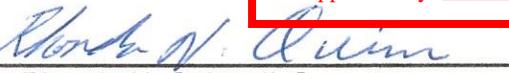
I hereby certify that this Groundwater Monitoring Plan was prepared by, or under the direct supervision of, a "Qualified Groundwater Scientist," in accordance with the Rules of Solid Waste Management and 40 CFR Part 258.50(g). According to 391-3-4-.01, a Qualified Groundwater Scientist is "a professional 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 the Georgia Environmental Protection Division (Georgia EPD) Rules of Solid Waste Management, Chapter 391-3-4-.10(6).

Signature: 
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Date: Sept. 28, 2022



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Date: September 28, 2022

1. INTRODUCTION

Groundwater and surface water monitoring is required by the Georgia Environmental Protection Division (Georgia EPD) to detect and quantify potential changes in groundwater chemistry. This Groundwater Monitoring Plan (plan) describes the groundwater and surface water monitoring program for the Site. This plan meets the requirements of Georgia EPD rules and uses Georgia EPD's Manual for Ground Water Monitoring dated September 1991 as a guide. Groundwater and surface water sampling locations are presented on Plant Bowen Solid Waste Disposal Facilities Monitoring Well Network for the Landfill Cells 1 & 2, 3 & 4, and 9 & 10 (**Appendix A: Groundwater Monitoring Network Documentation**).

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 the Permit or the Georgia EPD rules (391-3-4-.10), the Georgia EPD rules will take precedent.

In accordance with the United States Environmental Protection Agency (USEPA) Coal Combustion Rule (§257.90), which is incorporated by Georgia State CCR Rule by reference, a detection monitoring well network for the Landfill has been installed and certified by a qualified professional engineer. This certification has been placed in the facility's operating record. 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 Georgia EPD prior to any unscheduled installation or abandonment of monitoring wells. Well installation and/or abandonment must be directed by a qualified groundwater scientist. The Plant Bowen Landfill Cells 1 & 2, 3 & 4, and 9 & 10 remain in detection monitoring and Georgia Power will continue routine groundwater monitoring.

2. GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Geologic conditions for this Site are described in a report prepared by Southern Company Services Earth Science and Environmental Engineering titled *Combustion By-Products Storage Facility Site Acceptability Report* dated 2002, and *Plant Bowen Proposed Coal Combustion By-Product Monofill Addendum I Site Acceptability Report – Hydrogeological Assessment and Demonstration of Engineering Measures*, dated 2004.

The geology and hydrogeology of the Landfill Cells area is summarized below. The area is underlain by residuum clayey soils that transition into sedimentary bedrock. Karst terrain exists in the area. The uppermost aquifer is comprised of the terrace deposits and clayey soils and the upper fractured sedimentary bedrock with groundwater flow direction generally toward the Etowah River.

2.1 Regional Geology

The Plant Bowen Site lies within the Valley and Ridge physiographic province about three to four miles north of the Cartersville Fault. The Cartersville Fault separates the late Precambrian-aged metamorphic rocks to the east and south from the Cambrian-aged sedimentary rocks to the north and west.

The Site lies within an area mapped as Knox Group undifferentiated with a southwestern portion of the facility mapped as Newala Limestone in the work by Croft (1963). The Landfill Cells are located on the northeast portion of the Site (**Figure A1: Monitoring Well Network**).

2.2 Site Geology

The lithologies present in the landfill area of the Site from the ground surface to depth are Terrace Deposits, a residuum clay overburden, dolomite, and limestone bedrock.

The Knox Group produces a characteristic orange to red clayey residuum that ranges in thickness from 19 to 127 feet across the Plant Bowen Site and often contains weathered chert and dolomite fragments. Outcrops for geological mapping are rare and occur primarily in quarries and along streams. Terrace deposits (silt and clay with some gravel and sand) overlay the clayey residuum in some areas but are not continuous across the landfill area. The Terrace Deposits with the clayey residuum comprise the overburden.

The Knox Group dolomite consists predominantly of medium gray to medium dark gray, medium bedded to massive, fine to medium-grained rock. The Knox Group limestone was logged predominantly as light gray to medium light-gray, thin to medium-bedded, fine to medium-grained, argillaceous limestone. Some very occasional thin to medium beds of crystalline limestone or fine-grained calcareous sandstone were noted. The vigorous reaction to dilute hydrochloric acid was a major distinguishing feature between the limestone and dolomite. Fine-grained pyrite was noted in a few of the limestone core samples (SCS, 2002). Solution cavities are sometimes noted in the dolomite/limestone bedrock at the Site. These solution cavities are generally filled with residual clay and silt or may be open in some instances.

2.3 Site Hydrogeology

Two main geologic layers are present at the Site: overburden (residuum clay), and bedrock (dolomite and limestone). Overburden materials are very heterogeneous ranging in composition from well-graded gravelly sand to fat clay. The primary source of recharge for the uppermost aquifer is infiltration of rainfall. Bedrock underlying the Site (officially mapped as Knox undifferentiated) exhibits minor and discontinuous solution features within the underlying carbonate bedrock, which are predominately formed along initial discontinuities including joints, fractures, and bedding planes. To monitor the karst, 37 wells (17 overburden and 20 bedrock wells) are instrumented with pressure transducers to collect and record groundwater elevations multiple times daily from monitoring wells located around the perimeter of the landfill cells. The logged data are uploaded after each reading via satellite telemetry to a central database.

Rain-filled surface depressions are located between Cells 1 & 2 and Proposed Cells 5 to 8 and fluctuate in size depending upon rainfall. These depressions were present prior to the construction of the landfill and do not appear to have flowing water. A spring is located to the northeast of Cells 3 & 4 as shown on **Figure A1**. Water is present in the spring intermittently. The Etowah River to the west, north and east of the landfill cells, and the general service pond to the southwest of Cells 9 & 10 are present at the Site but outside of the landfill permit boundary.

General groundwater flow in the overburden in the Landfill area is to the north-northeast beneath Cells 1 & 2 and Cells 9 & 10 and to the west-northwest beneath Cells 3 & 4 (**Figure A2: Potentiometric Surface - Overburden Wells July 2021**). Groundwater flow direction in the bedrock is similar to the overburden, with flow to the north-northeast beneath Cells 1 & 2 and Cells 9 & 10 and to the west-northwest beneath Cells 3 & 4 (**Figure A3: Potentiometric Surface – Bedrock Wells July 2021**).

The difference in groundwater elevations between the overburden and upper bedrock were within a couple of feet in many well clusters across the landfill area. Continuous groundwater elevation monitoring data correlate with rainfall and river elevation data from the Site. These data suggest a direct groundwater communication between overburden and upper bedrock. The overburden and the upper fractured sedimentary bedrock comprise the uppermost aquifer beneath the landfill cells area. At a few locations around the landfill, particularly at areas of relatively higher elevations and at areas with relatively thinner overburden, the first groundwater is encountered in the upper fractured bedrock.

Horizontal groundwater flow rates in **July 2021** at the Site range from approximately 0.01 to 0.16 feet per day in the overburden and from approximately 0.03 to 0.38 feet per day in the upper bedrock (**Table 1: Groundwater Flow Velocities for July 2021**), based on horizontal hydraulic conductivity data reported in the *Plant Bowen Proposed Coal Combustion By-Product Storage Facility Site Acceptability Report* (SCS, 2002). The estimated groundwater flow rates are relatively low considering the karst topography at the Site.

TABLE 1
GROUNDWATER FLOW VELOCITIES FOR JULY 2021
Plant Bowen
Landfill Cells 1 & 2, 3 & 4, and 9 & 10
Bartow County, Georgia

Flow Paths		Groundwater Elevations in Well Pairs (h ₁ , h ₂) (feet)		Change in Elevation (Δh) (feet)	Distance Measured (L) (feet)	Hydraulic Gradient (i) (feet/feet)	Average Hydraulic Conductivity (K) (feet/day)	Estimated Effective Porosity (n _e)	Calculated Groundwater Flow Velocity (V) (feet/day)	Calculated Groundwater Flow Velocity (V) (feet/year)
Cells 1 & 2	Overburden GWC-5 to GWC-9	660.91	654.93	5.98	1302	0.005	0.072	0.01	0.03	10.95
	Overburden GWC-15 to GWC-14	656.73	655.82	0.91	325	0.003	0.072	0.01	0.02	7.30
	Overburden GWA-50 to GWC-6	672.08	658.02	14.06	650	0.022	0.072	0.01	0.16	58.40
	Bedrock GWC-8RR to GWC-10R	657.00	655.07	1.93	600	0.003	0.36	0.01	0.12	43.80
	Bedrock GWA-1 to GWA-2R	658.39	655.45	2.94	350	0.008	0.36	0.01	0.30	109.50
Cells 3 & 4	Overburden GWA-53 to GWC-18	654.01	649.31	4.70	1250	0.004	0.072	0.01	0.03	10.95
	Overburden GWA-37 to GWC-18	654.66	649.31	5.35	977	0.005	0.072	0.01	0.04	14.60
	Bedrock GWA-53R to GWC-18R	653.96	649.45	4.51	1265	0.004	0.36	0.01	0.13	47.45
	Bedrock GWA-36RA to GWC-17R	653.68	650.64	3.04	1215	0.003	0.36	0.01	0.09	32.85
	Bedrock GWC-25R to GWC-21R	653.31	652.21	1.10	1325	0.001	0.36	0.01	0.03	10.95
Cells 9 & 10	Overburden GWA-41 to GWC-44	666.32	664.55	1.77	975	0.002	0.072	0.01	0.01	3.65
	Overburden GWC-49Z to GWC-48	655.86	652.98	2.88	270	0.011	0.072	0.01	0.08	29.20
	Overburden GWC-45 to GWC-47	662.53	652.23	10.30	525	0.020	0.072	0.01	0.14	51.10
	Bedrock GWA-41R to GWC-45R	666.34	652.19	14.15	1350	0.010	0.36	0.01	0.38	138.70
	Bedrock GWC-49R to GWC-47R	656.15	652.46	3.69	550	0.007	0.36	0.01	0.24	87.60
	Bedrock GWA-41R to GWC-43R	666.34	660.82	5.52	600	0.009	0.36	0.01	0.33	120.45

Notes:

The average hydraulic conductivity values, measured in centimeters/second (cm/sec) used in the soil aquifer calculations (2.54×10^{-5} cm/sec = 0.072 ft/day) and the bedrock aquifer calculations (1.26×10^{-4} cm/sec = 0.36 ft/day) are presented in the 2002 *Plant Bowen Proposed Coal Combustion By-Product Storage Facility Site Acceptability Report*. An estimated effective porosity of 0.01 (based on default soil type value for silty clays to clays in USEPA 530/SW-89-031) of the screened horizon.

3. SELECTION OF WELL LOCATIONS

Groundwater monitoring wells are installed to monitor the uppermost aquifer beneath the Site. Locations are selected based on disposal cell layouts and site geologic and hydrogeologic considerations. Georgia Power Company (GPC) follows the recommendation as stated in Chapter 2 of the Manual for Groundwater Monitoring (1991) to determine well spacing based on site-specific conditions. Locations are chosen to serve as upgradient (GWA), or downgradient (GWC) based on groundwater flow direction determined by potentiometric evaluation. The well naming nomenclature is based on Georgia EPD's Industrial Waste Disposal Site Design and Operations Plan – Supplemental Data for Solid Waste Handling Permit (May 2014). Monitoring wells have been identified for six constructed Landfill units (Cells 1 & 2, 3 & 4, and 9 & 10) and four unconstructed Landfill units (Cells 5 & 6 and 7 & 8). The wells associated with Cells 5 & 6 and 7 & 8 have not been installed. Following installation of these monitoring wells, a well installation report documenting the actual well locations with the construction details and well logs will be submitted to Georgia EPD in a future well installation report. Well installation will be conducted under the direction of a qualified groundwater scientist.

Monitoring wells will be 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 Georgia EPD Rules.

A map depicting monitoring well locations is included in **Appendix A**. A tabulated list of individual monitoring wells used for groundwater sampling and water levels including well construction details such as location coordinates, top-of-casing elevation, well depths and screened intervals are also included in **Appendix A**. There are four wells (GWA-4R, GWC-13R, GWC-14, and GWC-15) not included in the groundwater monitoring network because these wells were replaced by new monitoring wells at the same locations that are included in the current monitoring network.

Any change to the groundwater monitoring or surface water monitoring network must be made by a minor modification to the permit pursuant to 391-3-4-.02(3)(b)6.

4. MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT & REPORTING

The existing monitoring well network for the CCR Landfill is in place. Existing monitoring wells were installed following Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure for Design and Installation of Monitoring Wells as a general guide for best practices. Monitoring well logs, for the existing monitoring well network, are included in **Appendix A (Attachment A1: Well Construction and Boring Logs)**. The following sections describe the methods used for well drilling, construction, abandonment, and reporting for modification to the well network at the CCR Landfill.

4.1 Drilling

A variety of well drilling methods are available for the purpose of installing groundwater wells. Drilling methodology may include, but not be limited to: hollow stem augers, direct push, air rotary, mud rotary, or rotosonic techniques. The drilling method shall minimize the disturbance of subsurface materials and shall not cause impact to the groundwater. Borings will be advanced using an appropriate drilling technology capable of drilling and installing a well in site-specific geology. Monitoring wells will be installed using the most current version of the Region 4 U.S. Environmental Protection Agency (USEPA) Science and Ecosystem Support Division (SESD) Operating Procedure SESDGUID-101-R2 and updates as a general guide for best practices. Drilling equipment shall be decontaminated before use and between borehole locations using the procedures described in the current version of the USEPA procedure LSASDPROC-205-R4 for Field Equipment Cleaning and Decontamination as a general guide.

Sampling and/or coring may be used to help determine the stratigraphy and geology. Samples will be logged under the oversight of a qualified groundwater scientist. Screen depths will be chosen based on the depth of the uppermost aquifer.

All drilling for any subsurface hydrologic investigation, installation, or abandonment of groundwater wells at a landfill in Georgia must be performed by a driller that has, at the time of installation, a performance bond on file with the Water Well Standards Advisory Council. Proof of bonding for wells installed at the Landfill, installed from 2007 to the present, is included as **Attachment A2: Well Drilling Contractor Proof of Bonding** in **Appendix A**. For future installations, proof of bonding will be included in the well installation reports. Drilling and well installation activities will be directed by a qualified groundwater scientist registered in Georgia.

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

ASTM, NSF rated, Schedule 40, 2-inch 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 Georgia EPD.

Well Intake Design

The design and construction of the intake of the groundwater wells shall: (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 shall not exceed 10 feet without justification as to why a longer screen is necessary (e.g., significant variation in groundwater level). If the above techniques 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. Pre-packed well screens will be installed following general industry standards and using the latest version of the USEPA SEDGUID-101-R2 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 hole 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 of filter pack depth will be measured, 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 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 zone. 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 2 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, four inches thick, 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 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 may 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 Details**, illustrates the general design and construction details for a monitoring well.

Well Development

No sooner than 24 hours 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. Development can be discontinued once a measured turbidity less than 10 NTUs is achieved. Additionally, the stabilization criteria contained in **Appendix C: Groundwater Sampling Procedures** should be met after well development and during low-flow sampling. A variety of techniques may be used to develop site groundwater monitoring wells and should be in accordance with USEPA SESDGUID-101-R2. 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 the wells' filter packs over time. Therefore, the turbidity of the groundwater from the monitoring wells may gradually increase over time after initial well development. As a result, the monitoring wells may have to be redeveloped periodically to remove the silt and clay that has worked its way into the filter pack of the monitoring 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. Well development data will be included in future well installation reports.

Surveying

The monitoring wells and piezometers were surveyed by Donaldson & Garrett Associates Inc, with a horizontal accuracy of 0.5 feet referenced to Georgia State Plane Coordinate System (Georgia State Plane, West Zone, NAD83) and a vertical accuracy of 0.01 feet referenced to North American Vertical Datum 1988 (NAVD88). The certified surveyor's report is included in **Attachment A3 of Appendix A: Surveyor's Certification.**

4.3 Well Abandonment

Per Georgia EPD Rule 391-3-4-.10(6)(g): Monitoring wells require replacement after two consecutive dry sampling events unless an alternate schedule has been approved by the Georgia EPD. A minor modification will be submitted in accordance with 391-3-4-.02(3)(b)6 prior to the installation or decommissioning of monitoring wells. Well replacement and abandonment will be directed by a qualified groundwater scientist, registered to practice in the State of Georgia.

Monitoring wells will be abandoned using industry-accepted practices and using the Manual for Groundwater Monitoring (1991) and Georgia Water Well Standards Act (1985) as guides. 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 future landfill expansion will be over-drilled prior to abandonment. Well abandonment reports will be submitted to Georgia EPD within 60 days of completion of well abandonment by a qualified groundwater scientist or engineer and will follow the applicable documentation requirements for well abandonment described in Section 4.4.

4.4 Documentation

Within 60 days of the construction, survey, and development or abandonment of each groundwater monitoring well, a well installation/abandonment report will be submitted to the Georgia EPD by a qualified groundwater scientist or engineer. The following information documenting the construction and development of each well will be included in the 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
- Dates of drilling and initial well emplacement
- Drilling technique used and drilling fluid if used
- Borehole diameter and well casing diameter
- Well depth (± 0.1 ft.)
- Lithologic logs
- Well casing materials
- Casing and screen joint type
- Screen materials and design
- Screen length

- Screened interval in feet below ground surface and elevation (in feet NAVD88)
- Screened interval lithology
- Screen slot size
- Details of filter pack construction including material/size and volume, and placement depths
- Filter pack emplacement method (narrative)
- Sealant emplacement method and including material/size and volume, and placement depths
- Type of protective well cap and sump dimension for each well
- Surface seal construction including materials, volumes/mix of annular seal material
- Documentation stating that a Georgia-registered professional surveyor shall certify that the horizontal accuracy for the installed monitoring wells is 0.5 feet, and vertical accuracy for elevations to 0.01 feet using a known datum.
- Schematic of the well with dimensions
- Well development dates
- Well turbidity following development
- Narrative of well development method(s)-specific well development procedures

In accordance with the Georgia Water Well Standards Act (O.C.G.A. § 12-5-134(5)(d)(vii)), at least once every five years, the owner of the property on which a monitoring well is constructed shall have the monitoring well(s) inspected by a professional engineer or professional geologist, who shall direct appropriate remedial corrective work to be performed if the well does not conform to standards. Well inspection records and records of remedial corrective work are subject to review by EPD. Additionally, as part of the post closure care plan, the cost estimate based upon current year cost for the well inspections will be provided for as part of the cost calculations for the groundwater monitoring period.

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 2: Groundwater Monitoring Parameters & Frequency, presents the groundwater monitoring parameters and sampling frequency. A minimum of eight independent samples from each groundwater well will be collected and analyzed for EPD-approved modified Appendix I and Appendix II test parameters (a subset of the full list contained in 40 CFR 258), as well as 40 CFR 257, Subpart D, Appendix III and Appendix IV test parameters to establish a background statistical dataset. Subsequently, in accordance with 391-3-4-.10(6), the monitoring frequency for Appendix I and III will be at least semi-annual during the active life of the facility and the post-closure care period. If required, Georgia Power will conduct assessment monitoring in accordance with the Georgia Rules for Solid Waste Management Chapter 391-3-4-.10 to also include EPD-approved modified Appendix II and 40 CFR, Subpart D Appendix IV test parameters.

As shown on **Table 3: Analytical Methods**, the groundwater samples will be analyzed using methods specified in USEPA Manual SW-846, EPA 600/4-79-020, Standard Methods for the Examination of Water and Wastewater (SM18-20), USEPA Methods for the Chemical Analysis of Water and Wastes (MCAWW), American Society for Testing and Materials (ASTM), or other suitable analytical methods approved by the Georgia EPD. The method used will be able to reach a suitable practical quantification limit to detect natural background conditions at the facility and be less than regulatory standards. The groundwater samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Program (NELAP) and will also have a Stipulation Letter from the Georgia EPD accepting the laboratory's NELAP certification. Field instruments used to measure pH must be accurate and reproducible to within 0.1 Standard Units (S.U.).

TABLE 2
GROUNDWATER MONITORING PARAMETERS & FREQUENCY
Plant Bowen
Landfill Cells 1 & 2, 3 & 4, and 9 & 10
Bartow County, Georgia

Monitoring Parameters	Groundwater Monitoring Frequency Semi-Annual Events	
Field Parameters	Temperature	X
	pH	X
	Specific Conductance	X
	Oxidation Reduction Potential (ORP)	X
	Turbidity	X
	Dissolved Oxygen (DO)	X
Appendix I and II (EPD-approved modified Appendix I and II test parameters from 40 CFR 258, Subpart E)	Antimony	X
	Arsenic	X
	Barium	X
	Beryllium	X
	Cadmium	X
	Chromium	X
	Cobalt	X
	Copper	X
	Lead	X
	Mercury	X
	Nickel	X
	Selenium	X
	Silver	X
	Thallium	X
	Vanadium	X
Zinc	X	
Appendix III (Detection test parameters from 40 CFR 257, Subpart D)	Boron	X
	Calcium	X
	Chloride	X
	Fluoride	X
	pH (field)	X
	Sulfate	X
	Total Dissolved Solids	X

TABLE 2 - continued
GROUNDWATER MONITORING PARAMETERS & FREQUENCY
Plant Bowen
Landfill Cells 1 & 2, 3 & 4, and 9 & 10
Bartow County, Georgia

Monitoring Parameters		Groundwater Monitoring Frequency Semi-Annual Events
Appendix IV (Assessment test parameters from 40 CFR 257, Subpart D)	Antimony	Assessment sampling frequency and parameter list determined in accordance with Georgia Chapter 391-3-4-.10(6).
	Arsenic	
	Barium	
	Beryllium	
	Cadmium	
	Chromium	
	Cobalt	
	Fluoride	
	Lead	
	Lithium	
	Mercury	
	Molybdenum	
	Selenium	
	Thallium	
	Radium 226 & 228	

**TABLE 3
 ANALYTICAL METHODS
 Plant Bowen
 Landfill Cells 1 & 2, 3 & 4, and 9 & 10
 Bartow County, Georgia**

Parameters	USEPA Method Number
Boron	EPA 6010D/6020B
Calcium	EPA 6010D/6020B/7140
Chloride	EPA 300.0/300.1/9250/9251/9253/9056A
Fluoride	EPA 300.0/300.1/9214/9056A
pH	EPA 150.1 field
Sulfate	EPA 300.0/300.1/9035/9036/9038/9056A
Total Dissolved Solids (TDS)	EPA 160.1/ Standard Method 2540C
Antimony	EPA 6010D/6020B/7040/7041
Arsenic	EPA 6010D/6020B/7060A/7061A
Barium	EPA 6010D/6020B/7080A/7081
Beryllium	EPA 6010D/6020B/7090/7091
Cadmium	EPA 6010D/6020B/7130/7131A
Chromium	EPA 6010D/6020B/7190/7191
Cobalt	EPA 6010D/6020B/7200/7201
Copper	EPA 6010D/6020B
Lead	EPA 6010D/6020B/7420/7421
Lithium	EPA 6010D/6020B/7430
Mercury	EPA 7470A
Molybdenum	EPA 6010D/6020B/7480/7481
Nickel	EPA 6010D/6020B
Selenium	EPA 6010D/6020B/7740/7741A
Silver	EPA 6010D/6020B
Thallium	EPA 6010D/6020B/7840/7841
Vanadium	EPA 6010D/6020B
Zinc	EPA 6010D/6020B
Radium 226 and 228 combined	EPA 9315/9320

6. SAMPLE COLLECTION

During each sampling event, samples will be collected and handled in accordance with the procedures specified in **Appendix C: Groundwater Sampling Procedures**. Sampling procedures were developed using standard industry practice and USEPA Region 4 Field Branches Quality System and Technical Procedures for the Science and Ecosystem Support Division 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 Georgia EPD approval.

For groundwater sampling, positive gas displacement Teflon or stainless-steel bladder pumps with PVC intake screens 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, unless an alternate schedule has been approved by Georgia EPD. A minor modification will be submitted in accordance with 391-3-4-.02(3)(b)6 prior to the installation or decommissioning of monitoring wells. Well replacement and abandonment will be directed by a qualified groundwater scientist, registered in Georgia.

During each sampling event, surface water samples will be collected and handled in accordance with the procedures specified in **Appendix D: Surface Water Sampling and Analysis Procedures**. These procedures were developed using field sampling guidelines described in the USEPA Region 4 Laboratory Services and Applied Science Division (LSASD) Operating Procedure for Surface Water Sampling (LSASDPROC-201-R5) and updates. For surface water sampling, dedicated, non-dedicated, or disposable sampling equipment may be used.

7. 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 and times of possession by each individual
- Notated dates(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 must relinquish possession and the samples must be received by the new owner. The transfer times and dates during transfer of samples between individuals will be documented and included in the laboratory reports.

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

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

8. FIELD AND LABORATORY 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 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. The calibration will be conducted each day prior to the initiation of sampling. Daily calibration will be documented on field forms and these field forms will be included in each groundwater monitoring report.

Instruments will be recalibrated as necessary (e.g., when calibration checks indicate significant variability), and all checks and recalibration steps will be documented on the field 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 if recalibration does not improve instrument function. Completed calibration field forms will be provided with the semi-annual groundwater monitoring reports.

9. REPORTING RESULTS

A semi-annual groundwater report that documents the results of sampling and analysis will be submitted to Georgia EPD. Semi-annual groundwater monitoring reports will be submitted to the Georgia 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 brief overview of purging/sampling methodologies.
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 decommissioned 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. A record of field sampling conditions including, well signage, well access, sampling and purging equipment condition and site conditions that may affect sampling will be recorded on Well Inspection Forms. These forms will be included as an appendix to the semi-annual groundwater monitoring reports.
16. Documentation of non-functioning wells, dry surface water sampling locations.
17. Table of current analytical results for each well, highlighting statistically significant increases and concentrations above maximum contaminant level (MCL).
18. Plume delineation (if applicable based on exceedances of groundwater protection standards)

19. Potable water well survey (annually, if applicable based on exceedances of groundwater protection standards)
20. Statistical analyses.
21. Certification by a qualified groundwater scientist.
22. Tabulated water quality results for the samples of discharging surface water collected semi-annually from the designated surface water sampling locations. The table will present data for the current reporting period. Data from historical monitoring events associated with the surface water monitoring program will be provided in report appendices.

10. 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 determine statistical limits. Statistical analysis techniques will be consistent with the methodology presented in *Statistical Analysis of Groundwater Data at RCRA Facilities, Unified Guidance*, March 2009, EPA 530/R-09-007 (USEPA, 2009).

According to Georgia EPD rule 391-3-4-.10(6)(a), which incorporates the statistical analysis requirements of 40 CFR 257.93 by reference, the Site must specify in the operating record the statistical methods to be used in evaluating groundwater monitoring data for each constituent. The statistical test chosen shall be conducted separately for each 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 prediction limit (§257.93(f)(3)).
2. A control chart approach that gives control limits for each constituent (§257.93(f)(4)).
3. Another statistical test method (such as prediction limits or control charts) that meets the performance standards of §257.93(g) or §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 §257.93(g).

Based on site-specific conditions, statistical methods may be intrawell, interwell, or combination of both. Intrawell methods use background data for individual wells and may be overly sensitive to natural variation; therefore, statistically significant increases (SSIs) may occur as a result of natural variation rather than facility impacts. A second step can be used to further evaluate the results and mitigate SSIs that result from natural variation. In instances where intrawell statistical methods identify an apparent SSI, a second step of interwell statistical evaluation may be used to determine whether the measurement exceeds the sitewide background limit. This is similar in concept to the procedure used in compliance monitoring programs where an interwell statistical limit is used to determine background per USEPA Unified Guidance (2009). Both interwell and intrawell methods may use a 1-of-2 resample plan, allowing for a collection of an independent resample to confirm or disconfirm the initial finding. If the result does not exceed sitewide (interwell) background, an SSI is not declared, and no further action is needed to stay in detection monitoring. Trend tests will continue to be included in Semi-Annual and Annual Groundwater Monitoring and Corrective Action Reports for constituents exhibiting an SSI using an intrawell statistical method that does not exceed sitewide (interwell) background.

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) and §257.93. **Figure 1: Statistical Analysis Plan Overview**, includes a flowchart that depicts the process that will be followed to develop the site-specific plan. **Figure 2: Decision Logic for Determining Appropriate Statistical Method**, depicts the decision logic that will be used to determine the

appropriate method as required by 391-3-4-.10(6) or §257.93. **Figure 3: Decision Logic for Computing Intrawell Prediction Limits**, presents the logic that will be used to calculate site-specific intrawell statistical limits and test compliance results against those limits. **Figure 4: Decision Logic for Computing Interwell Prediction Limits**, presents the logic that will be used to calculate site-specific interwell statistical limits and test compliance results against those limits.

11. REFERENCES

- Croft, M.G., 1963. Geology and Ground-Water Resources of Bartow County, Georgia. U.S. Geological Survey Water-Supply Paper 1619-FF, 37 p.
- Georgia Environmental Protection Division, 1991. Manual for Groundwater Monitoring. (Pp 38).
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- 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. USEPA 530/R-09-007.
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- United States Environmental Protection Agency, Region 4 Science and Ecosystem Support Division, 2018. Operating Procedure for Design and Installation of Monitoring Wells. SESDGUID-101-R2 (effective January 16, 2018).
- United States Environmental Protection Agency, Region 4 Laboratory Services and Applied Science Division, 2020. Operating Procedure for Field Equipment Cleaning and Decontamination. LSASDPROC-205-R4 (effective June 22, 2020).
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- United States Environmental Protection Agency, 1995. 40 CFR Part 258. Hazardous and Solid Waste Management System, Criteria for Municipal Solid Waste Landfills
- Wood Environment & Infrastructure Solutions, Inc., 2022. Plant Bowen Landfill Cells 1 & 2, 3 & 4, and 9 & 10 2021 Annual Groundwater Monitoring & Corrective Action Report, January 31, 2022.

FIGURE 1: STATISTICAL ANALYSIS PLAN OVERVIEW

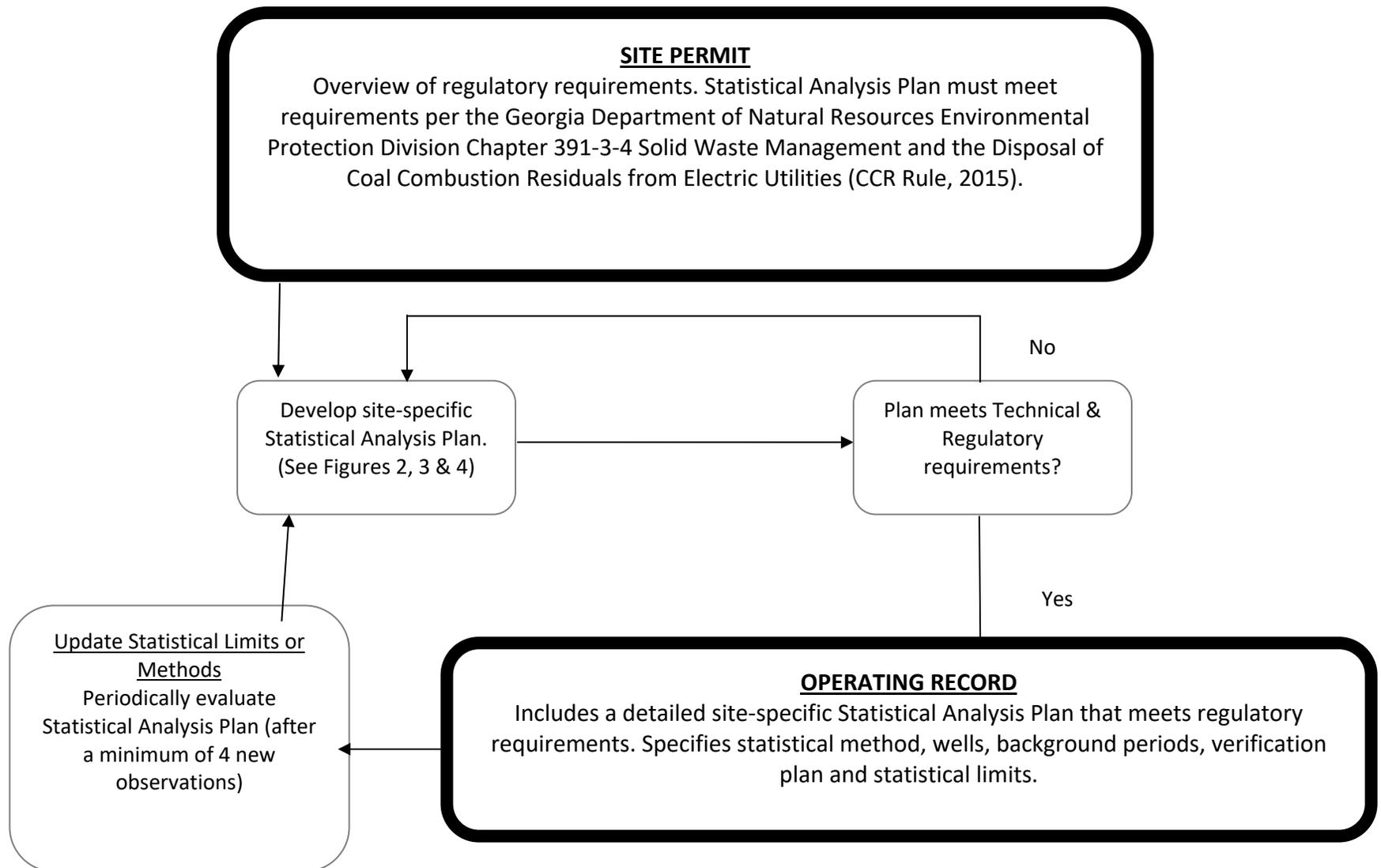


FIGURE 2. DECISION LOGIC FOR DETERMINING APPROPRIATE STATISTICAL METHOD

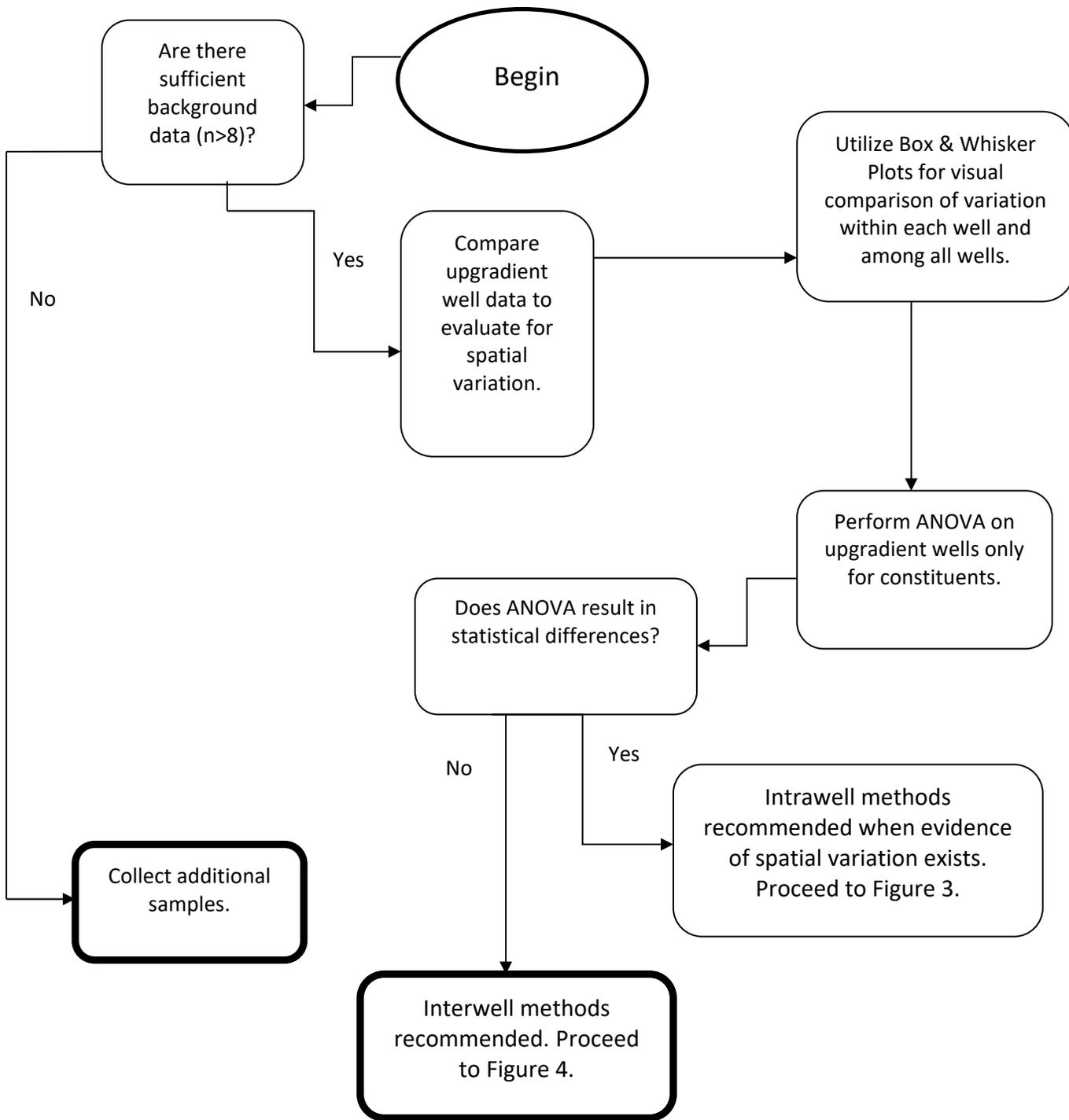


FIGURE 3: DECISION LOGIC FOR COMPUTING INTRAWELL PREDICTION LIMITS

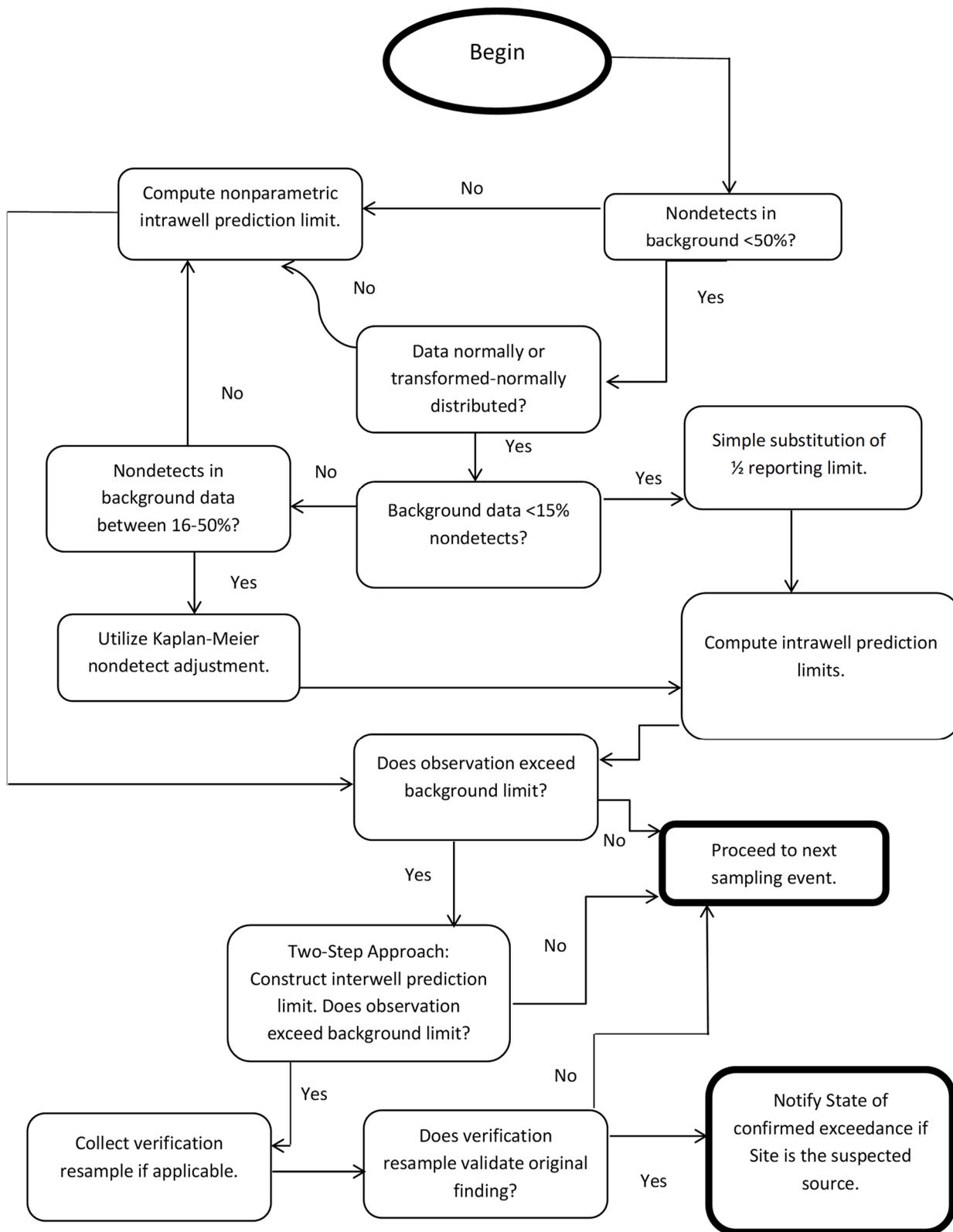
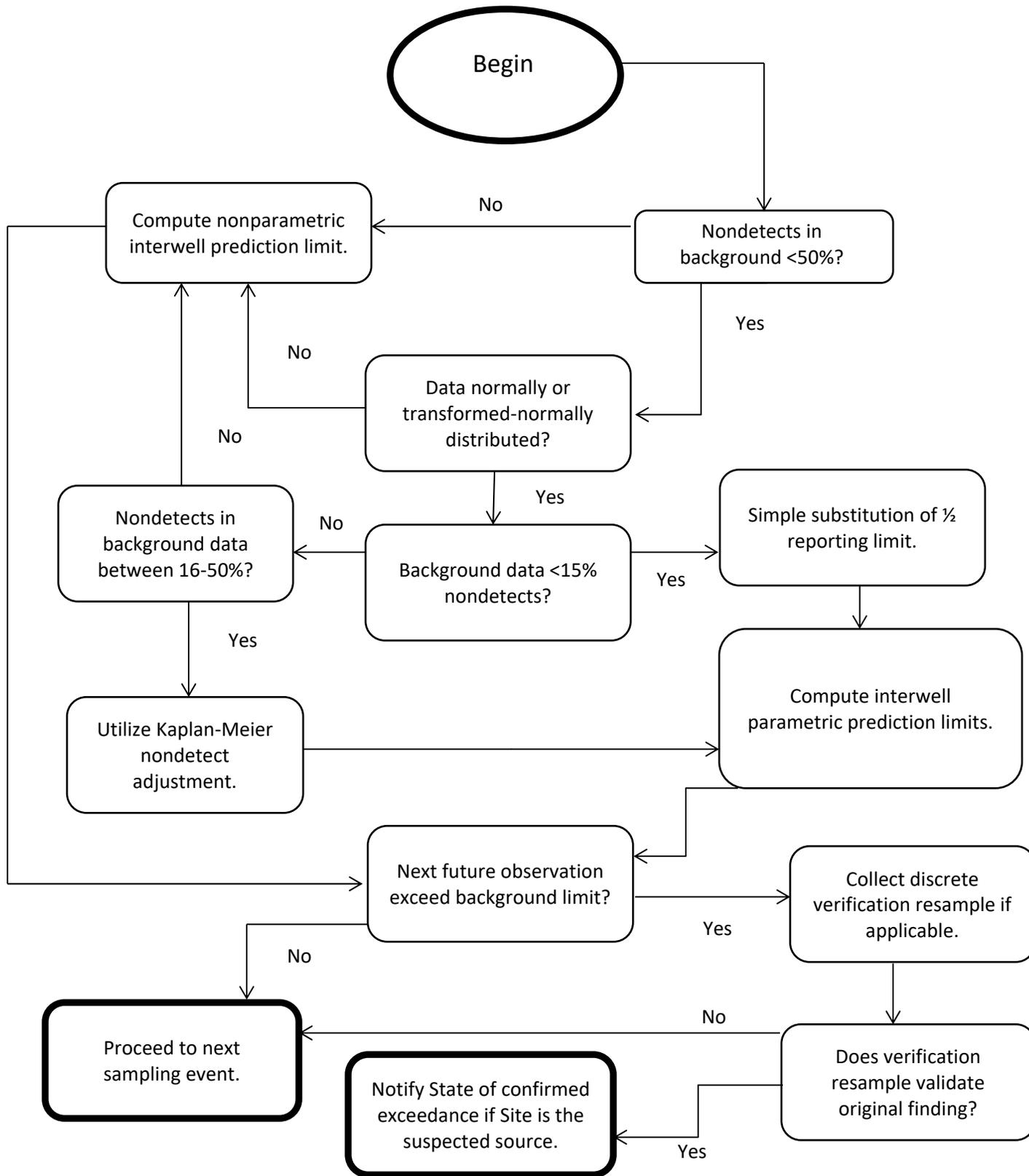


FIGURE 4. DECISION LOGIC FOR COMPUTING INTERWELL PREDICTION LIMITS



APPENDICES

- A. GROUNDWATER MONITORING NETWORK DOCUMENTATION**
- B. GROUNDWATER MONITORING WELL DETAILS**
- C. GROUNDWATER SAMPLING PROCEDURES**
- D. SURFACE WATER SAMPLING AND ANALYSIS PROCEDURES**

A. GROUNDWATER MONITORING NETWORK DOCUMENTATION

Table A1	Summary of Well Installation Dates, Coordinates, Elevation Screen Interval, and Purpose
Figure A1	Monitoring Well Network
Figure A2	Potentiometric Surface - Overburden Wells July 2021
Figure A3	Potentiometric Surface - Bedrock Wells July 2021
Attachment A1	Well Construction and Boring Logs
Attachment A2	Well Drilling Contractor Proof of Bonding
Attachment A3	Surveyor's Certification

TABLE A1
SUMMARY OF WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL AND PURPOSE

Plant Bowen
Landfill Cells 1 & 2, 3 & 4, and 9 & 10
Bartow County, Georgia

Well Name	Installation Date	Northing (feet, NAD83) ⁽¹⁾	Easting (feet, NAD83) ⁽¹⁾	Ground Surface Elevation (feet, NAVD88) ⁽²⁾	Top of Casing Elevation (feet, NAVD88) ⁽²⁾	Top of Screen Elevation (feet, NAVD88) ⁽³⁾	Bottom of Screen Elevation (feet, NAVD88) ⁽³⁾	Screen Length (feet)	Total Well Depth on Construction Log (feet below land surface)	Lithology Screened	Hydraulic Location and Purpose	Horizontal Hydraulic Conductivity (feet per day) ⁽¹⁰⁾
GWA-1	4/12/2007	1502842.29	2071724.15	738.86	741.76	601.13	591.13	10.0	147.90	Overburden/Bedrock	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-2	4/4/2007	1502640.55	2071935.13	731.48	733.89	590.00	580.00	10.0	151.92	Overburden/Bedrock	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-2R	8/3/2007	1502615.38	2071965.52	732.66	734.83	637.53	627.53	10.0	106.03	Bedrock	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-3	4/11/2007	1502386.74	2072067.26	729.90	732.47	644.90	634.90	10.0	95.40	Overburden	Cells 1 & 2 - Upgradient ⁽⁴⁾⁽⁶⁾	NA
GWA-3A	3/16/2021	1502374.48	2072061.21	728.68	731.68	601.88	591.88	10.0	137.27	Overburden	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-4	3/14/2007	1502241.02	2072318.24	740.40	743.06	680.91	670.91	10.0	69.64	Overburden	Cells 1 & 2 - Upgradient ⁽⁵⁾⁽⁶⁾	NA
GWA-4R	3/13/2007	1502246.31	2072317.15	740.65	743.23	657.60	647.60	10.0	93.17	Bedrock	Cells 1 & 2 - Upgradient ⁽⁵⁾	NA
GWA-4RZ	10/28/2016	1502238.85	2072329.55	740.04	742.84	633.04	623.04	10.0	117.00	Bedrock	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-50	6/4/2008	1502154.80	2072442.13	728.74	731.21	644.71	634.71	10.0	94.33	Overburden	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWA-50R	6/10/2008	1502150.85	2072448.35	727.87	730.37	599.69	589.69	10.0	138.48	Bedrock	Cells 1 & 2 - Upgradient ⁽⁴⁾	NA
GWC-5	4/18/2006	1502341.56	2072677.44	735.11	737.56	634.00	624.00	10.0	111.29	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-6	5/1/2007	1502520.08	2072962.89	725.97	728.64	628.35	618.35	10.3	107.53	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-6RZ	4/28/2015	1502502.00	2072900.50	728.66	731.91	633.66	623.66	10.0	105.30	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-7Z	5/19/2016	1502640.13	2073193.22	709.70	713.04	606.00	596.00	10.0	114.00	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-8Z	4/28/2015	1502827.67	2073526.15	698.68	702.09	635.68	625.68	10.0	73.30	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-8RR	6/27/2011	1502857.71	2073501.74	698.96	701.92	601.96	591.96	10.0	107.30	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-9	8/16/2006	1503018.96	2073781.05	691.99	694.67	631.81	621.81	10.0	70.47	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-10	9/6/2006	1503162.70	2074019.96	684.89	687.87	626.70	616.70	10.0	68.33	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-10R	5/15/2007	1503154.01	2074020.44	685.33	687.95	599.83	589.83	10.0	95.18	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-11	6/1/2007	1503390.40	2073829.95	675.04	677.83	643.28	633.28	10.0	41.71	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-11R	5/31/2007	1503395.25	2073828.03	675.98	677.73	608.08	598.08	10.0	78.85	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-12	6/4/2007	1503662.54	2073693.63	674.66	677.25	636.56	626.56	10.0	48.41	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-13	5/31/2007	1503898.17	2073495.16	684.19	686.76	613.75	603.75	10.0	80.43	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA
GWC-13R	6/5/2007	1503908.53	2073501.95	683.17	685.97	594.17	584.17	10.0	99.10	Bedrock	Cells 1 & 2 - Downgradient ⁽⁵⁾	NA
GWC-13RZ	11/2/2016	1503926.70	2073517.44	681.71	684.60	589.71	579.71	10.0	102.00	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	0.028
GWC-14	8/22/2007	1504059.92	2073205.96	684.04	686.81	616.30	606.30	10.0	78.01	Overburden	Cells 1 & 2 - Downgradient ⁽⁵⁾	NA
GWC-14Z	11/3/2016	1504060.77	2073193.66	684.34	687.28	621.34	611.34	10.0	73.00	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	0.088
GWC-15	6/1/2007	1503943.59	2072927.52	692.75	695.19	635.74	625.74	10.0	67.11	Overburden	Cells 1 & 2 - Downgradient ⁽⁵⁾	NA
GWC-15Z	10/31/2016	1503952.26	2072918.71	693.28	695.92	631.30	621.30	10.0	72.00	Overburden	Cells 1 & 2 - Downgradient ⁽⁴⁾	0.368
GWC-15R	5/24/2007	1503936.17	2072919.39	693.39	696.13	611.25	601.25	10.0	92.36	Bedrock	Cells 1 & 2 - Downgradient ⁽⁴⁾	NA

TABLE A1
SUMMARY OF WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL AND PURPOSE

Plant Bowen
 Landfill Cells 1 & 2, 3 & 4, and 9 & 10
 Bartow County, Georgia

Well Name	Installation Date	Northing (feet, NAD83) ⁽¹⁾	Easting (feet, NAD83) ⁽¹⁾	Ground Surface Elevation (feet, NAVD88) ⁽²⁾	Top of Casing Elevation (feet, NAVD88) ⁽²⁾	Top of Screen Elevation (feet, NAVD88) ⁽³⁾	Bottom of Screen Elevation (feet, NAVD88) ⁽³⁾	Screen Length (feet)	Total Well Depth on Construction Log (feet below land surface)	Lithology Screened	Hydraulic Location and Purpose	Horizontal Hydraulic Conductivity (feet per day) ⁽¹⁰⁾
GWA-36	6/16/2011	1505057.77	2073384.03	681.89	684.50	616.19	606.19	10.0	76.00	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾⁽⁹⁾	NA
GWA-36A	3/18/2022	1505026.95	2073357.46	680.63	683.75	588.80	578.80	10.0	102.16	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-36R	6/15/2011	1505051.72	2073384.47	681.41	684.16	605.71	595.71	10.0	86.00	Bedrock	Cells 3 & 4 - Upgradient ⁽⁴⁾⁽⁷⁾	NA
GWA-36RA	7/2/2021	1505060.13	2073365.45	682.26	685.20	583.26	573.26	10.0	109.40	Bedrock	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-37	9/11/2013	1505345.45	2073069.32	700.44	703.72	606.24	596.24	10.0	104.50	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-38	6/13/2011	1505501.33	2072831.77	713.32	716.24	658.62	648.62	10.0	65.00	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-51RZ	3/1/2016	1505310.36	2073781.34	705.81	708.58	625.11	615.11	10.0	91.00	Bedrock	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-52	4/21/2015	1505459.85	2073876.00	706.56	709.77	636.06	625.90	10.0	80.96	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-53	4/10/2015	1505695.52	2074038.90	707.61	710.99	600.11	590.06	10.0	117.85	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-53R	4/10/2015	1505689.06	2074032.00	708.38	711.58	554.38	543.24	11.0	165.44	Bedrock	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-54	4/14/2015	1505853.39	2074286.28	701.23	704.23	638.23	628.36	10.0	73.17	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-55	4/15/2015	1506034.69	2074507.04	693.43	696.72	641.43	632.31	10.0	62.42	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-55R	4/15/2015	1506041.22	2074517.62	693.28	696.53	600.78	590.85	10.0	102.83	Bedrock	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWA-56	4/16/2015	1506128.38	2074633.08	689.14	692.17	616.14	606.48	10.0	82.96	Overburden	Cells 3 & 4 - Upgradient ⁽⁴⁾	NA
GWC-16R	12/13/2011	1505877.86	2072607.38	727.77	730.59	643.07	633.07	10.0	95.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-17R	12/8/2011	1506069.29	2072829.29	730.02	733.37	650.82	640.82	10.0	89.50	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-18	6/6/2011	1506306.70	2072929.28	718.92	721.88	651.22	642.22	9.0	77.00	Overburden	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-18R	6/2/2011	1506301.39	2072929.47	718.97	721.76	591.77	581.77	10.0	137.50	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-19R	6/7/2011	1506395.96	2073158.36	723.13	726.31	589.43	579.43	10.0	144.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-20R	6/9/2011	1506602.14	2073486.53	717.63	720.59	643.63	633.63	10.0	84.30	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-21R	12/16/2011	1506695.89	2073784.42	720.45	723.07	641.25	631.25	10.0	89.50	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-22R	6/14/2011	1506717.93	2074105.65	712.54	715.41	605.84	595.84	10.0	117.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-23R	6/28/2011	1506701.61	2074446.53	688.02	690.94	651.32	641.32	10.0	47.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-24R	6/21/2011	1506694.13	2074806.11	673.76	676.57	647.06	637.06	10.0	37.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA
GWC-25R	6/21/2011	1506494.89	2075088.90	673.59	676.42	586.89	576.89	10.0	97.00	Bedrock	Cells 3 & 4 - Downgradient ⁽⁴⁾	NA

TABLE A1
SUMMARY OF WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL AND PURPOSE
Plant Bowen
Landfill Cells 1 & 2, 3 & 4, and 9 & 10
Bartow County, Georgia

Well Name	Installation Date	Northing (feet, NAD83) ⁽¹⁾	Easting (feet, NAD83) ⁽¹⁾	Ground Surface Elevation (feet, NAVD88) ⁽²⁾	Top of Casing Elevation (feet, NAVD88) ⁽²⁾	Top of Screen Elevation (feet, NAVD88) ⁽³⁾	Bottom of Screen Elevation (feet, NAVD88) ⁽³⁾	Screen Length (feet)	Total Well Depth on Construction Log (feet below land surface)	Lithology Screened	Hydraulic Location and Purpose	Horizontal Hydraulic Conductivity (feet per day) ⁽¹⁰⁾
GWA-39Z	3/1/2016	1502655.66	2071120.65	731.80	735.15	628.30	618.30	10.0	113.80	Overburden	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-39RZ	11/4/2016	1502618.73	2071164.20	729.57	732.62	602.57	592.57	10.0	137.00	Bedrock	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-40	6/7/2011	1503195.09	2071299.94	728.93	731.77	589.03	579.03	10.0	150.20	Overburden	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-41	6/6/2011	1503519.02	2071046.18	738.91	742.35	646.41	636.41	10.0	102.54	Overburden	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-41R	6/1/2011	1503527.39	2071050.84	737.95	743.08	635.19	625.19	10.0	113.06	Bedrock	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-42	6/1/2011	1503823.34	2071049.95	734.45	738.05	662.69	652.69	10.0	82.06	Overburden	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-43	5/25/2011	1504129.20	2070982.44	707.61	710.94	627.71	617.71	10.0	90.20	Overburden	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWA-43R	5/25/2011	1504117.39	2070973.14	707.80	711.19	594.10	584.10	10.0	124.20	Bedrock	Cells 9 & 10 - Upgradient ⁽⁴⁾	NA
GWC-44	6/9/2011	1504436.66	2071414.30	710.15	712.89	637.22	627.22	10.0	83.23	Overburden	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-45	5/17/2007	1504539.38	2071956.71	698.41	701.53	643.98	633.98	10.0	64.73	Overburden	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-45R	5/22/2007	1504538.68	2071945.39	699.00	702.02	583.56	573.56	10.0	125.74	Bedrock	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-46R	8/15/2014	1504522.23	2072184.47	687.94	690.49	641.84	631.84	10.0	56.50	Bedrock	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-47	4/24/2014	1504543.69	2072481.34	687.44	690.86	630.44	620.44	10.0	67.33	Overburden	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-47R	4/24/2014	1504539.25	2072467.10	687.71	691.13	616.91	606.91	10.0	81.20	Bedrock	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-48	6/8/2011	1504490.63	2072851.71	686.20	688.33	642.70	632.70	10.0	54.00	Overburden	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-49Z	3/1/2016	1504238.30	2072896.49	706.12	709.11	626.92	616.92	10.0	89.50	Overburden	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA
GWC-49R	4/17/2014	1504246.02	2072918.76	706.24	709.56	585.54	575.54	10.0	131.10	Bedrock	Cells 9 & 10 - Downgradient ⁽⁴⁾	NA

Notes:

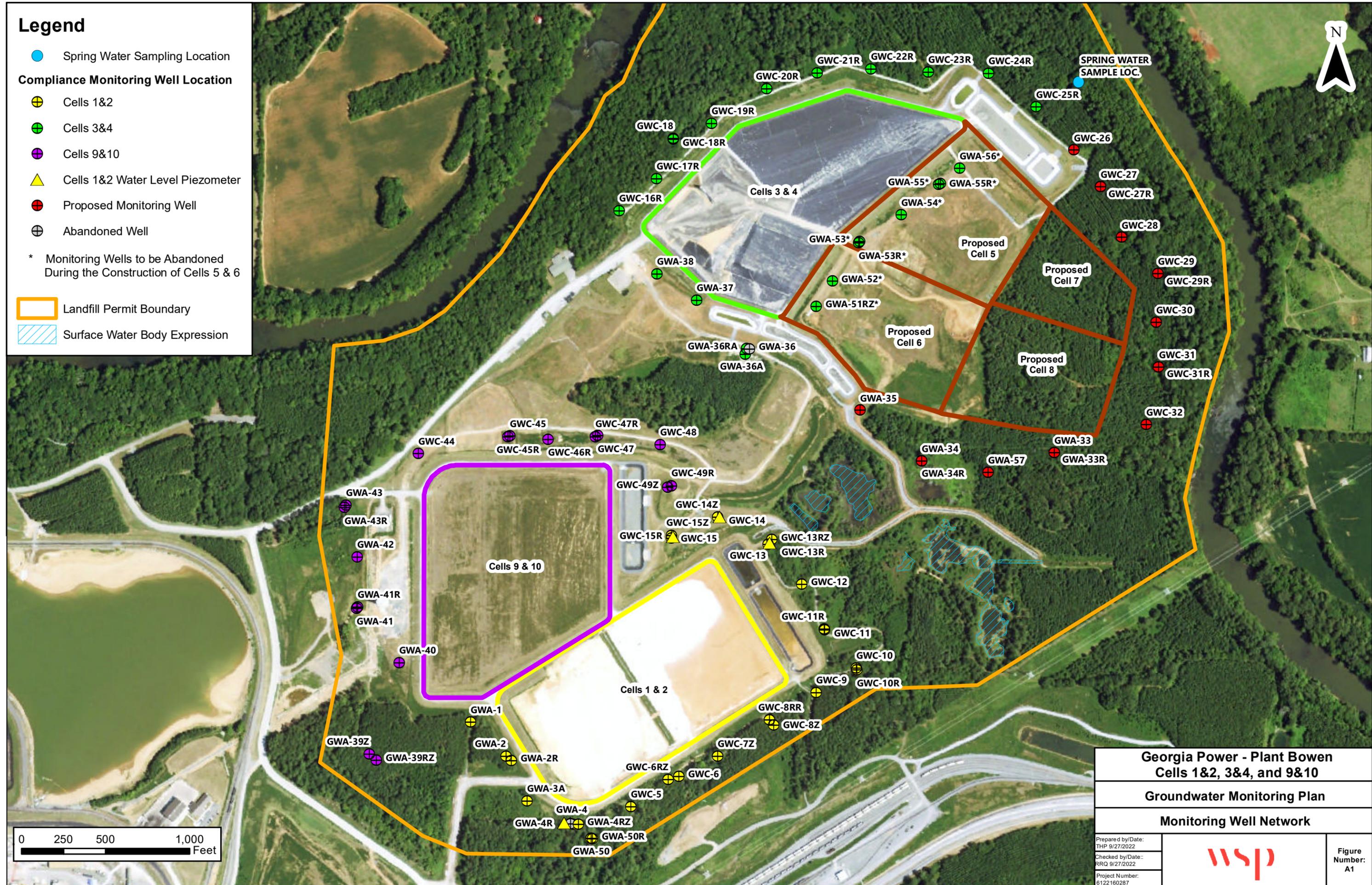
- (1) NAD83 indicates feet (ft) referenced to the North American Datum of 1983. Coordinates are from March 2021 re-survey of the Landfill wells by Donaldson & Garret Associates, Inc.
- (2) NAVD88 indicates feet (ft) in elevation referenced to the North American Vertical Datum 1988. Elevations are from March 2021 re-survey of the Landfill wells by Donaldson & Garret Associates, Inc.
- (3) Screen elevations calculated using depth below land surface and ground surface elevations from the March 2021 re-survey.
- (4) Monitoring wells are measured for water levels and sampled for groundwater quality.
- (5) Water Level Piezometers measured for water level only.
- (6) GWA-3 was abandoned on 2/19/2021 and was replaced with new well GWA-3A, completed on 3/16/2021 with installation of protective cover and pad.
- (7) GWA-36R was abandoned on 7/1/2021 and was replaced with new well GWA-36RA, completed on 7/2/2021 with installation of protective cover and pad.
- (8) GWA-4 was abandoned on 3/15/2022.
- (9) GWA-36 was abandoned on 3/16/2022 and was replaced with new well GWA-36A, completed on 3/18/2022 with installation of protective cover and pad.
- (10) Horizontal Hydraulic Conductivity evaluated using slug test methodology.

The average hydraulic conductivity values used in the soil aquifer calculations (2.54 x 10⁻⁵ cm/sec = 0.072 ft/day) and the bedrock aquifer calculations (1.26 x 10⁻⁴ cm/sec = 0.36 ft/day) were presented in the *Plant Bowen Proposed Coal Combustion By-Product Storage Facility Site Acceptability Report* (SCS, 2002) and were computed from the slug test data collected as part of that investigation.

NA indicates data not available

Legend

- Spring Water Sampling Location
- Compliance Monitoring Well Location**
- ⊕ Cells 1&2
- ⊕ Cells 3&4
- ⊕ Cells 9&10
- ▲ Cells 1&2 Water Level Piezometer
- ⊕ Proposed Monitoring Well
- ⊕ Abandoned Well
- * Monitoring Wells to be Abandoned During the Construction of Cells 5 & 6
- Landfill Permit Boundary
- Surface Water Body Expression

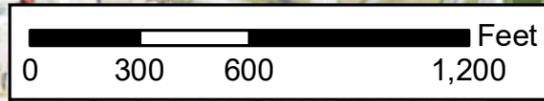
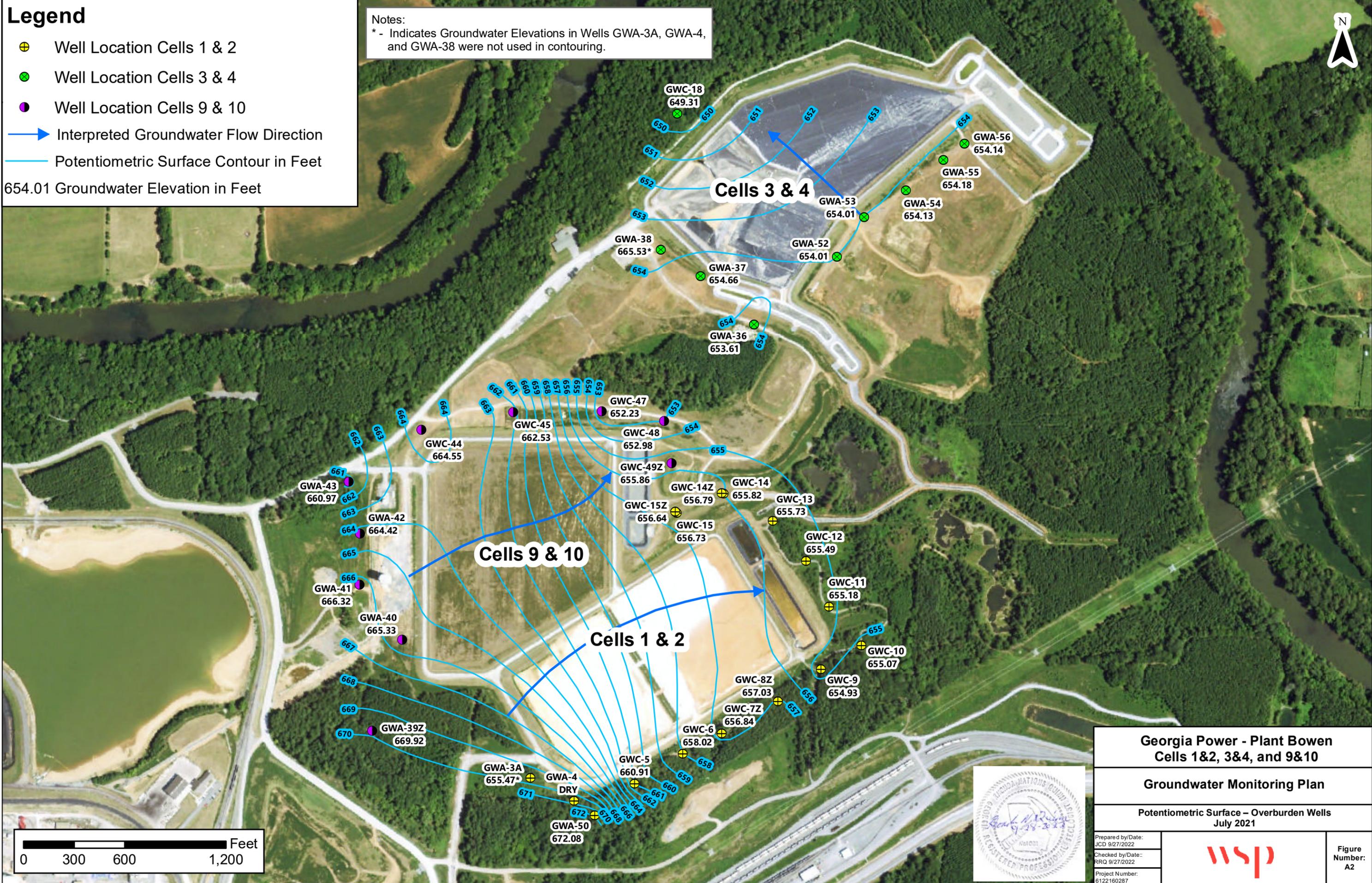


Georgia Power - Plant Bowen	
Cells 1&2, 3&4, and 9&10	
Groundwater Monitoring Plan	
Monitoring Well Network	
Prepared by/Date: THP 9/27/2022	
Checked by/Date: RRQ 9/27/2022	
Project Number: 6122160287	
Figure Number: A1	

Legend

- ⊕ Well Location Cells 1 & 2
 - ⊕ Well Location Cells 3 & 4
 - ⊕ Well Location Cells 9 & 10
 - ➔ Interpreted Groundwater Flow Direction
 - Potentiometric Surface Contour in Feet
- 654.01 Groundwater Elevation in Feet

Notes:
 * - Indicates Groundwater Elevations in Wells GWA-3A, GWA-4, and GWA-38 were not used in contouring.



Georgia Power - Plant Bowen Cells 1&2, 3&4, and 9&10	
Groundwater Monitoring Plan	
Potentiometric Surface – Overburden Wells July 2021	
Prepared by/Date: JCD 9/27/2022	
Checked by/Date: RRQ 9/27/2022	
Project Number: 6122160287	
Figure Number: A2	

ATTACHMENT A1

WELL CONSTRUCTION AND BORING LOGS

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: B. Filipovich	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: J. Lippert	DRILLING METHODS: HSA	GWA-1
DATE CONSTRUCTED: 4/12/2007 - 9:00 am		

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole	TOP OF RISER	2.90	741.76
4-ft x 4-ft concrete pad	GROUND SURFACE	0.00	738.86
WATER LEVEL: 108.3 @ 24 hrs	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until clear.	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	134.50	604.36
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	136.50	602.36
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 9 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	137.73	601.13
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	147.73	591.13
	BOTTOM OF CASING	147.90	590.96
HOLE DIA: 6-5/8"			

 <p>SOUTHERN COMPANY <i>Energy to Serve Your World</i></p>	DRILLING LOG		Hole No. GWA-1
	GEOLOGICAL SERVICES		Sheet 1 of 5
SITE Plant Bowen Dry Gypsum Storage Facility			HOLE DEPTH 149'
LOCATION Cells 1 & 2		COORDINATES N 1502842.29	SURF.ELEV. 738.86
ANGLE 0	BEARING 0	CONTRACTOR SCS	DRILL NO. _____
DRILLING METHOD HSA		NO. SAMPLES 30	NO. U.D. SAMPLES 0
CASING SIZE _____	LENGTH _____	CORE SIZE _____	TOTAL % REC. _____
WATER TABLE DEPTH 105.5	ELEV. 633.36	TIME AFTER COMP. _____	DATE TAKEN 4/11/2007
TYPE GROUT _____	QUANTITY _____	MIX _____	DRILLING START DATE 4/4/2007
DRILLER B. Filipovich	RECORDER J. Lippert	APPROVED _____	DRILLING COMP. DATE 4/11/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	738.86								
1									
2									
3									
4		Stiff, light brown, silty CLAY with trace organics and limestone pebbles, dry	S-1	3.5-5	4-5-6	11		90	
5	733.86								
6									
7									
8									
9		Very stiff, reddish brown and gray mottled CLAY, low plasticity, with limestone pebbles and chert fragments, slightly moist	S-2	8.5-10	6-8-11	19		100	
10	728.86								
11									
12									
13									
14		Very stiff, reddish brown, sandy SILT with chert fragments, slightly moist	S-3	13.5-15	7-10-13	23		100	
15	723.86								
16									
17									
18									
19		Same as above	S-4	18.5-20	9-11-16	27		90	
20	718.86								
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-1

Sheet 2 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **149'** SURF.ELEV. **738.86**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	713.86	Very stiff, red with light brown and gray CLAY, high plasticity, some chert fragments, moist	S-5	23.5-25	8-10-14	24		100	
26									
27									
28									
29									
30	708.86	Same as above	S-6	28.5-30	6-8-10	18		100	
31									
32									
33									
34		Same as above, stiff with chert pebbles	S-7	33.5-35	4-6-8	14		100	
35	703.86								
36									
37									
38									
39		Same as above, very moist, blocky structure	S-8	38.5-40	3-4-5	9		100	
40	698.86								
41									
42									
43									
44		Stiff, yellowish brown silty CLAY with chert, sand, and small pebbles, moist	S-9	43.5-45	3-4-5	9		100	
45	693.86								
46									
47									
48									
49		Same as above, very stiff with large limestone gravel, some manganese oxide nodules	S-10	48.5-50	6-8-9	17		100	
50	688.86								
51									
52									
53									
54		Same as above with mottled gray	S-11	53.5-55	11-13-11	24		90	
55	683.86								
56									



**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 3 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 149' SURF.ELEV. 738.86

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	678.86	Stiff, light brown and reddish brown CLAY, high plasticity with quartz pebbles, moist	S-12	58.5-60	4-5-7	12		90	
61									
62									
63									
64									
65	673.86	Same as above, very moist	S-13	63.5-65	4-5-7	12		100	
66									
67									
68									
69									
70	668.86	Same as above	S-14	68.5-70	4-6-8	14		100	
71									
72									
73									
74									
75	663.86	Very stiff, light brown, sandy CLAY with chert fragments, moist	S-15	73.5-75	4-7-10	17		100	
76									
77									
78									
79									
80	658.86	Same as above, stiff	S-16	78.5-80	5-6-8	14		100	
81									
82									
83									
84									
85	653.86	Chert seam from approximately 84.5-85.5	S-17	83.5-85	5-27-47	74		100	
86									
87									
88									



**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 4 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **149'** SURF.ELEV. **738.86**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		Same as above, very stiff	S-18	88.5-90	6-8-10	18			
90	648.86								
91									
92									
93		Same as above, stiff with highly weathered quartz pebbles, very moist	S-19	93.5-95	4-5-7	12		100	
94									
95	643.86								
96									
97		Same as above	S-20	98.5-100	4-4-6	10		100	
98									
99									
100	638.86								
101		Same as above, with very highly weathered dolomite gravel	S-21	103.5-105	4-5-7	12		100	
102									
103									
104									
105	633.86	Same as above	S-22	108.5-110	6-4-6	10		100	
106									
107									
108									
109		Same as above	S-23	113.5-115	2-4-5	9		100	
110	628.86								
111									
112									
113		Same as above, firm	S-24	118.5-120	2-2-4	6		90	
114									
115	623.86								
116									
117									
118									
119									
120	618.86								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-1

Sheet 5 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **149'** SURF.ELEV. **738.86**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121									
122									
123									
124									
125	613.86	Firm, light brown, sandy CLAY with yellowish brown SILT and chert gravel, wet	S-25	123.5-125	2-3-5	8		100	
126									
127									
128									
129									
130	608.86	Hard, light brown sandy CLAY and abundant highly weathered dolomite, wet, parent rock structure visible in soil	S-26	128.5-130	8-27-4	31		90	
131									
132									
133									
134									
135	603.86	Same as above, very soft, few chert fragments, less structured	S-27	133.5-135	WOH	0		100	
136									
137									
138									
139									
140	598.86	Same as above, firm, some chert gravel	S-28	138.5-140	2-3-3	6		100	
141									
142									
143									
144									
145	593.86	Same as above, stiff	S-29	143.5-145	2-2-12	14		100	
146									
147									
148									
149		Very hard, weathered DOLOMITE, highly fractured	S-30	148.5-150	50/2-x-x	>50		90	
150	588.86	Bottom of boring							
151									
152									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: K. Hobbs	DRILLING METHODS: H S A	GWA-2
DATE CONSTRUCTED: 4/4/2007 - 9:00 am		

	DEPTH FEET	ELEVATION FT, NAVD88	
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.41	733.89
4-ft x 4-ft concrete pad GROUND SURFACE WATER LEVEL: 77.8 ft.	GROUND SURFACE	0.00	731.48
BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 94 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	135.80	595.68
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie TOP OF FILTER PACK	TOP OF FILTER PACK	137.80	593.68
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	BOTTOM OF RISER / TOP OF SCREEN	141.48	590.00
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	BOTTOM OF SCREEN	151.48	580.00
	BOTTOM OF CASING	151.92	579.56
HOLE DIA: 8"			

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWA-2
	Sheet 1 of 5

SITE Plant Bowen Dry Gypsum Storage Facility	HOLE DEPTH 151	SURF. ELEV. 731.48
LOCATION Cells 1 & 2	COORDINATES N 1502640.55	E 2071935.13
ANGLE 0	BEARING 0	CONTRACTOR SCS
DRILLING METHOD HSA	NO. SAMPLES 13	NO. U.D. SAMPLES 0
CASING SIZE _____	LENGTH _____	CORE SIZE _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____
TYPE GROUT _____	QUANTITY _____	MIX _____
DRILLER S. Denty	RECORDER K. Hobbs	APPROVED _____
		DRILLING START DATE 3/29/2007
		DRILLING COMP. DATE 4/3/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	731.48								
1									
2									
3									
4									
5	726.48	Stiff, dark brown/red SILT with some sand, slightly moist	S-1	4.5-6	3-6-8	14		100	
6									
7									
8									
9									
10	721.48	Dark brown/red sandy SILT with pebbles up to 4 cm, most pebbles 3-4 mm, areas of tan sand	S-2	9.5-11	9-10-14	24		100	
11									
12									
13									
14									
15	716.48	Same as above	S-3	14.5-16	5-8-13	21		90	
16									
17									
18									
19									
20	711.48	Stiff, dark reddish brown sandy SILT with quartz sand grains up to 2 mm	S-4	19.5-21	4-9-11	20		90	
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 2 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 151 SURF.ELEV. 731.48

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	706.48	Stiff, dark reddish brown SILT with sand and pebbles up to 20 mm in diameter, dry	S-5	24.5-25	3-5-8	13			
26									
27									
28									
29									
30	701.48	Same as above	S-6	29.5-31	5-7-11	18		100	
31									
32									
33									
34		Dark reddish brown sandy pebbly SILT, approximately 10% pebbles, slightly moist, but still crumbly	S-7	34.5-36	5-10-15	25		60	
35	696.48								
36									
37									
38									
39		Dark reddish brown sandy SILT with pebbles up to 30 mm in diameter, approximately 20% pebbles, slightly moist	S-8	39.5-41	4-6-10	16		80	
40	691.48								
41									
42									
43									
44		Dark brown/red pebbly SILT, approximately 50% pebbles, areas of light brown silt, pebbles up to 20 mm in diameter	S-9	44.5-46	5-9-11	20		60	
45	686.48								
46									
47									
48									
49		Mottled light brown, red/brown, and white silty CLAY saprolite, high plasticity, slightly moist, no pebbles	S-10	49.5-51	4-10-7	17		75	
50	681.48								
51									
52									
53									
54		Highly weathered white, tan, and brown SAPROLITE, some bedding features still visible, uniform silt grain size, slightly moist	S-11	54.5-56	9-11-37	48		50	
55	676.48								
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 3 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 151 SURF.ELEV. 731.48

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	671.48	Firm, light brown, tan, and white silty SAPROLITE, mottled, moist	S-12	59.5-61	6-7-9	16			
61									
62									
63									
64									
65	666.48	Same as above, wet	S-13	64.5-66	5-6-7	13			
66									
67									
68									
69									
70	661.48	Same as above	S-14	69.5-71	3-4-7	11			
71									
72									
73									
74									
75	656.48	Same as above	S-15	74.5-76	5-6-12	18			
76									
77									
78									
79									
80	651.48	White decomposed boulder	S-16	79.5-81	2-21-45	66			
81									
82									
83									
84									
85	646.48	Firm, Brown to white CLAY with silt	S-17	84.5-86	4-5-11	16			
86									
87									
88									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 4 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 151 JRF.ELEV. 731.48

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89									
90	641.48	Same as above	S-18	89.5-91	2-7-8	15			
91									
92									
93									
94									
95	636.48	Same as above	S-19	94.5-96	29-15-8	23			
96									
97									
98									
99									
100	631.48	Firm, brown to white CLAY with sand and silt	S-20	99.5-101	2-5-8	13			
101									
102									
103									
104									
105	626.48	Same as above	S-21	104.5-106	1-3-5	8			
106									
107									
108									
109									
110	621.48	Same as above	S-22	109.5-111	2-3-8	11			
111									
112									
113									
114									
115	616.48	Same as above	S-23	114.5-116	2-3-5	8			
116									
117									
118									
119									
120	611.48	Firm, brown CLAY with rock fragments	S-24	119.5-121	1-2-2	4			



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 5 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 151 IRF.ELEV. 731.48

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Ret	RQD
				From To	Blows	N			
121									
122									
123									
124									
125	606.48	Soft, brown SILT, loose, with rock fragments	S-25	124.5-126	WOR	0			
126									
127									
128									
129									
130	601.48	Same as above	S-26	129.5-131	WOR	0			
131									
132									
133									
134									
135	596.48	Same as above	S-27	134.5-136	WOR	0			
136									
137									
138									
139									
140	591.48	Same as above	S-28	139.5-141	1-0-0	0			
141									
142									
143									
144									
145	586.48								
146		Rods dropped from 146-150.6							
147									
148									
149									
150	581.48								
151		Top of Rock Bottom of boring							
152									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Milam	
LOCATION: Cells 1&2	RIG TYPE: CME550	
LOGGER: J. Lippert	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWA-2R
DATE CONSTRUCTED: 8/3/2007 - 9:00 am		

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top	→		
1/4-inch Weep Hole	→		
	TOP OF RISER	2.17	734.83
	2" Threaded Riser Cap		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	732.66
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 78.0 ft.			
Well Development: Pump/surge until clear.			
	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 32 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	81.50	651.16
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	88.50	644.16
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 4 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	95.13	637.53
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	105.13	627.53
	BOTTOM OF CASING	106.03	626.63
HOLE DIA: 7.5"			

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p>SOUTHERN COMPANY Energy to Serve Your World™</p>	DRILLING LOG			Hole No. <u>GWA-2R</u>
	GEOLOGICAL SERVICES			Sheet 1 of 4
SITE <u>Plant Bowen Dry Gypsum Storage Facility</u>		HOLE DEPTH <u>103'</u>	SURF.ELEV. <u>732.66</u>	
LOCATION <u>Cells 1 & 2</u>		COORDINATES N <u>1502615.38</u>	E <u>2071965.52</u>	
ANGLE <u>0</u>	BEARING <u>0</u>	CONTRACTOR <u>SCS</u>	DRILL NO. <u>CME-550</u>	
DRILLING METHOD <u>HSA/HQ Rock core with water</u>		NO. SAMPLES <u>15</u>	NO. U.D. SAMPLES <u>0</u>	
CASING SIZE _____	LENGTH <u>78</u>	CORE SIZE <u>HQ</u>	TOTAL % REC. <u>87.2</u>	
WATER TABLE DEPTH <u>78</u>		ELEV. <u>654.66</u>	TIME AFTER COMP. <u>15 hrs</u>	DATE TAKEN <u>8/2/2007</u>
TYPE GROUT _____		QUANTITY _____	MIX _____	DRILLING START DATE <u>7/31/2007</u>
DRILLER <u>S. Milam</u>	RECORDER <u>J. Lippert</u>	APPROVED _____	DRILLING COMP. DATE <u>8/2/2007</u>	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	732.66								
1		Stiff brownish red sandy CLAY with silt, moist, residuum	S-1	4.5-6	2 - 4 - 5	9			
2									
3									
4									
5	727.66								
6		Same as above, very stiff with micaceous subrounded gravel	S-2	9.5-11	5 - 9 - 11	20			
7									
8									
9									
10	722.66								
11		Same as above	S-3	14.5-16	4 - 10 - 10	20			
12									
13									
14									
15	717.66								
16		Same as above	S-4	19.5-21	4 - 9 - 10	19			
17									
18									
19									
20	712.66								
21									
22									
23									
24									



**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-2R

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **103'** SURF.ELEV. **732.66**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	707.66	Very stiff brownish yellow with yellowish white SILT, moist, some cementation in yellowish white silt inclusions	S-5	24.5-26	8 - 8 - 12	20			
26									
27									
28									
29									
30	702.66	Same as above, some very fine sand grains in matrix	S-6	29.5-31	2 - 18 - 10	28			
31									
32									
33									
34									
35	697.66	Stiff brownish yellow SILT, wet, very homogeneous	S-7	34.5-36	4 - 5 - 5	10			
36									
37									
38									
39									
40	692.66	Hard brownish yellow and white SILT with highly weathered and friable chert gravel, wet	S-8	39.5-41	5 - 14 - 21	35			
41									
42									
43									
44									
45	687.66	Firm brownish yellow, yellowish white, and dark brown SILT, moist, elastic in dark brown inclusions	S-9	45.5-46	3 - 3 - 3	6			
46									
47									
48									
49									
50	682.66	Very stiff yellowish brown SILT with chert gravel, moist	S-10	49.5-51	4 - 13 - 13	26			
51									
52									
53									
54									
55	677.66	Same as above, very hard with abundant chert gravel	S-11	54.5-56	50/4	R			
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2R

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 103' SURF.ELEV. 732.66

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	672.66	Stiff brownish yellow, yellowish white, and dark brown SILT, moist, elastic where dark brown	S-12	59.5-61	3 - 4 - 5	9			
61									
62									
63									
64									
65	667.66	Same as above, very stiff with rounded gravel, some black stained inclusions	S-13	64.5-66	4 - 14 - 15	29			
66									
67									
68									
69									
70	662.66	Hard yellowish brown sandy SILT, wet	S-14	69.5-71	8 - 14 - 16	30			
71									
72									
73									
74									
75	657.66	Same as above, very hard	S-15	74.5-76	50/4 - X - X	R			
76									
77									
78		Auger refusal at 78.0							
79		DOLOMITE, slightly to moderately weathered, hard, aphanitic, slightly fractured		78-83			5.0/2.3	46	
80	652.66	79.2-80.7: Cavity, mud-filled							
81		81.0-81.5: Cavity, mud-filled							
82		Partial void 81.7 - 82.2					Lost Circulation		
83				83-88			5.0/4.3	86	
84									
85	647.66								
86									
87									
88									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-2R

Sheet 4 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 103' SURF.ELEV. 732.66

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		Unweathered, moderately to slightly fractured		88-93			5.0/4.8	96	
90	642.66								
91		High angle (~70° - 75°) healed fractures							
92									
93									
94					93-98			5.0/5.2	104
95	637.66								
96									
97		Split along high angle joint							
98									
99					98-103			5.0/5.2	104
100	632.66								
101									
102									
103		Thin cherty seam at 102.5							
104		Bottom of boring							
105	627.66								
106									
107									
108									
109									
110	622.66								
111									
112									
113									
114	618.66								
115	617.66								
116									
117									
118									
119									
120	612.66								

PROJECT NUMBER 6122160287.2101	DRILLING COMPANY Cascade Drilling	COORDINATES N 1502374.48, E 2072061.21
PROJECT NAME Plant Bowen	DRILLER D. Myles	COORD SYS Ga State Plane West (NAD 83)
CLIENT Georgia Power	RIG TYPE/ METHOD TSI CC150/ SONIC	COMPLETION Stick-up w/ protective casing
ADDRESS 317 Covered Bridge Rd SW	CASING DIA. 6-in Outer/ 4-in Inner	SURFACE ELEVATION 728.68 ft amsl
LOCATION Gypsum Landfill Cells 1 & 2	BORING DEPTH 139.5 ft	WELL TOC 731.68 ft amsl

COMMENTS Start drilling 2/17/2021 and drilling completed 2/18/2021. Well construction completed on 3/16/2021 with installation of well cover and concrete pad. **LOGGED BY** A. Shoredits
CHECKED BY R. Quinn

Depth (ft)	Samples	% Recovery	Sample Run	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
0-2	0-10		1		Backfill: Clayey SAND, brown/ orange, med. dense, moist, fine gravel, fragments of plastic sheeting	SC		726
2-4								724
4-6								722
6-8								720
8-10								718
10-12	10-20		2		CLAY, red, v. stiff, low plasticity, dry SAND seam 10-10.1 ft, light brown, med. dense, moist	CL		716
12-14								714
14-16								712
16-18					Clayey SILT, red/ yellow, med. dense, dry, coarse gravel, rounded to sub-rounded quartz, relic laminated texture, variable clay content throughout Sandy seam 30-30.7 ft, green/ tan	ML-SC		710
18-20								708
20-22	20-30		3					706
22-24								704
24-26								702
26-28								700
28-30								698
30-32	30-40		4					696
32-34								694
34-36								692
36-38								690
38-40					Silty CLAY, orange/ white/ yellow/ tan/ red, v. stiff, med. plasticity, moist, trace coarse gravel throughout, sub-rounded quartz, relic saprolite texture White carbonate seam 36.9-37.1 ft & 43.5 ft Coarse gravel seam @ 40.1 ft, 41.5 ft	CL		688
40-42	40-50		5					686
42-44								684
44-46								682
46-48					Clayey SILT, red, dense, dry, coarse gravel, rounded to sub-rounded quartz	ML-SC		680

Depth (ft)	Samples	% Recovery	Sample Run	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)	
50	50-60		6		Silty CLAY, orange/ white/ yellow, stiff, med. and high plasticity, dry, sub-rounded fine quartz gravel	CL-CH		678	
52					Wht carbonate clay 52.8-53.3 ft, coarse angular carbonate gravel inclusions 50-53.3 ft			676	
54					CLAY with silt, red/ orange/ yellow, stiff, med. plasticity, dry, rounded to sub-rounded gravel			CL	674
56					CLAY, red/ orange/ white/ yellow/ tan, v. stiff, high plasticity, dry, relic saprolite texture/ laminations, rounded to sub-rounded gravel			CH	672
58					No sample				670
60	60-70		7		CLAY with sand, brown/ white/ red, stiff, med. plasticity, moist, white chert gravel inclusions (fine, sub-angular), relic saprolite structure/ laminations	CL-SC		668	
62								666	
64					SILT w/ clay, white, med. dense, (non-plastic), dry, chalky, dolomitic	ML		664	
66					Silty CLAY, brown/ white/ red/ yellow, stiff, high plasticity, moist, relic saprolite structure	CL-CH		662	
68					No sample			660	
70	70-80		8		SILT with clay, yellow, med. dense, (non-plastic), dry	ML		658	
72					Wht chalky dolomitic 71.1-71.5 ft			656	
74					Clayey SILT, white/ red/ yellow, med. dense, (slight plasticity), dry to moist			ML-CL	654
76					Chert lens @ 81.2 ft				652
78									650
80	80-90		9			ML		648	
82								646	
84					SILT with clay, white, med. dense, (non-plastic), dry, chalky, dolomitic			ML	644
86					Chert lens 85.3-86 ft				642
88					Clayey SILT, yellow/ white/ red, med. dense, (slight plasticity), moist, chert lens @ 86.8 ft			ML-CL	640
90	90-100		10		SILT with clay, white, med. dense, (non-plastic), dry, trace chalky dolomite	ML		638	
92					Clayey SILT, yellow/ white/ red, med. dense, (slight plasticity), moist, white fine gravel inclusions	ML-CL		636	
94					Clayey SILT, tan/ white, med. dense to dense, (med. plasticity), moist, variable clay content, chert lenses throughout	ML-SC		634	
96					Dark brown chert lens @ 90-90.3 ft			632	
98					Solid chert cobble @ 91.6-91.9 ft			630	
100	100-110		11		Coarse gravel, sub-angular chert in interval of 100-110 ft			628	
102								626	
104								624	
106								622	
108								620	

Bentonite grout mix

Bentonite plug

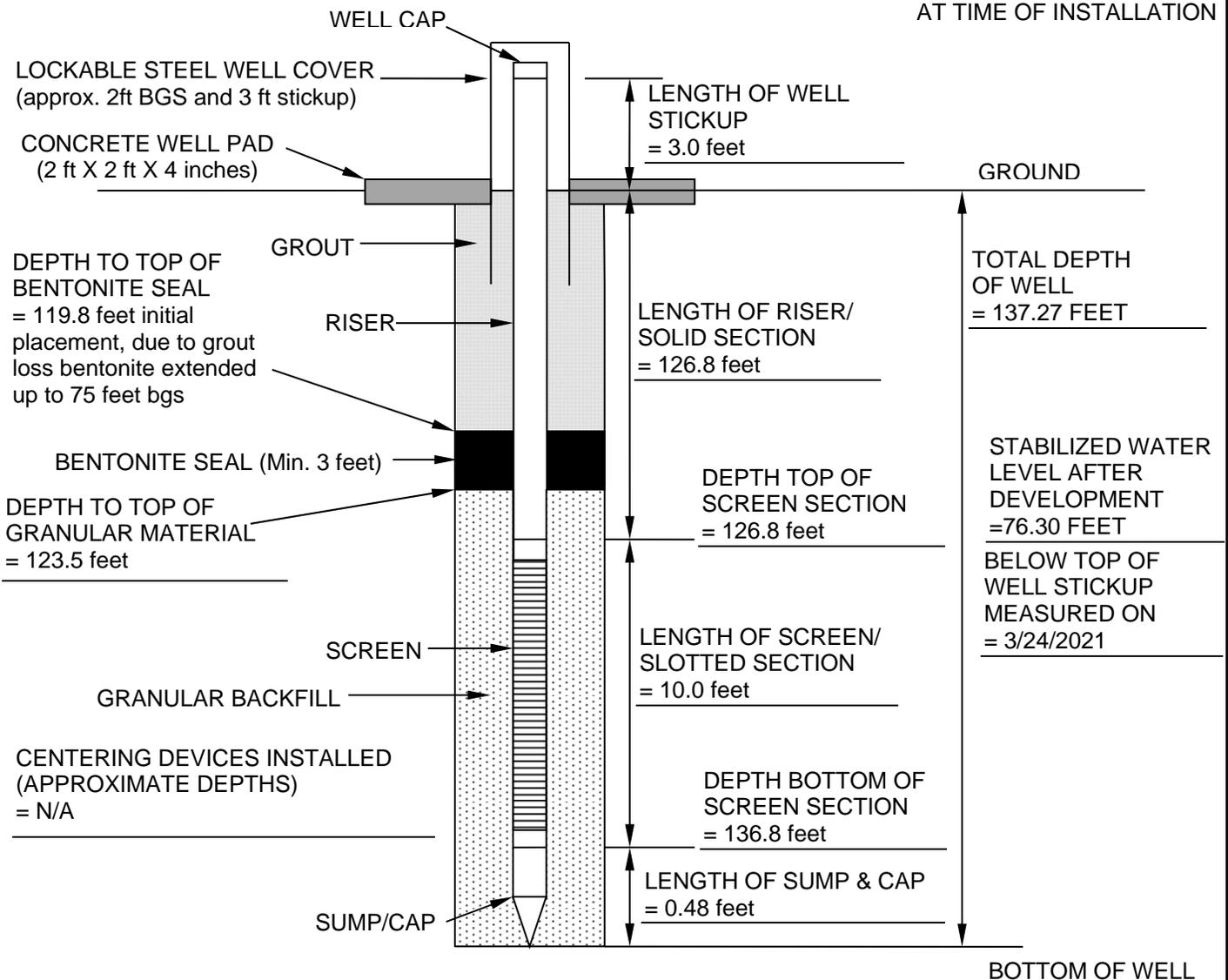
Depth (ft)	Samples	% Recovery	Sample Run	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
110	110-120		12		No sample from 110-130 ft			618
112					Thin resistant layer (rock) encountered and broken through @ ~125 ft			616
114								614
116								612
118								610
120	120-130		13					608
122								606
124								604
126								602
128		600						
130	130-140		14		Clayey SILT, yellow/ brown, loose, (low plasticity), wet, coarse angular gravel inclusions, sub-angular quartz, angular	ML-SC		598
132						596		
134					Silty SAND with clay, dark grey/ tan/ dark brown, v. dense, moist, gravelly, weathered and fractured rock (tan/grey sand mixed with coarse chert gravel)	SM-SC		594
136					Competent carbonate/ dolomite rock			592
138					Silty SAND with clay (same as 133-135 ft), dark grey/ tan/ yellow, v. dense, moist, gravelly	SM-SC		590
140					Drilling terminated @ 139.5 ft due to carbonate rock encountered at 135 ft			588
142					Well set at 137.3 feet below ground surface			586
144					Screened interval: 126.8-136.8 ft			584
146					Bentonite pellets placed from 75 -123.5 ft due to loss of grout.			582
148					Well completed with a stickup protective cover and bollards.			580
150								578
152								576
154								574
156								572
158								570
160								568
162								566
164								564
166								562
168								560

WELL INSTALLATION RECORD

JOB NAME Plant Bowen Cells 1 & 2	PROJECT NO. 6122-16-0287
WELL NUMBER GWA-3A	INSTALLATION DATE 3/16/2021
LOCATION* NORTH: 1502374.48 EAST: 2072061.21	GROUND ELEV: 728.68 feet NAVD88
WOOD FIELD REPRESENTATIVE A. Shoredits	DRILLER/ CONTRACTOR Cascade
GRANULAR BACKFILL MATERIAL #1 Silica Filter Sand	DRILLING TECHNIQUE Rotosonic
SCREEN MATERIAL 2-inch I.D. Flush Joint Slotted PVC (Sch. 40)	BOREHOLE DIAMETER ± 6 inch
SLOT SIZE 0.010-inch Machine Cut	REFERENCE POINT** ELEVATION* 731.68 ft NAVD88
RISER MATERIAL 2-inch I.D. Flush joint Solid PVC (Sch. 40)	LOCK TYPE/KEY CODE Master

* Preliminary-Final location/elevation to be determined by As-Built Survey
 ** Reference point is notch cut in the top of PVC casing

NOTE: NOT TO SCALE, ALL DEPTHS RECORDED ARE RELATIVE TO EXISTING GROUND SURFACE AT TIME OF INSTALLATION



Notes:
 Sand – 6.5 bags of #1 fine sand for well sump, prepack & screen interval
 Bentonite – 1 bag 3/8" chips for well sump; 1 bucket 1/2" uncoated pellets for plug; 8 bags of chips added to plug; 2 bags of chips to above pad
 Grout – 13.5 bags of bentonite mix with ~350 gals water

Review: RNQ Date: 4/13/2021

Well Installation Record GWA-3A

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWA-4R
DATE CONSTRUCTED: 3/13/2007 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap TOP OF RISER	2.58	743.23
4-ft x 4-ft concrete pad GROUND SURFACE	0.00	740.65
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 80 ft @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	78.00	662.65
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF FILTER PACK	80.00	660.65
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	83.05	657.60
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	93.05	647.60
BOTTOM OF CASING	93.17	647.48
HOLE DIA: 8"		

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWA-4R
	Sheet 1 of 4

SITE Plant Bowen Dry Gypsum Storage Facility	HOLE DEPTH 92.5'	SURF. ELEV. 740.65
LOCATION Cells 1 & 2	COORDINATES N 1502246.31	E 2072317.15
ANGLE 0	BEARING 0	CONTRACTOR SCS
DRILLING METHOD HSA/HQ Rock core with water	NO. SAMPLES 11	NO. U.D. SAMPLES 0
CASING SIZE _____	LENGTH _____	CORE SIZE _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____
TYPE GROUT _____	QUANTITY _____	MIX _____
DRILLER S. Denty	RECORDER L. Millet	APPROVED _____
		DRILLING START DATE 3/6/2007
		DRILLING COMP. DATE 3/13/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	740.65								
1									
2									
3									
4									
5	735.65	Orange, red, tan, and light gray clayey SILT, dry	S-1	4.5-6	8-11-13	24		80	
6									
7									
8									
9									
10	730.65	Red clayey SILT, dry, with 3" limestone lense at bottom, white, dry	S-2	9.5-11	9-32-34	68		85	
11									
12									
13									
14									
15	725.65	Light tan and orange silty CLAY, dry, occasional dark red mottling	S-3	14.5-16	6-11-17	28		85	
16									
17									
18									
19									
20	720.65	Light tan silty CLAY, dry, with carbonate rubble, fine dark red mottling	S-4	19.5-21	7-12-23	35			
21									
22									
23									
24									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-4R

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **92.5'** SURF.ELEV. **740.65**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD			
				From To	Blows	N						
25	715.65	Light orange silty CLAY, dry, occasional dolostone pebbles 26.3': drilled through 6" to 8" of rock	S-5	24.5-26	3-6-17	23						
26												
27												
28												
29												
30	710.65	Light orange silty CLAY, moist, occasional light gray and black mottling, occasional dolostone pebbles	S-6	29.5-31	9-9-9	18	50					
31												
3												
33												
34												
35	705.65	Same as above, large dolostone cobble stuck in bottom of spoon	S-7	34.5-36	10-11-9	20	15					
36												
37												
38												
39												
40	700.65	Light orange silty CLAY, moist, occasional light gray and black mottling, small carbonate shards 41.6' - 44.0': rock ledge, about 2.5' thick	S-8	39.5-41	7-7-9	16	50					
41												
42												
43												
44												
45	695.65	Light orange silty CLAY, dry, black mottling, degraded carbonate pebbles	S-9	44.5-46	8-8-8	16	75					
46												
47												
48												
49												
50	690.65	Brown clayey SILT, moist, occasional black mottling, carbonate pebbles and sand throughout	S-10	49.5-51	2-4-4	8	20					
51												
52												
53												
54									Same as above 54.0' Top of rock	S-11	53.5-56	50/2
55	685.65	54.0: Light gray DOLOSTONE, some secondary mineralization in minor fractures	54-57.5	3.5/2.9	83							
56												



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-4R

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 92.5' SURF.ELEV. 740.65

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57		56.7': Indication of cavity top, core is incomplete around, some sand mixed in DOLOMITE, some small clay rinds		57.5-67.5			10/5.4	54	
58									
59									58.6' - 59.4': Top of open cavity
60	680.65	60.0: Pitted DOLOSTONE, thicker clay rinds with some iron staining in fractures							
61									
62									
63									
64		64.2' - 65.7': Cavity, appears to be some soil deposition at bottom, possible chert about 2" thick							
65	675.65								
66		65.7' - 67.2': Gray DOLOMITE, secondary crystalization in minor fractures		67.5-77.5			10/9.9	99	
67									
68									
69									
70	670.65								
71									
72									
73									
74									
75	665.65								
76									
77									
78		78.0' - 79.3': Cavity, bottom of cavity is heavily weathered (2") DOLOSTONE, tan/orange then gray dolostone as above		77.5-87.5			10/8.6	86	
79									
80	660.65								
81		79.3' - 84.4': Gray DOLOSTONE, same as above							
82									
83									
84									
85	655.65	85.7': Fracture with iron oxide staining and light clay rind							
86									
87									
88									



DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GWA-4R

Sheet 4 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **92.5'** SURF.ELEV. **740.65**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		85.7' - 92.5': Light gray DOLOSTONE, same as above, no evidence of water in occasional fractures		87.5-92.5			5.0/5.0	100	
90	650.65								
91									
92									
93		92.5: Bottom of boring							
94									
95	645.65								
96									
97									
98									
99									
100	640.65								
101									
102									
103									
104									
105	635.65								
106									
107									
108									
109									
110	630.65								
111									
112									
113									
114									
115	625.65								
116									
117									
118									
119									
120	620.65								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **740.04**
 Top of PVC Casing Elevation (feet, NAVD88): **742.84**



LOG OF TEST BORING

BORING GWA-4RZ
 PAGE 1 OF 3
 6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

DATE STARTED 10/25/2016 **COMPLETED** 10/28/2016 **SURF. ELEV.** 740.04' NAVD88 **COORDINATES:** N:1502238.85 E:2072329.55

CONTRACTOR Cascade **EQUIPMENT** PS T-150 **METHOD**

DRILLED BY Tommy and Rodger **LOGGED BY** D. Morris* **CHECKED BY** **ANGLE** **BEARING**

BORING DEPTH 117 ft bgs **GROUND WATER DEPTH: DURING** **COMP.** 90 ft bgs **DELAYED** 88 ft.;7 days

NOTES Near GWA-4R, *Sample Logged by geologist employed by Amec Foster Wheeler

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma			HCL REACTION	WELL DATA
			ELEV.	44.25	88.5		
5		- SILT (ML), orange, tan and red (2.5 YR 6/4), loose, dry					Annular Fill: Aquaguard Grout Mixture
10							
15							
20							
25		- silty CLAY (CL), orange, tan and red (2.5 YR 6/4)	725.1				
30		- same as above, (5 YR 8/2), chert nodules, dry					
35		- same as above, (7.5 YR 8/6), without chert nodules, dry	714.1				
40		- clayey SILT (ML), mottled light tan and black, chert nodules, dry	702.1				

SIMPLE GEO W/ WELL AND GAMMA - ESEE2012DATABASE.GDT - 1/6/17 11:12 - C:\USERS\MACKENZIE\FIOCAIDESTOPIPLANT_BOWEN_SOUTHERN COMPANY.GPJ



LOG OF TEST BORING

BORING GWA-4RZ
PAGE 2 OF 3
6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

SIMPLE GEO W/ WELL AND GAMMA - ESEE2012DATABASE.GDT - 1/6/17 11:12 - C:\USERS\MACKENZIE\FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma			HCL REACTION	WELL DATA
			ELEV.	44.25	88.5		
		(Cont.)					Completion: Protective casing set in concrete pad; 2-foot square concrete pad
45							
50		- same as above					
55							
60							
65		- same as above, dolomite gravel present					
70		- same as above, increasing gravel, saturated					
75							
80		- Top of competent dolomitic bedrock, gray, saturated	660.1				Annular Seal: 3/8" bentonite chips
85							
							Annular Fill: Aquaguard Grout Mixture
							665.0 (75.0)



LOG OF TEST BORING

BORING GWA-4RZ
PAGE 3 OF 3
6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

SIMPLE GEO W/ WELL AND GAMMA - ESEE2012DATABASE.GDT - 1/6/17 11:12 - C:\USERS\MACKENZIE\FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma			HCL REACTION	WELL DATA
			ELEV.	44.25	88.5		
90		(Cont.) - same as above, possible horizontal fractures					Completion: Protective casing set in concrete pad; 2-foot square concrete pad Annular Seal: 3/8" bentonite chips Annular Seal: 3/8" bentonite pellets (non-coated) Filter: silica filter sand Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
95							
100		- same as above					
105							640.0 (100.0)
110		- same as above, vertical fractures present					635.0 (105.0)
115							633.0 (107.0)
		623.0					
120		Bottom of borehole at 117.0 feet.					
125							
130							
135							

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: J. Lippert	DRILLING METHODS: HSA	GWC-5
DATE CONSTRUCTED: 4/18/2006 - 9:00 am		

		DEPTH FEET	ELEVATION FT,NAVD88	
Locking Hinged Top		TOP OF RISER	2.45	737.56
1/4-inch Weep Hole		GROUND SURFACE	0.00	735.11
4-ft x 4-ft concrete pad				
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum			
	BOTTOM OF PROTECTIVE CASING			
WATER LEVEL: 74 ft				
Well Development: Pump/surge until clear.				
	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 34 bags			
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded			
		TOP OF SEAL	98.90	636.21
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie			
		TOP OF FILTER PACK	101.00	634.11
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water			
		BOTTOM OF RISER / TOP OF SCREEN	101.11	634.00
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch			
		BOTTOM OF SCREEN	111.11	624.00
		BOTTOM OF CASING	111.29	623.82
	HOLE DIA: 8"			

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-5
	Sheet 1 of 4
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 114.2' SURF.ELEV. 735.11	
LOCATION Cells 1 & 2 COORDINATES N 1502341.56 E 2072677.44	
ANGLE 0 BEARING 0 CONTRACTOR SCS DRILL NO. CME 75	
DRILLING METHOD HSA/HQ Rock core with water NO. SAMPLES 22 NO. U.D. SAMPLES 0	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH 74 ELEV. 661.11 TIME AFTER COMP. 20 hrs DATE TAKEN 4/19/2007	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 4/12/2007	
DRILLER S. Denty RECORDER J. Lippert APPROVED _____ DRILLING COMP. DATE 4/18/2007	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	735.11								
1		Very stiff, dark reddish brown sandy CLAY, slightly moist	S-1	4.5-6	6-8-11	19			
2									
3									
4									
5	730.11								
6		Same as above	S-2	9.5-11	5-13-15	28		100	
7									
8									
9									
10	725.11								
11		Same as above with black and light brown mottled with reddish brown	S-3	14.5-16	4-8-12	20		100	
12									
13									
14									
15	720.11								
16		Same as above	S-4	19.5-21	4-11-15	26		100	
17									
18									
19									
20	715.11								
21									
22									
23									
24									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-5

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **114.2'** SURF.ELEV. **735.11**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	710.11	Same as above with chert pebbles in matrix, some chert lenses	S-5	24.5-26	3-7-22	29		100	
26									
27									
28									
29									
30	705.11	Hard, brown, red, light brown and black mottled sandy gravelly CLAY with iron stained dolomite fragments and chert pebbles, slightly moist	S-6	29.5-31	8-14-18	32		100	
31									
32									
33									
34									
35	700.11	Very stiff, brownish red CLAY, high plasticity, with trace dolomite pebbles, moist	S-7	34.5-36	7-7-11	18		100	
36									
37									
38									
39									
40	695.11	Very stiff, brown and reddish brown sandy CLAY with abundant chert pebbles, some grayish white silt lenses, moist	S-8	39.5-41	3-8-21	29		100	
41									
42									
43									
44									
45	690.11	Very stiff, brown silty CLAY with some sandy lenses, moist	S-9	44.5-46	8-9-10	19		100	
46									
47									
48									
49									
50	685.11	Same as above, brown and reddish brown, wet	S-10	49.5-51	3-7-5	12		100	
51									
52									
53									
54									
55	680.11	Chert lense	S-11	54.5-56	50/5	R		75	
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-5

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 114.2' SURF.ELEV. 735.11

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	675.11		S-12	59.5-61	5-4-3	7		0	
61									
62									
63									
64									
65	670.11	Hard, light brown and white clayey SILT, clay content in light brown matrix, very moist	S-13	64.5-66	12-13-22	35		100	
66									
67									
68									
69									
70	665.11	Same as above, white silt more abundant	S-14	69.5-71	16-25-17	42		100	
71									
72									
73									
74									
75	660.11	Hard, highly weathered and fractured DOLOMITE, wet	S-15	74.5-76	18-33-14	47		100	
76									
77									
78		77.6: Rock seam							
79									
80	655.11	Hard, brown interbedded coarse SAND and silty CLAY, wet	S-16	79.5-81	30-13-23	36		75	
81									
82									
83									
84									
85	650.11	Very stiff, brown sandy CLAY with chert fragments ranging from coarse sand to gravel, wet	S-17	84.5-86	19-13-12	25			
86									
87									
88									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-5

Sheet 4 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 114.2' SURF.ELEV. 735.11

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		Same as above, hard with highly weathered dolomitic sand	S-18	89.5-91	14-25-19	44		50	
90	645.11								
91									
92									
93									
94		Hard, highly weathered DOLOMITE, highly fractured, grain size ranging from coarse sand to large gravel, some clay seams, wet	S-19	94.5-96	21-13-21	34		25	
95	640.11								
96									
97									
98									
99			S-20	99.5-101	17-5-7	12		0	
100	635.11								
101									
102									
103									
104		Very stiff, light brown silty CLAY with white silt lenses, wet	S-21	104.5-106	10-7-10	17		90	
105	630.11								
106									
107									
108									
109		Hard, white silty SAND, dolomitic, very fine to medium grained, wet	S-22	109.5-111	10-14-16	30		75	
110	625.11								
111									
112									
113									
114		Top of rock							
115	620.11	Bottom of boring							
116									
117									
118									
119									
120	615.11								

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: K. Hobbs	DRILLING METHODS: HSA	GWC-6
DATE CONSTRUCTED: 5/1/2007 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.67
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE WATER LEVEL: Well Development: Pump/surge until clear.	GROUND SURFACE	0.00
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		725.97
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 40 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	TOP OF SEAL	88.80
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.75 bucket PLACEMENT: Tremie TOP OF FILTER PACK	TOP OF FILTER PACK	94.30
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 12 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	BOTTOM OF RISER / TOP OF SCREEN	97.62
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	BOTTOM OF SCREEN	107.62
	BOTTOM OF CASING	107.53
HOLE DIA: 8"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <div style="text-align: center; font-weight: bold; font-size: 1.2em;">DRILLING LOG</div> <div style="text-align: center; font-weight: bold;">GEOLOGICAL SERVICES</div>	Hole No. GWC-6
	Sheet 1 of 4
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 109.3 SURF.ELEV. 725.97	
LOCATION Cells 1 & 2 COORDINATES N 1502520.08 E 2072962.89	
ANGLE 0 BEARING 0 CONTRACTOR SCS DRILL NO. _____	
DRILLING METHOD HSA NO. SAMPLES 21 NO. U.D. SAMPLES _____	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 5/1/2007	
DRILLER S. Denty RECORDER K. Hobbs APPROVED _____ DRILLING COMP. DATE 5/1/2007	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	725.97								
1									
2									
3									
4									
5	720.97	Very stiff, red sandy SILT, crumbly, some quartz pebbles	S-1	4.5-6	5-8-12	20			
6									
7									
8									
9									
10	715.97	Very stiff, red silty gravelly CLAY, dry, crumbly, with dolomite fragments	S-2	9.5-11	4-6-15	21			
11									
12									
13									
14									
15	710.97	Stiff, red-brown to light brown sandy SILT, dry, crumbly, with clay seams & some weathered dolomite fragments	S-3	14.5-16	3-5-7	12			
16									
17									
18									
19									
20	705.97	Stiff, light brown SILT, moist, 1.5" thick white dolomite lense	S-4	19.5-21	5-7-6	13			
21									
22									
23									
24									



**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-6

Sheet 2 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 109.3 SURF.ELEV. 725.97

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	700.97	Very stiff, light brown SILT, slightly moist	S-5	24.5-26	3-10-8	18			
26									
27									
28									
29									
30	695.97	Very stiff, sandy SILT, moist, banded light brown, brown, and red brown	S-6	29.5-31.0	3-8-11	19			
31									
32									
33									
34									
35	690.97	Very stiff, light brown sandy SILT, moist, some white dolomite fragments	S-7	34.5-36	6-7-13	20			
36									
37									
38									
39									
40	685.97	Same as above, wet, some quartz fragments	S-8	39.5-41	7-8-10	18			
41									
42									
43									
44									
45	680.97	Hard, white SILT, wet, with layers of light brown weathered dolomite	S-9	44.5-46	4-9-38	47			
46									
47									
48									
49									
50	675.97	Hard, white gravelly SILT, wet, some bands of light brown, quartz fragments	S-10	49.5-51	19-39-19	58			
51									
52									
53									
54									
55	670.97	Stiff, light brown sandy gravelly SILT, wet, fragments of weathered dolomite, veins of mostly pure sand	S-11	54.5-56	6-6-8	14			
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-6

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 109.3 SURF.ELEV. 725.97

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	665.97	Stiff, light brown sandy SILT, wet, some dolomite fragments	S-12	59.5-61	8-7-8	15			
61									
62									
63									
64									
65	660.97	Stiff, light brown SILT, wet, with gravel	S-13	64.5-66	4-6-8	14			
66									
67									
68									
69									
70	655.97	Stiff, light brown gravelly SILT, one band of quartz	S-14	69.5-71	7-5-7	12			
71									
72									
73									
74									
75	650.97	Stiff, light brown SILT, wet, some banding and quartz fragments	S-15	74.5-76	6-10-10	20			
76									
77									
78									
79									
80	645.97	Stiff, light brown SILT, wet, with black/gray chert, banding, chert and quartz fragments	S-16	79.5-81	5-6-9	15			
81									
82									
83									
84									
85	640.97	Very stiff, light brown to reddish brown sandy SILT, wet, with chert fragments	S-17	84.5-86	8-3-24	27			
86									
87									
88									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-6

Sheet 4 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **109.3** SURF.ELEV. **725.97**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		Medium stiff, light brown clayey SILT, wet, red mottling, some chert fragments	S-18	89.5-91	2-3-3	6			
90	635.97								
91									
92									
93		Soft, light brown silty CLAY, saturated, with some sandy bands	S-19	94.5-96	2-2-2	4			
94									
95	630.97								
96									
97		Soft, light brown silty CLAY, saturated, with few rock fragments	S-20	99.5-101	0-1-2	3			
98									
99									
100	625.97								
101		Light brown clayey sandy SILT, with rock fragments chert, and dolomite	S-21	104.5-106	1-1-15	16			
102									
103									
104									
105	620.97	Top of rock Bottom of boring							
106									
107									
108									
109									
110	615.97								
111									
112									
113									
114									
115	610.97								
116									
117									
118									
119									
120	605.97								

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 7/2/15 09:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **728.66**
 Top of PVC Casing Elevation (feet, NAVD88): **731.91**



RECORD OF WELL CONSTRUCTION

WELL: GWC-6RZ
 PAGE 1 OF 3
 841443

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
 LOCATION Cartersville, GA

DATE STARTED 4/22/2015 COMPLETED 4/28/2015 SURF. ELEV. 728.66 COORDINATES: N:1502502.00 E:2072900.50
 CONTRACTOR Cascade Drilling EQUIPMENT 7868 METHOD Sonic; SPT
 DRILLED BY J. Sigler LOGGED BY B. Smelser CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 110 ft. GROUND WATER DEPTH: DURING 48.5 ft. COMP. 71.7 ft. DELAYED 73.9 ft. after 100 hrs.
 NOTES TOC Elevation 731.91, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core

BOREHOLE DATA	WELL DATA	COMMENTS
<p>ELEV. Strata</p>	<p>Surface: protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>Surface Seal: Concrete</p> <p>ELEV. (DEPTH)</p> <p>725.2 (3.5)</p> <p>720.7</p> <p>715.7</p> <p>701.7</p> <p>695.7</p> <p>690.7</p> <p>Well: 2" OD PVC (SCH 40) Annular Fill: Portland Cement-Bentonite Grout (24 - 47lbs bags PC, 2.5 - 50lbs bags Gel, 135 gal. Water)</p>	

(Continued Next Page)

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE.GDT - 7/2/15 09:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CEL



RECORD OF WELL CONSTRUCTION

WELL: GWC-6RZ
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">ELEV.</td> <td style="width: 50%;">Strata</td> </tr> </table>	ELEV.	Strata	<p style="text-align: center;">(CONTINUED)</p>	<p>Surface: protective aluminum cover with bollards; 4-foot square concrete pad</p>	<p style="text-align: right;">ELEV. (DEPTH)</p>														
ELEV.	Strata																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">685.7</td> <td style="width: 50%;">40</td> </tr> <tr> <td style="width: 50%;">680.7</td> <td style="width: 50%;">45</td> </tr> <tr> <td style="width: 50%;">675.7</td> <td style="width: 50%;">50</td> </tr> <tr> <td style="width: 50%;">670.7</td> <td style="width: 50%;">55</td> </tr> <tr> <td style="width: 50%;">665.7</td> <td style="width: 50%;">60</td> </tr> <tr> <td style="width: 50%;">661.2</td> <td style="width: 50%;">67.5</td> </tr> <tr> <td style="width: 50%;">650.7</td> <td style="width: 50%;">75</td> </tr> <tr> <td style="width: 50%;">645.7</td> <td style="width: 50%;">80</td> </tr> </table>	685.7	40	680.7	45	675.7	50	670.7	55	665.7	60	661.2	67.5	650.7	75	645.7	80	<p>Annular Fill: Portland Cement-Bentonite Grout (24 - 47lbs bags PC, 2.5 - 50lbs bags Gel, 135 gal. Water)</p>	<p>Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (93.1'-76.0')) and Baroid Hole Plug 3/8 Chips (4 - 50lbs bags (76.0'-67.5'))</p>	
685.7	40																		
680.7	45																		
675.7	50																		
670.7	55																		
665.7	60																		
661.2	67.5																		
650.7	75																		
645.7	80																		

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2012 WELL CONSTRUCTION RECORD - ESEE DATABASE.GDT - 7/2/15 09:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CEL



RECORD OF WELL CONSTRUCTION

WELL: GWC-6RZ
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

BOREHOLE DATA		WELL DATA		COMMENTS
ELEV.	Strata	DEPTH (ft)	(CONTINUED)	ELEV. (DEPTH)
640.7	[Diagonal Hatching]	85	Surface: protective aluminum cover with bollards; 4-foot square concrete pad	
635.2	[Vertical Lines]	90	Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (93.1'-76.0')) and Baroid Hole Plug 3/8 Chips (4 - 50lbs bags (76.0'-67.5'))	635.6 (93.1)
	[Horizontal Lines]	95	← Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)	633.7 (95.0)
	[Diagonal Hatching]	100	← Screen: 10 ft. 0.010" Slot Prepack	
	[Diagonal Hatching]	105	← Sump: 0.30 ft.	623.7 (105.0)
	[Diagonal Hatching]	110	← Backfill: Caving	623.4 (105.3) 621.7 (107.0)
618.7	[Diagonal Hatching]	110		

SIMPLE GEOLOGY LOG - ESEE DATABASE.GDT - 5/14/15 14:38 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **728.66**
 Top of PVC Casing Elevation (feet, NAVD88): **731.91**



LOG OF TEST BORING

BORING GWC-6RZ
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

DATE STARTED 4/22/2015 **COMPLETED** 4/28/2015 **SURF. ELEV.** 728.66 **COORDINATES:** N:34.128150 E:-84.905832

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____

BORING DEPTH 110 ft. **GROUND WATER DEPTH: DURING** 48.5 ft. **COMP.** 71.7 ft. **DELAYED** 73.9 ft. after 100 hrs.

NOTES TOC Elevation 732.91, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS
5		Elastic Silt (MH) - dark red (10R 3/6) fill dry, very stiff, low plastic, clayey, some white to light gray brittle/frangible dolomite fragments			SPT N=28bpf(@3ft.) 10/12/16
10		Lean Clay (CL) - trace mottling dark red (10R 3/6) and dark brown (7.5YR 3/4) residuum dry, very stiff, low to medium plastic, trace organics and rock fragments			SPT N=27bpf(@8ft.) 8/13/14
15		Elastic Silt (MH) - mottled red / moderate reddish brown (10R 4/6) and brownish yellow / dark yellowish orange (10YR 6/6) residuum dry, very stiff, clayey silt, abundant light gray to white, angular to subangular, medium to very coarse dolomite fragments, trace interbedded clay layers			SPT N=26bpf(@13ft.) 7/12/14
20		- mottled red / moderate reddish brown (10R 4/6), strong brown (7.5YR 4/6) and yellow (10YR 7/6) residuum moist, stiff, low plastic, clayey silt, decrease in rock fragments			SPT N=11bpf(@18ft.) 3/5/6
25		- mottled yellow (10YR 7/8) and red (2.5YR 4/6) residuum moist, very stiff, low plastic, clayey silt with interbedded zones of increased clay, abundant medium to coarse, angular light gray dolomite fragments, trace light gray clay streaks			SPT N=16bpf(@23ft.) 3/7/9
30		Lean Clay (CL) - mottled yellow (10YR 7/8) and red (2.5YR 4/6) residuum moist, stiff, low to medium plastic, trace angular to subangular, coarse to very coarse dolomite and chert fragments			SPT N=9bpf(@28ft.) 3/4/5
35		Elastic Silt (MH) - mottled yellowish red (5YR 5/8) and yellow (10YR 8/8) residuum moist, stiff, low plastic, interbedded zones of red CL and yellow ML			SPT N=10bpf(@33ft.) 3/5/5

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-6RZ
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

SIMPLE GEOLOGY LOG - ESEE DATABASE.GDT - 5/14/15 14:38 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION		COMMENTS
				Weak	Moderate Strong	
40		Lean Clay (CL) - mottled red (2.5YR 4/6) and reddish brown / moderate brown (5YR 4/4) residuum moist, stiff, low to medium plastic, trace angular, coarse to very coarse dolomite fragments				SPT N=13bpf(@38ft.) 3/6/7
45		Silty Clay (CL-ML) - trace mottling white / pinkish gray (5YR 8/1), red / moderate reddish brown (10R 4/6) and reddish yellow (7.5YR 7/8) residuum moist, very stiff, non to medium plastic, silt grading to silty clay, non plastic light gray silt, low to medium plastic red clay, trace light gray and angular to subangular, brittle/friable, medium to coarse dolomite fragments				SPT N=19bpf(@43ft.) 12/12/7
50		Sandy Lean Clay (CL) - yellow (10YR 7/8) residuum wet, medium stiff, low to medium plastic, interbedded zones of fine silty sand, cohesive, can roll 4-6mm, no visible rock fragments				SPT N=7bpf(@48ft.) 1/2/5
55		Elastic Silt (MH) - mottled very dark brown / dusky yellowish brown (10YR 2/2) and very light gray (N8) residuum wet, very stiff, low plastic, abundant light gray to light brown, medium to very coarse angular chert fragments				SPT N=28bpf(@53ft.) 28/14/14
60		Silty Clay (CL-ML) - mottled yellowish brown / moderate yellowish brown (10YR 5/4) and yellow (10YR 7/8) residuum wet, stiff, low to medium plastic, trace medium rock fragments				SPT N=9bpf(@58ft.) 2/3/6
65		Lean Clay (CL) - mottled reddish yellow (7.5YR 6/8), yellow / pale yellowish orange (10YR 8/6) and red (2.5YR 5/6) residuum wet, very stiff, low to medium plastic, silty, trace light gray to white, medium to coarse, angular to subangular dolomite fragments				SPT N=17bpf(@63ft.) 4/8/9
70		- mottled brownish yellow (10YR 6/8), white (10YR 8/1) and red (2.5YR 5/8) residuum wet, very stiff, low to medium plastic, trace subangular to subrounded, medium to coarse dolomite fragments and white to light gray chert fragments				SPT N=25bpf(@68ft.) 4/10/15
75		- mottled reddish yellow (7.5YR 6/6), reddish yellow (7.5YR 7/8) and red (2.5YR 5/8) residuum wet, medium stiff, low to medium plastic, trace coarse angular to subangular chert fragments and dolomite fragments				SPT N=8bpf(@73ft.) 1/4/4
80		Silt (ML) - mottled yellowish red (5YR 5/8) and yellow (10YR 7/8) residuum wet, very stiff, trace interbedded clay and rock fragments				SPT N=25bpf(@78ft.) 4/15/10
						SPT N=23bpf(@83ft.)

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SIMPLE GEOLOGY LOG - ESEE DATABASE.GDT - 5/14/15 14:38 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC



LOG OF TEST BORING

BORING GWC-6RZ
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION		COMMENTS
				Weak	Moderate Strong	
85		- trace mottling strong brown (7.5YR 5/6) and pale yellow (2.5Y 7/4) residuum wet, very stiff, low to medium plastic, some bluish gray to brown, angular to subangular, coarse to cobble sized chert fragments, trace light gray, angular, brittle/friable, coarse to very coarse dolomite fragments and interbedded zones of ML silt Lean Clay (CL) (Con't)				10/10/13
90		Silt (MH) - brownish yellow / dark yellowish orange (10YR 6/6) and yellow (10YR 7/6) residuum wet, very stiff, non to low plastic, cohesive, can roll 6mm but cannot support roll, trace light gray to bluish gray, angular, coarse chert and dolomite fragments				SPT N=28bpf(@88ft.) 10/12/16
95		Dolostone - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, hard, slightly to moderately weathered, massive, trace medium grains visible, limited 1-2" core pieces recovered, mostly fragments recovered, trace chert near top of section, some low to high angle fractures visible, partial healing with calcite fracture fill, visible calcite fill 1-2mm thick, trace orangish mud staining near top decreasing with depth - Dolostone: bluish gray (10B 5/1) and light gray (N7) very fine to fine grain, hard, massive, trace medium grains visible, moderate to high angled fractures, trace low angled fractures visible, trace orangish mud staining near bottom of recovered section, calcite fracture fill visible, no identifiable healing				NOTE: degree of fracture unknown due to sonic drilling method, no intact core pieces recovered making fracture orientation difficult to determine.
100						
105						driller noted a very weak zone (possible void or heavily fractured zone) @ approx. 107-110', no recovery, hole caved from 110-107', filter sand was placed on bottom above the caved zone from 105-107'.
110						
Bottom of borehole at 110.0 feet.						
115						
120						
125						

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 9/8/16 08:34 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\GWC-07\BOWEN LANDFILL REPLACEMENT

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **709.70**
 Top of PVC Casing Elevation (feet, NAVD88): **713.04**



LOG OF TEST BORING

BORING GWC-7 Z
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 GPC633179

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED 5/12/2016 COMPLETED 5/19/2016 SURF. ELEV. 709.70 COORDINATES: N:1502640.13 E:2073193.22

CONTRACTOR Cascade EQUIPMENT Tracked METHOD Rotosonic

DRILLED BY J. Asua LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 127.5 ft. GROUND WATER DEPTH DURING 75 ft. COMP. 55 ft. DELAYED 55 ft. after 24 hrs.

NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION	COMMENTS	Natural Gamma		
						Weak Moderate Strong	55	110
5		Sandy Silt (ML) - dark yellowish brown (10YR 4/6) dry - dark grayish brown / dark yellowish brown (10YR 4/2)						
10		- light brownish gray / pale yellowish brown (10YR 6/2) - mottled strong brown (7.5YR 4/6) and light gray (2.5Y 7/2) dry						
15								
20		- mottled strong brown (7.5YR 5/6) and red (2.5YR 4/6) dry to damp, increased sand content than above						
25		- damp						
30		Sandy Lean Clay (CL) - dark red (2.5YR 3/6) damp, with fine angular gravel - medium						
35								
40		- mottled red (2.5YR 4/6), pale brown (10YR 6/3) and white (2.5YR 8/1) hard						

(Continued Next Page)

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 9/8/16 08:34 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\GWC-07\BOWEN LANDFILL REPLACEMENT



LOG OF TEST BORING

BORING GWC-7 Z
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 GPC633179

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
45		<p>Sandy Lean Clay (CL)(Con't)</p> <p>- mottled pale yellow (5Y 8/2), pinkish gray / grayish orange pink (5YR 7/2) and yellowish red / light brown (5YR 5/6) damp, hard, with fine angular gravel</p>						
50		<p>- increased gravel content than above, weathered chert</p>						
55		<p>Well-graded Sandy Gravel (GW)</p> <p>- light gray (5YR 7/1) coarse chert gravel</p>						
55		<p>Sandy Fat Clay (CH)</p> <p>- mottled yellowish brown (10YR 5/6) and red (2.5YR 5/8) moist, high</p> <p>- pale yellow (2.5Y 8/3) moist, fine to coarse weathered chert gravel</p> <p>- mottled yellow (10YR 7/6), red (2.5YR 5/8) and reddish yellow (7.5YR 6/6)</p>						
60								
65		<p>- mottled brownish yellow / dark yellowish orange (10YR 6/6), white (10YR 8/1) and red (2.5YR 5/8) fine to coarse chert gravel (sub-rounded and angular)</p>						
70								
75		<p>▽ - light gray (10YR 7/1) angular chert gravel</p> <p>- red (2.5YR 5/8), brownish yellow (10YR 6/8) and white (10YR 8/1) wet, high, fine angular gravel, light gray chert cobbles</p>						
80								
85		<p>- increased sand content than above</p>						

(Continued Next Page)



RECORD OF WELL CONSTRUCTION

WELL: GWC-7 Z
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GPC633179

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells
LOCATION Plant Bowen

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 9/8/16 08:36 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\GWC-07\BOWEN LANDFILL REPLACEMENT WELLS

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata	(CONTINUED)	ELEV. (DEPTH)	
619.7	90	Surface: protective aluminum cover with bollards; 4-foot square concrete pad	
	95	Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (1 - 5gal bucket (101.0'-99.0') and Baroid Hole Plug 3/8 Chips (11.5 - 50lbs bags (99.0'-55.0')	
	100		
	105	Filter: Filter Media 20/40 Silica Sand (9 - 50 lbs bags, 116.0'-103.0') then 30/40 Silica Sand (0.5 bag, 103.0-101.0.0')	608.7 (101.0)
603.7	110	Screen: 10 ft. 0.010" Slot Prepack	606.0 (103.7)
	115	Sump: 0.30 ft.	596.0 (113.7)
	120		595.7 (114.0)
	125	Backfill: Baroid Hole Plug, 3/8" chips, 127.5'-116.0', (3-50lbs bags)	593.7 (116.0)
582.2			

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 7/2/15 09:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **698.68**
 Top of PVC Casing Elevation (feet, NAVD88): **702.09**

WELL: GWC-8Z
 PAGE 1 OF 2
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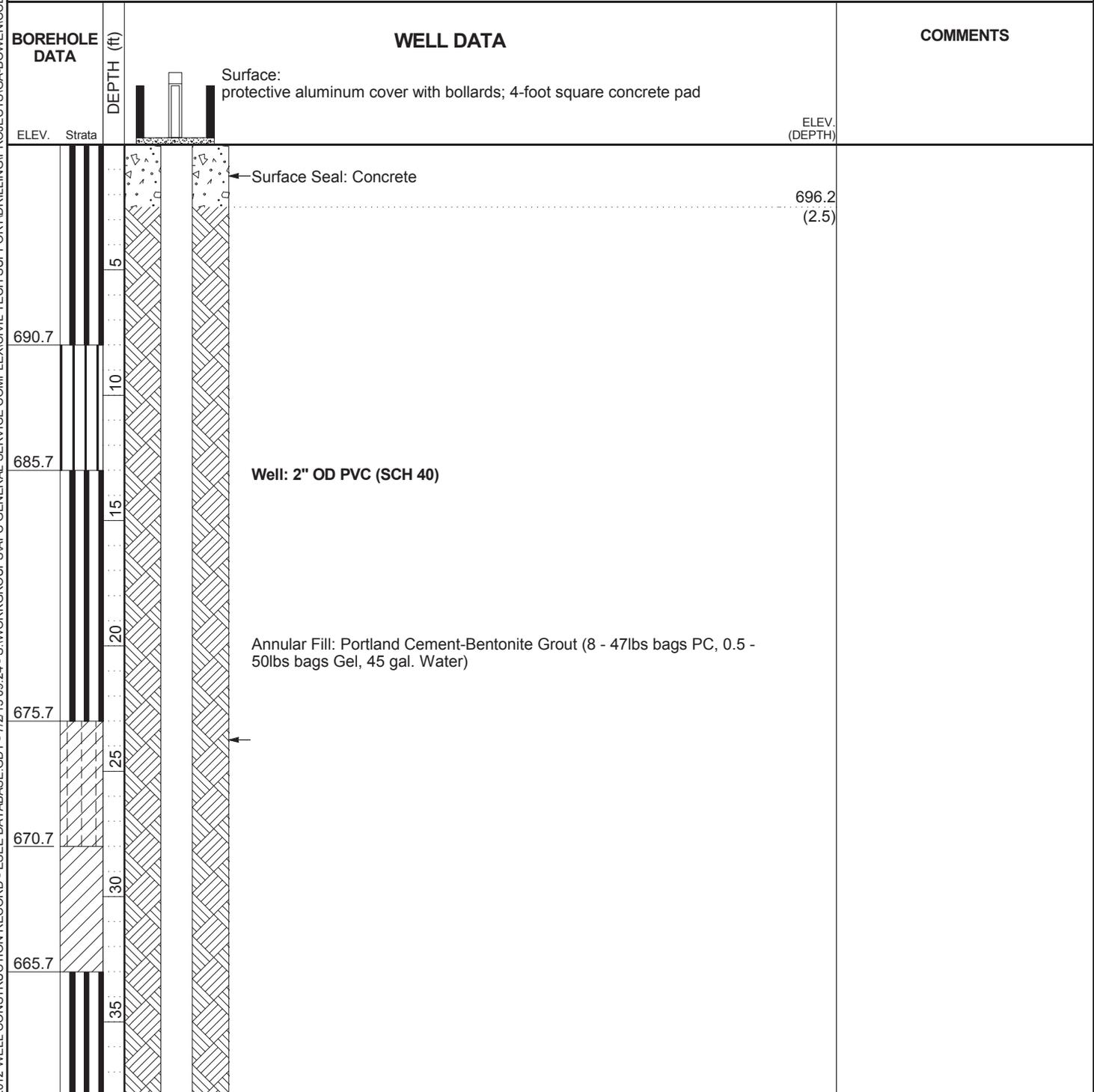


RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
 LOCATION Cartersville, GA

DATE STARTED 4/17/2015 COMPLETED 4/28/2015 SURF. ELEV. 698.68 COORDINATES: N:1502827.67 E:2073526.15
 CONTRACTOR Cascade Drilling EQUIPMENT 7868 METHOD Sonic; SPT
 DRILLED BY J. Sigler LOGGED BY B. Smelser CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 73.31 ft. GROUND WATER DEPTH: DURING 53 ft. COMP. 50.5 ft. DELAYED 44.12 ft. after 100 hrs.
 NOTES TOC Elevation 702.09, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Core



(Continued Next Page)

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE.GDT - 7/2/15 09:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CEL



RECORD OF WELL CONSTRUCTION

WELL: GWC-8Z
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

BOREHOLE DATA		WELL DATA	COMMENTS
ELEV.	Strata	DEPTH (ft)	ELEV. (DEPTH)
655.7		40	
		45	653.7 (45.0)
650.7		50	
		55	
640.7		60	637.7 (61.0)
635.7		65	635.7 (63.0)
625.7		70	625.7

Surface: protective aluminum cover with bollards; 4-foot square concrete pad

Annular Fill: Portland Cement-Bentonite Grout (8 - 47lbs bags PC, 0.5 - 50lbs bags Gel, 45 gal. Water)

Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (61.0'-48.0')) and Baroid Hole Plug 3/8 Chips (2 - 50lbs bags (48.0'-45.0'))

Filter: Filter Media 1A Silica Sand (6 - 50 lbs bags)

Screen: 10 ft. 0.010" Slot Prepack

Sump: 0.30 ft.

SIMPLE GEOLOGY LOG - ESEE DATABASE.GDT - 5/14/15 14:38 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **698.68**
 Top of PVC Casing Elevation (feet, NAVD88): **702.09**



LOG OF TEST BORING

BORING GWC-8Z
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

DATE STARTED 4/17/2015 **COMPLETED** 4/28/2015 **SURF. ELEV.** 698.68 **COORDINATES:** N:1502827.67 E:2073526.15

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____

BORING DEPTH 73.31 ft. **GROUND WATER DEPTH: DURING** 53 ft. **COMP.** 50.5 ft. **DELAYED** 44.12 ft. after 100 hrs.

NOTES TOC Elevation 702.09, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Core

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS
5		Elastic Silt (MH) - trace mottling reddish yellow (5YR 6/8) and strong brown (7.5YR 5/8) residuum dry, hard, clayey, trace medium sized subangular to subrounded rock fragments			SPT N=34bpf(@3ft.) 9/14/20
10		Silt (ML) - trace mottling strong brown (7.5YR 5/8) and light yellowish brown (10YR 6/4) residuum dry, very stiff, trace clay and medium to coarse, angular to subangular rock fragments			SPT N=25bpf(@8ft.) 4/10/15
15		Elastic Silt (MH) - mottled red (2.5YR 5/8), reddish yellow (7.5YR 6/8) and light gray (7.5YR 7/1) residuum dry, hard, clayey, trace medium to coarse, hard to brittle, angular to subangular rock fragments			SPT N=31bpf(@13ft.) 11/12/19
20		- mottled light red (2.5YR 6/8), reddish yellow (7.5YR 6/8) and light gray (10YR 7/1) residuum moist, very stiff, non to low plastic, clayey with interbedded layers of gray CL lean clay, trace subrounded coarse chert fragments			SPT N=19bpf(@18ft.) 5/9/10
25		Silty Clay (CL-ML) - mottled reddish yellow (7.5YR 6/6), light gray (7.5YR 7/1) and red (10R 4/8) residuum moist, very stiff, low plastic, interbedded layers of CL, medium to coarse hard to brittle angular to subangular dolomite fragments, trace very coarse angular chert fragments			SPT N=17bpf(@23ft.) 4/6/11
30		Lean Clay (CL) - mottled red (2.5YR 5/8), light red (2.5YR 6/6) and light reddish gray (2.5YR 7/1) residuum moist, very stiff, low to medium plastic, trace coarse to very coarse, rounded to subrounded white chert fragments			SPT N=28bpf(@28ft.) 9/14/14
35		Elastic Silt (MH) - mottled reddish yellow (7.5YR 6/8), red (2.5YR 5/8) and light reddish gray (2.5YR 7/1) residuum moist, hard, non to low plastic, clayey, coarse to very coarse, angular to rounded chert fragments			SPT N=35bpf(@33ft.) 15/16/19

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-8Z
PAGE 2 OF 2
841443

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
LOCATION Cartersville, GA

SIMPLE GEOLOGY LOG - ESEE DATABASE.GDT - 5/14/15 14:38 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION		COMMENTS
				Weak	Moderate Strong	
40		Elastic Silt (MH) (Cont) - mottled yellow / pale yellowish orange (10YR 8/6) and reddish yellow (7.5YR 6/6) residuum moist, very stiff, non to low plastic, coarse to very coarse, subangular to subrounded chert fragments				SPT N=16bpf(@38ft.) 6/7/9
45		Silt (ML) - yellow (10YR 7/8) residuum moist, very stiff, trace subrounded to subangular, coarse to very coarse dolomite and chert fragments				SPT N=17bpf(@43ft.) 4/7/10
50		Elastic Silt (MH) - reddish yellow (7.5YR 6/8) and light red (2.5YR 6/6) residuum moist, stiff, non to low plastic, medium to cobble sized, angular to subangular chert and dolomite fragments				SPT N=12bpf(@48ft.) 4/5/7
55		- reddish yellow (7.5YR 6/8) residuum wet, stiff, non to low plastic, abundant medium to coarse dolomite fragments				SPT N=11bpf(@53ft.) 4/6/5
60		Sandy Silt (ML) - reddish yellow (7.5YR 6/8) residuum wet, very soft, cannot roll, cohesive, trace clay				SPT N=0bpf(@58ft.) WOH
65		Elastic Silt (MH) - strong brown (7.5YR 5/8) residuum wet, very stiff, low plastic, clayey with interbedded CL, cohesive, trace coarse to very coarse, subangular to subrounded chert and dolomite fragments				SPT N=21bpf(@63ft.) 5/10/11
70		- strong brown (7.5YR 5/8) residuum wet, very soft, low plastic, clayey, cohesive, trace medium to coarse rock fragments				SPT N=0bpf(@68ft.) WOH
75		Bottom of borehole at 73.3 feet.				
80						

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	SCS	WELL NAME
LOCATION:	Cells 1 and 2	DRILLER:		
LOGGER:		RIG TYPE:		GWC-8RR
DATE CONSTRUCT	6/27/2011	DRILLING METHODS:		

		DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top	→		
	TOP OF RISER	2.96	701.92
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
2-ft x 2-ft concrete pad	→		
	GROUND SURFACE	0.00	698.96
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement Grout		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	91.0	607.96
	ANNULAR SEAL TYPE: Bentonite chips PLACEMENT: Tremie		
	TOP OF FILTER PACK	95.0	603.96
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	97.0	601.96
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted		
	BOTTOM OF SCREEN	107.00	591.96
Flush-threaded end cap	→		
	BOTTOM OF CASING	107.30	591.66
HOLE DIA: 6"			

 SOUTHERN COMPANY <i>Energy to Serve Your World</i>		DRILLING LOG				Hole No. GWC-8RR
		GEOLOGICAL SERVICES				Sheet 1 of 4
SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 107	SURF. ELEV. 698.96			
LOCATION Cells 1 & 2		COORDINATES N 1502857.71	E 2073501.74			
ANGLE 0	BEARING 0	CONTRACTOR SCS	DRILL NO. CME 75			
DRILLING METHOD Rotosonic		NO. SAMPLES Continuous	NO. U.D. SAMPLES 0			
CASING SIZE 8"	LENGTH _____	CORE SIZE _____	TOTAL % REC. _____			
WATER TABLE DEPTH 46.02		ELEV. 655.9	TIME AFTER COMP. 24 hour	DATE TAKEN _____		
TYPE GROUT _____		QUANTITY _____	MIX _____	DRILLING START DATE 6/27/2011		
DRILLER Boart	RECORDER C. Sellers	APPROVED _____	DRILLING COMP. DATE 6/27/2011			

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	701.92								
1		CLAY, Sandy; brownish red; fine grained sand							
2									
3									
4									
5	696.92								
6									
7									
8									
9									
10	691.92	CLAY, Silty; yellowish red; traces of chert gravel							
11									
12									
13									
14									
15	686.92								
16									
17									
18									
19									
20	681.92								
21									
22									
23									
24	677.92								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-8RR

Sheet 2 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 107 SURF.ELEV. 701.92

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
25	676.92	CLAY, Silty; yellowish red; traces chert gravel							
26									
27									
28									
29									
30	671.92	CLAY, Sandy; yellow; with chert							
31									
32									
33									
34									
35	666.92								
36									
37									
38									
39									
40	661.92	SAA							
41									
42									
43									
44									
45	656.92								
46									
47									
48		SAA							
49									
50	651.92								
51									
52									
53									
54									
55	646.92								
56	645.92								



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-8RR

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 107 SURF.ELEV. 701.92

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
57	644.92								
58									
59									
60	641.92	Silt; yellow; wet							
61									
62									
63									
64									
65	636.92	SILT; yellow; sandy with chert gravel							
66									
67									
68									
69		SAA with increasing gravel content							
70	631.92								
71									
72									
73									
74									
75	626.92								
76									
77									
78									
79									
80	621.92								
81									
82									
83									
84		Top of rock at 84'							
85	616.92	Dolostone; blue grey; iron stained fractures							
86									
87									
88	613.92								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-8RR

Sheet 4 of 4

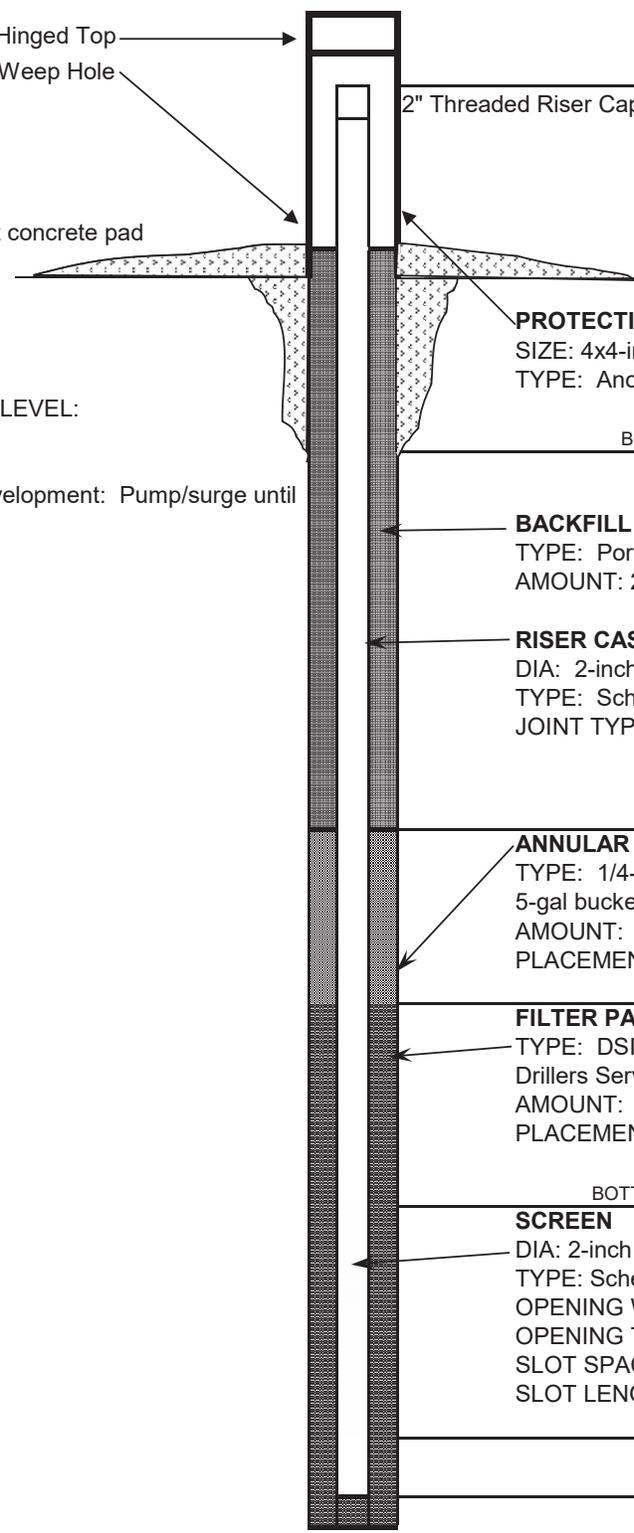
SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 107 SURF.ELEV. 701.92

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		SAA							
90	611.92								
91									
92									
93									
94									
95	606.92								
96									
97									
98									
99									
100	601.92								
101									
102									
103									
104									
105	596.92								
106									
107	594.92								
108		BOH @ 107'							
109									
110	591.92								
111									
112									
113									
114									
115	586.92								
116									
117									
118									
119									
120	581.92								

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: B. Filipovich	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: K. Hobbs	DRILLING METHODS: HSA	GWC-9
DATE CONSTRUCTED: 8/16/2006 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.68
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	GROUND SURFACE	0.00
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: Well Development: Pump/surge until clear.	BOTTOM OF PROTECTIVE CASING	
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 20.5 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	56.00
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie	TOP OF FILTER PACK	58.00
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 7 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water	BOTTOM OF RISER / TOP OF SCREEN	60.18
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	BOTTOM OF SCREEN	70.18
	BOTTOM OF CASING	70.47
HOLE DIA: 8.5"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <div style="text-align: center; font-weight: bold; font-size: 1.2em;">DRILLING LOG</div> <div style="text-align: center; font-weight: bold;">GEOLOGICAL SERVICES</div>	Hole No. GWC-9
	Sheet 1 of 3
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 70' SURF.ELEV. 691.99	
LOCATION Cells 1 & 2 COORDINATES N 1503018.96 E 2073781.05	
ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. CME-550	
DRILLING METHOD HSA NO. SAMPLES 14 NO. U.D. SAMPLES 0	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 8/16/2006	
DRILLER B. Filipovich RECORDER A. Grissom APPROVED _____ DRILLING COMP. DATE 8/16/2006	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	691.99								
1		Hard, dark reddish brown sandy CLAY, dry, with large chert fragments	S-1	3.5-5	10-14-18	32			
2									
3									
4									
5	686.99	Same as above	S-2	8.5-10	2-5-9	14			
6									
7									
8		Same as above	S-3	13.5-15	5-10-13	23			
9									
10	681.99								
11									
12		Stiff, yellowish orange silty CLAY, fairly dry, with few small rock fragments	S-4	18.5-20	4-4-5	9			
13									
14									
15	676.99								
16									
17									
18									
19									
20	671.99								
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-9

Sheet 2 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **70'** SURF.ELEV. **691.99**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	666.99	Same as above, with many large chert fragments	S-5	23.5-25	4-7-6	13			
26									
27									
28									
29		Same as above, with small amount of chert	S-6	28.5-30	2-3-4	7			
30	661.99								
31									
32		Same as above, with small amount of chert	S-7	33.5-35	4-3-5	8			
33									
34									
35	656.99								
36									
37		Soft, yellowish orange to light brown slightly sandy silty CLAY, moist, with trace of chert	S-8	38.5-40	WOH-2-2	4			
38									
39									
40	651.99								
41		Same as above	S-9	43.5-45	WOH-1-1	2			
42									
43									
44									
45	646.99								
46		Firm, light brown sandy CLAY, fairly dry, with a few chert fragments	S-10	48.5-50	1-2-3	5			
47									
48									
49									
50	641.99	Soft, yellowish orange slightly sandy CLAY, slightly moist, with trace of chert	S-11	53.5-55	1-2-2	4			
51									
52									
53									
54									
55	636.99								
55									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-9

Sheet 3 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 70' SURF.ELEV. 691.99

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57		Very soft, yellowish orange sandy CLAY, with trace of pebbles	S-12	58.5-60	WOR	0			
58									
59									
60	631.99								
61		Same as above, with many rock fragments	S-13	63.5-65	1-1-1	2			
62									
63									
64									
65	626.99	Same as above	S-14	68.5-70	50/2	R			
66									
67									
68									
69		Top of rock Bottom of boring							
70	621.99								
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: B. Filipovich	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: S. Bearce	DRILLING METHODS: HSA	GWC-10
DATE CONSTRUCTED: 9/6/2006 - 9:00 am		

		DEPTH FEET	ELEVATION FT,NAVD88
	Locking Hinged Top		
	1/4-inch Weep Hole		
	TOP OF RISER	2.98	687.87
	2" Threaded Riser Cap		
	GROUND SURFACE	0.00	684.89
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 19.5 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	54.00	630.89
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie			
TOP OF FILTER PACK	56.00	628.89	
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 4 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water			
BOTTOM OF RISER / TOP OF SCREEN	58.19	626.70	
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch			
BOTTOM OF SCREEN	68.19	616.70	
BOTTOM OF CASING	68.33	616.56	
HOLE DIA: 6-5/8"			

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 DRILLING LOG GEOLOGICAL SERVICES	Hole No. GWC-10
	Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility	HOLE DEPTH 65	SURF.ELEV. 684.89
LOCATION Cells 1 & 2	COORDINATES N 1503162.7	E 2074019.96
ANGLE 0	BEARING 0	CONTRACTOR SCS
DRILLING METHOD HSA	NO. SAMPLES 13	NO. U.D. SAMPLES 0
CASING SIZE 4.25" ID	LENGTH _____	CORE SIZE _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____
TYPE GROUT _____	QUANTITY _____	MIX _____
DRILLER B. Filipovich	RECORDER M. Hughes	APPROVED _____
		DRILLING START DATE 8/24/2006
		DRILLING COMP. DATE 8/24/2006

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	684.89								
1									
2									
3									
4		Red CLAY, with medium to large quartz pebbles	S-1	4-5.5	5-11-18	29			
5	679.89								
6									
7									
8									
9		Same as above	S-2	9-10.5	6-10-11	21			
10	674.89								
11									
12									
13									
14		Same as above	S-3	14-15.5	5-11-13	24			
15	669.89								
16									
17									
18									
19									
20	664.89	Same as above	S-4	19-20.5	5-15-11	26			
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10

Sheet 2 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 65 SURF.ELEV. 684.89

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	659.89	Orange and light tan CLAY with chert and rock fragments	S-5	24-25.5	5-6-6	12			
26									
27									
28									
29									
30	654.89	Same as above	S-6	29-30.5	7-5-5	10			
31									
32									
33									
34		Same as above	S-7	34-35.5	11-8-5	13			
35									
36									
37									
38									
39		Same as above	S-8	39-40.5	4-4-4	8			
40									
41									
42									
43									
44		Same as above	S-9	44-45.5	3-4-7	11			
45									
46									
47									
48									
49		Same as above	S-10	49-50.5	3-4-6	10			
50									
51									
52									
53									
54		Orange and reddish brown CLAY with rock fragments and trace sand	S-11	54-55.5	WOH-2-0	2			
55									
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10

Sheet 3 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 65 SURF.ELEV. 684.89

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
57									
58									
59									
60	624.89	Brown and orange CLAY with rock fragments, trace sand	S-12	59-60.5		1-2-11	13		
61									
62									
63									
64									
65	619.89	No recovery	S-13	64-35.5		WOH	0		
66		Bottom of boring							
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWC-10R
DATE CONSTRUCTED: 5/15/07 - 9:00 am		

	DEPTH FEET	ELEVATION FT,NAVD88	
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.62	687.95
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	GROUND SURFACE	0.00	685.33
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: Well Development: Pump/surge until clear.	BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 28 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	80.20	605.13
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie	TOP OF FILTER PACK	85.00	600.33
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 2 50 lbs/bag PLACEMENT: Tremie; wash with water	BOTTOM OF RISER / TOP OF SCREEN	85.50	599.83
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	BOTTOM OF SCREEN	95.50	589.83
	BOTTOM OF CASING	95.18	590.15
HOLE DIA: 8"			

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-10R
	Sheet 1 of 4

SITE	Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH	97.8	SURF.ELEV.	685.33	
LOCATION	Cells 1 & 2		COORDINATES N	1503154.01	E	2074020.44	
ANGLE	0	BEARING	0	CONTRACTOR	SCS	DRILL NO.	CME 75
DRILLING METHOD	HSA/HQ Core with water		NO. SAMPLES	14	NO. U.D. SAMPLES	0	
CASING SIZE	LENGTH	CORE SIZE	TOTAL % REC.				
WATER TABLE DEPTH	34'	ELEV.	651.33	TIME AFTER COMP.	12h	DATE TAKEN	5/15/2007
TYPE GROUT	QUANTITY	MIX	DRILLING START DATE	5/14/2007			
DRILLER	S. Denty	RECORDER	L. Millet	APPROVED	DRILLING COMP. DATE	5/14/2007	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	685.33								
1									
2									
3									
4									
5	680.33	Dark red silty CLAY, dry, hard, occasional carbonate	S-	4.5-6	6-8-12				
6									
7									
8									
9									
10	675.33	Same as above with carbonate pebbles	S-2	9.5-11	8-10-13	23			
11									
12									
13									
14									
15	670.33	Dark orange silty CLAY, dry, hard, carbonate sand and cobbles	S-3	14.5-16	10-13-42	55			
16									
17									
18									
19									
20	665.33	Same as above	S-4	19.5-21	9-7-8	15			
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10R

Sheet 2 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 97.8 SURF.ELEV. 685.33

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	660.33	Orange silty CLAY, dry, firm, carbonate sand and pebbles	S-5	24.5-26	6-9-12	21			
26									
27									
28									
29									
30	655.33	Same as above	S-6	29.5-31	12-18-4	22			
31									
32									
33									
34		Same as above	S-7	34.5-36	8-8-10	18			
35	650.33								
36									
37									
38									
39		Orange silty CLAY, dry, firm, occasional dark red mottling, occasional carbonate sand	S-8	39.5-40	2-3-5	8			
40	645.33								
41									
42									
43									
44		Orange silty CLAY, damp, firm, occasional black mottling, carbonate pebbles	S-9	44.5-46	5-5-8	13			
45	640.33								
46									
47									
48									
49		Orange and dark brown silty CLAY, damp, soft, occasional black mottling, carbonate sand and pebbles	S-10	49.5-51	2-2-3	5			
50	635.33								
51									
52									
53									
54		Same as above	S-11	54.5-56	4-5-6	11			
55	630.33								
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-10R

Sheet 3 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **97.8** SURF.ELEV. **685.33**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	625.33	Orange silty CLAY, moist, firm, light to heavy black mottling, carbonate sand and pebbles	S-12	59.5-61	4-6-7	13			
61									
62									
63									
64									
65	620.33	Orange and light gray CLAY, saturated, firm (gray) and soft (orange), occasional dark brown mottling,	S-13	64.5-66	10-20-12	32			
66									
67									
68									
69									
70	615.33	Light orange and medium brown silty CLAY, saturated, soft, carbonate pebbles and sand	S-14	69.5-71	2-10-6	16			
71									
72									
73	612.33	73.1 - Top of rock							
74									
75	610.33								
76									
77		Dark gray DOLOSTONE, shaley							
78			77.6-82.6				5.0/4.7		
79									
80	605.33	80.8- Fracture with iron staining							
81									
82									
83	602.33	Dark gray DOLOSTONE, shaley							
84			82.6-87.6				5.0/5.0		
85	600.33	85.2- Fracture with minimal clay rind							
86									
87									
88									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10R

Sheet 4 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 97.8 SURF.ELEV. 685.33

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89		88.6- Fracture over shale lense							
90	595.33	90.4-91.4 Open space with soil and clay rind							
91									
92				87.6-92.6			5.0/4.0		
93									
94									
95	590.33	Shaley DOLOMITE/DOLOSTONE							
96	589.33			92.6-97.6			5.0/5.0		
97									
98	587.33	Bottom of boring							
99									
100	585.33								
101									
102									
103									
104									
105	580.33								
106									
107									
108									
109									
110	575.33								
111									
112									
113									
114									
115	570.33								
116									
117									
118									
119									
120	565.33								

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Milam	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: Wayne Wang	DRILLING METHODS: HSA	GWC-11
DATE CONSTRUCTED: 6/1/2007 - 16:00		

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→		
1/4-inch Weep Hole	→		
	TOP OF RISER	2.79	677.83
	2" Threaded Riser Cap		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	675.04
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
WATER LEVEL:	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until clear.	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 17 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	28.00	647.04
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	31.00	644.04
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 4 bags PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	31.76	643.28
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	41.76	633.28
	BOTTOM OF CASING	41.71	633.33
HOLE DIA: 7.5"			

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-11
	Sheet 1 of 2
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 46' SURF.ELEV. 677.83	
LOCATION Cells 1 & 2	COORDINATES N 1503390.4 E 2073829.95
ANGLE 0 BEARING 0	CONTRACTOR SCS DRILL NO. CME-550
DRILLING METHOD HSA	NO. SAMPLES 9 NO. U.D. SAMPLES 0
CASING SIZE _____ LENGTH _____	CORE SIZE _____ TOTAL % REC. _____
WATER TABLE DEPTH _____ ELEV. _____	TIME AFTER COMP. _____ DATE TAKEN _____
TYPE GROUT _____ QUANTITY _____ MIX _____	DRILLING START DATE 6/1/2007
DRILLER S. Milam RECORDER J. Lippert APPROVED _____	DRILLING COMP. DATE 6/1/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	677.83								
1									
2									
3									
4									
5	672.83	Very stiff, light brown, gray, and reddish brown, silty CLAY with chert fragments, slightly moist	S-1	4.5-6.0	5-8-9	17			
6									
7									
8									
9									
10	667.83	Same as above.	S-2	9.5-11.0	4-10-15	25			
11									
12									
13									
14									
15	662.83	Very stiff, light reddish brown, sandy CLAY with chert gravel, slightly moist	S-3	14.5-16.0	7-12-12	24			
16									
17									
18									
19									
20	657.83	Stiff, light reddish brown, silty CLAY (CL) with chert gravel, moist	S-4	19.5-21.0	2-4-7	11			
21									
22									
23									
24									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-11

Sheet 2 of 2

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **46'** SURF.ELEV. **677.83**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	652.83	Same as above, light brown	S-5	24.5-26.0	3-4-5	9			
26									
27									
28									
29									
30	647.83	Same as above, firm, very moist	S-6	29.5-31.0	2-4-3	7			
31									
32									
33									
34									
35	642.83	Firm, light brown and gray, plastic CLAY, some dolomite pebbles, very moist	S-7	34.5-36.0	2-2-3	5			
36									
37									
38									
39									
40	637.83	Very soft, light brown, sandy CLAY, wet	S-8	39.5-41.0	WOR	0			
41									
42									
43									
44									
45	632.83	Same as above, very hard, with angular dolomite fragments	S-9	44.5-46.0	50/1-x-x	R			
46									
47									
48									
49									
50	627.83	Bottom of boring @ 46'							
51									
52									
53									
54									
55	622.83								
56									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: J. Lippert	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWC-11R
DATE CONSTRUCTED: 5/31/07 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	1.75
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	GROUND SURFACE	0.00
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 24.5 ft Well Development: Pump/surge until clear.	BOTTOM OF PROTECTIVE CASING	675.98
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	65.20
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie	TOP OF FILTER PACK	68.20
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water	BOTTOM OF RISER / TOP OF SCREEN	67.90
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	BOTTOM OF SCREEN	77.90
	BOTTOM OF CASING	78.85
HOLE DIA: 8"		

 DRILLING LOG GEOLOGICAL SERVICES	Hole No. GWC-11R
	Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility	HOLE DEPTH 83.1	SURF.ELEV. 677.73
LOCATION Cells 1 & 2	COORDINATES N 1503395.25	E 2073828.03
ANGLE 0 BEARING 0	CONTRACTOR SCS	DRILL NO. CME 75
DRILLING METHOD HSA/HQ rock core with water	NO. SAMPLES 8	NO. U.D. SAMPLES 0
CASING SIZE _____ LENGTH _____	CORE SIZE _____	TOTAL % REC. _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____
DATE TAKEN _____		
TYPE GROUT _____	QUANTITY _____	MIX _____
DRILLING START DATE 5/30/2007		
DRILLER S. Denty	RECORDER J. Lippert	APPROVED _____
DRILLING COMP. DATE 5/31/2007		

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	677.73								
1									
2									
3									
4		Very stiff light brown silty CLAY with chert fragments, slightly moist	S-1	4.5-6	7-12-14	26			
5	672.73								
6									
7									
8									
9									
10	667.73	Same as above, hard, light brown & red	S-2	9.5-11.0	8-12-26	36			
11									
12									
13									
14		Same as above, very stiff, light grey & brownish red, moist moist	S-3	14.5-16.0	8-12-15	27			
15	662.73								
16									
17									
18									
19		Same as above, light brown	S-4	19.5-21.0	8-8-8	16			
20	657.73								
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-11R

Sheet 2 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 83.1 SURF.ELEV. 677.73

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	652.73	Same as above, stiff, very moist	S-5	24.5-26.0	4-5-6	11			
26									
27									
28									
29		Same as above.	S-6	29.5-31.0	3-4-6	10			
30	647.73								
31									
32									
33		Same as above.	S-7	34.5-36.0	2-3-6	9			
34									
35	642.73								
36									
37		Dolomite gravel	S-8	39.5-41.0	36-50/1-X	R			
38									
39	638.73								
40	637.73								
41	636.73	DOLOMITE, very hard, fresh, some Fe staining 41.6-47.1: Mud filled cavity		40.1-48.1		8.0/2.2	28	28	
42	635.73								
43									
44									
45	632.73	DOLOMITE, highly weathered joints 48.1-51.4: Cavity		48.1-53.1		5.0/1.3	27	12	
46									
47									
48									
49		DOLOMITE, very hard, fresh, grey		53.1-58.1		5.0/5.0	100	100	
50	627.73								
51									
52									
53									
54									
55	622.73								
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-11R

Sheet 3 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 83.1 SURF.ELEV. 677.73

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57		56.5: Chemically weathered joint							
58									
59				58.1-63.1			5.0/4.0	98	98
60	617.73								
61									
62									
63									
64				63.1-68.1			5.0/5.0	100	100
65	612.73								
66									
67									
68									
69				68.1-73.1			5.0/2.1	42	33
70	607.73	69.4-72.4: Cavity							
71									
72									
73		DOLOMITE							
74		73.1-74.7: Cavity		73.1-78.1			5.0/1.1	22	7
75	602.73	Very highly weathered top of rock							
76		75.8: Chemically weathered joint							
77									
78									
79				78.1-83.1			5.0/4.8	95	92
80	597.73	79.5: Slightly weathered joint							
81									
82									
83									
84		83.1: Bottom of boring							
85	592.73								
86									
87									
88									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Milam	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: J. Lippert	DRILLING METHODS: HSA	GWC-12
DATE CONSTRUCTED: 6/4/2007 - 16:00		

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top	→		
1/4-inch Weep Hole	→		
	TOP OF RISER	2.59	677.25
	2" Threaded Riser Cap		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	674.66
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 29.8 @ 24 hr.			
Well Development: Pump/surge until clear.			
	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 20 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	37.00	637.66
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 2 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	39.50	635.16
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 12 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	38.10	636.56
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	48.10	626.56
	BOTTOM OF CASING	48.41	626.25
HOLE DIA: 7.5"			

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. <u>GWC-12</u>
	Sheet 1 of 2
SITE <u>Plant Bowen Dry Gypsum Storage Facility</u> HOLE DEPTH <u>51'</u> SURF.ELEV. <u>674.66</u>	
LOCATION <u>Cells 1 & 2</u> COORDINATES N <u>1503662.54</u> E <u>2073693.63</u>	
ANGLE <u>0</u> BEARING <u>0</u> CONTRACTOR <u>SCS</u> DRILL NO. <u>CME-550</u>	
DRILLING METHOD <u>HSA</u> NO. SAMPLES <u>10</u> NO. U.D. SAMPLES <u>0</u>	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE <u>6/4/2007</u>	
DRILLER <u>S. Milam</u> RECORDER <u>J. Lippert</u> APPROVED _____ DRILLING COMP. DATE <u>6/4/2007</u>	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	674.66								
1									
2									
3									
4									
5	669.66	Stiff, gray and light brown, silty CLAY, moist	S-1	4.5-6.0	3-6-6	12			
6									
7									
8									
9									
10	664.66	Same as above, firm	S-2	9.5-11.0	3-4-4	8			
11									
12									
13									
14									
15	659.66	Same as above, some sand	S-3	14.5-16.0	3-3-5	8			
16									
17									
18									
19									
20	654.66	Same as above, some rounded chert pebbles	S-4	19.5-21.0	1-2-2	4			
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-12

Sheet 2 of 2

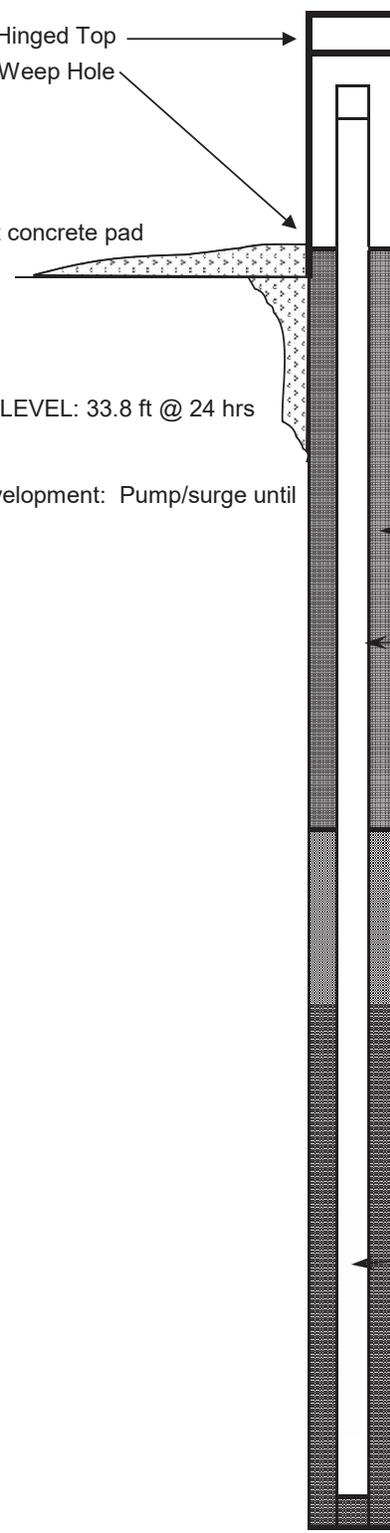
SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **51'** SURF.ELEV. **674.66**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	649.66	Same as above	S-5	24.5-26.0	2-3-4	7			
26									
27									
28									
29									
30	644.66	Same as above, soft, very moist	S-6	29.5-31.0	1-2-2	4			
31									
32									
33									
34									
35	639.66	Same as above	S-7	34.5-36.0	1-1-2	3			
36									
37									
38									
39									
40	634.66	Same as above, firm, some dark brown mottling and angular chert fragments	S-8	39.5-41.0	2-2-3	5			
41									
42									
43									
44									
45	629.66	Same as above, dark brown with abundant organics	S-9	44.5-46.0	2-2-4	6			
46									
47									
48									
49									
50	624.66	Very hard, light brown and gray, sandy SILT with abundant chert fragments, wet	S-10	49.5-51.0	2-50/2-X	R			
51									
52		51.0: Bottom of boring							
53									
54									
55	619.66								
56									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Milam	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: Wayne Wang	DRILLING METHODS: HSA	GWC-13
DATE CONSTRUCTED: 5/31/07 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.57
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	0.00	684.19
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 33.8 ft @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 30 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	63.60	620.59
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1/2 buckets PLACEMENT: Tremie TOP OF FILTER PACK	66.60	617.59
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 2 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	70.44	613.75
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	80.44	603.75
	BOTTOM OF CASING	80.43
HOLE DIA: 7.5"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <div style="text-align: center;"> DRILLING LOG GEOLOGICAL SERVICES </div>	Hole No. GWC-13
	Sheet 1 of 3
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 61' SURF.ELEV. 684.19	
LOCATION Cells 1 & 2 COORDINATES N 1503898.17 E 2073495.16	
ANGLE 0 BEARING 0 CONTRACTOR SCS DRILL NO. CME-550	
DRILLING METHOD HSA NO. SAMPLES 12 NO. U.D. SAMPLES 0	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 5/31/2007	
DRILLER S. Milam RECORDER J. Lippert APPROVED _____ DRILLING COMP. DATE 5/31/2007	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	684.19								
1									
2									
3									
4									
5	679.19	Very stiff, reddish brown, sandy silty CLAY, slightly moist	S-1	4.5-6.0	8-13-16	29			
6									
7									
8									
9									
10	674.19	Very stiff, reddish brown, sandy clayey SILT with rounded chert gravel, slightly moist	S-2	9.5-11.0	8-11-13	24			
11									
12									
13									
14									
15	669.19	Firm, light reddish brown, SILTY SAND, some clay, moist	S-3	14.5-16.0	4-9-9	18			
16									
17									
18									
19									
20	664.19	Chert gravel	S-4	19.5-21.0	8-13-16	29			
21									
22									
23									
24									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-13

Sheet 2 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 61' SURF.ELEV. 684.19

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	659.19	Very stiff, light grayish brown, sandy CLAY, moist	S-5	24.5-26.0	13-7-16	23			
26									
27									
28									
29									
30	654.19	Same as above, stiff, light reddish brown, some chert fragr very moist	S-6	29.5-31.0	WOH-4-6	10			
31									
32									
33									
34		Same as above	S-7	34.5-36.0	2-5-5	10			
35	649.19								
36									
37									
38									
39		Firm, light brown and light gray, sandy SILT, wet	S-8	39.5-41.0	3-4-4	8			
40	644.19								
41									
42									
43									
44		Same as above, stiff, some black sand interbeds	S-9	44.5-46.0	2-4-5	9			
45	639.19								
46									
47									
48									
49		Same as above, firm, some chert gravel	S-10	49.5-51.0	3-5-3	8			
50	634.19								
51									
52									
53									
54		Same as above	S-11	54.5-56.0	2-3-2	5			
55	629.19								
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. **GWC-13**

Sheet 3 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **61'** SURF.ELEV. **684.19**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD	
				From To	Blows	N				
57										
58										
59										
60	624.19	Same as above, very soft	S-12	59.5-61.0	WOR	0				
61		61.0: Bottom of boring								
62										
63										
64										
65	619.19									
66										
67										
68										
69										
70	614.19									
71										
72										
73										
74										
75	609.19									
76										
77										
78										
79										
80	604.19									
81										
82										
83										
84										
85	599.19									
86										
87										
88										

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: J. Lippert	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWC-13R
DATE CONSTRUCTED: 6/5/2007 - 16:00		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.80 685.97
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	GROUND SURFACE	0.0 683.17
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: Well Development: Pump/surge until clear.	BOTTOM OF PROTECTIVE CASING	
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 40 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	84.90 598.27
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie	TOP OF FILTER PACK	88.90 594.27
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 2 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water	BOTTOM OF RISER / TOP OF SCREEN	89.00 594.17
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	BOTTOM OF SCREEN	99.00 584.17
	BOTTOM OF CASING	99.10 584.07
HOLE DIA: 8"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-13R
	Sheet 1 of 4
SITE Plant Bowen Dry Gypsum Storage Facility HOLE DEPTH 102.1' SURF.ELEV. 683.93	
LOCATION Cells 1 & 2 COORDINATES N 1503908.53 E 2073501.95	
ANGLE 0 BEARING 0 CONTRACTOR SCS DRILL NO. CME-75	
DRILLING METHOD HSA/HQ rock core with water NO. SAMPLES 16 NO. U.D. SAMPLES 0	
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____	
WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____	
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE _____	
DRILLER S. Denty RECORDER J. Lippert APPROVED _____ DRILLING COMP. DATE 6/5/2007	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	683.93								
1									
2									
3									
4									
5	678.93	Very stiff, dark red, sandy CLAY, some rounded pebbles, very moist	S-1	4.5-6.0	8-12-14	26			
6									
7									
8									
9									
10	673.93	Same as above, brownish red and light brown, slightly moist	S-2	9.5-11.0	9-12-16	28			
11									
12									
13									
14									
15	668.93	Very firm, light brown, SILTY SAND with chert fragments, moist	S-3	14.5-16.0	9-10-11	21			
16									
17									
18									
19									
20	663.93	Same as above, dense, abundant chert fragments	S-4	19.5-21.0	10-20-19	39			
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-13R

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **102.1'** SURF.ELEV. **683.93**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	658.93	Same as above, very stiff, light brown and brownish red, very moist	S-5	24.5-26.0	19-17-10	27			
26									
27									
28									
29									
30	653.93	Stiff, light brown and grayish white, silty CLAY with rounded chert pebbles, very moist	S-6	29.5-31.0	8-6-5	11			
31									
32									
33									
34									
35	648.93	Stiff, light brown, sandy clayey SILT, wet	S-7	34.5-36.0	3-5-4	9			
36									
37									
38									
39									
40	643.93	Same as above, some rock fragments	S-8	39.5-41.0	12-5-6	11			
41									
42									
43									
44									
45	638.93	Same as above, firm	S-9	44.5-46.0	2-3-2	5			
46									
47									
48									
49									
50	633.93	Same as above, light grayish brown	S-10	49.5-51.0	3-3-5	8			
51									
52									
53									
54									
55	628.93	Same as above, very soft, light grayish brown and reddish brown	S-11	54.5-56.0	1-0-1	1			
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-13R

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 102.1' SURF.ELEV. 683.93

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	623.93	Same as above, soft	S-12	59.5-61.0	2-2-2	4			
61									
62									
63									
64									
65	618.93	Same as above	S-13	64.5-66.0	1-1-1	2			
66									
67									
68									
69									
70	613.93	No recovery	S-14	69.5-71.0	WOR	0			
71									
72									
73									
74									
75	608.93	No recovery	S-15	74.5-76.0	WOR	0			
76									
77									
78									
79									
80	603.93	No recovery	S-16	79.5-81.0	WOR	0			
81									
82									
83		82.1: Top of rock DOLOMITE, very hard, fresh, gray, excellent rock quality		82.1-87.1			5.0/4.8	97	97
84									
85	598.93								
86									
87							lost water 5.0/4.5		
88		87.0-87.8: Cavity		87.1-92.1				90	90



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-13R

Sheet 4 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 102.1' SURF.ELEV. 683.93

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		Dolomite							
90	593.93								
91									
92									
93		Same as above		92.1	97.1		5.0/5.0	100	100
94									
95	588.93								
96									
97									
98		Same as above		97.1	102.1		5.0/5.0	100	100
99									
100	583.93								
101									
102									
103		102.1: Bottom of boring							
104									
105	578.93								
106									
107									
108									
109									
110	573.93								
111									
112									
113									
114									
115	568.93								
116									
117									
118									
119									
120	563.93								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **681.71**
 Top of PVC Casing Elevation (feet, NAVD88): **684.60**



LOG OF TEST BORING

BORING GWC-13RZ
 PAGE 1 OF 3
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

DATE STARTED 10/31/2016 COMPLETED 11/2/2016 SURF. ELEV. 681.71' NAVD88 COORDINATES: N:1503926.70 E:2073517.44

CONTRACTOR Cascade EQUIPMENT PS T-150 METHOD _____

DRILLED BY Tommy and Rodger LOGGED BY D. Morris * CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 102 ft bgs GROUND WATER DEPTH: DURING _____ COMP. 50 ft bgs DELAYED 51 ft.; 2 days

NOTES Near GWC-13R, *Sample Logged by geologist employed by Amec Foster Wheeler

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	ELEV. (DEPTH)
5		- sandy SILT (ML), reddish brown (3 YR 4/6), dry					Annular Fill: Aquadguard Grout Mixture
10							
15		- same as above, (5 YR 5/6)					
20							
25		- same as above, (5 YR 5/6)					
26			656.7				
27		- CLAY (CH), brown (10 YR 6/8), high plasticity, moist					Annular Seal: 3/8" bentonite chips
30							
35							
40							

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ



LOG OF TEST BORING

BORING GWC-13RZ
 PAGE 2 OF 3
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						(CONTINUED)	ELEV. (DEPTH)
45		(Cont.) - same as above, (10 YR 6/8), chert nodules					Annular Seal: 3/8" bentonite chips
50		- same as above, (10 YR 6/8), increasing chert and gravel, moist			▼ ▼		
55							
60							
65							
70		- same as above, hard drilling					
75							
80		- competent DOLOMITE, gray	601.7				
85							Annular Seal: 3/8" bentonite pellets (non-coated)
							597.7 (84.0)

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-13RZ
PAGE 3 OF 3
6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA		
						(CONTINUED)	ELEV. (DEPTH)	
90		(Cont.) - same as above					Completion: Protective casing set in concrete pad; 2-foot square concrete pad	592.7 (89.0)
95							Filter: silica filter sand	589.7 (92.0)
100		- same as above	579.7				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack	
Bottom of borehole at 102.0 feet.								
105								
110								
115								
120								
125								
130								
135								

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: Ranger	WELL NAME
Storage Facility	DRILLER: Ranger	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: Wayne Wang	DRILLING METHODS: HSA	GWC-14
DATE CONSTRUCTED: 8/22/2007 - 16:00		

	DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.77 686.81
4-ft x 4-ft concrete pad GROUND SURFACE	GROUND SURFACE	0.00 684.04
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 50 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	63.00 621.04
ANNULAR SEAL TYPE: bentonite chips 5-gal bags AMOUNT: 1 bag PLACEMENT: Tremie TOP OF FILTER PACK	TOP OF FILTER PACK	65.00 619.04
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	BOTTOM OF RISER / TOP OF SCREEN	67.74 616.30
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	BOTTOM OF SCREEN	77.74 606.30
	BOTTOM OF CASING	78.01 606.03
HOLE DIA: 8"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 DRILLING LOG GEOLOGICAL SERVICES	Hole No. GWC-14
	Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility	HOLE DEPTH 80.5	SURF.ELEV. 684.04
LOCATION Cells 1 & 2	COORDINATES N 1504059.92	E 2073205.96
ANGLE 0	BEARING 0	CONTRACTOR Ranger
DRILLING METHOD HSA	NO. SAMPLES 16	NO. U.D. SAMPLES 0
CASING SIZE _____	LENGTH _____	CORE SIZE _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____
TYPE GROUT _____	QUANTITY _____	MIX _____
DRILLER Ranger	RECORDER K. Hobbs	APPROVED _____
		DRILLING START DATE 8/22/2007
		DRILLING COMP. DATE 8/22/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	684.04								
1									
2									
3									
4									
5	679.04	Light brown sandy SILT, dry with some pebbles	S-1	4-5.5	4-4-9	13			
6									
7									
8									
9									
10	674.04	White, tan, light brown SILT, dry, with rock flakes and pockets of sand	S-2	9-10.5	5-9-14	23			
11									
12									
13									
14									
15	669.04	Dark brown sandy SILT, dry, with dolomite fragments	S-3	14-15.5	6-14-19	33			
16									
17									
18									
19									
20	664.04	White to light brown SILT, moist, with few quartz fragments	S-4	19-20.5	2-4-7	11			
21									
22									
23									
24									

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-14

Sheet 2 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH	80.5		SURF.ELEV.	683.56		
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD	
				From To	Blows	N				
25	658.56	White to light brown SILT, wet	S-5	24-25.5	2-2-3	5				
26	657.56									
27	656.56									
28	655.56									
29	654.56									
30	653.56	Light brown sandy SILT, moist, with rock fragments	S-6	29-30.5	4-3-5	8				
31	652.56									
32	651.56									
33	650.56									
34	649.56									
35	648.56	Light brown gravelly sandy SILT, wet, with quartz and dolomite fragments	S-7	34-35.5	2-6-8	14				
36	647.56									
37	646.56									
38	645.56									
39	644.56									
40	643.56	Same as above	S-8	39-40.5	1-5-11	16				
41	642.56									
42	641.56									
43	640.56									
44	639.56									
45	638.56	Same as above	S-9	45.5	5-7	12				
46	637.56									
47	636.56									
48	635.56									
49	634.56									
50	633.56	Light brown SILT, wet, with rock fragments	S-10	49-50.5	4-5-9	14				
51	632.56									
52	631.56									
53	630.56									
54	629.56									
55	628.56	Same as above	S-11	54-55.5	6-7-11	18				
56	627.56									

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-14

Sheet 3 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **80.5** SURF.ELEV. **683.56**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	626.56	Light brown SILT, with some weathered rock fragments	S-12	59-60.5	4-5-7	12			
58	625.56								
59	624.56								
60	623.56								
61	622.56								
62	621.56	Same as above	S-13	64-65.5	4-2-2	4			
63	620.56								
64	619.56								
65	618.56								
66	617.56								
67	616.56	Light brown silty CLAY, wet, very soft	S-14	69-70.5	1-2-4	6			
68	615.56								
69	614.56								
70	613.56								
71	612.56								
72	611.56	Mottled light/dark brown/gray SILT, wet, with few rock fragments	S-15	74-75.5	6-7-7	14			
73	610.56								
74	609.56								
75	608.56								
76	607.56								
77	606.56	Same as above	S-16	79-80.5	5-7-9	16			
78	605.56								
79	604.56								
80	603.56								
81	602.56								80.5: Bottom of boring
82	601.56								
83	600.56								
84	599.56								
85	598.56								
86	597.56								
87	596.56								
88	595.56								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **684.34**
 Top of PVC Casing Elevation (feet, NAVD188): **687.28**



LOG OF TEST BORING

BORING GWC-14Z
 PAGE 1 OF 2
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

DATE STARTED 11/2/2016 COMPLETED 11/3/2016 SURF. ELEV. 684.34' NAVD88 COORDINATES: N:1504060.77 E:2073193.66

CONTRACTOR Cascade EQUIPMENT PS T-150 METHOD _____

DRILLED BY Tommy and Rodger LOGGED BY D. Morris * CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 73 ft bgs GROUND WATER DEPTH: DURING _____ COMP. 57 ft bgs DELAYED 34 ft.; 1 days

NOTES Near GWC-14, *Sample Logged by geologist employed by Amec Foster Wheeler

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	ELEV. (DEPTH)
5		- SILT (ML), brown (7.5 YR 4/4), dry					Annular Fill: Aquaguard Grout Mixture
10		- CLAY (CL), red, brown and white (7.5 YR 5/3 - 8/1), tight, low plasticity, dry	677.3				
15		- CLAY (CL) with chert lenses, gray (7.5 YR 8/6), tight, medium stiff, low plasticity, dry	674.3				
20		- SILT (ML), light gray (7.5 YR 5/0), medium stiff, moist	667.3				
25		- SILT (ML), beige (7.5 YR 8/6), medium stiff, moist	663.3				
30							Annular Seal: 3/8" bentonite chips
35							
40		- SILT (ML), brown (7.5 YR 5/8), medium stiff, white nodules, moist	647.3				656.8 (27.5)

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE\FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **684.34**
 Top of PVC Casing Elevation (feet, NAVD188): **687.28**



LOG OF TEST BORING

BORING GWC-14Z
 PAGE 2 OF 2
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

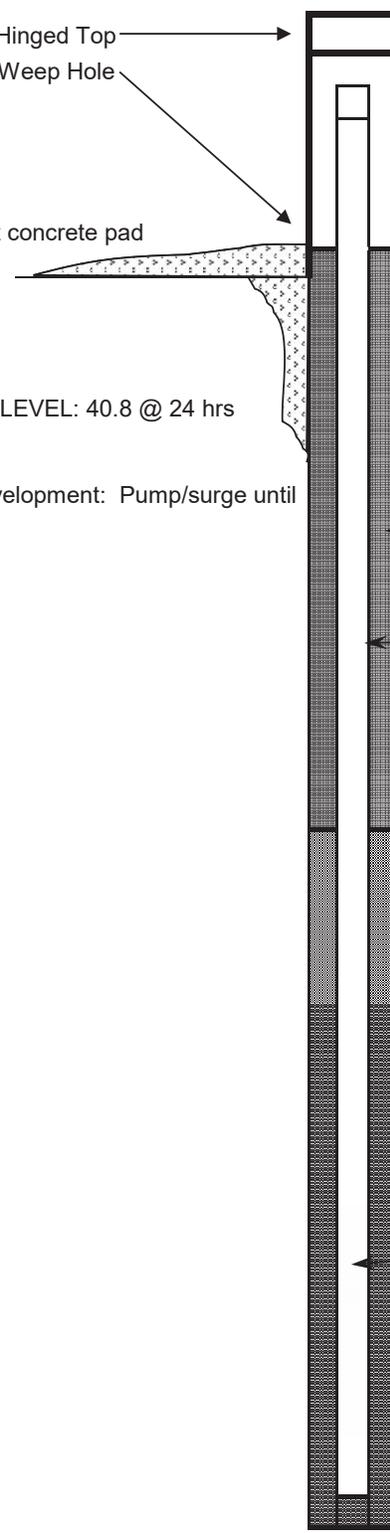
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						(CONTINUED)	ELEV. (DEPTH)
		(Cont.)					Completion: Protective casing set in concrete pad; 2-foot square concrete pad
45		- CLAY (CL), brown (7.5 YR 5/8), moderate plasticity, moist	639.3				Annular Seal: 3/8" bentonite chips
50							
55		- same as above, black and white layering, wet			▼		628.3 (56.0) Annular Seal: 3/8" bentonite pellets (non-coated)
60		- same as above, wet					623.3 (61.0) Filter: silica filter sand
65							621.3 (63.0) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
70		- same as above, wet	614.3				
		- Top of Rock @ 73.0 feet	611.3				
75		Bottom of borehole at 73.0 feet.					
80							
85							

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE\FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Milam	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: Wayne Wang	DRILLING METHODS: HSA	GWC-15
DATE CONSTRUCTED: 6/1/07 - 16:00		

	DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	2.44
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE	0.00	692.75
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
WATER LEVEL: 40.8 @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 20 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	53.60	639.15
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1.75 buckets PLACEMENT: Tremie TOP OF FILTER PACK	56.60	636.15
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 7 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	57.01	635.74
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	67.01	625.74
	BOTTOM OF CASING	67.11
HOLE DIA: 7.5"		

Log Updated with revised survey certified March 23, 2021. Coordinates are NAD83. Elevations are in feet NAVD88.

 <p>SOUTHERN COMPANY <i>Energy to Serve Your World™</i></p>	DRILLING LOG		Hole No. GWC-15
	GEOLOGICAL SERVICES		Sheet 1 of 3
SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 70	SURF.ELEV. 692.75
LOCATION Cells 1 & 2	COORDINATES N 1503943.59	E 2072927.52	
ANGLE 0	BEARING 0	CONTRACTOR SCS	DRILL NO. CME 550
DRILLING METHOD HSA	NO. SAMPLES 13	NO. U.D. SAMPLES 0	
CASING SIZE _____	LENGTH _____	CORE SIZE _____	TOTAL % REC. _____
WATER TABLE DEPTH _____	ELEV. _____	TIME AFTER COMP. _____	DATE TAKEN _____
TYPE GROUT _____	QUANTITY _____	MIX _____	DRILLING START DATE 5/30/2007
DRILLER S. Milam	RECORDER J. Lippert	APPROVED _____	DRILLING COMP. DATE 5/30/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	692.75								
1									
2									
3									
4									
5	687.75	Firm, reddish brown, silty sandy CLAY, moist	S-1	4.5-6.0	4-3-3	6			
6									
7									
8									
9									
10	682.75	Same as above, very stiff, reddish brown and light brown	S-2	9.5-11.0	3-10-8	18			
11									
12									
13									
14									
15	677.75	Stiff, reddish brown and light yellowish gray banded, clayey SILT, moist	S-3	14.5-16.0	4-6-8	14			
16									
17									
18									
19									
20	672.75	Same as above, firm, predominantly yellowish gray	S-4	19.5-21.0	4-4-4	8			
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15

Sheet 2 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **70** SURF.ELEV. **692.75**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	667.75	Firm, reddish brown and yellowish brown, silty CLAY, moist	S-5	24.5-26.0	3-3-4	7			
26									
27									
28									
29									
30	662.75	Firm, yellowish brown, clayey SILT, very moist	S-6	29.5-31.0	2-3-5	8			
31									
32									
33									
34									
35	657.75	Same as above, soft	S-7	34.5-36.0	2-2-2	4			
36									
37									
38									
39									
40	652.75	Same as above, very stiff, with chert gravel, wet	S-8	39.5-41.0	4-8-8	16			
41									
42									
43									
44									
45	647.75	Same as above, very hard	S-9	44.5-46.0	4-5-50/2	>100			
46									
47									
48									
49									
50	642.75	No recovery	S-10	49.5-51.0	3-3-2	5			
51									
52									
53									
54									
55	637.75	Firm, brown, sandy SILT, wet	S-11	54.5-56.0	8-5-3	8			
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15

Sheet 3 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 70 SURF.ELEV. 692.75

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57									
58									
59									
60	632.75	Same as above, light brown and brown	S-12	59.5-61.0	1-3-2	5			
61									
62									
63									
64									
65	627.75	Same as above	S-13	64.5-66.0	0-0-2	2			
66									
67									
68									
69									
70	622.75								
71		70.0: Bottom of boring							
72									
73									
74									
75	617.75								
76									
77									
78									
79									
80	612.75								
81									
82									
83									
84									
85	607.75								
86									
87									
88									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: K. Hobbs	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWC-15R
DATE CONSTRUCTED: 5/24/2007 - 9:00 am		

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top	→		
1/4-inch Weep Hole	↘		
	TOP OF RISER	2.74	696.13
	2" Threaded Riser Cap		
4-ft x 4-ft concrete pad	↘		
	GROUND SURFACE	0.00	693.39
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
WATER LEVEL:	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until clear.	BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	79.20	614.19
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	81.20	612.19
	FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1.5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	82.14	611.25
	SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	92.14	601.25
	BOTTOM OF CASING	92.36	601.03
HOLE DIA: 8"			

 <p style="text-align: center;">DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-15R
	Sheet 1 of 4

SITE	Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH	95.5	SURF. ELEV.	693.39
LOCATION	Cells 1 & 2	COORDINATES N	1503936.17	E	2072919.39	
ANGLE	0	BEARING	0	CONTRACTOR	SCS	DRILL NO. CME 75
DRILLING METHOD	HSA/HQ rock core with water	NO. SAMPLES	14	NO. U.D. SAMPLES		
CASING SIZE		LENGTH		CORE SIZE		TOTAL % REC.
WATER TABLE DEPTH		ELEV.		TIME AFTER COMP.		DATE TAKEN
TYPE GROUT		QUANTITY		MIX		DRILLING START DATE 5/23/2007
DRILLER	S. Denty	RECORDER	K. Hobbs	APPROVED		DRILLING COMP. DATE 5/24/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	693.39								
1									
2									
3		Light brown sandy SILT, slightly moist quartz sands	S-1	3.5-5	2-3-4	7		40	
4									
5	688.39								
6									
7									
8		Same as above w/ mottling	S-2	8.5-11.0	4-7-14	21		100	
9									
10	683.39								
11									
12									
13									
14		Mottled light brown clayey SILT w/ layers of light tan silty clay, slightly moist. Few sand grains.	S-3	14.5-16.0	3-6-8	14		100	
15	678.39								
16									
17									
18									
19		Mottled light brown clayey SILT w/ tan & red brown	S-4	19.5-21.0	3-5-7	12			
20	673.39								
21									
22									
23									
24									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15R

Sheet 2 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 95.5 SURF.ELEV. 693.39

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	668.39	Mottled light brown, tan, white, red brown clayey SILT, slightly moist. Some small 1cm weathered fragments	S-5	24.5-26.0	2-3-6	9		100	
26									
27									
28									
29									
29		SAA	S-6	29.5-31.0	15-5-5	10		100	
30	663.39								
31									
32									
33									
34		Medium stiff light brown sandy gravelly SILT. Approxiate 50% rock fragments, up to 2 mm diameter. Very moist	S-7	34.5-36.0	1-2-4	6		100	
35	658.39								
36									
37									
38									
39		Soft light brown SILT w/ some small pebbles, wet	S-8	39.5-41.0	2-1-3	4		100	
40	653.39								
41									
42									
43									
44		Soft light brown SILT, very homogenous, wet	S-9	44.5-46	1-1-2	3		100	
45	648.39								
46									
47									
48									
49		Soft, wet light brown SILT w/ small pebbles, saturated	S-10	49.5-51	1-2-2	4		100	
50	643.39								
51									
52									
53									
54		Very soft, saturated, light brown SILT, few pebbles	S-11	54.5-56	WOR	0			
55	638.39								
56									



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-15R

Sheet 3 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **95.5** SURF.ELEV. **693.39**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57		Very soft light brown SILT w/thin bands of tan/white sand, saturated	S-12	59.5-61	W.O.R	0			
58									
59									
60	633.39								
61		Very soft, saturated light brown SILT w/ some sand layers less than 2 cm thick, few rock fragments	S-13	64.5-66	1-1-1	2		100	
62									
63									
64									
65	628.39								
66		Very stiff light brown SILT, saturated w/ a 2" layer of weathered dolomite. Some red & black banding in the silt.	S-14	69.5-71	6-12-5	17		100	
67									
68									
69									
70	623.39								
71		71.1: Top of rock, start coring							
72		Chert rich DOLOMITE w/ stylolites		74.5-77.9			3.4/3.4	100	
73									
74									
75	618.39								
76		Grey DOLOMITE w/thin shale interbeds		77.9-82.9			5.0/5.0	100	
77									
78									
79									
80	613.39	Grey DOLOMITE w/ some calcite filled fractures		82.9-88.5			6.0/6.0	100	
81									
82									
83									
84									
85	608.39								
86									
87									
88									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15R

Sheet 4 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 95.5 SURF.ELEV. 693.39

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD							
				From To	Blows	N										
89		Grey DOLOSTONE w/ very small calcite filled fractures		88.5-95.5			7.0/7.0	100								
90	603.39															
91																
92																
93																
94																
95	598.39															
96			95.5: Bottom of boring													
97																
98																
99																
100	593.39															
101																
102																
103																
104																
105	588.39															
106																
107																
108																
109																
110	583.39															
111																
112																
113																
114																
115	578.39															
116																
117																
118																
119																
120	573.39															

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **693.28**
 Top of PVC Casing Elevation (feet, NAVD188): **695.92**



LOG OF TEST BORING

BORING GWC-15Z
 PAGE 1 OF 2
 6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

DATE STARTED 10/28/2016 **COMPLETED** 10/31/2016 **SURF. ELEV.** 693.28' NAVD88 **COORDINATES:** N:1503952.26 E:2072918.71

CONTRACTOR Cascade **EQUIPMENT** PS T-150 **METHOD**

DRILLED BY Tommy and Rodger **LOGGED BY** D. Morris* **CHECKED BY** **ANGLE** **BEARING**

BORING DEPTH 72 ft bgs **GROUND WATER DEPTH: DURING** **COMP.** 45 ft bgs **DELAYED** 42 ft.;4 days

NOTES Near GWA-15, *Sample Logged by geologist employed by Amec Foster Wheeler

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	ELEV. (DEPTH)
5		- SILT (ML), red orange (5 YR 5/8), dry	688.3			Annular Fill: Aquaguard Grout Mixture	
		- clayey SILT (ML), dark red (5 YR 4/6), dry	686.3				
10		- SILT (ML), interbedded red, black and orange (5 YR 8/8), dry					
15							
20		- same as above, (7.5 YR 5/8), with chert lenses from 23-27', dry					
25							
30		- CLAY (CL) with chert nodules, tan and white (10 YR 7/6), moderate plasticity, moist	665.3				
35						Annular Seal: 3/8" bentonite chips	660.3 (33.0)
40			653.3				

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-15Z
PAGE 2 OF 2
6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN_SOUTHERN COMPANY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						(CONTINUED)	ELEV. (DEPTH)
45		- sandy CLAY (CH), tan, white and black (10 YR 7/6), high plasticity			▼		Annular Seal: 3/8" bentonite chips
		- clayey SAND (SC), tan, white and black (10 YR 7/6), moist	648.3		▼		
		- CLAY (CH), tan (10 YR 7/6), high plasticity, saturated	646.3				
50							
55		- same as above, saturated					Annular Seal: 3/8" bentonite pellets (non-coated)
							639.3 (54.0)
60							Filter: silica filter sand
			633.3				634.3 (59.0)
65		- same as above, saturated					Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
			628.3				631.3 (62.0)
70		- same as above, saturated					
		- Top of rock @ 72.0 feet					
		Bottom of borehole at 72.0 feet.	621.3				
75							
80							
85							

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **728.74**
 Top of PVC Casing Elevation (feet, NAVD88): **731.21**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: D. Willis	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock core with water	GWA-50
DATE CONSTRUCTED: 6/4/2008 - 8:00 am		

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 1/4-inch Weep Hole Padlock 2" Threaded Riser Cap TOP OF RISER	2.47	731.21
4-ft x 4-ft x 4" concrete pad Pea Gravel in annular space GROUND SURFACE	0.00	728.74
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until clear. All drill equipment steam-cleaned between borings BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 20 bags @ 1.3 cf/bag = 26 cf PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	78.00	650.74
ANNULAR SEAL TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK	81.50	647.24
FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Drillers Services, Inc. AMOUNT: 1.75 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water PRE-PACK FILTER SAND: DSI - 1A BOTTOM OF RISER / TOP OF SCREEN	84.03	644.71
SCREEN DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	94.03	634.71
BOTTOM OF CASING	94.33	634.41

HOLE DIA: 10.5"

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **728.74**
 Top of PVC Casing Elevation (feet, NAVD88): **731.21**

	DRILLING LOG		Hole No. GWA-50
	GEOLOGICAL SERVICES		Sheet 1 of 4
SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 93.5	SURF.ELEV. 728.74
LOCATION Cells 1 & 2	COORDINATES N 1502154.80	E 2072442.13	
ANGLE 0 BEARING 0	CONTRACTOR SCS	DRILL NO. CME 550	
DRILLING METHOD HSA/HQ rock core with water	NO. SAMPLES 15	NO. U.D. SAMPLES 0	
CASING SIZE _____ LENGTH _____	CORE SIZE _____	TOTAL % REC. _____	
WATER TABLE DEPTH 62.5	ELEV. 666.24	TIME AFTER COMP. 15 hours	DATE TAKEN 6/4/2008
TYPE GROUT _____	QUANTITY _____	MIX _____	DRILLING START DATE 5/28/2008
DRILLER D. Willis	RECORDER L. Millet	APPROVED _____	DRILLING COMP. DATE 6/2/2008

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	728.74								
1									
2									
3									
4									
5	723.74	Dark red CLAY, dry, stiff, with light gray mottling	S-1	4.5-6	4-7-10	17			
6									
7									
8									
9									
10	718.74	Dark red CLAY, dry, stiff, occassional pockets of light orange silt, occassional coarse sand grains	S-2	9.5-11	5-10-14	24			
11									
12									
13									
14									
15	713.74	Dark red CLAY, dry, stiff, with orange and white pebbles	S-3	14.5-16	6-8-8	16			
16									
17									
18									
19									
20	708.74	Orange and dark red silty CLAY, dry, stiff, occassional pebbles	S-4	19.5-21	7-8-11	19			
21									
22									
23									
24	704.74								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50

Sheet 2 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 93.5 SURF.ELEV. 728.74

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	703.74	Light tan and white silty CLAY, dry, stiff, with occasional pebbles	S-5	24.5-26	6-8-9	17			
26									
27									
28									
29									
30	698.74	Dark red and white silty CLAY, dry, crumbly, occasional tan mottling	S-6	29.5-31	6-12-13	25			
31									
32									
33									
34									
35	693.74	Light tan and orange silty CLAY, moist, with occasional pebbles	S-7	34.5-36	7-7-11	18			
36									
37									
38									
39									
40	688.74	Same as above	S-8	39.5-41	4-4-4	8			
41									
42									
43									
44									
45	683.74	Tan and light brown clayey SILT, moist, some white mottling, occasional coarse sand grains	S-9	44.5-46	5-10-10	20			
46									
47									
48									
49									
50	678.74	Orange and brown clayey SILT, moist, firm, occasional dark brown mottling, degraded white cobbles	S-10	49.5-51	3-4-5	9			
51									
52									
53									
54									
55	673.74	Orange SILT, moist, softer, degraded and intact gravel and cobbles	S-11	54.5-56	6-9-10	19			
56	672.74								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50

Sheet 3 of 4

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 93.5 SURF.ELEV. 728.74

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	671.74								
58									
59									
60	668.74	Same as above, with chert	S-12	59.5-61	3-4-5	9			
61									
62									
63									
64									
65	663.74	Same as above	S-13	64.5-66	5-8-12	20			
66									
67									
68									
69									
70	658.74	Orange clayey SILT, saturated, soft, with dark red, white, and dark brown mottling, carbonate and chert cobbles and gravel	S-14	69.5-71	9-12-12	24			
71									
72									
73									
74									
75	653.74	Chert cobble in bottom of spoon	S-15	74.5-76	50/1	R			
76									
77									
78		Auger refusal - 78.2							
79									
80	648.74	Tan and orange chert and carbonate, with fractures, fractures filled with sand and clay, iron staining, rock is fossiliferous and pitted		78.5-88.5			1.7/10.0		
81									
82									
83									
84									
85	643.74								
86									
87									
88	640.74								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **727.87**
 Top of PVC Casing Elevation (feet, NAVD88): **730.37**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: D. Willis	
LOCATION: Cells 1&2	RIG TYPE: CME 550	
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock core with water	GWA-50R
DATE CONSTRUCTED: 6/10/2008 - 9:00 am		

	DEPTH FEET	ELEVATION FT,NAVD88
	<p>TOP OF RISER 2.50</p> <p>GROUND SURFACE 0.00</p> <p>BOTTOM OF PROTECTIVE CASING</p> <p>TOP OF SEAL 118.00</p> <p>TOP OF FILTER PACK 120.00</p> <p>BOTTOM OF RISER / TOP OF SCREEN 128.18</p> <p>BOTTOM OF SCREEN 138.18</p> <p>BOTTOM OF CASING 138.48</p>	<p>730.37</p> <p>727.87</p> <p>609.87</p> <p>607.87</p> <p>599.69</p> <p>589.69</p> <p>589.39</p>
<p>Well Development: Pump/surge until clear.</p> <p>All drill equipment steam-cleaned between borings</p>		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **727.87**
 Top of PVC Casing Elevation (feet, NAVD88): **730.37**



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-50R**
 Sheet 1 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **142.9** SURF.ELEV. **727.87**
 LOCATION **Cells 1 & 2** COORDINATES N **1502150.85** E **2072448.35**
 ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME 550**
 DRILLING METHOD **HSA/HQ rock core with water** NO. SAMPLES **18** NO. U.D. SAMPLES **0**
 CASING SIZE **7.5" OD** LENGTH _____ CORE SIZE _____ TOTAL % REC. _____
 WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____
 TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE **6/4/2008**
 DRILLER **D. Willis** RECORDER **L. Millet** APPROVED _____ DRILLING COMP. DATE **6/5/2008**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	727.87								
1									
2									
3									
4		Red silty CLAY, dry, hard, with gravel, occasional tan mottling	S-1	4.5-6	10-14-22	36			
5	722.87								
6									
7									
8									
9									
10	717.87	Dark red silty CLAY, dry, hard, with gravel, orange and tan mottling	S-2	9.5-11	8-14-20	34			
11									
12									
13									
14									
15	712.87	Dark red clayey SILT, dry, hard, with gravel carbonate pebbles	S-3	14.5-16	8-13-16	29			
16									
17									
18									
19									
20	707.87	Dark red silty CLAY, dry, hard, with gravel and brown mottling	S-4	19.5-21	7-12-16	28			
21									
22									
23									
24	703.87								



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-50R

Sheet 2 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 142.9 SURF.ELEV. 727.87

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	702.87	Orange and white silty CLAY, moist, hard, with sand and gravel	S-5	24.5-26	10-8-10	18			
26									
27									
28									
29									
30	697.87	Pink and white silty CLAY, moist, firm, with degraded carbonate pebbles	S-6	29.5-31	15-16-13	29			
31									
32									
33									
34									
35	692.87	Pink and tan clayey SILT, dry, with trace sand, degraded carbonate cobbles	S-7	34.5-36	6-21-21	42			
36									
37									
38									
39									
40	687.87	Orange and white silty CLAY, dry, firm, with pebbles and gravel	S-8	39.5-41	6-25-14	39			
41									
42									
43									
44									
45	682.87	Tan and white silty CLAY, moist, plastic, some dark orange mottling	S-9	44.5-46	5-5-3	8			
46									
47									
48									
49									
50	677.87	Same as above	S-10	49.5-51	4-5-11	16			
51									
52									
53									
54									
55	672.87	Tan and orange silty CLAY, moist, plastic, occassional white mottling, cobbles	S-11	54.5-56	7-8-3	11			
56	671.87								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50R

Sheet 3 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 142.9 SURF.ELEV. 727.87

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	670.87								
58									
59									
60	667.87	Light orange and tan silty CLAY, moist, plastic, occasional white mottling, gravel	S-12	59.5-61	6-9-7	16			
61									
62									
63									
64									
65	662.87	Tan and orange clayey SILT, moist, plastic, with chert sand and pebbles	S-13	64.5-66	3-7-9	16			
66									
67									
68									
69									
70	657.87	Orange clayey SILT, moist, firm, occasional black mottling	S-14	69.5-71	3-5-8	13			
71									
72									
73									
74									
75	652.87	Orange clayey SILT, moist, firm, with chert and carbonate pebbles, saturated last 3"	S-15	74.5-76	4-7-16	23			
76									
77									
78									
79									
80	647.87	White and light tan clayey SILT, moist, firm, orange and brown mottling	S-16	79.5-81	4-6-7	13			
81									
82									
83									
84									
85	642.87	Light tan silty CLAY, moist, firm, with chert and carbonate gravel	S-17	84.5-86	7-7-24	31			
86									
87									
88	639.87								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-50R

Sheet 4 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 142.9 SURF.ELEV. 727.87

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	638.87	Tan clayey SILT, moist, firm, with chert gravel	S-18	89.5-91	4-4-10	14			
90	637.87								
91									
92		Auger refusal - 92.0							
93		No recovery		92-97			0.0/5.0		
94									
95	632.87								
96		White fossiliferous carbonate gravel and cobbles, gray chert with pink veining and non-directional fractures		97-107			0.2/10.0		
97									
98									
99									
100	627.87	Tan carbonate as above		107-117			1.5/10.0		
101									
102									
103									
104		Same as above		117-127			1.3/10.0		
105	622.87								
106									
107									
108									
109									
110	617.87								
111									
112									
113									
114									
115	612.87								
116									
117									
118									
119									
120	607.87								



DRILLING LOG GEOLOGICAL SERVICES

Hole No. **GWC-50R**
Sheet 5 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **142.9** SURF.ELEV. **727.87**

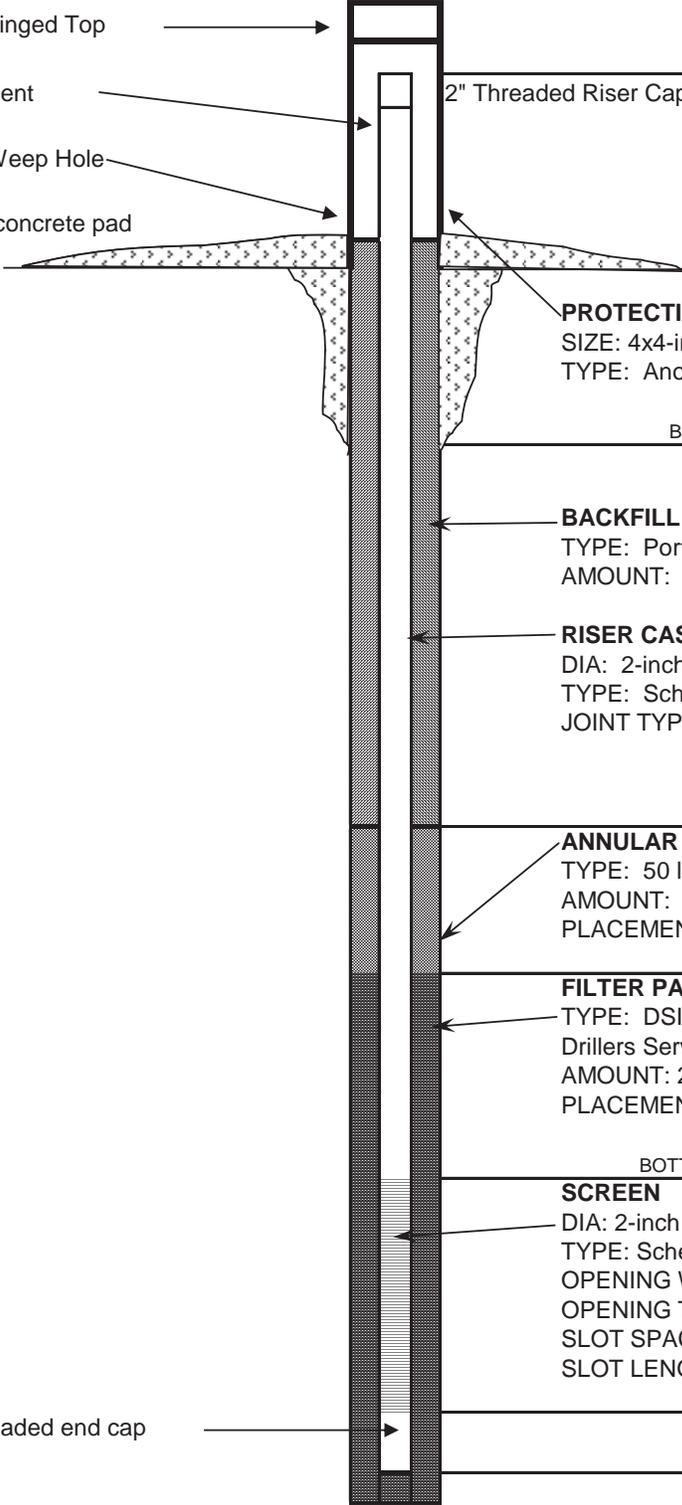
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121	606.87								
122									
123									
124									
125	602.87								
126									
127		Same as above		127-137			1.4/10.0		
128									
129									
130	597.87								
131									
132									
133									
134									
135	592.87								
136									
137		Same as above		137-142.9			1.5/6.7		
138									
140	587.87								
141									
142									
143	682.87								
144		142.9 - Bottom of boring							
145									
146									
147									
148									
149									
150									
151									
152									
153									

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **727.77**
 Top of PVC Casing Elevation (feet, NAVD88): **730.59**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	SCS Civil Field Services	WELL NAME
		DRILLER:	Milam	
LOCATION:	Cells 3 and 4	RIG TYPE:	CME 550	GWC-16R
LOGGER:	D. Brooks	DRILLING METHODS:	Hollow stem/ HQ rock core	
DATE CONSTRUCTED:	12/13/2011			

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top		TOP OF RISER	2.82 730.59
1/4-inch Vent	2" Threaded Riser Cap		
1/4-inch Weep Hole			
4-ft x 4-ft concrete pad	GROUND SURFACE	0.00	727.77
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 135 gallons		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	70.00	657.77
	ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2.5 bags PLACEMENT: Tremie, Wash with water		
	TOP OF FILTER PACK	82.90	644.87
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 2 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	84.70	643.07
	SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	94.70	633.07
Flush-threaded end cap			
	BOTTOM OF CASING	95.00	632.77
HOLE DIA: 6.25"/4.25"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **727.77**
 Top of PVC Casing Elevation (feet, NAVD88): **730.59**

	DRILLING LOG				Hole No. GWC-16R
	GEOLOGICAL SERVICES				Sheet 1 of 4
SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 95'	SURF.ELEV. 727.77		
LOCATION Cells 3 and 4		COORDINATES N 1505877.86	E 2072607.38		
ANGLE 90	BEARING NA	CONTRACTOR SCS CFS	DRILL NO. NA		
DRILLING METHOD Hollow Stem/ HQ Rock Core		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA		
CASING SIZE 6.25"	LENGTH 57'	CORE SIZE 4.25"	TOTAL % REC. NA		
WATER TABLE DEPTH 72'	ELEV. 656'	TIME AFTER COMP. 1 hour	DATE TAKEN 12/13/2011		
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 12/9/2011		
DRILLER S. Milam	RECORDER D. Brooks	APPROVED D. Brooks	DRILLING COMP. DATE 12/13/2011		

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	727.77	SAND, Silty; brown; dry; very fine to fine grained							
1									
2									
3									
4									
5	722.77	SAND, Clayey; red; dry; fine grained with chert fragments							
6									
7									
8									
9		SAA with pieces of limestone							
10	717.77								
11									
12									
13									
14		CLAY, Sandy; orange; damp; contains fine grained sand and chert fragments							
15	712.77								
16									
17									
18									
19		CLAY, Silty, Sandy; damp; red; fine grained with chert fragments							
20	707.77								
21									
22		SAND, Silty; damp; reddish yellow; very fine to fine grained							
23									
24		CLAY, Sandy; reddish yellow; damp; very fine to fine grained							



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-16R

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 95' SURF.ELEV. 727.77

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89									
90	637.77								
91		Dolomite; blue grey; hard; slightly weathered; multiple horizontal fractures show iron staining and some solutioning along fracture faces							
92									
93									
94									
95	632.77								
96		BOH @ 95' bgs							
97									
98									
99									
100	627.77								
101									
102									
103									
104									
105	622.77								
106									
107									
108									
109									
110	617.77								
111									
112									
113									
114									
115	612.77								
116									
117									
118									
119									
120	607.77								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **730.02**
 Top of PVC Casing Elevation (feet, NAVD188): **733.37**

	DRILLING LOG		Hole No. GWC-17R
	GEOLOGICAL SERVICES		Sheet 1 of 4
SITE Plant Bowen CCB Disposal Facility			HOLE DEPTH 89.5' bgs SURF.ELEV. 730.02
LOCATION Cells 3 and 4		COORDINATES N 1506069.29	E 2072829.29
ANGLE 90	BEARING NA	CONTRACTOR SCS CFS	DRILL NO. NA
DRILLING METHOD Hollow Stem/ HQ Rock Core		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA
CASING SIZE 6.25"	LENGTH 30.7'	CORE SIZE 4.25"	TOTAL % REC. NA
WATER TABLE DEPTH 70'	ELEV. 660'	TIME AFTER COMP. 1 hour	DATE TAKEN 12/8/2011
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 11/21/2011
DRILLER S. Milam	RECORDER S. Bearce	APPROVED D. Brooks	DRILLING COMP. DATE 12/8/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	730.02	SAND, Silty; brown; dry; very fine to fine grained with white chert fragments							
1									
2									
3									
4									
5	725.02	CLAY, sandy; yellowish brown; dry; fine grained sand sand with chert fragments							
6									
7									
8									
9									
10	720.02								
11									
12									
13									
14									
15	715.02								
16									
17									
18									
19									
20	710.02	CLAY; yellowish brown; moist; soft; slightly plastic							
21									
22									
23									
24	706.02								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-17R

Sheet 3 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 89.5' SURF.ELEV. 730.02

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	673.02								
58		DOLOMITE; blue grey; hard; fresh							
59									
60	670.02								
61									
62									
63									
64									
65	665.02								
66									
67									
68									
69									
70	660.02	SAA							
71									
72									
73									
74									
75	655.02								
76									
77									
78		DOLOMITE; blue grey; hard; fresh; some horizontal fractures with iron staining; some solutioning along faces							
79									
80	650.02								
81									
82									
83									
84									
85	645.02								
86									
87									
88	642.02								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-17R

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 89.5 SURF.ELEV. 730.02

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		DOLOMITE; blue grey; hard; fresh; some horizontal fractures with iron staining; some solutioning along faces BOH @ 89.5' bgs							
90	640.02								
91									
92									
93									
94									
95	635.02								
96									
97									
98									
99									
100	630.02								
101									
102									
103									
104									
105	625.02								
106									
107									
108									
109									
110	620.02								
111									
112									
113									
114									
115	615.02								
116									
117									
118									
119									
120	610.02								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **718.92**
 Top of PVC Casing Elevation (feet, NAVD88): **721.88**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWC-18
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/6/2011			

	DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top		
TOP OF RISER	2.96	721.88
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	718.92
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement/ Grout Slurry AMOUNT: 135 gallons		
RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
TOP OF SEAL	60.40	658.52
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2 bags PLACEMENT: Wash with water		
TOP OF FILTER PACK	64.90	654.02
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 6 bags; 50 lbs/bag PLACEMENT: Wash with water		
BOTTOM OF RISER / TOP OF SCREEN	67.70	651.22
SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
BOTTOM OF SCREEN	76.70	642.22
Flush-threaded end cap		
BOTTOM OF CASING	77.00	641.92
HOLE DIA: 6"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **718.92**
 Top of PVC Casing Elevation (feet, NAVD88): **721.88**

SOUTHERN COMPANY <i>Energy to Serve Your World™</i>	DRILLING LOG		Hole No. GWC-18
	GEOLOGICAL SERVICES		Sheet 1 of 3
SITE Plant Bowen CCB Disposal Facility			
LOCATION Cells 3 and 4	COORDINATES N 1506306.70	HOLE DEPTH 77	SURF.ELEV. 718.92
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA
DRILLING METHOD Rotosonic	NO. SAMPLES Continuous	NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA
WATER TABLE DEPTH 71.3'	ELEV. 647.62	TIME AFTER COMP. 1 hour	DATE TAKEN 6/6/2011
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 6/6/2011
DRILLER Boart	RECORDER C. Sellers	APPROVED D. Brooks	DRILLING COMP. DATE 6/6/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	718.92								
1		Top Soil							
2									
3		CLAY; sandy; red; dry; very fine							
4									
5	713.92	SILT; white; very fine							
6									
7		SAND; silty; reddish brown							
8									
9									
10	708.92	CLAY; sandy; red; dry; fine							
11									
12									
13									
14		SAND; silty; yellow; damp							
15	703.92								
16		SAA; yellow-brown; dry							
17									
18		CHERT; gravel; black							
19		SAND; silty; brownish yellow; moist							
20	698.92								
21									
22									
23									
24	694.92								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18

Sheet 2 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 77.0' SURF.ELEV. 718.92

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	693.92	CLAY; reddish brown; wet							
26									
27									
28		SAND; silty; yellow-brown; very fine; moist; had some red and brown mixed throughout							
29									
30	688.92								
31									
32		SAA; with black banding; moist							
33									
34									
35	683.92	SAA							
36									
37									
38									
39		SAA; chert gravel							
40	678.92								
41									
42		SAA; chert gravel							
43									
44									
45	673.92								
46		SAA; chert gravel							
47									
48									
49		SAA; chert gravel							
50	668.92								
51		SAND; silty; dolostone gravel							
52									
53									
54									
55	663.92	SAND; silty; dolostone gravel							
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18

Sheet 3 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 77.0' SURF.ELEV. 718.92

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	661.92	Chert gravel; wet					6 inch steel casing to 57' bgs		
58									
59									
60	658.92								
61									
62									
63									
64									
65	653.92								
66									
67		Gravel; chert and dolostone; silty sand; yellowish brown; saturated							
68									
69									
70	648.92								
71									
72									
73									
74									
75	643.92								
76									
77		BOH @ 77.0' bgs							
78									
79									
80	638.92								
81									
82									
83									
84									
85	633.92								
86									
87									
88	630.92								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **718.97**
 Top of PVC Casing Elevation (feet, NAVD88): **721.76**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWC-18R
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED	6/2/2011			

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→		
	TOP OF RISER	2.80	721.76
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	718.97
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 180 gallons		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	84.00	634.97
	ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 11 bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	127.00	591.97
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5 bags; 50 lbs/bag PLACEMENT: Wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	127.20	591.77
	SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	137.20	581.77
Flush-threaded end cap	→		
	BOTTOM OF CASING	137.50	581.47

HOLE DIA: 6"

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **718.97**
 Top of PVC Casing Elevation (feet, NAVD88): **721.76**

SOUTHERN COMPANY <i>Energy to Serve Your World™</i>	DRILLING LOG		Hole No.	GWC-18R
	GEOLOGICAL SERVICES		Sheet	1 of 5
SITE Plant Bowen CCB Disposal Facility				
LOCATION Cells 3 and 4		COORDINATES N 1506301.39	HOLE DEPTH 137.5	SURF.ELEV. 718.97
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA	
DRILLING METHOD Rotosonic		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 6"	TOTAL % REC. NA	
WATER TABLE DEPTH 71.4'	ELEV. 647.57	TIME AFTER COMP. 1 hour	DATE TAKEN 6/2/2011	
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 6/2/2011	
DRILLER Boart	RECORDER C. Sellers	APPROVED D. Brooks	DRILLING COMP. DATE 6/2/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	718.97								
1		Top Soil							
2									
3		CLAY; sandy; red; dry; very fine							
4									
5	713.97	SILT; white; very fine							
6									
7		SAND; silty; reddish brown							
8									
9									
10	708.97	CLAY; sandy; red; dry; fine							
11									
12									
13									
14		SAND; silty; yellow; damp							
15	703.97								
16		SAA; yellow-brown; dry							
17									
18		CHERT; gravel; black							
19		SAND; silty; brownish yellow; moist							
20	698.97								
21									
22									
23									
24	694.97								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18R

Sheet 2 of 5

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 137.5' SURF.ELEV. 718.97

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	693.97	CLAY; reddish brown; wet							
26									
27									
28		SAND; silty; yellow-brown; very fine; moist; had some red and brown mixed throughout							
29									
30	688.97								
31									
32									
33		SAA; with black banding; moist							
34									
35	683.97								
36		SAA							
37									
38									
39									
40	678.97								
41		SAA; chert gravel							
42									
43									
44									
45	673.97								
46		SAND; silty; dolostone gravel							
47									
48									
49									
50	668.97								
51		SAND; silty; dolostone gravel							
52									
53									
54									
55	663.97								
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18R

Sheet 3 of 5

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 137.5' SURF.ELEV. 718.97

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	661.97								
58		SAA; wet							
59									
60	658.97								
61									
62									
63									
64		Chert Gravel; black; with dry cobbles							
65	653.97	SAND; silty; yellowish brown; damp							
66		SAND; silty; yellowish white; dry							
67									
68									
69		SILT; sandy; brownish yellow; with dolostone gravel							
70	648.97								
71									
72									
73									
74									
75	643.97								
76									
77									
78									
79									
80	638.97								
81									
82									
83									
84									
85	633.97								
86		Dolostone; blue gray; slightly weathered							
87									
88	630.97								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18R

Sheet 5 of 5

SITE Plant Bowen CCB Disposal Facility TOTAL DEPTH 137.5 SURF.ELEV. 718.97

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
121	597.97								
122									
123									
124									
125	593.97								
126									
127									
128									
129									
130	588.97	Dolostone; blue gray; slightly weathered							
131									
132									
133		Dolostone; heavily fractured, gravel sized fragments							
134									
135	583.97								
136									
137									
138		BOH @ 137.5' bgs							
139									
140	578.97								
141									
142									
143									
144									
145	573.97								
146									
147									
148									
149									
150	568.97								
151									
152	566.97								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **723.13**
 Top of PVC Casing Elevation (feet, NAVD88): **726.31**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	GWC-19R
DATE CONSTRUCTED:	6/7/2011			

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top	TOP OF RISER	3.18	726.31
1/4-inch Vent	2" Threaded Riser Cap		
1/4-inch Weep Hole			
4-ft x 4-ft concrete pad	GROUND SURFACE	0.00	723.13
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 225 gal		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	119.40	603.73
	ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2 bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	122.50	600.63
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags PLACEMENT: Wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	133.70	589.43
	SCREEN DIA: 2-inch inner/3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	143.70	579.43
Flush-threaded end cap	BOTTOM OF CASING	144.00	579.13

HOLE DIA: 6"

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **723.13**
 Top of PVC Casing Elevation (feet, NAVD188): **726.31**

 <small>Energy to Serve Your World™</small>	DRILLING LOG			Hole No. GWC-19R
	GEOLOGICAL SERVICES			Sheet 1 of 5
SITE Plant Bowen CCB Disposal Facility				
LOCATION Cells 3 and 4		COORDINATES N 1506395.96	HOLE DEPTH 144.0' SURF.ELEV. 723.13	
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA	
DRILLING METHOD Roto Sonic		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA	
WATER TABLE DEPTH 75.25'		ELEV. 647.88	TIME AFTER COMP. 1 hour	DATE TAKEN 6/8/2011
TYPE GROUT NA		QUANTITY NA	MIX NA	DRILLING START DATE 6/7/2011
DRILLER Boart	RECORDER C. Sellers	APPROVED D. Brooks	DRILLING COMP. DATE 6/8/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	723.13								
1		Top Soil							
2		-----							
3		CLAY; brownish red; dry							
4		-----							
5	718.13	Chert; white; weathered; dry							
6		-----							
7									
8		CLAY; sandy; light brown; trace chert gravel							
9									
10	713.13								
11									
12									
13									
14		SAA; yellowish orange							
15	708.13								
16		-----							
17									
18		CLAY; silty; light brown; damp							
19									
20	703.13								
21									
22		SAND; silty; fine-grained; chert gravel; throughout; yellowish orange to light brown							
23									
24	699.13								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-19R

Sheet 2 of 5

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 144' SURF.ELEV. 723.13

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
25	698.13								
26									
27									
28									
29		SAND; silty; light brown; fine-grained; damp							
30	693.13								
31									
32									
33									
34		CLAY; silty; yellowish orange; chert gravel; damp							
35	688.13	trace sand @ 35'							
36									
37									
38									
39									
40	683.13								
41									
42		SAA; saturated							
43									
44									
45	678.13								
46									
47									
48									
49									
50	673.13								
51									
52		Chert; very fractured							
53									
54									
55	668.13	CLAY; silty; yellowish orange; some chert gravel; damp							
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-19R

Sheet 3 of 5

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 144' SURF.ELEV. 723.13

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	666.13								
58									
59									
60	663.13								
61		SAND; silty; coarse chert gravel; saturated							
62									
63									
64									
65	658.13	sand; silty; light tan; very fine-grained							
66									
67									
68									
69									
70	653.13								
71		No recovery; evidence of sand							
72									
73									
74									
75	648.13								
76									
77	646.13								
78									
79		Dolostone; blue gray; fractured							
80	643.13								
81									
82									
83									
84	639.13	Void; no recovery							
85									
86		Dolostone and chert gravel; heavily fractured							
87									
88	635.13								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-19R

Sheet 4 of 5

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 144' SURF.ELEV. 723.13

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		SAA							
90	633.13								
91									
92		Void; no recovery							
93									
94		Dolostone; chert gravel; fractured							
95	628.13								
96									
97									
98									
99									
100	623.13								
101									
102									
103		Void; mud filled							
104									
105	618.13								
106		Dolostone; blue gray; heavily fractured							
107									
108									
109									
110	613.13								
111									
112		Void; mud filled							
113									
114		Dolostone; blue gray; heavily fractured							
115	608.13								
116									
117									
118									
119									
120	603.13								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-19R

Sheet 5 of 5

SITE Plant Bowen CCB Disposal Facility TOTAL DEPTH 144.0' SURF.ELEV. 723.13

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
121	602.13	Dolostone; blue gray; heavily fractured							
122									
123									
124									
125	598.13	Void; gravel filled							
126									
127									
128									
129		Dolostone; blue gray; heavily fractured							
130	593.13								
131									
132									
133									
134									
135	588.13	Dolostone; blue gray; heavily fractured							
136									
137									
138									
139									
140	583.13								
141		BOH @ 144' bgs							
142									
143									
144									
145	578.13								
146									
147									
148									
149									
150	573.13								
151									
152	571.13								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **717.63**
 Top of PVC Casing Elevation (feet, NAVD88): **720.59**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	
LOGGER:	Sellers/Dyer	DRILLING METHODS:	Rotosonic	GWC-20R
DATE CONSTRUCTED:	6/9/2011			

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→		
	TOP OF RISER	2.96	720.59
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	717.63
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 120 gallons		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	67.00	650.6
	ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 3 bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	72.00	645.6
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 6 bags PLACEMENT: Wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	74.00	643.6
	SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	84.00	633.6
Flush-threaded end cap	→		
	BOTTOM OF CASING	84.30	633.3
HOLE DIA: 6"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **717.63**
 Top of PVC Casing Elevation (feet, NAVD88): **720.59**

 <small>Energy to Serve Your World™</small>	DRILLING LOG			Hole No. GWC-20R
	GEOLOGICAL SERVICES			Sheet 1 of 3
SITE Plant Bowen CCB Disposal Facility HOLE DEPTH 100.0' SURF.ELEV. 717.63				
LOCATION Cells 3 and 4		COORDINATES N 1506602.14	E 2073486.53	
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA	
DRILLING METHOD Rotosonic		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 6"	TOTAL % REC. NA	
WATER TABLE DEPTH 84.3'	ELEV. 633.33	TIME AFTER COMP. 1 hour	DATE TAKEN 6/8/2011	
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 6/8/2011	
DRILLER Boart	RECORDER Sellers/Dyer	APPROVED D. Brooks	DRILLING COMP. DATE 6/8/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	717.63								
1		Top Soil							
2									
3									
4		CLAY; sandy; light brown; med-grained;							
5	712.63								
6									
7									
8									
9		SAA							
10	707.63								
11									
12									
13									
14									
15	702.63	SAA							
16									
17									
18									
19									
20	697.63	CLAY; silty; yellowish orange							
21									
22									
23									
24	693.63								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-20R

Sheet 2 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 100.0' SURF.ELEV. 717.63

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	692.63	SILT; sandy; trace clays; med-grained sand; yellowish orange							
26									
27									
28		SILT; sandy; chert gravel throughout; yellow; damp							
29									
30	687.63								
31									
32									
33									
34									
35	682.63								
36									
37									
38									
39									
40	677.63	SILT; clayey; 20% chert gravel; some med-grained sand							
41									
42									
43		Dolostone @ 47.5'; blue gray; red staining; very fractured							
44									
45	672.63								
46									
47									
48		Void @ 52' to 67'							
49									
50	667.63								
51									
52									
53									
54									
55	662.63								
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-20R

Sheet 3 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 100.0' SURF.ELEV. 717.63

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	660.63	Void							
58									
59									
60	657.63								
61									
62									
63									
64									
65	652.63								
66									
67		Dolomiticrite; fine-grained; gray; contains prevalent calcine veining in a unimodal direction; sparse oxidation staining; weakly laminated in some individual samples							
68									
69									
70	647.63								
71									
72									
73									
74									
75	642.63								
76									
77		BOH @ 84.3' bgs							
78									
79									
80	637.63								
81									
82									
83									
84									
85	632.63								
86									
87									
88	629.63								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **720.45**
 Top of PVC Casing Elevation (feet, NAVD88): **723.07**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	SCS Civil Field Services	WELL NAME
		DRILLER:	Milam	
LOCATION:	Cells 3 and 4	RIG TYPE:	CME 550	GWC-21R
LOGGER:	D. Brooks	DRILLING METHODS:	Hollow stem/ HQ rock core	
DATE CONSTRUCTED:	12/16/2011			

		DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top	→		
		TOP OF RISER	2.62 723.07
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→		
		GROUND SURFACE	0.00 720.45
		PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum	
		BOTTOM OF PROTECTIVE CASING	
		BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 135 gallons	
		RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	
		TOP OF SEAL	64.00 656.45
		ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2.5 bags PLACEMENT: Tremie, Wash with water	
		TOP OF FILTER PACK	77.40 643.05
		FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 2.5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water	
		BOTTOM OF RISER / TOP OF SCREEN	79.20 641.25
		SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	
		BOTTOM OF SCREEN	89.20 631.25
Flush-threaded end cap	→		
		BOTTOM OF CASING	89.50 630.95
HOLE DIA: 6.25"/4.25"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **720.45**
 Top of PVC Casing Elevation (feet, NAVD88): **723.07**

	DRILLING LOG			Hole No.	GWC-21R	
	GEOLOGICAL SERVICES			Sheet	1 of 4	
SITE Plant Bowen CCB Disposal Facility						
LOCATION	Cells 3 and 4		COORDINATES	N 1506695.89	E 2073784.42	
ANGLE	90	BEARING	NA	CONTRACTOR	SCS CFS	
DRILLING METHOD	Hollow Stem/ HQ Rock Core		NO. SAMPLES	Continuous	NO. U.D. SAMPLES	NA
CASING SIZE	6.25"	LENGTH	49'	CORE SIZE	4.25"	
WATER TABLE DEPTH	56.55'	ELEV.	663.9	TIME AFTER COMP.	1 hour	
TYPE GROUT	NA	QUANTITY	NA	MIX	NA	
DRILLER	Milam	RECORDER	D. Brooks	APPROVED	D. Brooks	
				DRILLING START DATE	12/15/2011	
				DRILLING COMP. DATE	12/16/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	720.45								
1		Top Soil							
2									
3									
4									
5	715.45	CLAY; sandy; light brown							
6									
7									
8									
9									
10	710.45								
11									
12		SILT; clayey with trace sand and chert gravel; light brown							
13									
14									
15	705.45								
16									
17		SILT; clayey; light brown							
18									
19									
20	700.45								
21		SAA; with chert gravel throughout							
22									
23									
24	696.45								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-21R

Sheet 2 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 89.5 SURF.ELEV. 720.45

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	695.45	SAA							
26									
27									
28		SILT; clayey; yellowish orange							
29									
30	690.45								
31									
32									
33									
34									
35	685.45								
36									
37									
38		SAA; 10% sand							
39									
40	680.45								
41									
42									
43									
44									
45	675.45								
46									
47									
48									
49									
50	670.45								
51									
52									
53									
54									
55	665.45	Dolostone; blue gray; no fractures							
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-21R

Sheet 3 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 89.5 SURF.ELEV. 720.45

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	663.45	Dolostone; blue gray; fractured; slight red staining							
58									
59									
60	660.45								
61									
62									
63									
64									
65	655.45								
66									
67									
68									
69									
70	650.45								
71									
72									
73									
74									
75	645.45								
76									
77									
78									
79									
80	640.45	SAA							
81									
82									
83									
84									
85	635.45								
86									
87									
88	632.45								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-21R

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 89.5 SURF.ELEV. 720.45

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		SAA							
90	630.45	BOH @ 89.5 bgs							
91									
92									
93									
94									
95	625.45								
96									
97									
98									
99									
100	620.45								
101									
102									
103									
104									
105	615.45								
106									
107									
108									
109									
110	610.45								
111									
112									
113									
114									
115	605.45								
116									
117									
118									
119									
120	600.45								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **712.54**
 Top of PVC Casing Elevation (feet, NAVD88): **715.41**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWC-22R
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/14/2011			

	DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top		
TOP OF RISER	2.60	715.41
1/4-inch Vent		
2" Threaded Riser Cap		
1/4-inch Weep Hole		
GROUND SURFACE	0.00	712.54
4-ft x 4-ft concrete pad		
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 150 gallons		
RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
TOP OF SEAL	102.00	610.54
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1- 50 lbs bags PLACEMENT: Wash with water		
TOP OF FILTER PACK	105.30	607.24
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5 bags / 50 lbs bags PLACEMENT: Wash with water		
BOTTOM OF RISER / TOP OF SCREEN	106.70	605.84
SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
BOTTOM OF SCREEN	116.70	595.84
Flush-threaded end cap		
BOTTOM OF CASING	117.00	595.54
HOLE DIA: 6"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **712.54**
 Top of PVC Casing Elevation (feet, NAVDI88): **715.41**

	DRILLING LOG			Hole No. GWC-22R
	GEOLOGICAL SERVICES			Sheet 1 of 4
SITE Plant Bowen CCB Disposal Facility				
LOCATION Cells 3 and 4	COORDINATES N 1506717.93	HOLE DEPTH 117'	SURF.ELEV. 712.54	
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA	
DRILLING METHOD Rotosonic	NO. SAMPLES Continuous	NO. U.D. SAMPLES NA		
CASING SIZE 6"	LENGTH NA	CORE SIZE 6"	TOTAL % REC. NA	
WATER TABLE DEPTH 68'	ELEV. 644.5	TIME AFTER COMP. 1 hour	DATE TAKEN 6/14/2011	
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 6/13/2011	
DRILLER Boart	RECORDER D. Brooks	APPROVED D. Brooks	DRILLING COMP. DATE 6/14/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	712.54	SAND, Silty; brick red; dry; fine grained							
1									
2									
3									
4									
5	707.54								
6									
7									
8		SAND, Clayey; brick red; dry; fine grained with white chert fragments							
9									
10	702.54								
11									
12		CLAY, Sandy; red and reddish yellow; damp; fine grained sand; low plasticity							
13									
14									
15	697.54								
16									
17									
18									
19									
20	692.54								
21									
22									
23									
24	688.54								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-22R

Sheet 2 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 117' SURF.ELEV. 712.54

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	687.54	CLAY, Sandy; red and reddish yellow; damp; fine grained sand; low plasticity							
26									
27									
28									
29									
30	682.54								
31									
32									
33									
34									
35	677.54								
36									
37									
38									
39									
40	672.54								
41									
42									
43									
44									
45	667.54								
46									
47									
48									
49									
50	662.54								
51									
52									
53									
54									
55	657.54								
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-22R

Sheet 3 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 117' SURF.ELEV. 712.54

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	655.54	1' bed of white chert				6 inch steel casing to 57' bgs			
58									
59		Mud filled void from 58' to 69'							
60	652.54								
61									
62									
63									
64									
65	647.54								
66									
67									
68									
69									
70	642.54	DOLOMITE; blue grey; hard; slightly weathered							
71		Void with no recovery from 70' to 85'							
72									
73									
74									
75	637.54								
76									
77									
78									
79									
80	632.54								
81									
82									
83									
84									
85	627.54								
86		DOLOMITE; blue grey; hard; slightly weathered							
87									
88	624.54								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-22R

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 117' SURF.ELEV. 712.54

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		Void with no recovery from 88' to 103.5'							
90	622.54								
91									
92									
93									
94									
95	617.54								
96									
97									
98									
99									
100	612.54								
101									
102									
103									
104									
105	607.54	DOLOSTONE; blue grey; hard; slightly weathered; contains purple chert inclusions							
106									
107		DOLOMITE; blue grey; hard; slightly weathered; horizontal fractures with iron staining along faces							
108									
109									
110	602.54								
111									
112									
113									
114									
115	597.54								
116									
117									
118		BOH @ 117' bgs							
119									
120	592.54								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **688.02**
 Top of PVC Casing Elevation (feet, NAVD88): **690.94**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWC-23R
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/28/2011			

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→		
	TOP OF RISER	2.92	690.94
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	688.02
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 45 gallons		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	18.00	670.02
	ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 4 - 50 lbs bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	34.40	653.62
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 4 bags / 50 lbs bags PLACEMENT: Wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	36.70	651.32
	SCREEN DIA: 2-inch inner/3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	46.70	641.32
Flush-threaded end cap	→		
	BOTTOM OF CASING	47.00	641.02
HOLE DIA: 6"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **688.02**
 Top of PVC Casing Elevation (feet, NAVDI88): **690.94**

	DRILLING LOG				Hole No. GWC-23R
	GEOLOGICAL SERVICES				Sheet 1 of 2
SITE Plant Bowen CCB Disposal Facility					
LOCATION Cells 3 and 4		COORDINATES N 1506701.61 E 2074446.53		HOLE DEPTH 47.0'	SURF.ELEV. 688.02
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear		DRILL NO. NA	
DRILLING METHOD Rotosonic		NO. SAMPLES Continuous		NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA		
WATER TABLE DEPTH 33.35'		ELEV. 654.67	TIME AFTER COMP. 1 hour	DATE TAKEN 6/28/2011	
TYPE GROUT NA		QUANTITY NA	MIX NA	DRILLING START DATE 6/28/2011	
DRILLER Boart	RECORDER C. Sellers	APPROVED D. Brooks		DRILLING COMP. DATE 6/28/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	688.02								
1		Top Soil							
2									
3									
4									
5	683.02	CLAY; silty; reddish brown							
6									
7		Chert; white; dry							
8									
9		SILT; clayey; brown; trace chert gravel							
10	678.02								
11									
12									
13									
14									
15	673.02								
16									
17		dolostone; some chert; dry							
18									
19									
20	668.02								
21									
22		CLAY; silty; reddish brown; chert gravel throughout							
23									
24	664.02								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **673.76**
 Top of PVC Casing Elevation (feet, NAVD88): **676.57**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rototsonic	GWC-24R
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/21/2011			

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→	TOP OF RISER	2.81 676.57
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→	GROUND SURFACE	0.00 673.76
		PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING	
		BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 90 gallons RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	
		10.00	663.76
		ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 8 - 50 lbs bags PLACEMENT: Wash with water TOP OF FILTER PACK	
		24.80	648.96
		FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5 bags / 50 lbs bags PLACEMENT: Wash with water BOTTOM OF RISER / TOP OF SCREEN	
		26.70	647.06
		SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	
		36.70	637.06
Flush-threaded end cap	→	BOTTOM OF CASING	37.00 636.76
HOLE DIA: 6"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **673.76**
 Top of PVC Casing Elevation (feet, NAVD88): **676.57**



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-24R**

Sheet **1** of **2**

SITE **Plant Bowen CCB Disposal Facility** HOLE DEPTH **37.0'** SURF.ELEV. **673.76**
 LOCATION **Cells 3 and 4** COORDINATES **N 1506694.13 E 2074806.11**
 ANGLE **90** BEARING **NA** CONTRACTOR **Boart Longyear** DRILL NO. **NA**
 DRILLING METHOD **Rotosonic** NO. SAMPLES **Continuous** NO. U.D. SAMPLES **NA**
 CASING SIZE **6"** LENGTH **NA** CORE SIZE **4"** TOTAL % REC. **NA**
 WATER TABLE DEPTH **23.24'** ELEV. **650.52** TIME AFTER COMP. **1 hour** DATE TAKEN **6/21/2011**
 TYPE GROUT **NA** QUANTITY **NA** MIX **NA** DRILLING START DATE **6/20/2011**
 DRILLER **Boart** RECORDER **C. Sellers** APPROVED **D. Brooks** DRILLING COMP. DATE **6/21/2011**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	673.76								
1		Top Soil							
2									
3		SAND; silty; brownish red; very fine grained							
4									
5	668.76								
6		SAND; silty; red; more silt; 10% clay							
7									
8									
9		SAA							
10	663.76								
11									
12		Dolostone; blue gray; dry							
13									
14									
15	658.76	Chert gravel; with silty clay; trace dolostone pieces							
16									
17									
18									
19									
20	653.76	Dolostone; blue gray; very fracture; minimal staining							
21									
22									
23									
24	649.76								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **673.59**
 Top of PVC Casing Elevation (feet, NAVD88): **676.42**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	
LOGGER:	C. Sellers	DRILLING METHODS:	Rotosonic	GWC-25R
DATE CONSTRUCTED:	6/21/2011			

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top		
TOP OF RISER	2.83	676.42
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	673.59
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 100 gallons		
RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
TOP OF SEAL	75.00	598.59
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 3 - 50 lbs bags PLACEMENT: Wash with water		
TOP OF FILTER PACK	84.80	588.79
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags / 50 lbs bags PLACEMENT: Wash with water		
BOTTOM OF RISER / TOP OF SCREEN	86.70	586.89
SCREEN DIA: 2-inch inner/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
BOTTOM OF SCREEN	96.70	576.89
Flush-threaded end cap		
BOTTOM OF CASING	97.00	576.59
HOLE DIA: 6"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **673.59**
 Top of PVC Casing Elevation (feet, NAVD88): **676.42**

 <p>SOUTHERN COMPANY Energy to Serve Your World™</p>	<p>DRILLING LOG GEOLOGICAL SERVICES</p>	Hole No. GWC-25R Sheet 1 of 4
SITE Plant Bowen CCB Disposal Facility		
LOCATION Cells 3 and 4	COORDINATES N 1506494.89 E 2075088.9	HOLE DEPTH 97.0' SURF.ELEV. 673.59
ANGLE 90 BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA
DRILLING METHOD Rotosonic	NO. SAMPLES Continuous	NO. U.D. SAMPLES NA
CASING SIZE 6" LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA
WATER TABLE DEPTH 22.62' ELEV. 650.97	TIME AFTER COMP. 1 hour	DATE TAKEN 6/21/2011
TYPE GROUT NA QUANTITY NA	MIX NA	DRILLING START DATE 6/21/2011
DRILLER Boart RECORDER C. Sellers	APPROVED D. Brooks	DRILLING COMP. DATE 6/21/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	673.59								
1		Top Soil							
2									
3									
4									
5	668.59	SILT; clayey; light brown; trace sand; fine; dry							
6									
7									
8									
9									
10	663.59								
11									
12		SILT; trace sand; very micaceous; yellowish orange							
13									
14									
15	658.59								
16		Chert gravel; well rounded							
17		SILT; sandy; medium grained sand; some chert gravel; light brown							
18									
19		SAND; with chert gravel; brownish yellow; medium grained; wet							
20	653.59								
21									
22									
23									
24	649.59								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-25R

Sheet 3 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 97.0' SURF.ELEV. 673.59

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	616.59								
58									
59									
60	613.59								
61									
62									
63		SAA							
64									
65	608.59								
66									
67									
68									
69									
70	603.59								
71									
72		VOID; clay filled with dolostone gravel and trace sand							
73									
74									
75	598.59								
76									
77	596.59	Dolostone; blue gray							
78									
79									
80	593.59								
81									
82		Dolostone; blue gray; very fracture; heavy red staining							
83		Clay filled void from 83' to 84'							
84									
85	588.59								
86									
87									
88	585.59								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-25R

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 97.0' SURF.ELEV. 673.59

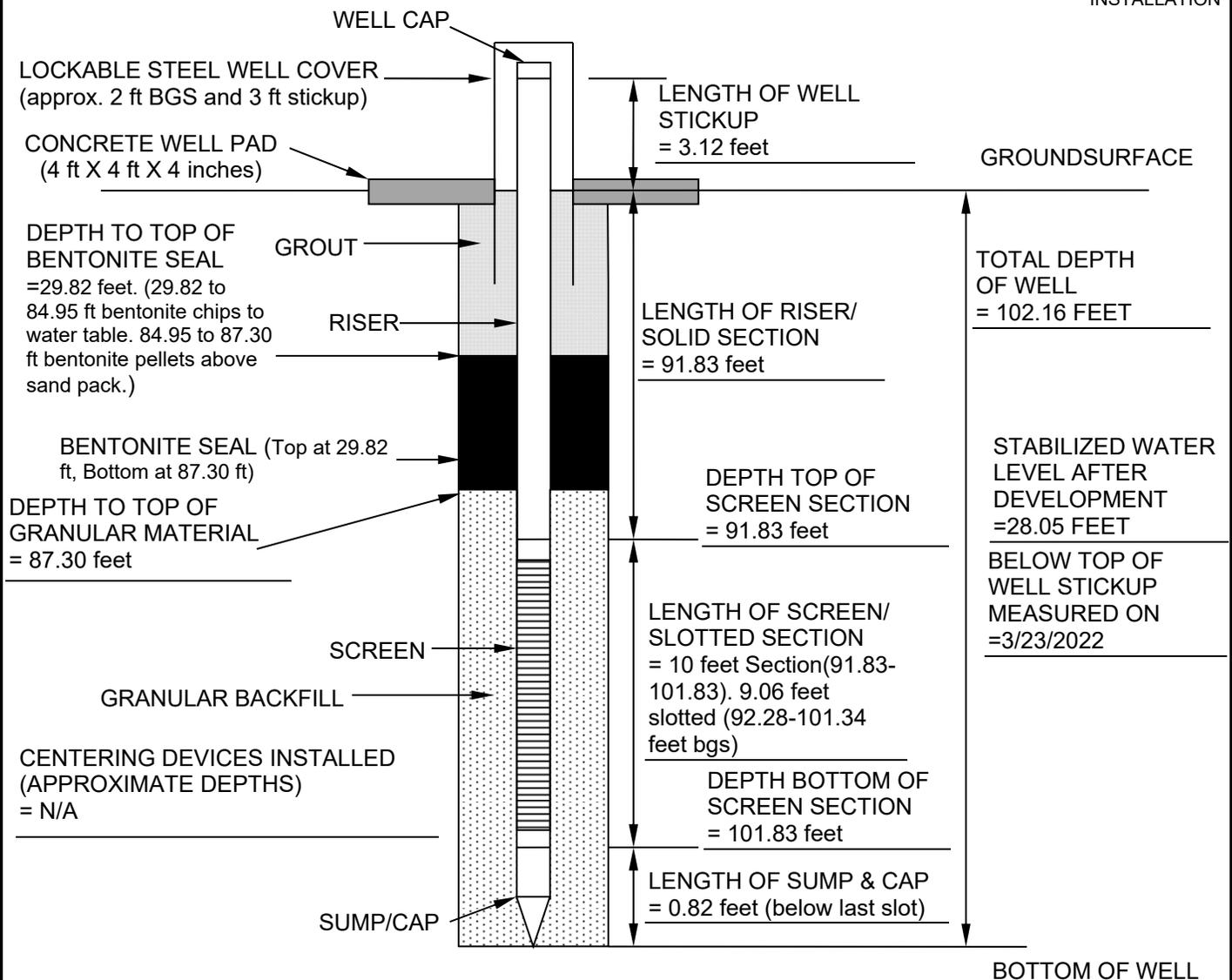
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		Dolostone; blue gray; heavy red staining; with coarse angular sand							
90	583.59								
91									
92									
93									
94									
95	578.59								
96									
97									
98	575.59		BOH @ 97' bgs						
99									
100	573.59								
101									
102									
103									
104									
105	568.59								
106									
107									
108									
109									
110	563.59								
111									
112									
113									
114									
115	558.59								
116									
117									
118									
119									
120	553.59								

WELL INSTALLATION RECORD

JOB NAME Plant Bowen Cells 3 & 4	PROJECT NO. 6122-16-0287
WELL NUMBER GWA-36A	INSTALLATION DATE 3/18/2022
LOCATION* NORTH: 1505026.95 EAST: 2073357.46	GROUND ELEV: 680.63 feet NAVD88
WOOD FIELD REPRESENTATIVE T. Parker	DRILLER/ CONTRACTOR C. Franklin/Cascade
GRANULAR BACKFILL MATERIAL 20/40 mesh Silica Filter Sand	DRILLING TECHNIQUE Rotosonic
SCREEN MATERIAL 2-inch I.D. Flush Joint Slotted PVC (Sch. 40)	BOREHOLE DIAMETER ± 6 inch
SLOT SIZE 0.010-inch Machine Cut	REFERENCE POINT** ELEVATION* 683.75 ft NAVD88
RISER MATERIAL 2-inch I.D. Flush joint Solid PVC (Sch. 40)	LOCK TYPE/KEY CODE Master

* Preliminary-Final location/elevation to be determined by As-Built Survey
 ** Reference point is notch cut in the top of PVC casing

NOTE: NOT TO SCALE, ALL DEPTHS RECORDED ARE
 RELATIVE TO EXISTING GROUND SURFACE AT TIME OF
 INSTALLATION



Notes:
 Sand – 6.5 bags of 20/40 mesh sand for prepack & screen interval
 Bentonite – 3 buckets 3/8" uncoated pellets for bentonite seal above the sand filter pack; 7 bags of 3/8" chips added to bring level up to water table
 Grout – 2 bags of Aqua-guard® bentonite/grout mix with ~40 gals water

Review: RNQ Date: 3/27/2022

Well Installation Record

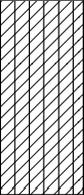
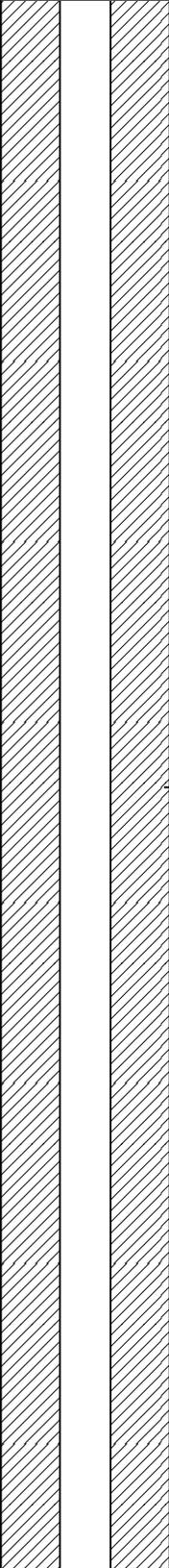
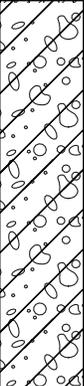
GWA-36A

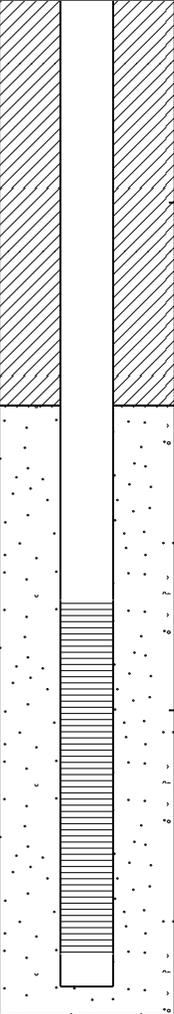
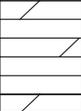
PROJECT NUMBER 6122160287	DRILLING COMPANY Cascade Drilling	COORDINATES N 1505026.95, E 2073357.46
PROJECT NAME Plant Bowen	DRILLER Cory Franklin	COORD SYS Ga State Plane West (NAD 83)
CLIENT Georgia Power	RIG TYPE/METHOD Terrasonic CC150/SONIC	COMPLETION Stick-up w/ protective casing
ADDRESS 317 Covered Bridge Rd., Euharlee GA	CASING DIA. 2-in I.D. PVC	GROUND SURFACE ELEV. 680.63 ft NAVD 88
LOCATION Cells 3 & 4	BORING DEPTH 102.9 ft	WELL TOC ELEVATION 683.75 ft NAVD 88

COMMENTS Start drilling on 3/16/2022 and complete drilling on 3/16/2022. Well construction completed on 3/18/2022 with installation of well cover and concrete pad. Well surveyed on 3/22/2022.

LOGGED BY T. Parker
CHECKED BY R. Quinn

Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
0-10	#1	(96%)		Fine grain silty CLAY, moist, mottled light brown/yellow/orange. Low to med. plasticity with white weathered limestone fragments (<3%), 1 to 5 mm, subangular to subrounded.	CL		680 678 676 674 672
10-20	#2	(76%)		Fine grained silty CLAY, mottled light brown at top, transitioning to mottled orange/red silty clay at 12.1 ft to 14.3 ft and then back to mottled light yellow/orange silty clay, stiffening in lower 1 ft. Low plasticity. ~5% limestone/chert fragments and rocks, 2 to 60 mm.	CL		670 668 666 664 662
20-30	#3	(100%)		Fine silty CLAY, mottled light brown to yellow/orange with some light tan and red/orange and more clayey (28 ft - 30 ft). ~5% weathered limestone (white) fragments and rocks, 2-20 mm, subrounded.	CL		660 658 656 654 652
30-35	#4	(100%)		Fine silty mottled CLAY, higher moisture content with high plasticity and 25-35% weathered limestone and chert, 2-80 mm. Cobble at 35 ft.	CL		650 648 646

Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
36	35-40	#4 (100%)		Fine silty mottled CLAY, higher moisture content with high plasticity and 25-35% weathered limestone and chert, 2-80 mm. Cobble at 35 ft.	CL	 <p>Bentonite seal (chips 29.82-84.95 ft, prior to hydration, pellets 84.95-87.30 ft, prior to hydration). Top of bentonite seal at 27.00 ft after hydration.</p>	644
38							642
40	40-50	#5 (100%)		Gravelly, silty CLAY, mottled light brown and yellow, medium stiff, slight plasticity, ~50% fine gravel/gravel/cobble mix of weathered limestone and chert up to 140 mm (at 45.5 ft). Moisture increased and core is wet from 49 ft to 50 ft.	CL		640
42							638
44							636
46							634
48							632
50	50-60	#6 (20%)		Gravelly fine silty CLAY, wet, yellow/white/tan, soft with ~50% fine gravel/ gravel/cobble. No plasticity. Angular limestone/chert fragments throughout, fine to coarse angular chert gravel and angular to subrounded cobble up to 140 mm. Poor recovery (2 ft out of a 10 ft run).	CL		630
52						628	
54						626	
56						624	
58						622	
60	60-70	#7 (80%)		Gravelly fine silty CLAY, upper 4 ft mottled yellow/orange/white, 4 to 8 ft brown/orange/white. Upper 2 ft of recovered core very wet, 2 to 8 ft recovered core is moist. ~50% fine gravel/gravel mix of weathered limestone, dolomite and chert.	CL	620	
62						618	
64						616	
66						614	
68						612	
70	70-80	#8 (98%)		Gravelly fine silty CLAY, mottled yellow/light to dark brown. Very soft, high plasticity. 50% gravel and cobbles up to 110 mm. Angular dark grey/black chert 70-80 ft. Manganese lens at 79.5 ft of recovered core. Upper 1 ft very wet then moist then wet at about 77 - 78 ft.	CL	610	
72						608	
74						606	
76						604	

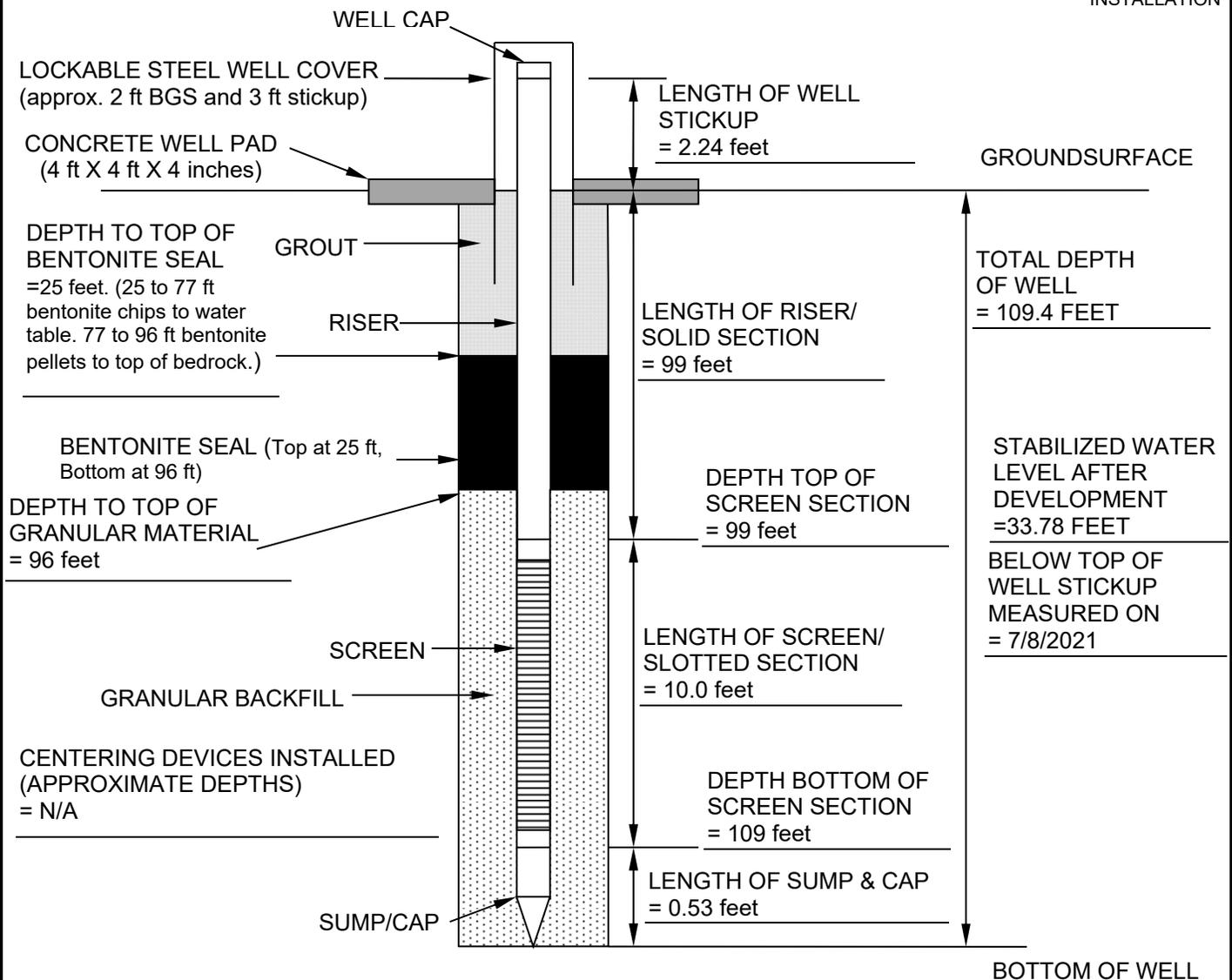
Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
78						 <p>Bentonite seal (chips 29.82-84.95 ft, prior to hydration, pellets 84.95-87.30 ft, prior to hydration). Top of bentonite seal at 27.00 ft after hydration.</p> <p>Sand filter pack and pre-pack screen</p>	602
80	80-90	#9 (0%)		No recovery.			600
82							598
84						596	
86						594	
88						592	
90	90-100	#10 (10%)		Gravelly SILT yellow/light brown, wet with >50% mix of fine gravel and gravel up to 60 mm, composed of angular chert, minor quartz, and dolomite. Bedrock at 100.5 ft	ML-GM	590	
92						588	
94						586	
96						584	
98						582	
100	100-102.9	#11 (34%)		100.0 - 100.5 ft Gravelly SILT. 100.5 - 102.9 ft Dolomite, light gray, no fines.	Rock	580	
102						578	
104				Boring terminated at 102.9 feet in bedrock			576
106							574
108							572
110							570
112							568
114							566
116							564
118							562

WELL INSTALLATION RECORD

JOB NAME Plant Bowen Cells 3 & 4	PROJECT NO. 6122-16-0287
WELL NUMBER GWA-36RA	INSTALLATION DATE 7/2/2021
LOCATION* NORTH: 1505060.13 EAST: 2073365.45	GROUND ELEV: 682.26 feet NAVD88
WOOD FIELD REPRESENTATIVE A. Shoredits	DRILLER/ CONTRACTOR Cascade
GRANULAR BACKFILL MATERIAL #1 Silica Filter Sand	DRILLING TECHNIQUE Rotosonic
SCREEN MATERIAL 2-inch I.D. Flush Joint Slotted PVC (Sch. 40)	BOREHOLE DIAMETER ± 6 inch
SLOT SIZE 0.010-inch Machine Cut	REFERENCE POINT** ELEVATION* 685.20 ft NAVD88
RISER MATERIAL 2-inch I.D. Flush joint Solid PVC (Sch. 40)	LOCK TYPE/KEY CODE Master

* Preliminary-Final location/elevation to be determined by As-Built Survey
 ** Reference point is notch cut in the top of PVC casing

NOTE: NOT TO SCALE, ALL DEPTHS RECORDED ARE
 RELATIVE TO EXISTING GROUND SURFACE AT TIME OF
 INSTALLATION



Notes:
 Sand – 2.3 bags of #1 sand for prepack & screen interval
 Bentonite – 5 buckets 3/8" coated and uncoated pellets for bedrock plug;
 7 bags of 3/8" chips added to above groundwater elevation
 Grout – 2 bags of bentonite mix with ~50 gals water

Review: RNQ Date: 8/12/2021

Well Installation Record

GWA-36RA

PROJECT NUMBER 6122160287	DRILLING COMPANY Cascade Drilling	COORDINATES N 1505060.13, E 2073365.45
PROJECT NAME Plant Bowen	DRILLER C. Franklin	COORD SYS Ga State Plane West (NAD 83)
CLIENT Georgia Power	RIG TYPE/ METHOD TSI CC150/ SONIC	COMPLETION Stick-up w/ protective casing
ADDRESS 317 Covered Bridge Rd., Euharlee GA	CASING DIA. 2-in I.D. PVC	SURFACE ELEVATION 682.26 ft NAVD 88
	BORING DEPTH 109.5 ft	WELL TOC 685.20 ft NAVD 88

LOCATION Cells 3 & 4

COMMENTS Start drilling on 6/29/2021 and complete drilling on 6/30/2021. Well construction completed on 7/2/2021 with installation of well cover and concrete pad.

LOGGED BY A. Shoredits
CHECKED BY J. Quinn

Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
2	0-10	#1 (0%)		Air knife utility clearance No sample	-	Bentonite grout mix	680
4							678
6							676
8							674
10	10-20	#2 (56%)		No sample			672
12							670
14				Gravelly silty SAND with clay, red/grey/black, loose, dry, coarse angular chert	SW-SC		668
16				Gravelly silty SAND, tan/grey, very loose, dry	SM		666
18							664
20	20-30	#3 (100%)		CLAY with silts, yellow/umber/orange, medium stiff, slight plasticity, dry, some fine gravel	CL		662
22				CLAY, yellow/white/tan, soft, high plasticity, moist, chert fragments throughout, fine to coarse angular gravel	CH		660
24				21 ft cobble sized rounded chert			658
26							656
28							654
30	30-40	#4 (0%)		No recovery	-	Bentonite seal (chips)	652
32				Drill casings did not appear to drop during drilling. Very soft clays and gravel are estimated to be present at 30-40 feet and were not retained in the sampling casing.			650

Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)	
34							648	
36							646	
38							644	
40	40-50	#5 (100%)		CLAY with gravels, fine to coarse grained, yellow/black/red, very soft, high plasticity, wet, angular dark grey/black chert throughout	CH		642	
42				CLAY, yellow/tan, soft, high plasticity, moist, trace quartz gravel			640	
44					Sandy CLAY, purple/brown/red/brown, very stiff, low plasticity, moist, coarse to fine quartz gravel throughout, sub-angular to sub-rounded, some fine sand		CL	638
46					Silty CLAY, yellow/black, stiff, medium plasticity, moist, trace fine quartz gravel throughout, sub-angular		CH	636
48				Gravelly SAND, fine to coarse grained, grey/brown, loose, wet	SW		634	
50	50-60	#6 (100%)		Silty SAND, fine grained, yellow/tan/brown, loose, moist, relic decomposed sandstone texture with oxidation	SM-SP CL-GC		632	
52				Gravelly CLAY, dark brown/yellow, very soft, low plasticity, fine to coarse angular quartz gravel			630	
54				CLAY with gravels, brown/tan/orange, soft to medium stiff, medium to high plasticity, moist, coarse sub-rounded quartz and sandstone gravel	CH-CL		628	
56						626		
58						624		
60	60-70	#7 (100%)		Silty CLAY, yellow, medium stiff, medium plasticity, moist, sub-rounded quartz cobble and angular dark grey chert cobble	CL	622		
62				Sandy CLAY and gravel, brown/tan/yellow, soft, low to medium plasticity, moist to wet, fine to coarse sub-rounded quartz gravel and rounded cobbles	CL-SW	620		
64						618		
66						616		
68						614		
70	70-80	#8 (80%)				612		
72							610	

Depth (ft)	Samples	Sample Run (Recovery)	Graphic Log	Material Description	USCS	Well Diagram	Elevation (ft)
74							608
76							606
78				Dolomite, dark grey, moist (acid test confirmation)	-		604
80	80-85	#9		Decomposed dolomite with sub-rounded quartz gravel inclusions and cobbles, wet			602
82		(100%)		83.2-85 ft interstitial sandy clay			600
84							598
86	85-90	#10		Dolomite, dark grey, wet, no visible decomposition			596
88		(20%)					594
90	90-98	#11		95-95.3 ft brown surface staining			592
92		(38%)		96.8 ft sub-rounded quartz gravel inclusion			590
94							588
96							586
98	98-108	#12		Clayey GRAVEL, grey/orange, loose, moist to wet, angular gravel with orange sticky clay matrix/cement	GC-SC		584
100		(100%)		Sandy CLAY, orange/yellow/grey, very soft, medium plasticity, moist, fine grained sands	CL-SC		582
102				Dolomite, fractured with interstitial clays, grey/brown/tan, moist			580
104				103.7-104 ft silty sand, brown			578
106				105-105.6 dry rock lens			576
108							574
110				Boring terminated at 109.5 feet in bedrock			572
112							570

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **700.44**
 Top of PVC Casing Elevation (feet, NAVDI88): **703.72**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	SCS CFS	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	CME 550	GWA-37
LOGGER:	D. Brooks	DRILLING METHODS:	Hollow Stem Auger	
DATE CONSTRUCTED:	9/11/2013			

	DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top 	TOP OF RISER	703.72
1/4-inch Vent 1/4-inch Weep Hole 4-ft x 4-ft concrete pad 2" Threaded Riser Cap GROUND SURFACE	0.00	700.44
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement/ Grout Slurry AMOUNT: 130 gallons RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	89.00	611.44
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1 - 50 lbs bags PLACEMENT: Wash with water TOP OF FILTER PACK	92.50	607.94
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 6 bags / 50 lbs bags PLACEMENT: Wash with water BOTTOM OF RISER / TOP OF SCREEN	94.20	606.24
SCREEN DIA: 2-inch inside/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	104.20	596.24
Flush-threaded end cap BOTTOM OF CASING	104.50	595.94
HOLE DIA: 6"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **700.44**
 Top of PVC Casing Elevation (feet, NAVD188): **703.72**

	DRILLING LOG			Hole No. GWA-37
	GEOLOGICAL SERVICES			Sheet 1 of 4
SITE Plant Bowen CCB Disposal Facility				
LOCATION Cells 3 and 4	COORDINATES N 1505345.45 E 2073069.32	HOLE DEPTH 104.5'	SURF.ELEV. 700.44	
ANGLE 90	BEARING NA	CONTRACTOR SCS Field Services	DRILL NO. NA	
DRILLING METHOD Hollow Stem Auger	NO. SAMPLES Continuous	NO. U.D. SAMPLES NA		
CASING SIZE NA	LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA	
WATER TABLE DEPTH 45'	ELEV. 655.44	TIME AFTER COMP. 1 hour	DATE TAKEN 9/11/2013	
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 9/9/2013	
DRILLER Denty	RECORDER D. Brooks	APPROVED D. Brooks	DRILLING COMP. DATE 9/11/2013	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	700.44	SAND, Silty; reddish brown; dry; very fine to fine grained sand							
1									
2		SAA except red; fine grained							
3									
4									
5	695.44	SAND, Clayey; brick red; damp; very fine to fine grained							
6									
7									
8									
9									
10	690.44	SAA except red and yellow							
11									
12									
13									
14									
15	685.42								
16									
17									
18									
19									
20	680.44	SAND, Silty; yellow and white; damp; fine to medium grained with white chert fragments							
21									
22	678.44								
23									
24	676.44								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-37

Sheet 2 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 104.5 SURF.ELEV. 700.44

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	675.44	CLAY, Sandy; yellow and white; damp; very fine to fine grained sand with small grey chert fragments							
26									
27									
28									
29									
30	670.44								
31									
32									
33									
34									
35	665.44	SAA with grey chert increasing in content and size; moist							
36									
37									
38									
39									
40	660.44								
41									
42									
43									
44									
45	655.44	SAND, Clayey; yellow and white; moist; fine to medium grained							
46									
47									
48									
49									
50	650.44								
51									
52									
53									
54									
55	645.44	CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments							
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-37
Sheet 3 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 104.5 SURF.ELEV. 700.44

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
57		CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments							
58									
59									
60	640.44								
61									
62									
63									
64									
65	635.44								
66									
67									
68									
69									
70	630.44								
71									
72									
73		SAA except mottled pale yellow, yellow, and brown							
74									
75	625.44								
76									
77									
78									
79									
80	620.44								
81									
82									
83									
84									
85	615.44								
86									
87		CLAY, Sandy; brownish yellow; wet; very soft; fine grained sand							
88	612.44								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-37

Sheet 4 of 4

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 104.5 SURF.ELEV. 700.44

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89		CLAY, Sandy; brownish yellow; wet; very soft; fine grained sand							
90	610.44								
91		SAND, Clayey; yellow and brown; wet; fine grained with fragments of grey chert							
92									
93			CLAY, Sandy; yellow and brown; wet; fine to medium grained sand with chert and dolomite cobbles						
94									
95	605.44								
96									
97									
98									
99		SAND, Clayey; yellow and brown; wet; fine grained with fragments of grey chert							
100	600.44								
101									
102									
103		DOLOMITE; blue grey; hard; slightly weathered; fractured with iron staining							
104									
105	595.44	BOH @ 104.5' bgs							
106									
107									
108									
109									
110	590.44								
111									
112									
113									
114									
115	585.44								
116									
117									
118									
119									
120	580.44								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **713.32**
 Top of PVC Casing Elevation (feet, NAVD88): **716.24**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWA-38
LOGGER:	D. Brooks	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/13/2011			

		DEPTH FEET	ELEVATION FT,NAVD88
Locking Hinged Top	→		
	TOP OF RISER	2.92	716.24
1/4-inch Vent	→		
1/4-inch Weep Hole	→		
4-ft x 4-ft concrete pad	→		
	GROUND SURFACE	0.00	713.32
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 130 gallons		
	RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
	TOP OF SEAL	49.00	664.32
	ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1 - 50 lbs bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	53.00	660.32
	FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags / 50 lbs bags PLACEMENT: Wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	54.70	658.62
	SCREEN DIA: 2-inch inside/ 3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	64.70	648.62
Flush-threaded end cap	→		
	BOTTOM OF CASING	65.00	648.32
HOLE DIA: 6"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **713.32**
 Top of PVC Casing Elevation (feet, NAVD88): **716.24**

	DRILLING LOG			Hole No. GWA-38
	GEOLOGICAL SERVICES			Sheet 1 of 3
SITE Plant Bowen CCB Disposal Facility				
LOCATION Cells 3 and 4		COORDINATES N 1505501.33	HOLE DEPTH 76' SURF.ELEV. 713.32	
ANGLE 90	BEARING NA	CONTRACTOR Boart Longyear	DRILL NO. NA	
DRILLING METHOD Rotosonic		NO. SAMPLES Continuous	NO. U.D. SAMPLES NA	
CASING SIZE 6"	LENGTH NA	CORE SIZE 4"	TOTAL % REC. NA	
WATER TABLE DEPTH 45.15'		ELEV. 668.17	TIME AFTER COMP. 1 hour	DATE TAKEN 6/13/2011
TYPE GROUT NA		QUANTITY NA	MIX NA	DRILLING START DATE 6/13/2011
DRILLER Boart	RECORDER D. Brooks	APPROVED D. Brooks	DRILLING COMP. DATE 6/13/2011	

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	713.32	SAND, Silty; red and yellowish red; dry; very fine to fine grained							
1									
2									
3									
4									
5	708.32								
6									
7									
8		SAA except damp							
9									
10	703.32								
11		CLAY, Silty; white to pale yellow; damp; no plasticity							
12									
13									
14									
15	698.32								
16									
17									
18									
18		CLAY, Sandy, Silty; mottled pale yellow and brown; damp; no plasticity							
19									
20	693.32								
21									
22									
23									
24	689.32								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-38

Sheet 2 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 76' SURF.ELEV. 713.32

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	688.32	CLAY, Sandy, Silty; mottled pale yellow and brown; damp; no plasticity; contained 1' bed of white chert at 25.5 to 26.5 feet							
26									
27									
28									
29									
30	683.32	CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with pieces of weakly cemented sandstone							
31									
32									
33									
34									
35	678.32								
36									
37									
38									
39									
40	673.32								
41									
42									
43									
44									
45	668.32								
46									
47									
48		SAA							
49									
50	663.32								
51									
52									
53									
54									
55	658.32								
56									



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-38
Sheet 3 of 3

SITE Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL DEPTH 76' SURF.ELEV. 713.32

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	656.32	CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with pieces of weakly cemented sandstone							
58									
59									
60	653.32								
61									
62									
63		SAA with lenses of water bearing purple chert/ gravel							
64									
65	648.32								
66									
67									
68									
69									
70	643.32								
71									
72									
73		BOH @76' bgs							
74									
75	638.32								
76									
77									
78									
79									
80	633.32								
81									
82									
83									
84									
85	628.32								
86									
87									
88	625.32								

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **706.56**
 Top of PVC Casing Elevation (feet, NAVD88): **709.77**

WELL: GWA-52
 PAGE 1 OF 2
 ECS37738



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 4/7/2015 **COMPLETED** 4/21/2015 **SURF. ELEV.** 706.56 **COORDINATES:** N 1505459.85 E 2073876.0

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 80.96 ft. **GROUND WATER DEPTH: DURING** 67 ft. **COMP.** 55.75 ft. **DELAYED** 56.79 ft. after 100 hrs.

NOTES TOC Elevation 709.77, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA		NOTES
		ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
0		706.56	← Surface Seal: Concrete	
5		703.56		
10				
15				
20				
25			Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water)	
30				
35				
40				

(Continued Next Page)

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
			(CONTINUED)	
45			Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water)	
50				
55		652.56		
60			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (4 - 5gal buckets (67.9'-57.0')) and Baroid Hole Plug 3/8 Chips (1 - 50lbs bags (57.0'-54.0'))	
65				
70		637.76 636.06	Filter: Filter Media 1A Silica Sand (7 - 50 lbs bags)	
75			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
80		625.9 625.6	Sump: 0.30 ft. Cave-in to 80.96 ft.	
85				

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUP\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **706.56**
 Top of PVC Casing Elevation (feet, NAVD88): **709.77**



LOG OF TEST BORING

BORING GWA-52
 PAGE 1 OF 2
 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 4/7/2015 **COMPLETED** 4/21/2015 **SURF. ELEV.** 706.56 **COORDINATES:** N 1505459.85 E 2073876.0

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 80.96 ft. **GROUND WATER DEPTH: DURING** 67 ft. **COMP.** 55.75 ft. **DELAYED** 56.79 ft. after 100 hrs.

NOTES TOC Elevation 709.77, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
5		Silt (ML) - trace mottling red / moderate reddish brown (10R 4/6) and brown (7.5YR 5/4) fill moist, very stiff, interbedded clayey zones, trace coarse to cobble/subrounded to rounded rock fragments			Soil density gauged by thumb penetration			
10		Elastic Silt (MH) - mottled red (2.5YR 4/6) and brown (7.5YR 5/3) residuum moist, stiff to very stiff, low plastic, alternating interbedded zones of CL, trace coarse to very coarse/rounded to subrounded rock fragments						
20		Silt (ML) - dusky red / dark reddish brown (10R 3/4) residuum moist, very stiff, trace medium to coarse rock fragments - mottled dusky red (10R 3/3), red (10R 4/8) and light reddish brown / light brown (5YR 6/4) residuum moist, very stiff, trace medium to coarse/angular to subangular rock fragments						
30		Elastic Silt (MH) - mottled dark red (10R 3/6), red (10R 5/6) and light brown (7.5YR 6/4) residuum moist, very stiff to hard, low plastic, clayey silt with trace zones of interbedded CL						
35		Lean Clay (CL) - mottled dark red (10R 3/6) and reddish yellow (7.5YR 6/6) residuum moist, very stiff, low to medium plastic, some white to light gray with orangish brown stained/angular to subrounded/brittle to friable to hard dolomite fragments						
40								

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LOG OF TEST BORING

BORING GWA-52
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ECS37738

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SA\PC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma
45		<p>Lean Clay (CL) (Con't)</p> <p>- mottled reddish yellow (7.5YR 6/6) and red / moderate reddish brown (10R 4/6) residuum moist, stiff to very stiff, medium plastic, trace coarse to very coarse/rounded to subangular rock fragments</p>				55 110 165
50						
55		<p>Silt (ML)</p> <p>- brownish yellow / dark yellowish orange (10YR 6/6), very pale brown / very pale orange (10YR 8/2) and light red (2.5YR 6/6) residuum moist, stiff to very stiff, interbedded clay lenses, abundant light gray to white to light brown/coarse to very coarse/subrounded to angular dolomite and chert fragments</p> <p>▽ ▽</p>				
60						
65		<p>- mottled reddish brown (5YR 4/3) and reddish brown (2.5YR 4/3) residuum wet, very stiff, trace very coarse/angular to subangular chert and dolomite fragments</p> <p>▽</p>				
70		<p>- trace mottled brownish yellow (10YR 6/8) and red (10R 5/8) residuum wet, medium stiff to stiff, trace interbedded clay, zone of fine to medium grained 5YR 6/8 reddish yellow SM @ approx. 70.5-71'</p>				
75		<p>Lean Clay (CL)</p> <p>- red (10R 4/8) residuum wet, soft, low to medium plastic, some interbedded CH, trace zones of light gray angular dolomite fragments</p>				
80		<p>Dolomite with Chert fragments</p>				
Bottom of borehole at 81.0 feet.						
85						

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.61**
 Top of PVC Casing Elevation (feet, NAVD88): **710.99**

WELL: GWA-53
 PAGE 1 OF 4
 ECS37738



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/26/2015 **COMPLETED** 4/10/2015 **SURF. ELEV.** 707.61 **COORDINATES:** N 1505695.52 E 2074038.90
CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT
DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____
BORING DEPTH 117.85 ft. **GROUND WATER DEPTH: DURING** 53.5 ft. **COMP.** 56 ft. **DELAYED** 59.15 ft. after 100 hrs.
NOTES TOC Elevation 710.99, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA		NOTES
		ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
		707.61		
		704.61	← Surface Seal: Concrete	
5				
10				
15				
20				
25				
30				

Annular Fill: Portland Cement-Bentonite Grout (39 - 47lbs bags PC, 3 - 50lbs bags Gel, 255 gal. Water)

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\SUPPORTING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA		NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad		
70			(CONTINUED)		
75					
80					
85					
90					
95					
100					
105		602.61		Filter: Filter Media 1A Silica Sand (4.5 - 50 lbs bags)	

Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (105.5'-94.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (94.0'-55.0'))

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4



Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.61**
 Top of PVC Casing Elevation (feet, NAVD188): **710.99**

BORING GWA-53
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LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/26/2015 **COMPLETED** 4/10/2015 **SURF. ELEV.** 707.61 **COORDINATES:** N 1505695.52 E 2074038.90

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 117.85 ft. **GROUND WATER DEPTH: DURING** 53.5 ft. **COMP.** 56 ft. **DELAYED** 59.15 ft. after 100 hrs.

NOTES TOC Elevation 710.99, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
5		<p>Silt (ML)</p> <p>- mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, some light gray to white/angular to subangular dolomite fragments</p>			SPT N=42bpf(@3ft.) 12/18/24			
10		<p>- mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, trace white/medium to coarse/angular dolomite fragments</p>			SPT N=32bpf(@8ft.) 7/15/17			
15		<p>- mottled yellowish red (5YR 5/8) and red (10R 4/8) residuum dry, very stiff, abundant white with orangish staining/coarse/angular to subangular dolomite fragments</p>			SPT N=21bpf(@13ft.) 8/9/12			
20		<p>Elastic Silt (MH)</p> <p>- mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) residuum dry, very stiff, low plastic, abundant coarse/angular to subangular/very brittle to friable dolomite fragments, trace light gray interbedded clay lenses</p>			SPT N=19bpf(@18ft.) 6/9/10			
25		<p>- mottled brownish yellow (10YR 6/8) and red / moderate reddish brown (10R 4/6) residuum moist, very stiff, low plastic, trace light gray angular dolomite and chert fragments</p>			SPT N=20bpf(@23ft.) 6/6/14			
30		<p>Silt (ML)</p> <p>- trace mottling reddish yellow (7.5YR 7/8), reddish yellow (7.5YR 7/8) and brownish yellow (10YR 6/8) residuum moist, stiff, trace clay and rock fragments</p>			SPT N=11bpf(@28ft.) 3/5/6			

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LOG OF TEST BORING

BORING GWA-53
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORK\GROU\SP\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
		Silt (ML) (Con't)						
35		Elastic Silt (MH) - trace mottling strong brown (7.5YR 5/8) and reddish yellow (7.5YR 7/8) residuum moist, very stiff, low plastic, abundant light gray/angular dolomite and dark bluish gray to brown chert fragments			SPT N=27bpf(@33ft.) 20/18/9			
40		- mottled strong brown (7.5YR 5/8) and red / moderate reddish brown (10R 4/6) residuum moist, stiff, low plastic, trace dark gray to light gray/coarse/subangular chert and dolomite fragments			SPT N=13bpf(@38ft.) 10/4/9			
45		Silt (ML) - mottled brown (7.5YR 4/4) and reddish yellow (7.5YR 6/6) residuum moist, stiff, abundant medium to coarse/subrounded dolomite fragments, trace dark gray/coarse/subangular to subrounded chert fragments			SPT N=14bpf(@43ft.) 8/6/8			
50		- reddish yellow (7.5YR 6/8) residuum moist, stiff, dark brown angular chert fragments, trace clay			SPT N=13bpf(@48ft.) 4/7/6			
55		▽ Elastic Silt (MH) - mottled strong brown (7.5YR 5/8) and reddish yellow (7.5YR 7/8) residuum wet, very stiff, low plastic, subangular to subrounded chert and dolomite fragments			SPT N=19bpf(@53ft.) 7/8/11			
60		▽ - yellowish red (5YR 5/8) residuum wet, soft, low plastic, cohesive, trace rock fragments			SPT N=2bpf(@58ft.) 1/1/1			
65		Lean Clay (CL) - yellowish red (5YR 5/8) residuum wet, very soft, low to medium plastic, trace rock fragments			SPT N=0bpf(@63ft.) WOH			

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LOG OF TEST BORING

BORING GWA-53
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUP\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
70		Lean Clay (CL) (Con't) - yellowish red / light brown (5YR 5/6) wet, very soft, low plastic to medium plastic, cohesive, abundant dark brown chert fragments			SPT N=0bpf(@68ft.) WOH			
75		Dolostone - light gray (N7) and light bluish gray (10B 7/1) very fine to fine grain, medium hard to hard, slightly to moderately weathered, massive, moderate- to high-angle fractures visible, moderate to partial healing, trace total and no healing visible, staining visible within fractures from approx. 71-72', core pieces stained from approx. 72-77.5', trace calcite fracture fill visible, trace dark brown interbedded chert			Degree of fracturing and fracture orientation unknown due to sonic drilling method			
80		VOID - possible solution cavity (77.5-100') - approx. 8' of mud and rock fragments recovered, thin chert/dolomite ledge @ approx. 89-90'						
85								
90								
95								
100								
105		Dolostone - bluish gray (10B 5/1) very fine to fine grain, hard, not to slightly weathered, massive, moderate- to high-angle fractures visible, trace low-angle fractures, moderate to full healing, no visible staining within healed fractures, trace staining visible from approx. 106-108', no to few open fractures visible, calcite fracture fill visible approx. 1-2mm in thickness						

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **708.38**
 Top of PVC Casing Elevation (feet, NAVD88): **711.58**



LOG OF WELL CONSTRUCTION

WELL: GWA-53R
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 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/30/2015 **COMPLETED** 4/10/2015 **SURF. ELEV.** 708.38 **COORDINATES:** N 1505689.06 E 2074032.00

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 165.44 ft. **GROUND WATER DEPTH: DURING** 55 ft. **COMP.** 63.4 ft. **DELAYED** 59.81 ft. after 100 hrs.

NOTES TOC Elevation 711.58, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA		NOTES
		ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
0		708.38	← Surface Seal: Concrete	
5		705.38		
10				
15				
20				
25				
30				

Annular Fill: Portland Cement-Bentonite Grout (28 - 47lbs bags PC, 2 - 50lbs bags Gel, 120 gal. Water)

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

WELL: GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
			(CONTINUED)	
35				
40				
45				
50				
55		656.38		
60			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (153.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (140.0'-52.0'))	
65				

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

WELL: GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA Completion: Protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)	NOTES
70				
75				
80				
85			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (153.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (140.0'-52.0'))	
90				
95				
100				

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

WELL: GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
105			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)	
110				
115				
120			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (153.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (140.0'-52.0'))	
125				
130				
135				

(Continued Next Page)

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

WELL: GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA	NOTES
140		(CONTINUED) Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
145		Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (153.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (140.0'-52.0'))	
150		Filter: Filter Media 1A Silica Sand (5 - 50 lbs bags)	
155		Standpipe: 2" OD PVC (SCH 40) Screen: 11 ft; 0.010" Slot Prepack	
160		Sump: 0.30 ft. Cave-in to 165.44 ft.	
165		Elevation markers: 555.38, 554.38, 543.24, 542.94	
170			

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROU\SPAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **708.38**
 Top of PVC Casing Elevation (feet, NAVD88): **711.58**



LOG OF TEST BORING

BORING GWA-53R
 PAGE 1 OF 5
 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/30/2015 **COMPLETED** 4/10/2015 **SURF. ELEV.** 708.38 **COORDINATES:** N 1505689.06 E 2074032.00

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 165.44 ft. **GROUND WATER DEPTH: DURING** 55 ft. **COMP.** 63.4 ft. **DELAYED** 59.81 ft. after 100 hrs.

NOTES TOC Elevation 711.58, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION	COMMENTS	Natural Gamma		
						Weak Moderate Strong	55	110
5		<p>Elastic Silt (MH) - dusky red (10R 3/3) fill dry, very stiff, trace organics and medium to coarse/subangular to subrounded rock fragments</p> <p>Silt (ML) - red / moderate reddish brown (10R 4/6) and red (10R 5/8) residuum dry, very stiff, zone of brittle to friable light gray rock fragments @ approx. 6-7', trace clay</p> <p>- mottled yellowish red (5YR 5/8) and brownish yellow / dark yellowish orange (10YR 6/6) residuum dry, very stiff, medium to coarse/angular to subangular dolomite fragments, trace clay</p>			Soil density gauged by thumb penetration 			
10		<p>Elastic Silt (MH) - mottled strong brown (7.5YR 5/8) and red (10R 5/8) residuum dry, very stiff to hard, low plastic, interbedded sandy CL, zone of decreased clay to silt and rock fragments @ approx. 13-14', abundant very coarse/subangular/light gray dolomite fragments</p> <p>- mottled reddish yellow (7.5YR 6/6) and red / moderate reddish brown (10R 4/6) residuum dry, very stiff, low plastic, abundant light gray to white/very coarse to cobble/angular to subangular dolomite fragments, light gray to brown chert fragments</p>						
15								
20								
25								
30		<p>Silt (ML) - mottled strong brown (7.5YR 5/6), pink (7.5YR 7/4) and red (2.5YR 5/8) residuum moist, stiff, interbedded zones of ML, abundant light gray to white/medium to coarse dolomite and chert fragments, rubble zone of very coarse to cobble size @ approx. 35-36'</p>						

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-53R
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 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CB CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
35		Silt (ML) (Con't)						
40		- trace mottling strong brown (7.5YR 5/6) and red (2.5YR 4/8) residuum moist, stiff, decrease in rock fragments from above, light gray/coarse to very coarse/angular to subangular dolomite fragments, trace chert fragments						
45								
50		- trace mottling strong brown (7.5YR 5/6) and red (10R 5/8) residuum moist to wet, stiff, abundant coarse/angular to subangular dolomite and chert fragments, rock lens/ledge of dolomite with trace chert @ approx. 54-55' with coarse to large cobble size pieces recovered, trace interbedded clay lenses						
55		Lean Clay (CL)						
60		▽ - reddish brown (2.5YR 4/3) residuum wet, soft, low to medium plastic, cohesive, trace coarse/angular to subangular dolomite and chert fragments, limited recovery						
65								

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\ICB CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
70		Lean Clay (CL) (Con't) - No Recovery (67-77')						
75								
80		Silt (ML) - reddish yellow (5YR 6/8) residuum wet, soft, mud-filled void, limited recovery, abundant coarse to very coarse dolomite and chert fragments, cohesive						
85								
90		Dolostone			Limited Recovery			
		VOID - possible solution cavity (91-95')						
95		Dolostone with interbedded Chert - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, medium hard, moderately weathered, massive, trace apparent high-angle fractures, partial healing, some calcite fracture fill visible, some light brown to orangish-brown mud staining, dark gray to dark brown chert, chert decreasing with depth			Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered			
100		VOID - possible solution cavity (100-104')						

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-53R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SPAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CB CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
		VOID - possible solution cavity (100-104') (Con't)						
105		Dolostone - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, medium hard, moderately weathered, massive, trace moderate- to high-angle fractures from core pieces recovered, no visible evidence of healing (no visible fracture fill), zone of moderately healed fractures and pitting @ approx. 106', heavily stained mud @ approx. 108-110'			Few intact core pieces recovered			
110		VOID - possible solution cavity (110-117') - mud and rock fragment-filled void, rock fragments range from cobble to coarse to very coarse with depth						
115								
120		Dolostone - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, medium hard, moderately weathered, trace fragments show low- to high-angle fractures, moderately to not healed fractures, calcite fracture fill visible, trace fully healed fractures visible, where sonic broke up the rock trace calcite crystallization is visible, visible light brown to orangish brown mud staining on some fragments			Limited Recovery			
125		VOID - possible solution cavity (122-125') - no recovery						
130		Dolostone - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fine to fine grain, medium hard, moderately weathered, mud coating rock fragments from approx. 129-130'			Limited Recovery			
135		VOID - possible solution cavity (130-143') - mud and rock fragment filled void						

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **701.23**
 Top of PVC Casing Elevation (feet, NAVD188): **704.23**

WELL: GWA-54
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LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/25/2015 **COMPLETED** 4/14/2015 **SURF. ELEV.** 701.23 **COORDINATES:** N 1505853.39 E 2074286.28

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 73.17 ft. **GROUND WATER DEPTH: DURING** 58 ft. **COMP.** 55 ft. **DELAYED** 51.05 ft. after 100 hrs.

NOTES TOC Elevation 704.23, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA		NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad		
		701.23			
		698.23		← Surface Seal: Concrete	
5					
10					
15					
20					
25					
30					
35					

Annular Fill: Portland Cement-Bentonite Grout (20 - 47lbs bags PC, 2.25 - 50lbs bags Gel, 120 gal. Water)

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
			(CONTINUED)	
40				
45				
50				
55		647.23		
60		640.23	Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (2 - 5gal buckets (60.9'-54.0'))	
		638.23	Filter: Filter Media 1A Silica Sand (8 - 50 lbs bags)	
65				
70			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
		628.36		
		628.06	Sump: 0.30 ft. Cave-in to 73.17 ft.	
75				
80				

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **701.23**
 Top of PVC Casing Elevation (feet, NAVD188): **704.23**



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/25/2015 **COMPLETED** 4/14/2015 **SURF. ELEV.** 701.23 **COORDINATES:** N 1505853.39 E 2074286.28

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 73.17 ft. **GROUND WATER DEPTH: DURING** 58 ft. **COMP.** 55 ft. **DELAYED** 51.05 ft. after 100 hrs.

NOTES TOC Elevation 704.23, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORK\GROU\SP\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
5		<p>Silt (ML) - red / moderate reddish brown (10R 4/6) fill moist, hard, trace organics and interbedded clay lenses</p> <p>- dark red (10R 3/6) and dusky red / dark reddish brown (10R 3/4) residuum moist, very stiff, white to light gray/medium to coarse/angular rock fragments, trace clay</p>			Soil density gauged by thumb penetration			
10		<p>- mottled red (10R 5/8) and reddish yellow (5YR 7/8) residuum moist, very stiff, white to light gray/coarse to cobble/angular to subangular dolomite fragments, amount and size of rock fragments increases with depth, trace interbedded clay lenses</p>						
15								
20		<p>Elastic Silt (MH) - mottled reddish yellow (5YR 6/8) and red (10R 4/8) residuum dry, very stiff, low plastic, abundant light gray to white/angular to subrounded rock fragments, clay content increasing with depth</p>						
25								
30		<p>- trace mottling strong brown (7.5YR 5/6) and red (10R 5/8) residuum moist, stiff to very stiff, low plastic, interbedded CL, decrease in amount of dolomite fragments, increase in size of dolomite fragments, trace dark gray angular chert fragments</p>						
35								

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **693.43**
 Top of PVC Casing Elevation (feet, NAVD188): **696.72**

WELL: GWA-55
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LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/18/2015 **COMPLETED** 4/15/2015 **SURF. ELEV.** 693.43 **COORDINATES:** N 1506034.69 E 2074507.04

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 62.42 ft. **GROUND WATER DEPTH: DURING** 40.5 ft. **COMP.** 42.8 ft. **DELAYED** 43.59 ft. after 100 hrs.

NOTES TOC Elevation 696.72, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
		693.43	<p>Completion: Protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>← Surface Seal: Concrete</p> <p>Annular Fill: Portland Cement-Bentonite Grout (26 - 47lbs bags PC, 2.5 - 50lbs bags Gel, 150 gal. Water)</p>	
		691.43		
5				
10				
15				
20				
25				

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
			(CONTINUED)	
30				
35			Annular Fill: Portland Cement-Bentonite Grout (26 - 47lbs bags PC, 2.5 - 50lbs bags Gel, 150 gal. Water)	
40				
45		650.43		
			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (4 - 5gal buckets (50.4'-43.0'))	
50		642.93		
			Filter: Filter Media 1A Silica Sand (5 - 50 lbs bags)	
		641.43		
55			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA	NOTES
60		<p>(CONTINUED)</p> <p>Completion: Protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack</p> <p>Sump: 0.30 ft. Cave-in to 62.42 ft.</p>	
65			
70			
75			
80			
85			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **693.43**
 Top of PVC Casing Elevation (feet, NAVD188): **696.72**

BORING GWA-55
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LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

DATE STARTED 3/18/2015 COMPLETED 4/15/2015 SURF. ELEV. 693.43 COORDINATES: N 1506034.69 E 2074507.04

CONTRACTOR Cascade Drilling EQUIPMENT 7868 METHOD Sonic

DRILLED BY J. Sigler LOGGED BY B. Smelser CHECKED BY L. Millet ANGLE BEARING

BORING DEPTH 62.42 ft. GROUND WATER DEPTH: DURING 40.5 ft. COMP. 42.8 ft. DELAYED 43.59 ft. after 100 hrs.

NOTES TOC Elevation 696.72, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet.

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUP\SPAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
5		<p>Silt (ML) - mottled red / moderate reddish brown (10R 4/6) and dark reddish gray (10R 3/1) fill dry, hard, trace organics, clay, and medium to coarse/angular to subangular rock fragments</p> <p>- dusky red / dark reddish brown (10R 3/4) and weak red (10R 4/4) residuum dry, very stiff, increase in rock fragments with depth, white to light gray with brown staining/angular to subangular dolomite fragments, trace interbedded CL</p> <p>- increase in size of rock fragments, very coarse to cobble size</p> <p>- mottled red (10R 4/8) and reddish yellow (5YR 6/8) residuum dry, very stiff, abundant white to pinkish white/coarse to very coarse/angular to subangular dolomite fragments</p>						
20		<p>Elastic Silt (MH) - trace mottling strong brown (7.5YR 5/8) and red (2.5YR 4/8) residuum dry, very stiff, low plastic, red mottling decreasing with depth, zones of mostly weathered rock fragments @ approx. 21' and 23.5', abundant white to light gray/angular to subangular dolomite fragments</p>						
25								

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LOG OF TEST BORING

BORING GWA-55
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUP\SPAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma
						55 110 165
30		Elastic Silt (MH) (Con't) - mottled dark reddish brown (2.5YR 3/4) and yellowish red (5YR 5/8) residuum moist, very stiff, low plastic, interbedded CL lenses, decrease in dolomite fragments, increase in light to dark brown/angular chert fragments				
35		Lean Clay (CL) - yellowish red (5YR 4/6) residuum moist, very stiff, low to medium plastic, interbedded silt lenses, dark to light brown/angular chert fragments, trace dolomite fragments, zone of interbedded 10YR 8/8 yellow silt @ approx. 36-36.5'				
40		▽ - mottled reddish brown / moderate brown (5YR 4/4) and dark reddish brown (2.5YR 3/4) residuum wet, stiff, medium plastic, dark brown angular chert fragments, trace interbedded CH and coarse subangular dolomite fragments				
45		Dolostone with trace chert - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fine to medium grain, medium hard, moderately weathered, massive, visible fully healed fractures with calcite fracture fill, high-angle (vertical) fractures with trace low-angle fractures, some samples show bisecting healed fractures, fractures range from 1-2mm to few 4-6mm, some partially healed fractures observed VOID - possible solution cavity (48'-52')			Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered	
50		Dolostone - light gray (N7) and light bluish gray (10B 7/1) very fine to fine grain, medium hard, moderately to highly weathered, moderate- to high-angle fractures, partial to full healing visible, calcite fracture fill visible, healed fractures range from 1-2mm to 3-4mm thick, trace very coarse calcite crystals visible @ 53' within heavily fractured zone, driller				
55						

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **693.28**
 Top of PVC Casing Elevation (feet, NAVD188): **696.53**



LOG OF WELL CONSTRUCTION

WELL: GWA-55R
 PAGE 1 OF 3
 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/11/2015 **COMPLETED** 4/15/2015 **SURF. ELEV.** 693.28 **COORDINATES:** N 1506034.69 E 2074507.04

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** _____ **BEARING** _____

BORING DEPTH 102.83 ft. **GROUND WATER DEPTH: DURING** 38.5 ft. **COMP.** 41.55 ft. **DELAYED** 43.47 ft. after 100 hrs.

NOTES TOC Elevation 696.53, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA		NOTES
		ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
		693.28		
		691.28		
5				
10				
15				
20				
25				
30				
35				

← Surface Seal: Concrete

Annular Fill: Portland Cement-Bentonite Grout (40 - 47lbs bags PC, 4.5 - 50lbs bags Gel, 205 gal. Water)

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



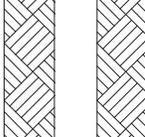
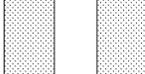
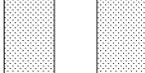
LOG OF WELL CONSTRUCTION

WELL: GWA-55R
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 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
40			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
45		646.78	(CONTINUED) 	Annular Fill: Portland Cement-Bentonite Grout (40 - 47lbs bags PC, 4.5 - 50lbs bags Gel, 205 gal. Water)
50				
55				
60				
65				Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (7 - 5gal buckets (91.0'-78.0')) and Baroid Hole Plug 3/8 Chips (14 - 50lbs bags (78.0'-46.5'))
70				
75				
80				

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WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

WELL: GWA-55R
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SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells

LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA	NOTES
		(CONTINUED) Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
85			
90		Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (7 - 5gal buckets (91.0'-78.0')) and Baroid Hole Plug 3/8 Chips (14 - 50lbs bags (78.0'-46.5'))	
95		Filter: Filter Media 1A Silica Sand (8.75 - 50 lbs bags)	
100		Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
105		Sump: 0.30 ft. Cave-in to 102.83 ft.	
110			
115			
120			
125			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **693.28**
 Top of PVC Casing Elevation (feet, NAVD188): **696.53**



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DATE STARTED 3/11/2015 **COMPLETED** 4/15/2015 **SURF. ELEV.** 693.28 **COORDINATES:** N 1506034.69 E 2074507.04

CONTRACTOR Cascade Drilling **EQUIPMENT** 7868 **METHOD** Sonic; SPT

DRILLED BY J. Sigler **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 102.83 ft. **GROUND WATER DEPTH: DURING** 38.5 ft. **COMP.** 41.55 ft. **DELAYED** 43.47 ft. after 100 hrs.

NOTES TOC Elevation 696.53, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
5		Silt (ML) - red / moderate reddish brown (10R 4/6) residuum moist, very stiff, trace clay and subrounded coarse sand			SPT N=26bpf(@3ft.) 6/10/16			
10		- mottled red (10R 5/8) and reddish yellow (5YR 6/8) residuum dry, hard, trace clay and subrounded coarse sand			SPT N=34bpf(@8ft.) 8/14/20			
15		- mottled strong brown (7.5YR 5/8), light gray (10YR 7/1) and red (10R 5/6) residuum dry, hard, increase in clay content within mottled zones, trace white to light gray/angular rock fragments			SPT N=33bpf(@13ft.) 10/14/19			
20		- mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum dry, hard, light gray angular chert fragments			SPT N=41bpf(@18ft.) 12/24/17			
25		Elastic Silt (MH) - mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum moist, very stiff, low plastic, light gray with yellowish staining/angular rock fragments			SPT N=24bpf(@23ft.) 7/10/14			
30		- mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum moist, very stiff, low plastic, light gray/coarse/angular to subangular chert and dolomite fragments			SPT N=24bpf(@28ft.) 7/9/15			
35		Lean Clay (CL) - mottled reddish yellow (5YR 6/8) and red (10R 5/8) residuum moist, very stiff, low to medium plastic, gray angular to subrounded chert fragments			SPT N=22bpf(@33ft.) 4/13/9			

(Continued Next Page)

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4



LOG OF TEST BORING

BORING GWA-55R
PAGE 2 OF 3
ECS37738

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORK\GROU\SP\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma
40		Lean Clay (CL) (Con't) ▽ - yellowish red (5YR 5/8) residuum wet, very stiff, low to medium plastic, trace chert fragments			SPT N=16bpf(@38ft.) 5/7/9	
45		▽ Fat Clay (CH) - yellowish red (5YR 5/8) residuum wet, very stiff, medium to high plastic, trace light gray rock fragments			SPT N=17bpf(@43ft.) 7/9/8	
50		Dolostone - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fine to fine grain, medium hard, slightly to moderately weathered, some visible high-angle fractures with calcite fracture fill, full healing, trace chert			Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered	
55		VOID - possible solution cavity (53'-58') - some orangish mud with rock fragments recovered from void				
60		Chert with Dolostone - bluish black (10B 2.5/1), dark brown (10YR 3/3) and light bluish gray (10B 7/1) very fine to fine grain, medium hard, moderately to highly weathered				
65		VOID - possible solution cavity (61'-63')				
70		Chert with Dolostone - trace fully healed fractures, calcite fracture fill, very limited recovery, some orangish mud staining visible				
75		VOID - possible solution cavity (66'-78')				
80		Dolostone with Chert - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fine to fine grain, medium hard, not to moderately weathered, visible fully healed fractures, calcite fracture fill, moderate- to high- angle				

(Continued Next Page)

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **689.14**
 Top of PVC Casing Elevation (feet, NAVD188): **692.17**

WELL: GWA-56
 PAGE 1 OF 3
 ECS37738



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

DATE STARTED 4/14/2015 COMPLETED 4/16/2015 SURF. ELEV. 689.14 COORDINATES: N 1506128.38 E 2074633.08
 CONTRACTOR Cascade Drilling EQUIPMENT 7868 METHOD Sonic
 DRILLED BY J. Sigler LOGGED BY B. Smelser CHECKED BY L. Millet ANGLE _____ BEARING _____
 BORING DEPTH 82.96 ft. GROUND WATER DEPTH: DURING 43 ft. COMP. 38.8 ft. DELAYED 39.02 ft. after 100 hrs.
 NOTES TOC Elevation 692.17, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	WELL DATA		NOTES
		ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
0		689.14		
5		685.14		
10				
15				
20				
25				
30				

← Surface Seal: Concrete

← Annular Fill: Portland Cement-Bentonite Grout (12 - 47lbs bags PC, 1 - 50lbs bags Gel, 65 gal. Water)

(Continued Next Page)

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICGB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA	NOTES
35 40 45 50 55 60 65		654.14	<p style="text-align: center;">(CONTINUED)</p> <p>Completion: Protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>Annular Fill: Portland Cement-Bentonite Grout (12 - 47lbs bags PC, 1 - 50lbs bags Gel, 65 gal. Water)</p> <p>Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (5 - 5gal buckets (69.8'-60.0')) and Baroid Hole Plug 3/8 Chips (10 - 50lbs bags (60.0'-35.0'))</p>	

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **689.14**
 Top of PVC Casing Elevation (feet, NAVD88): **692.17**

BORING GWA-56
 PAGE 1 OF 3
 ECS37738



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
 LOCATION Cartersville, GA

DATE STARTED 4/14/2015 COMPLETED 4/16/2015 SURF. ELEV. 689.14 COORDINATES: N 1506128.38 E 2074633.08
 CONTRACTOR Cascade Drilling EQUIPMENT 7868 METHOD Sonic
 DRILLED BY J. Sigler LOGGED BY B. Smelser CHECKED BY L. Millet ANGLE _____ BEARING _____
 BORING DEPTH 82.96 ft. GROUND WATER DEPTH: DURING 43 ft. COMP. 38.8 ft. DELAYED 39.02 ft. after 100 hrs.
 NOTES TOC Elevation 692.17, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core Well installed. Refer to well data sheet.

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPO\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
0 - 5		Silty Clay (CL-ML) - dusky red / dark reddish brown (10R 3/4) fill dry, very stiff to hard, low plastic			Soil density gauged by thumb penetration			
5 - 10		Silt (ML) - dusky red / dark reddish brown (10R 3/4) fill dry, very stiff, trace interbedded clay lenses and medium to coarse/subangular to subrounded/brittle to friable dolomite fragments - trace mottling red (10R 5/6) and light brown (7.5YR 6/4) residuum dry, very stiff, white with reddish staining/medium to very coarse/angular to subangular dolomite fragments, trace chert fragments						
10 - 20		Elastic Silt (MH) - mottled red (10R 4/8), yellowish red (5YR 5/8) and light gray (10YR 7/1) residuum moist, very stiff to stiff, low plastic, white to light gray interbedded ML, light gray clayey zones have increased plasticity, trace light gray to white angular dolomite and chert fragments						
20 - 30		Gravelly Lean Clay (CL) - trace mottling yellowish red (5YR 5/8) and red (2.5YR 4/8) residuum moist, very stiff to stiff, low to medium plastic, abundant gray to dark brown/medium cobble/angular to subangular chert fragments, trace dolomite fragments						

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-56
 PAGE 2 OF 3
 ECS37738

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 3 & 4 Wells
LOCATION Cartersville, GA

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:25 - S:\WORKGROUPO\SP\GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\ICB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma		
						55	110	165
35		Gravelly Lean Clay (CL) (Cont')						
40								
45		Sandy Lean Clay (CL) - red (2.5YR 5/8) and reddish yellow (7.5YR 6/6) residuum wet, medium stiff to soft, low to medium plastic, trace very coarse to cobble size angular chert fragments						
		Chert (ledge)			Limited Recovery			
50		VOID - possible solution cavity (48'-68') - mud filled void, no recovery						
55								
60								
65								

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **729.57**
 Top of PVC Casing Elevation (feet, NAVD88): **732.62**



LOG OF TEST BORING

BORING GWA-39RZ
 PAGE 1 OF 4
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

DATE STARTED 11/3/2016 COMPLETED 11/4/2016 SURF. ELEV. 729.57 ft NAVD88 COORDINATES: N:1502618.73 E:2071164.20

CONTRACTOR Cascade EQUIPMENT PS T-150 METHOD _____

DRILLED BY Tommy and Rodger LOGGED BY D. Morris* CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 137 ft bgs GROUND WATER DEPTH: DURING _____ COMP. 96 ft bgs DELAYED 73.22 ft.; 26 days

NOTES *Sample Logged by geologist employed by Amec Foster Wheeler

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						ELEV. (DEPTH)
5		- SILT (ML), red and beige (5 YR 8/2 - 5/8), stiff, dry				Annular Fill: Aquaguard Grout Mixture
10		- same as above, stiff, dry				
15						
20		- same as above, stiff, dry				
25			704.6			
30		- CLAY (CL), white and gray (5 YR 8/1 - 8/2), low plasticity, slightly moist				
35						
38		- SILT (ML), light orange (5 YR 7/8), stiff, moist	693.6			
39		- CLAY (CL), light brown, moist	692.6			
40						

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

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LOG OF TEST BORING

BORING GWA-39RZ
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 6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						(CONTINUED)	ELEV. (DEPTH)
		(Cont.)					Annular Fill: Aquaguard Grout Mixture
45							
50		- same as above, light brown to white (5 YR 8/1 - 6/6), low plasticity, chert nodules and lenses, moist					
55							
60		- same as above, (5 YR 8/1), moist					
65							Annular Seal: 3/8" bentonite chips
70		- same as above, orangish brown (5 YR 6/6), very moist					
75		- sandy CLAY (CL), orangish brown (5 YR 6/6), black layering	654.6				
80							
85							
		- NO RECOVERY	642.6				

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-39RZ
 PAGE 3 OF 4
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA		
						(CONTINUED)	ELEV. (DEPTH)	
90		(Cont.) - sandy CLAY (CL), orangish brown (7.5 YR 5/6), gravel, stiff, very moist	640.6				Annular Seal: 3/8" bentonite chips	
		- CLAY with gravel (CL), white (7.5 YR 8/1), stiff, saturated	638.6					
95								
100		- competent DOLOMITE, gray, wet	630.6					
105		- same as above						
110		- same as above						
115								
120		- same as above, white siliceous veins					Annular Seal: 3/8" bentonite pellets (non-coated)	610.6 (119.0)
125							Filter: silica filter sand	605.6 (124.0)
130		- same as above, white siliceous veins					Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack	602.6 (127.0)
135								

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-39RZ
 PAGE 4 OF 4
 6122160287

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen
 LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
						CONTINUED	ELEV. (DEPTH)
	/	(Cont.)	592.6				Completion: Protective casing set in concrete pad; 2-foot square concrete pad
140		Bottom of borehole at 137.0 feet.					
145							
150							
155							
160							
165							
170							
175							
180							

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN - SOUTHERN COMPANY.GPJ

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	CCB Disposal	DRILLING CO.:	Boart Longyear	WELL NAME
		DRILLER:	Boart	
LOCATION:	Cells 9 and 10	RIG TYPE:	Rotosonic	GWA-40
LOGGER:	D Brooks	DRILLING METHODS:	RotoSonic	
DATE CONSTRUCT	6/7/2011			

	DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top → TOP OF RISER	2.84	731.77
1/4-inch Vent → 1/4-inch Weep Hole → 2-ft x 2-ft concrete pad → 2" Threaded Riser Cap GROUND SURFACE	0.00	728.93
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement Grout RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
TOP OF SEAL	133.20	595.73
ANNULAR SEAL TYPE: Bentonite chips PLACEMENT: Tremie TOP OF FILTER PACK	137.70	591.23
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	139.90	589.03
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted		
BOTTOM OF SCREEN	149.90	579.03
Flush-threaded end cap → BOTTOM OF CASING	150.20	578.73
HOLE DIA: 6"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **728.93**
 Top of PVC Casing Elevation (feet, NAVD88): **731.77**



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED _____ COMPLETED _____ SURF. ELEV. 728.93 COORDINATES: N:1503195.09 E:2071299.94

CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD Rotosonic

DRILLED BY _____ LOGGED BY G. Dyer CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 153 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED _____

NOTES Well installed. Refer to well data sheet.

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
5		- Gravelly Sand; mottled white, gray, tan and brown; sand estimated to be 55%, gravel at 45% and silts and clays at 10%; gravel is subrounded quartz, chert and calcite; probably flood deposits; weakly cemented to cemented						
10		- SAA; less mottling of color, more red-brown; dry; fragments more subangular						
15		- Sandy Silt; red-brown, few subangular fragments of quartz, chert and dolomite; dry	716					
20		- Zone of white, clayey silt	709					
		- Sandy Silt; red-brown, few subangular fragments of quartz, chert and dolomite; dry	708					
		- Clayey silt; mostly white but veins of brown-red mud cut through silt layers; Slightly damp; shows pressure/dissolution features	707					
25		- Clayey silt; mostly white but veins of brown-red mud cut through silt layers; Slightly damp; shows pressure/dissolution features	703					
30		- mottled tan, white and brown Gravelly Sand with prevalent fines; gravels are very large and angular quartz; slightly damp	698					
35		- Clayey Silt; white to brown-tan and orange with interbedded layers of fine sand; few gravels (dolomitic and subangular); slightly damp, medium to high plasticity; very strong/hard	693					
40		- Gravelly Clay; tan and orange, contains sands less than 10%, low plasticity clay, gravel is subangular and cherty						

(Continued Next Page)



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		(cont)	688					
45		- Clayey Silt; white, gray, tan and orange; clay is low plasticity; gravel is angular chert; sand less than 5%						
50		- Silty clay with gravel, tan and orange, clay is low plasticity, damp						
55								
60		- Clayey silt to Silty Clay; tan and white, moist, low plasticity, few gravel sized fragments, moist						
65		- Gravelly silt to Gravelly clayey silt; tan, white and gray; pressure solution features, banding and flow paths; wet, low plasticity	667					
70		- Clayey Silt and Silty Clay with few dolomitic gravels; tan, gray and white; very damp; low plasticity	660					
75								
80		- Gravelly Sand; mottled tan, orange, gray and white; dry	653					
			651					
85		- Clayey Silt to Silty Clay with slight gravel content; tan and white; banding present; sand content increases with depth						
		- Clayey Silt to Silty Clay; tan to white with some						

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-40
PAGE 3 OF 4

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
90		manganese staining (black); damp; medium to low plasticity; infrequent gravel beds <i>(cont)</i>						
95								
100								
105			623					
110		- Gravelly sand and sandy gravel; tan, gray and white; wet						
115								
120								
125								
130								

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-40
PAGE 4 OF 4

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
135		(cont)	576					
140								
145								
150								
155								
160								
165								
170								
175								
180								

Bottom of borehole at 153.0 feet.

Top of Rock: Bottom of Boring.

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **738.91**
 Top of PVC Casing Elevation (feet, NAVDI88): **742.35**

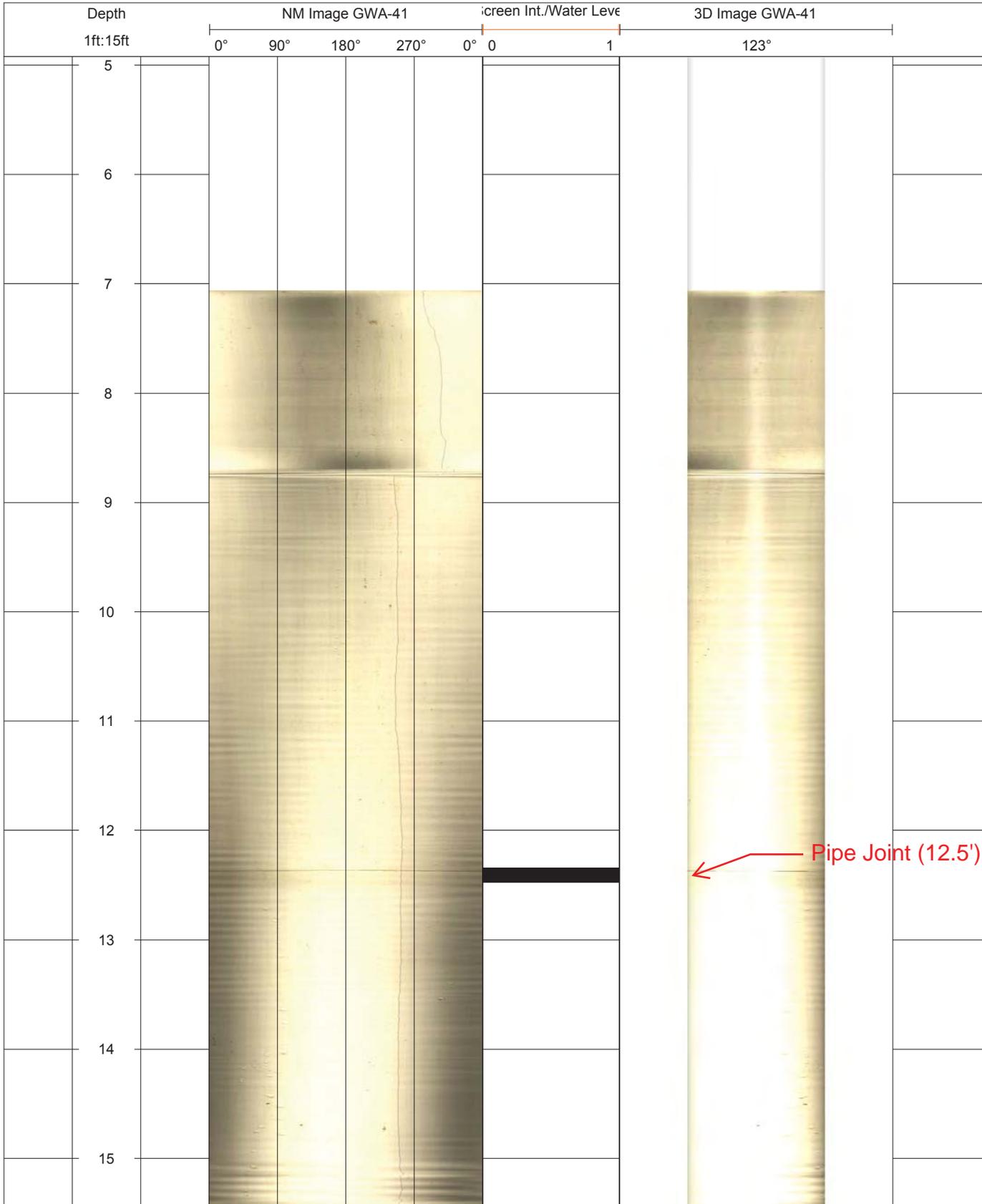
WELL CONSTRUCTION LOG

Southern Company Generation

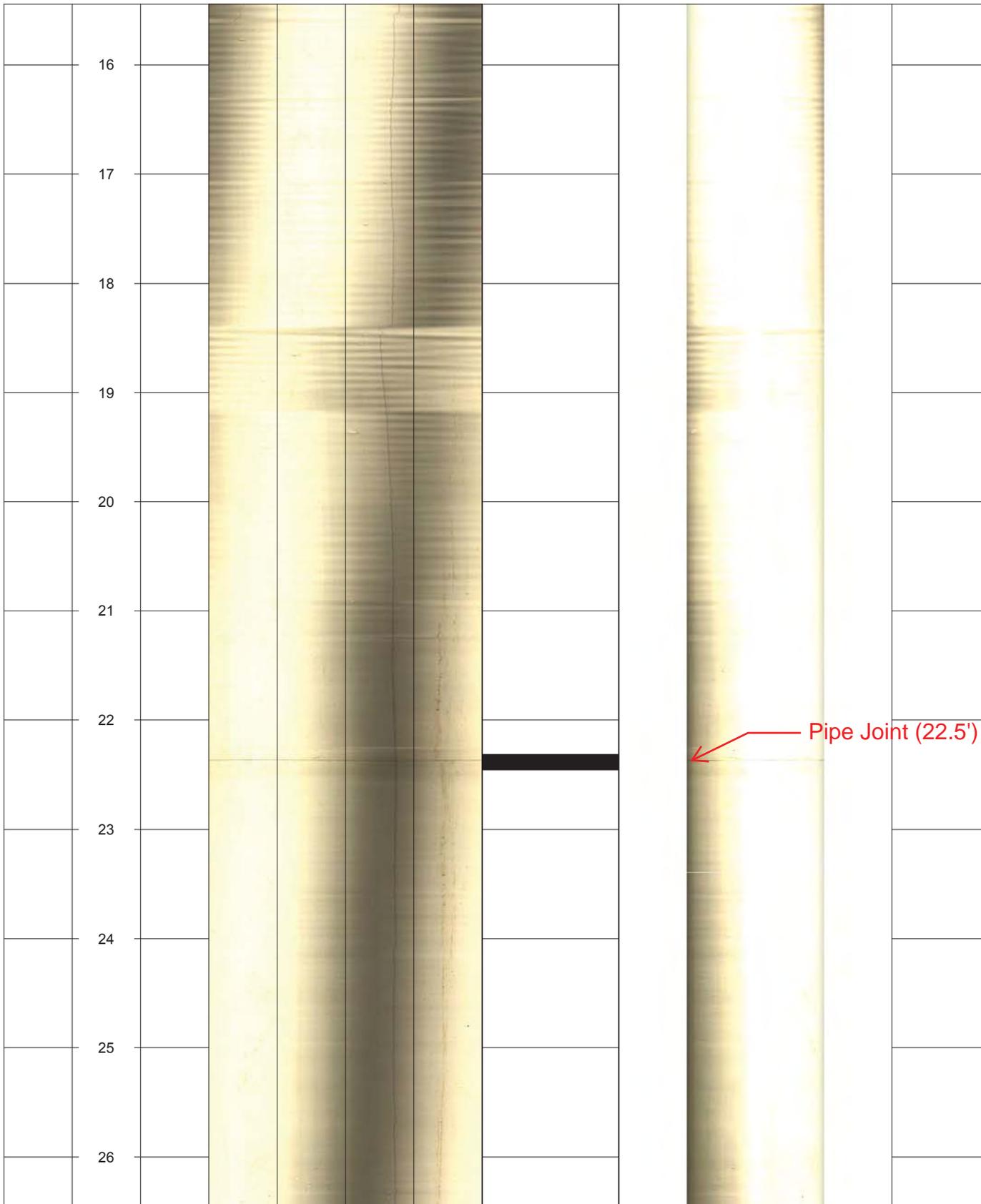
PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear (estimated)	WELL
LOCATION:	Cells 9 and 10	RIG TYPE	Roto Sonic (estimated)	GWA-41
LOGGER:		DRILLING METHODS:	Roto Sonic (estimated)	
DATE CONSTRUCTED:	6/6/2011			

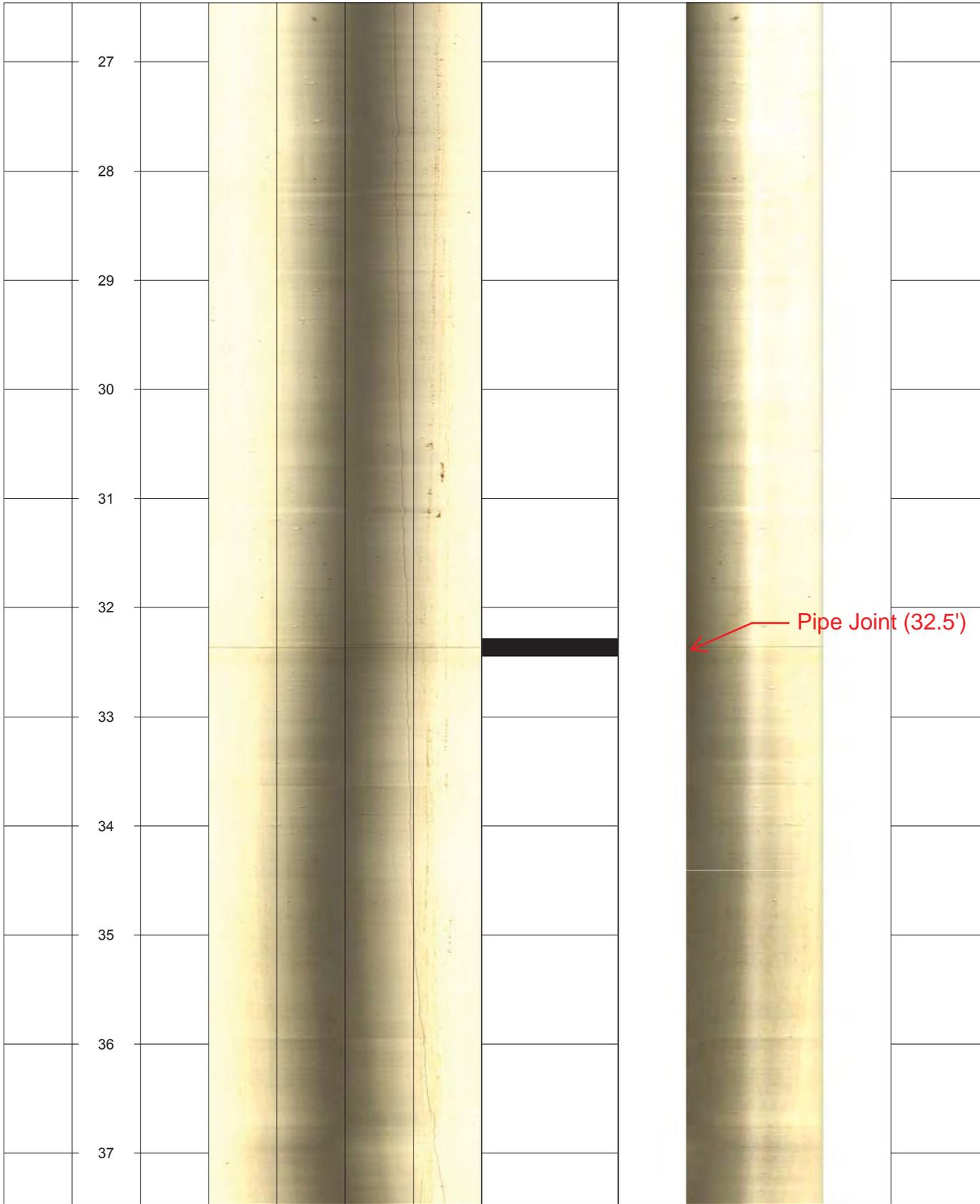
		DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top		TOP OF RISER	3.44 742.35
		GROUND SURFACE	0.00 738.91
		TOP OF SEAL	
		TOP OF FILTER PACK	
		BOTTOM OF RISER / TOP OF SCREEN	92.50 646.41
		BOTTOM OF SCREEN	102.50 636.41
Flush-threaded end cap		BOTTOM OF CASING	102.54 636.37
HOLE DIA: 6"			

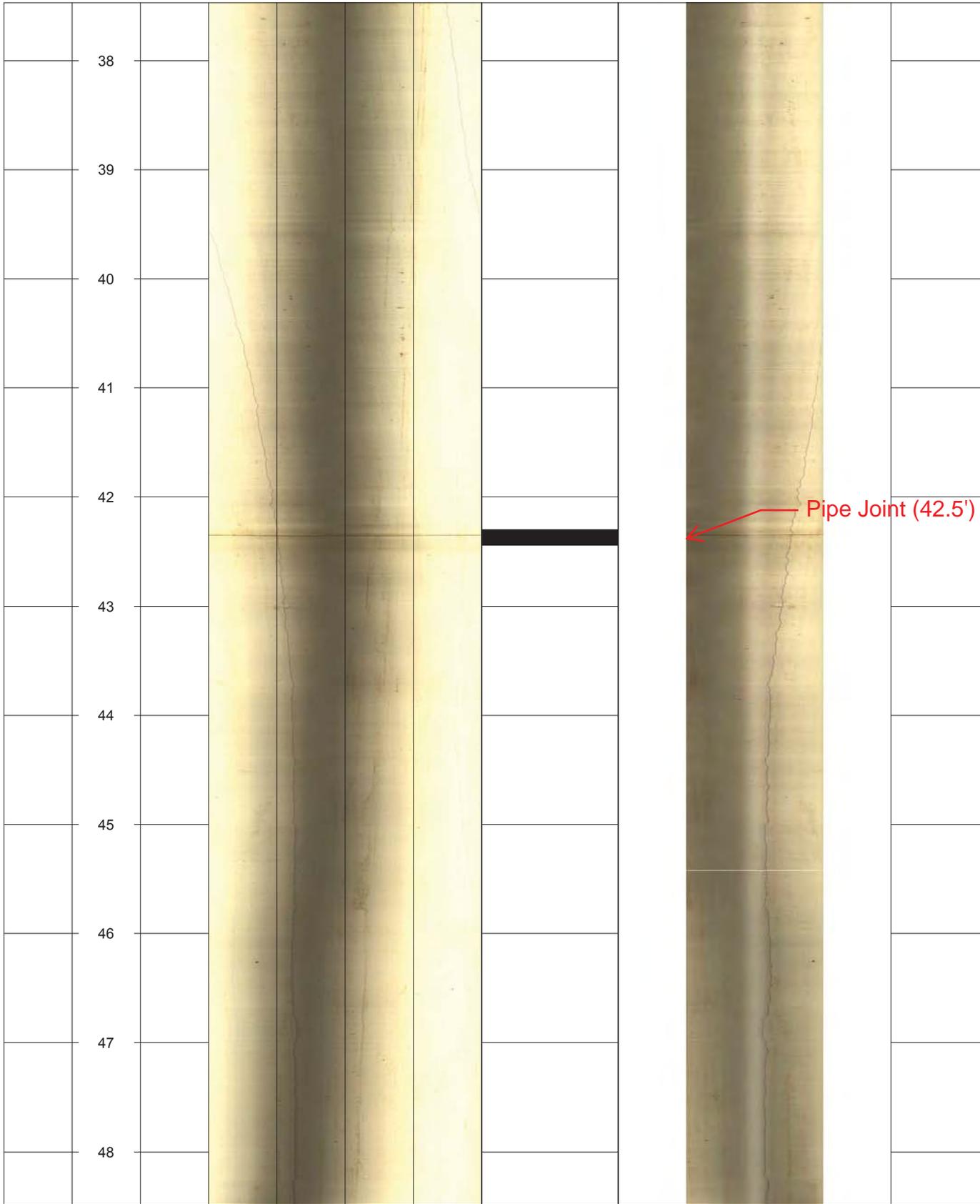
**PLANT BOWEN
Optical Teleview
Magnetic North and 3D Image
GWA-41**



← Pipe Joint (12.5')





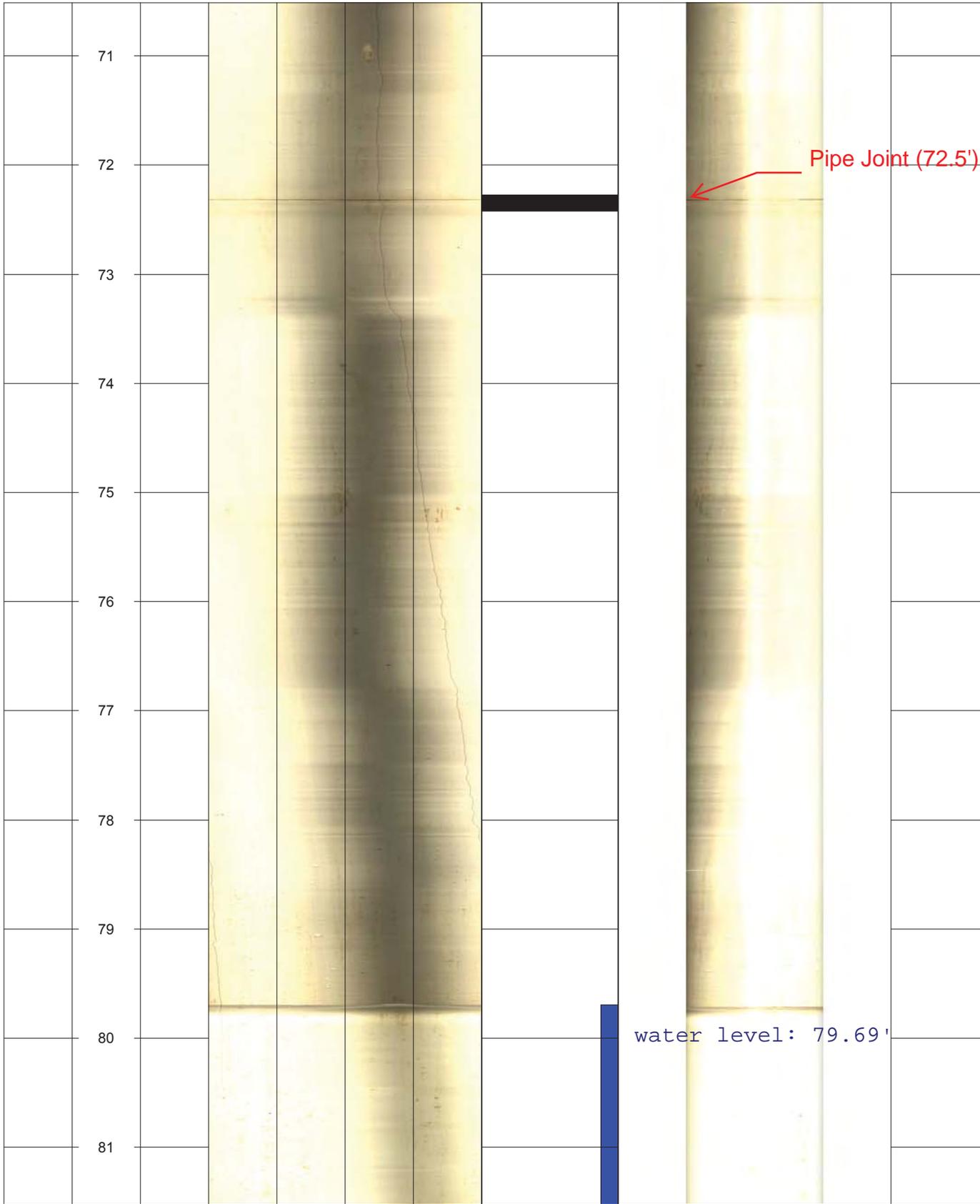


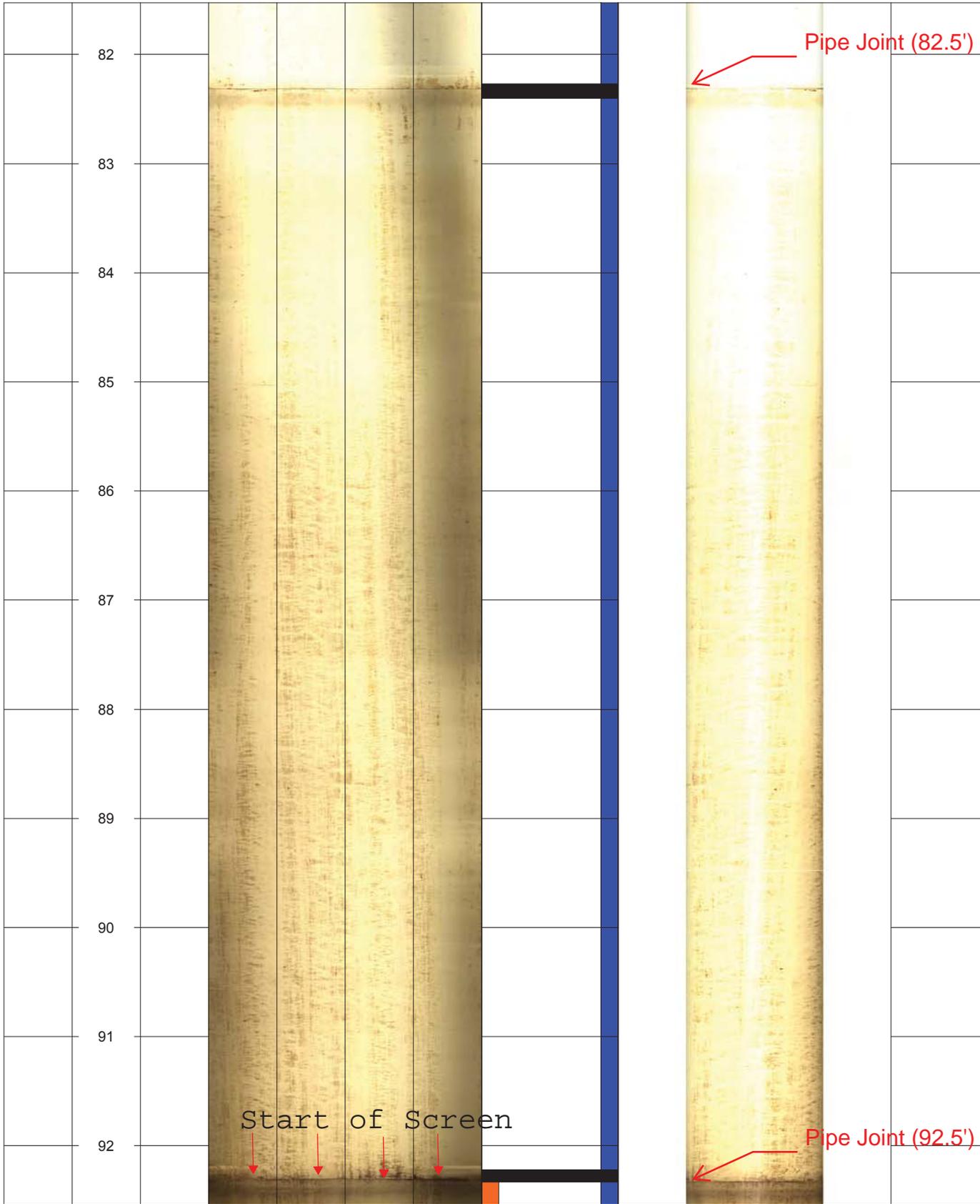
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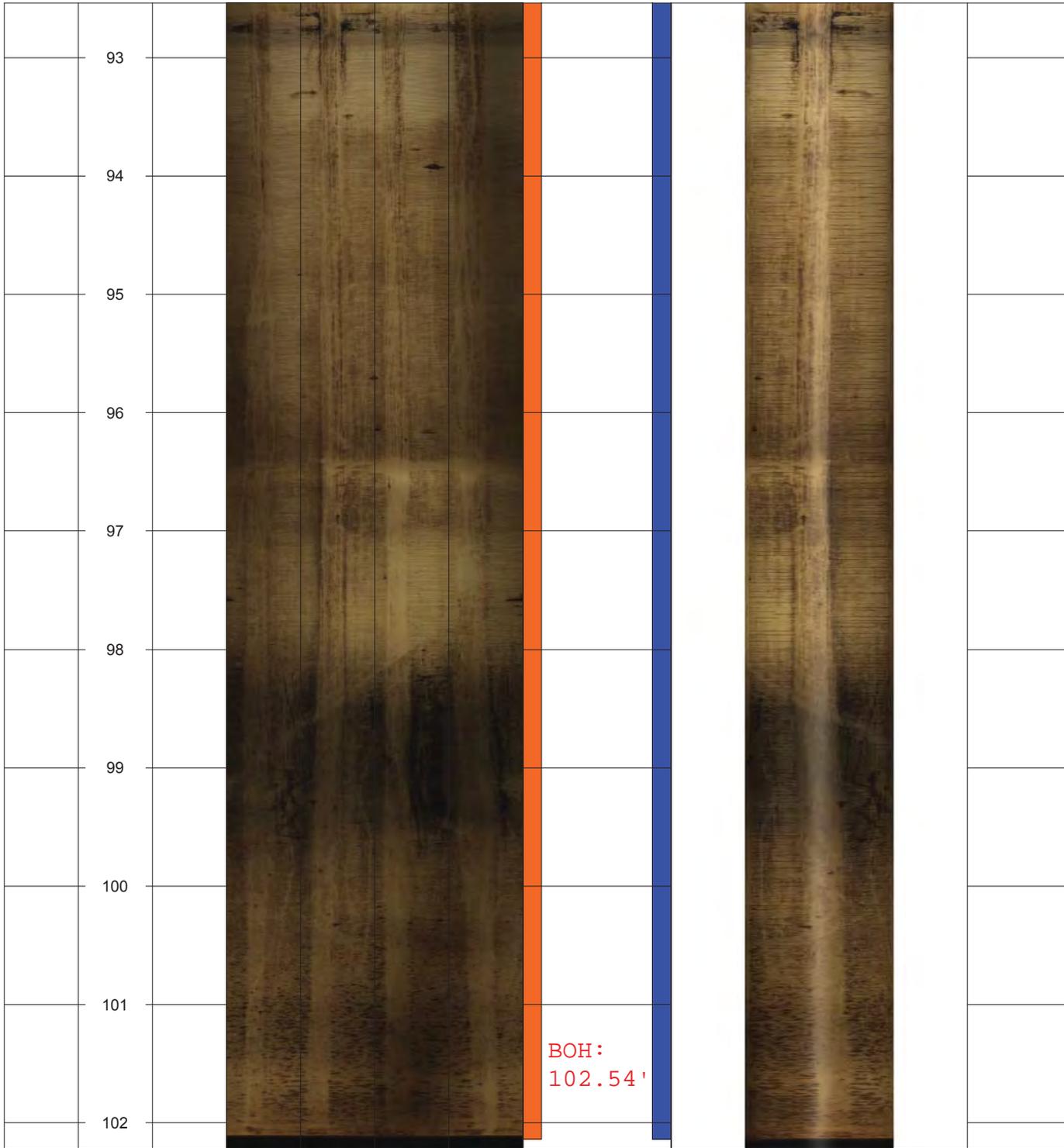
← Pipe Joint (52.5')

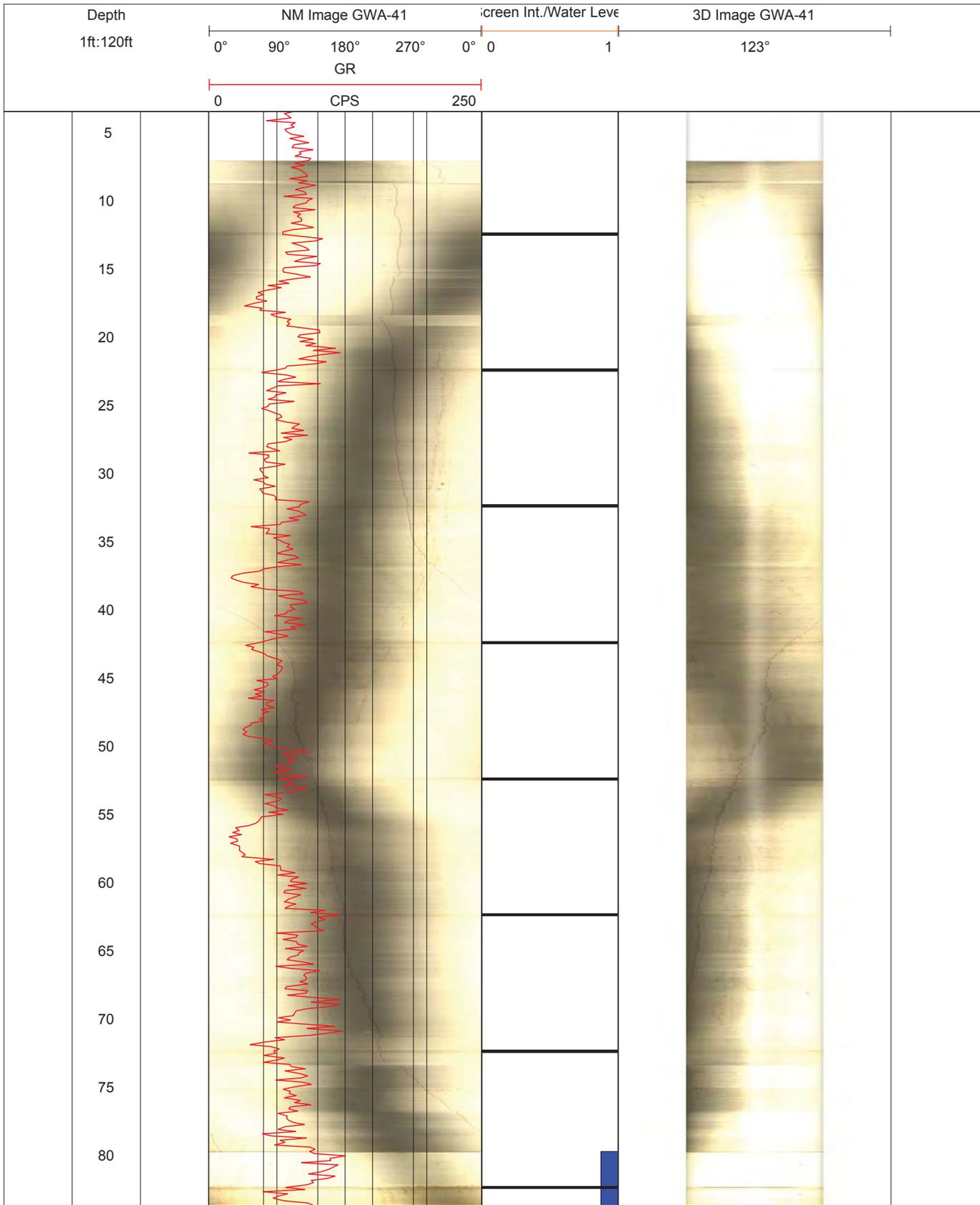
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	61						
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	67						
	68						
	69						
	70						

← Pipe Joint (62.5')











Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **738.91**
 Top of PVC Casing Elevation (feet, NAVD188): **742.35**



LOG OF TEST BORING

BORING GWA-41
 PAGE 1 OF 2

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
LOCATION Plant Bowen

DATE STARTED 6/6/2011 **COMPLETED** 6/6/2011 **SURF. ELEV.** 738.91' NAVD88 **COORDINATES:** N:1503519.02 E:2071046.18

CONTRACTOR Boart Longyear **EQUIPMENT** _____ **METHOD** Rotosonic

DRILLED BY _____ **LOGGED BY** G. Dyer **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____

BORING DEPTH 85 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** _____

NOTES Well installed. Refer to well data sheet.

GEO TECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		- Sandy Clay; gray to brown; damp; low plasticity	736					
5		- Silty sand with some clay; gray; dry; material is competent and clumped	733					
		- Clayey Silty Sandy; mottled gray, brown and tan; dry; root structures and organic material	731					
10		- Gravelly Sand; tan and brown; moist to wet; clay present; moisture decreasing with depth; fines increasing with depth	726					
15		- SAA						
20								
25								
			713					
30		- Clayey Sand; tan to brown with large subangular clasts of chert; dry; clay increasing with depth; hard; low plasticity; fragments become smaller with depth						
35			703					
		- Fine to medium sand; tan; wet	701					
40		- Clayey Sand; brown to tan with prevalent chert and dolomitic clasts; damp						

(Continued Next Page)



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		(cont)						
			696.4					
45		- SAA						
			693					
50		- Sandy Clay; tan (some brown) with few chert and dolomitic fragments; clay is hard and of low plasticity; slightly moist						
55			683					
60		- Clayey Sand to Sandy Clay; clay increasing with depth; brown to tan; sand is medium grained to coarse, small subangular to few subrounded chert and dolomitic clasts, very damp						
65			673					
70		- Clayey Silty Sand; tan; very moist; coarse grained; few chert and dolomitic fragments (subangular); moisture content increasing with depth						
75			663					
80		- Gravelly Sand; tan; medium and coarse grained; wet; gravels are subangular; high yield zone from 76'-85'						
85			654					
		Bottom of borehole at 85.0 feet.						Bottom of Hole.

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **737.95**
 Top of PVC Casing Elevation (feet, NAVD88): **743.08**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL NAME
LOCATION: Bowen		DRILLER: Boart		
LOGGER: K. Lewis		RIG TYPE: RotoSonic		
DATE CONSTRUCTED: 6/1/2011		DRILLING METHODS: RotoSonic		GWA-41R
			DEPTH FEET	ELEVATION FT, MSL
NOT APPLICABLE: Locking Hinged Top			TOP OF RISER	5.13 743.08
1/4-inch Vent 1/4-inch Weep Hole 2-ft x 2-ft concrete pad			2" Threaded Riser Cap GROUND SURFACE	0.00 737.95
			PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminium BOTTOM OF PROTECTIVE CASING	
			BACKFILL MATERIAL TYPE: Portland Cement AMOUNT: RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	95.06 642.89
			ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall TOP OF FILTER PACK	100.56 637.39
			FILTER PACK TYPE: DSI Sand - 2A (20/30) AMOUNT: 7 bags PLACEMENT Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	102.76 635.19
			SCREEN DIA: 2-inch 10ft U-Pack TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: BOTTOM OF SCREEN	112.76 625.19
Flush-threaded end cap			BOTTOM OF CASING	113.06 624.89
HOLE DIA: 6"				

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **737.95**
 Top of PVC Casing Elevation (feet, NAVD88): **743.08**



LOG OF TEST BORING

BORING GWA-41R
 PAGE 1 OF 3

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED 6/1/2011 COMPLETED 6/1/2011 SURF. ELEV. 737.95' NAVD88 COORDINATES: N:1503527.39 E:2071050.84

CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD Rotosonic

DRILLED BY _____ LOGGED BY K. Byrd CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 116 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED _____

NOTES Well installed. Refer to well data sheet.

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
5		- Silty sand; top soil; reddish yellow; dry; very fine grained - SAA except gray - Clayey Sand; gray; damp; very fine to fine grained; clay content increasing with depth - Sandy Clay with chert fragments; brown; damp; very fine to fine grained - Sandy Clay with quartz pebbles; brown; damp; very fine grained; medium plasticity	736 734.5					
10		- SAA except in reddish in color						
15								
20		- Clayey Sand with quartz pebbles; orange reddish (brown); damp; very fine to fine grained	719					
25		- Sandy clay with quartz pebbles decreasing in size; brown; fine grained - SAA with chert pieces	715.5					
30		- Sandy clay with quartz and chert pieces; brownish yellow; moist; fine-grained - Sandy Clay with small quartz pebbles and large carbonate chunks; light brown; moist; very fine grained						
35		- Silty clay with small quartz fragments; light brown; moist; very fine grained - SAA with added chert pieces	701					
40								

(Continued Next Page)



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		(cont)						
		- SAA with increasing chert size fragments; sand content increasing as well	694					
45		- Clayey sand with weathered carbonate and chert pieces; mottled yellowish very pale brown; damp, fine to medium grained	691					
50		- Sandy clay with small chert pieces, very pale brown/yellowish brown; moist; very fine to fine grained						
		- SAA with weathered carbonates, sand content increasing	685					
55		- Clayey Sand, weathered carbonates and large pieces of smokey quartz; mottled yellow, brown, and white; damp; very fine to fine grained						
		- Clayey sand with large pieces of cherty quartz; yellowish brown, damp, very fine to fine grained						
60								
65								
70								
75		- SAA except for very fine grained with yellow lenses of silty clay						
80								
85		- SAA except fine grained to medium grained, wet						

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **734.45**
 Top of PVC Casing Elevation (feet, NAVD88): **738.05**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal	DRILLING CBoart Longyear	WELL NAME	
	DRILLER: Boart		
LOCATION: Bowen	RIG TYPE: RotoSonic		
LOGGER: G. Dyer	DRILLING METHODS: RotoSonic	GWA-42	
DATE CONSTRUCTED: 6/1/2011			
<p>NOT APPLICABLE: Locking Hinged Top</p> <p>1/4-inch Vent 1/4-inch Weep Hole 2-ft x 2-ft concrete pad</p> <p>Flush-threaded end cap</p>		DEPTH FEET	ELEVATION FT, NAVD88
	TOP OF RISER	3.60	738.05
	2" Threaded Riser Cap		
	GROUND SURFACE	0.00	734.45
	<p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminium</p> <p>BOTTOM OF PROTECTIVE CASING</p>		
	<p>BACKFILL MATERIAL TYPE: Portland Cement AMOUNT:</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE Flush Threaded</p>		
	TOP OF SEAL	64.56	669.89
	<p>ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall</p>		
	TOP OF FILTER PACK	69.56	664.89
	<p>FILTER PACK TYPE: DSI Sand - 2A (20/30)</p> <p>AMOUNT: 7 bags PLACEMENT Tremie; wash with water</p>		
BOTTOM OF RISER / TOP OF SCREEN	71.76	662.69	
<p>SCREEN DIA: 2-inch 10ft U-Pack TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH:</p>			
BOTTOM OF SCREEN	81.76	652.69	
BOTTOM OF CASING	82.06	652.39	
HOLE DIA: 6"			



Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **734.45**
 Top of PVC Casing Elevation (feet, NAVD88): **738.05**

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED _____ COMPLETED _____ SURF. ELEV. 734.45' NAVD88 COORDINATES: N:1503823.34 E:2071049.95
 CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD Rotosonic
 DRILLED BY _____ LOGGED BY G. Dyer CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 85 ft. GROUND WATER DEPTH: DURING _____ COMP. 55 ft. DELAYED _____
 NOTES Well installed. Refer to well data sheet.

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
5		- Sand with gravel; brown; root material gavel; consists of chert and dolomite (subangular)	733					
10		- Silty sand; tan, orange and white; with angular chert fragments; dry; black weathering bands	728.5					
15		- Silty clay with highly weathered chert and dolomite clasts; light tan, gray and white; low plasticity; dry						
20		- Silty clay with angular to subangular chert clasts; mottled tan, orange and gray; dry; low plasticity						
25		- Silty clay with weathered chert and dolomite clasts; orange and white; damp; low plasticity	714.5					
30		- Clay with angular chert fragments with black weathering surfaces; mottled orange, tan and white; low plasticity; damp - Clay; streaked tan and white; moist; medium to low plasticity	708					
35		- Sandy, silty clay with few angular chert and dolomite fragments; orange; low plasticity; damp and hard						
40		- Silty Sand; white to gray; sand is carbonate - Clayey silty sand with small carbonate fragments; dry	699.5					

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-42

PAGE 2 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		(cont)	693.5					
		- Gravelly sand with some fines; slightly damp gravels are dolomitic in nature						
45		- Clayey silty sand; orange and tan; hard; slightly damp; few dolomitic fragments	690.5					
		- Clayey sand; orange and tan; hard; few chert and dolostone fragments	688.5					
50								
		- SAA: less hard						
55		▼ - SAA: harder						
60								
		- Moist Zone from 64 to 66 feet						
65								
70								
75								
80								
		- SAA: tan and brown						
85								
		- Lost sample	648.5					

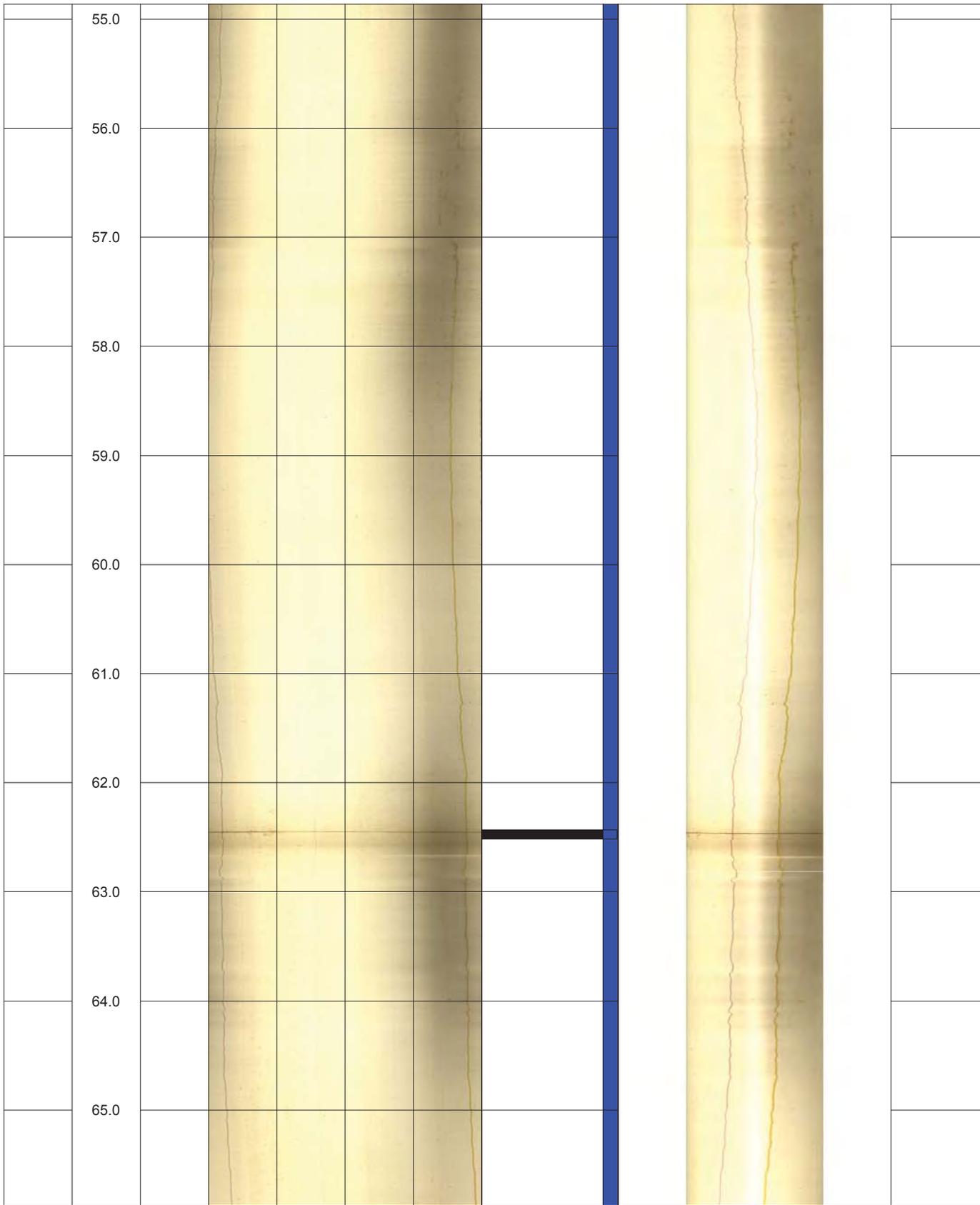
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Depth		Image-NM GWA-43				Screen Int./Water Level	GWA-43 3D		
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	12.0								
	13.0								
	14.0								
	15.0								
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	17.0								
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	19.0								
	20.0								
	21.0								

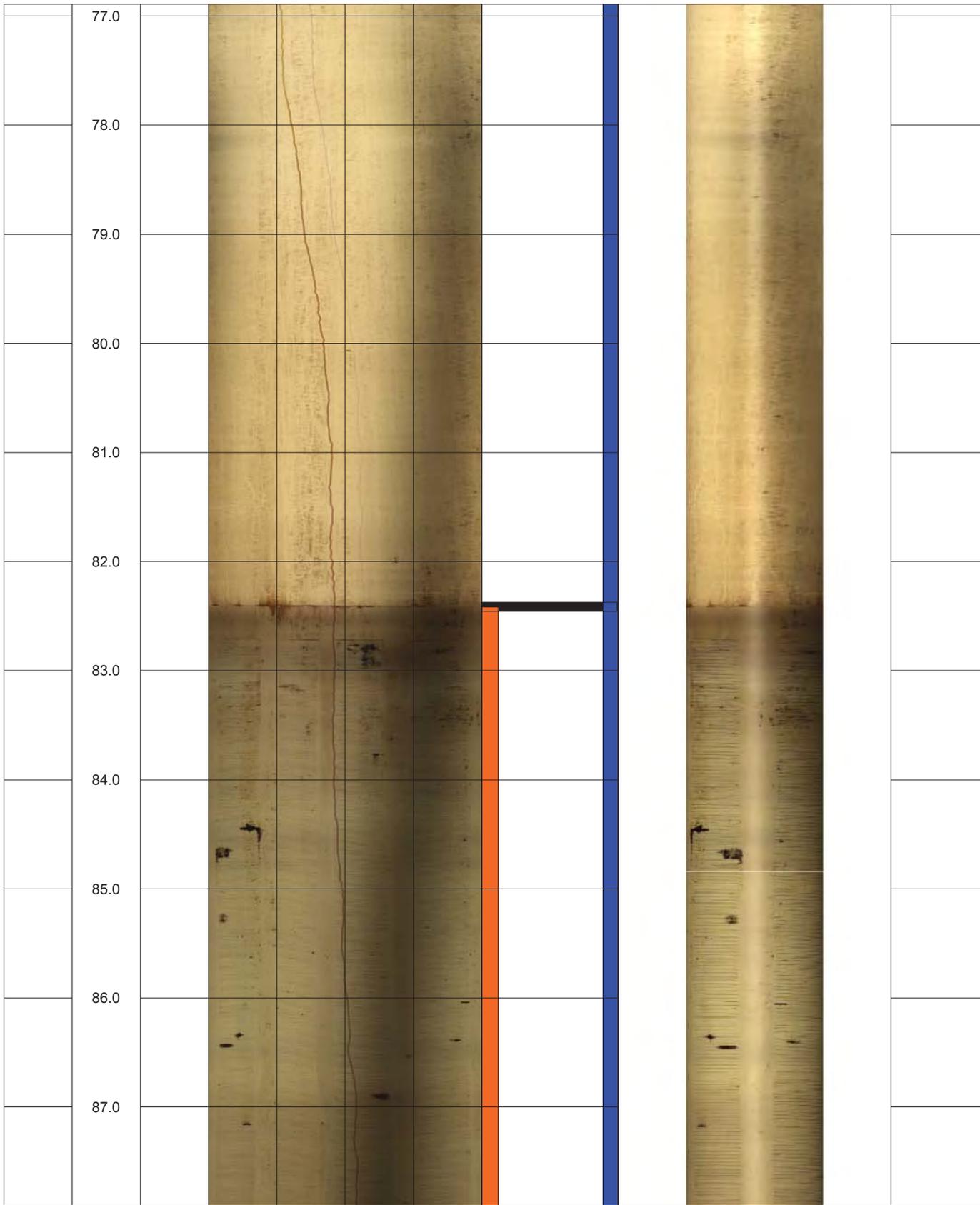
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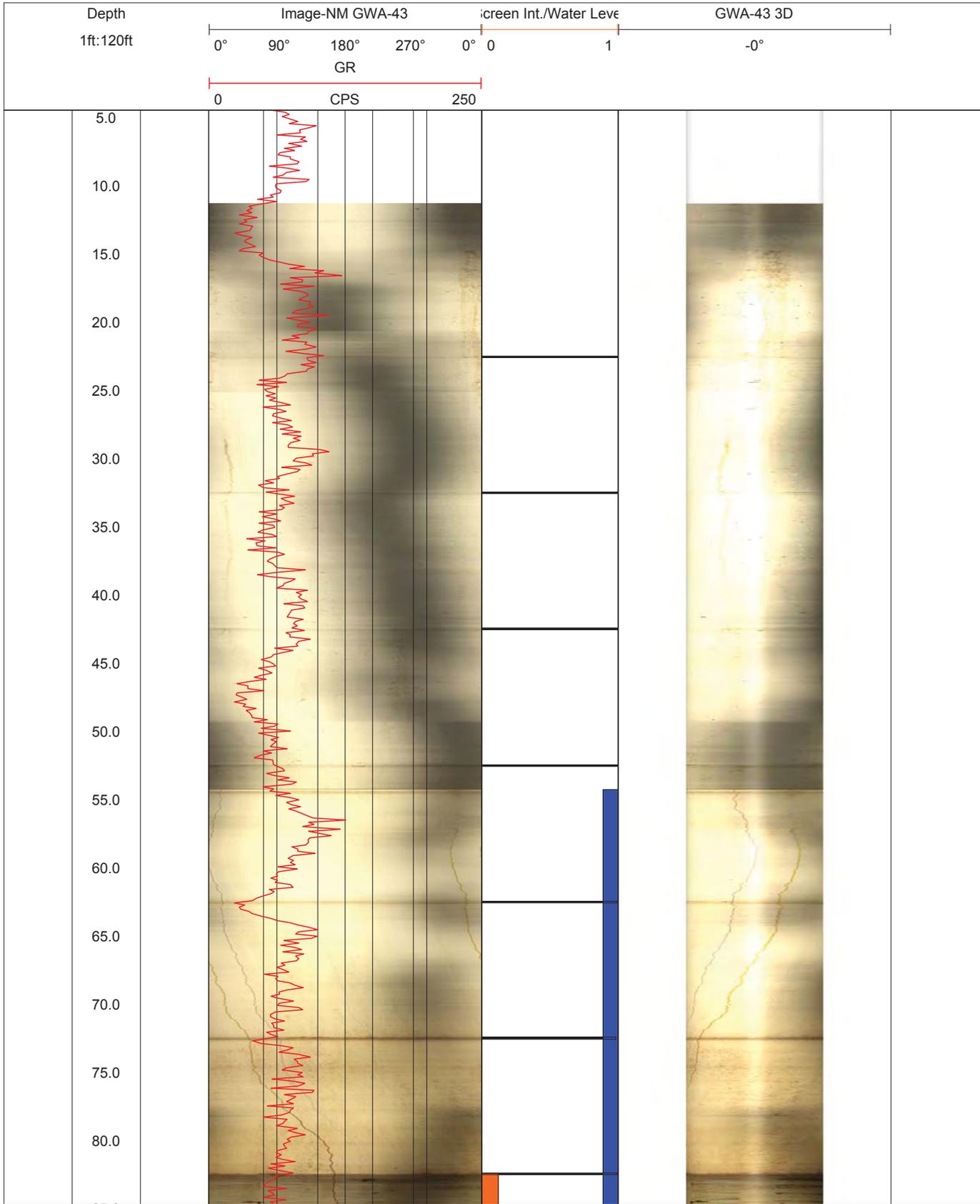
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	66.0								
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	76.0								



	88.0										
	89.0										
	90.0										
	91.0										
	92.0										



	85.0									
	90.0									

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.61**
 Top of PVC Casing Elevation (feet, NAVD88): **710.94**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL NAME
LOCATION: Bowen		DRILLER: Boart		GWA-43
LOGGER: G. Dyer		RIG TYPE: RotoSonic		
DATE CONSTRUCTED: 5/25/2011		DRILLING METHODS: RotoSonic		
<p>NOT APPLICABLE: Locking Hinged Top</p> <p>1/4-inch Vent 1/4-inch Weep Hole 2-ft x 2-ft concrete pad</p> <p>Flush-threaded end cap</p>		DEPTH FEET	ELEVATION FT, NAVD88	
		TOP OF RISER	3.33	710.94
		2" Threaded Riser Cap		
		GROUND SURFACE	0.00	707.61
		PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminium		
		BOTTOM OF PROTECTIVE CASING		
		BACKFILL MATERIAL TYPE: Portland Cement AMOUNT:		
		RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
		TOP OF SEAL	75.90	631.71
		ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 3.25 bags PLACEMENT: Free fall		
	TOP OF FILTER PACK	77.90	629.71	
	FILTER PACK TYPE: DSI Sand - 2A (20/30) AMOUNT: 2 bags PLACEMENT Tremie; wash with water			
	BOTTOM OF RISER / TOP OF SCREEN	79.90	627.71	
	SCREEN DIA: 2-inch 10ft U-Pack TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH:			
	BOTTOM OF SCREEN	89.90	617.71	
	BOTTOM OF CASING	90.20	617.41	
	HOLE DIA: 6"			

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.61**
 Top of PVC Casing Elevation (feet, NAVD88): **710.94**



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
LOCATION Plant Bowen

DATE STARTED 5/25/2011 **COMPLETED** 5/25/2011 **SURF. ELEV.** 707.61' NAVD88 **COORDINATES:** N:1504129.20 E:2070982.44
CONTRACTOR Boart Longyear **EQUIPMENT** _____ **METHOD** Rotosonic
DRILLED BY _____ **LOGGED BY** G. Dyer **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____
BORING DEPTH 92.5 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** _____
NOTES Well installed. Refer to well data sheet.

GEO TECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
5		- Clayey Silty Sand; Brown; with few subangular, crystalline calcite clasts; upper 1' contains organics; damp - Silty Sand; Brown-red; with prevalent subrounded to subangular dolomite and calcite clasts, dolomite is more highly weathered, damp	701.6					
10		- Gravelly Sand; Red to brown; Gravels are composed of subangular to subrounded dolomite, calcite and sparse chert; damp - Less Gravel						
15		- Sand is more coarse						
20			684.6					
25		- Sandy Gravel with clay; red; compositional banding or lamination; bleaching zone or relict sedimentary structure slightly intact; moist; gravel is dolomite and calcite; subangular to subrounded - Silty Clay with pebble sized chert and calcite/dolomite clasts; yellow-red; damp	681.1					
30			675.6					
35		- Clay; yellow-red, mottled to white due to weathering of chert and carbonate material; low plasticity; damp						
40								

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-43

PAGE 2 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
45		(con't) - Sandy clay with prevalent zones of weathered chert; mottled tan, white and yellow--chert is white; moist						
50		- Sandy clay to clayey sand with prevalent subrounded to subangular fragments and chert and calcite; mottled tan, white and yellow; damp						
55								
60		- SAA: higher moisture content, larger dolomite, chert and calcite fragments; soil contains non-parallel banding (black)						
65		- SAA: more silt						
70		- Sandy gravel with some silts; mottled tan, orange and white; wet; gravel is subangular chert and dolomite	639.1					
75		- Silty Clay; tan and orange; low plasticity; damp	633.6					
80		- Silty clay; tan and orange; low plasticity; damp						
85		- Gravelly, sandy clay; brown and tan; moist; gravels are composed of weathered chert and	622.6					

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.80**
 Top of PVC Casing Elevation (feet, NAVD88): **711.19**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL NAME	
LOCATION: Bowen		DRILLER: Boart			
LOGGER: D. Brooks		RIG TYPE: RotoSonic			
DATE CONSTRUCTED: 5/24/2011		DRILLING METHODS: RotoSonic		GWA-43R	
			DEPTH FEET	ELEVATION FT, NAVD88	
NOT APPLICABLE: Locking Hinged Top			TOP OF RISER	3.39	711.19
1/4-inch Vent 1/4-inch Weep Hole 2-ft x 2-ft concrete pad			2" Threaded Riser Cap		
			GROUND SURFACE	0.00	707.80
			PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminium		
			BOTTOM OF PROTECTIVE CASING		
			BACKFILL MATERIAL TYPE: Portland Cement AMOUNT:		
			RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded		
			TOP OF SEAL	62.20	645.60
			ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall		
			TOP OF FILTER PACK	111.70	596.10
			FILTER PACK TYPE: DSI Sand - 2A (20/30) AMOUNT: 7 bags PLACEMENT Tremie; wash with water		
			BOTTOM OF RISER / TOP OF SCREEN	113.70	594.10
			SCREEN DIA: 2-inch 10ft U-Pack TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH:		
			BOTTOM OF SCREEN	123.70	584.10
Flush-threaded end cap			BOTTOM OF CASING	124.20	583.60
HOLE DIA: 6"					

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **707.80**
 Top of PVC Casing Elevation (feet, NAVD88): **711.19**



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED 5/24/2011 COMPLETED 5/25/2011 SURF. ELEV. 707.80' NAVD88 COORDINATES: N:1504117.39 E:2070973.14

CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD Rotosonic

DRILLED BY _____ LOGGED BY D. Brooks CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 127 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED _____

NOTES Well installed. Refer to well data sheet.

GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
5		Silty Sand (SM) - brown, dry, fine grain, Top Soil	706.3					
		Clayey Sand (SC) - red, damp, fine grain, with chert fragments						
10		Silty Sand (SM) - red, damp, fine to medium grain, with pieces of chert and carbonate	699.8					
		Silt (ML) - reddish yellow, damp, saprolite; highly weathered carbonate	694.8					
15		Lean Clay (CL) - mottled red and reddish yellow, damp, red sandy clay with lenses of reddish yellow silt	692.8					
20		Clayey Sand (SC) - red, damp, fine to medium grain, with quartz and chert fragments	688.8					
25		Lean Clay (CL) - mottled orange and red, moist, contains pieces of highly weathered carbonate; becoming more yellow-orange with depth	685.8					
30		- CL: mottled yellow-orange and white and red, moist, very fine grain, with sand; lenses of weathered carbonate						
35		- SAA with lenses of carbonate increasing in prominence						
40		Silt (ML) - mottled yellow-orange and reddish orange, with sand and weathered chert	670.8					
			667.8					

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-43R
PAGE 2 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
45		Silty Sand (SM) - mottled black, orange, red and white, fine to medium grain, with chert fragments	663.8					
50		Lean Clay (CL) - yellow-orange, damp, low plasticity	656.8					
55		Clayey Sand (SC) - mottled orange and yellow, red and black, moist, fine to medium grain, with chert	653.8					
60		Lean Clay (CL) - reddish yellow, moist, no to low plasticity, with sand - black, tan and reddish yellow - light brown	643.8					
65		Clayey Sand (SC) - black, red, and brown, damp, fine to medium grain, with chert	641.8					
70		- Dolostone	640.8					
75		- Cavity						
80								
85								

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **710.15**
 Top of PVC Casing Elevation (feet, NAVD88): **712.89**

SITE	Plant Bowen	HOLE DEPTH	86	SURFELEV	710.15' NAVD88
LOCATION	Landfill Cells 9 & 10	COORDINATES	1504436.66		2071414.30
ANGLE	BEARING	CONTRACTOR	Boart	DRILL NO.	
DRILLING METHOD	Rotosonic	NO. SAMPLES		NO. U.D. SAMPLES	
CASING SIZE	2"	LENGTH	10'	CORE SIZE	TOTAL % REC.
WATER TABLE DEPTH	58.55'	ELEV.	654.34	TIME AFTER COMP.	DATE TAKEN 8/25/2014
TYPE GROUT		QUANTITY		MIX	DRILLING START DATE 6/9/2011
DRILLER	RECORDER Dyer / Abraham	APPROVED		DRILLING COMP. DATE	6/9/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	710.15								
1		SILTY SAND (0 - 8 FT) Red to reddish-brown, moderately-cemented silty sand with minor angular gravels; damp.							
2									
3									
4									
5	705.15								
6									
7									
8									
9									
10	700.15								
11									
12									
13									
14									
15	695.15								
16									
17		SANDY SILT (8 - 18 FT) Mottled white to reddish brown silty sand to sandy silt, rare gravels; contains angular to sub-angular nodular chert; poorly cemented; slightly damp.							
18									
19									
20	690.15								
21									
22									
23		CLAYEY SILT (18 - 24 FT) Tan-yellow to white clayey silt with rare gravels; predominant silty hardened soil with no structure; slightly damp.							
24	686.15								



**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. **GWC-44**

Sheet 2 of 4

SITE **Plant Bowen** TOTAL DEPTH **86** SURF.ELEV. 710.15' NAVD88

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
25	685.15								
26									
27									
28									
29									
30	680.15								
31									
32									
33									
34									
35	675.15								
36									
37									
38									
39									
40	670.15								
41									
42									
43									
44									
45	665.15								
46									
47									
48									
49									
50	660.15								
51									
52									
53									
54		CLAYEY SILT (24 - 56 FT) Tan-yellow to white, silty clay to clayey silt; clay varies from 15 to 30%; minor gravel.							
55	655.15								

SITE Plant Bowen TOTAL DEPTH 86 SURF.ELEV. 710.15' NAVD88

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
56	654.15								
57									
58									
59									
60	650.15								
61									
62									
63									
64									
65	645.15								
66		SILTY CLAY (56 - 67 FT) Tan silty clay to low-plasticity clay; few dolomitic fragments; very damp.							
67									
68									
69									
70	640.15	SILT (67 - 74 FT) Tan to light yellow silt with minor sand; gravel absent; moist to wet.							
71									
72									
73									
74		SANDY GRAVEL Tan yellow, low plasticity, sandy gravel with some clay; moist to wet.							
75	635.15								
76									
77									
78									
79	631.15								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-44**

Sheet 4 of 4

SITE Plant Bowen TOTAL DEPTH 86 SURF.ELEV. 710.15' NAVD88

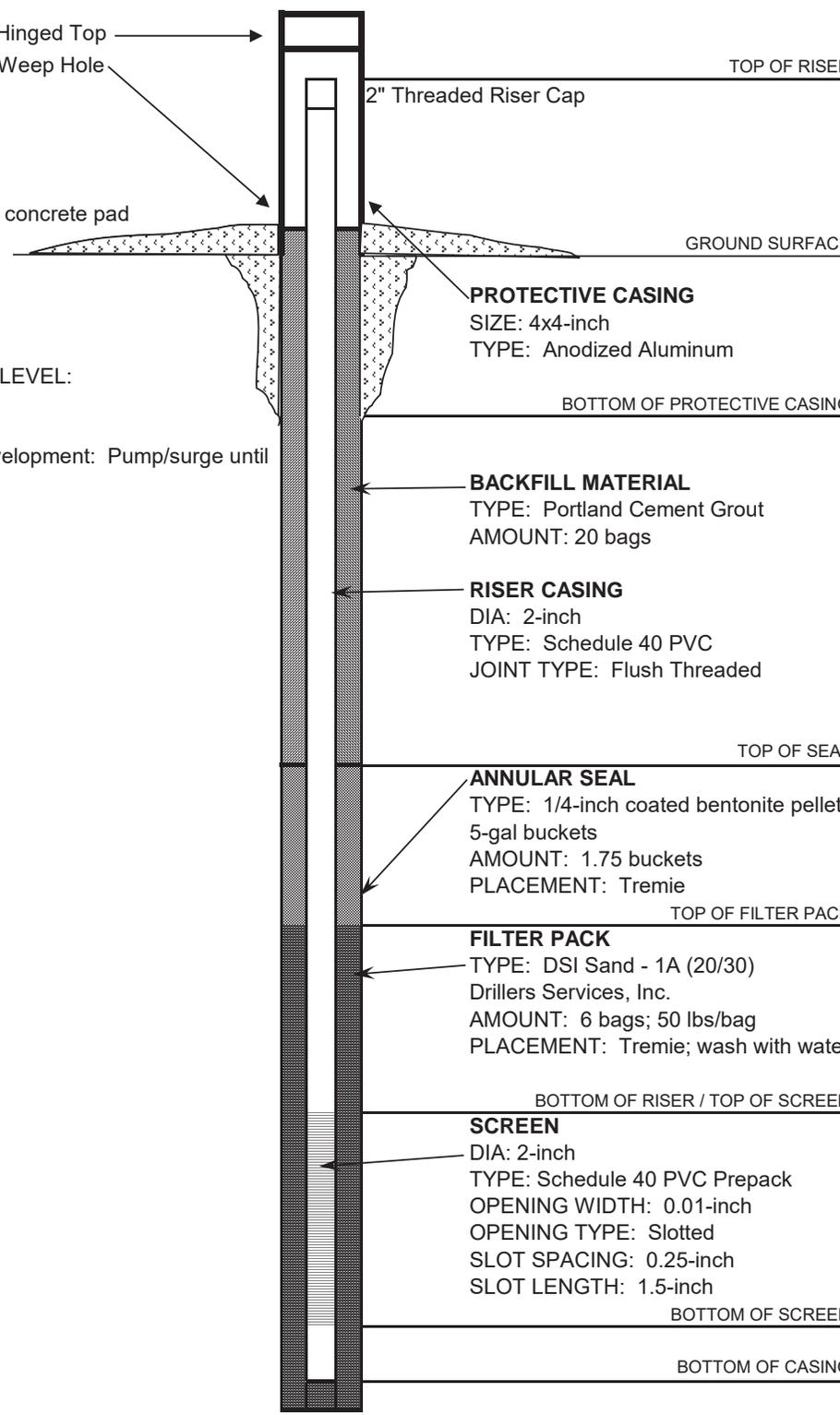
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
80	630.15	SANDY GRAVEL (74 - 86 FT) Tan yellow, low plasticity, sandy gravel with some clay; wet. BOTTOM AT 86-FT							
81									
82									
83									
84									
85	625.15								
86	624.15								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **698.41**
 Top of PVC Casing Elevation (feet, NAVD88): **701.53**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: L. Millet	DRILLING METHODS: HSA	GWC-45
DATE CONSTRUCTED: 5/17/07 - 9:00 am		

	DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top 1/4-inch Weep Hole 	TOP OF RISER	3.12 701.53
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURFACE PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: Well Development: Pump/surge until clear.	GROUND SURFACE	0.00 698.41
BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 20 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded	TOP OF SEAL	49.40 649.01
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1.75 buckets PLACEMENT: Tremie	TOP OF FILTER PACK	51.40 647.01
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 6 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water	BOTTOM OF RISER / TOP OF SCREEN	54.43 643.98
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	BOTTOM OF SCREEN	64.43 633.98
	BOTTOM OF CASING	64.73 633.68
HOLE DIA: 8"		

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **698.41**
 Top of PVC Casing Elevation (feet, NAVDI88): **701.53**



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-45**
 Sheet 1 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **64.3** SURF.ELEV. **698.41**
 LOCATION **Cells 1 & 2** COORDINATES N **1504539.38** E **2071956.71**
 ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME 75**
 DRILLING METHOD **HSA** NO. SAMPLES **13** NO. U.D. SAMPLES **0**
 CASING SIZE **4/4 ID 7" OD** LENGTH _____ CORE SIZE _____ TOTAL % REC. _____
 WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____
 TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE **5/16/2007**
 DRILLER **S. Denty** RECORDER **L. Millet** APPROVED _____ DRILLING COMP. DATE **5/16/2007**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	698.41								
1									
2									
3									
4									
5	693.41	Red silty CLAY, dry, firm, occasional pebbles	S-1	4.5-6	3-5-7	12		75	
6									
7									
8									
9		Red silty CLAY, dry, firm, some tan mottling, occasional pebbles and coarse sand grains	S-2	9.5-11.0	4-5-6	11		100	
10	688.41								
11									
12									
13									
14		Same as above	S-3	14.5-16.0	11-16-20	36		100	
15	683.41								
16									
17									
18									
19									
20	678.41	Red CLAY, dry, firm, w/ silt, carbonate sand, pebbles, and gravel, occasional orange mottling	S-4	19.5-21.0	6-12-11	13		100	
21									
22									
23									
24	674.41								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-45

Sheet 2 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **64.3** SURF.ELEV. **698.41**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	673.41	Red & yellow orange CLAY, dry to damp, firm, carbonate pebbles and sand	S-5	24.5-26.0	3-4-4	8		90	
26									
27									
28									
29		Tan orange & dark red CLAY, dry, mottled firm, small carbonate pebbles	S-6	29.5-31.0	2-3-6	9		95	
30	668.41								
31									
32									
33		Orange & tan silty CLAY, dry, firm to slightly plastic occasional small carbonate pebbles, coarse sand	S-7	34.5-36.0	3-3-6	9		100	
34									
35	663.41								
36									
37		Orange & light tan CLAY, dry, slightly plastic, small carbonate pebbles, coarse sand	S-8	39.5-41.0	2-3-5	8		100	
38									
39									
40	658.41								
41		Light tan & tan silty CLAY, moist, moderately soft, orange & black mottles, few pebbles and sand	S-9	44.5-46	2-2-3	5		100	
42									
43									
44									
45	653.41	Tan silty CLAY, moist, moderately soft, dark red and black mottles, pebbles and gravel	S-10	49.5-51	5-2-5	7		80	
46									
47									
48									
49		Tan silty CLAY, saturated, soft, many chert pebbles, carbonate sand	S-11	54.5-56	11-19-19	38		50	
50	648.41								
51									
52									
53									
54									
55	643.41								
56	642.41								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-45

Sheet 3 of 3

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 64.3 SURF.ELEV. 698.41

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	641.41	Tan clayey SILT, moist, moderately soft, sand pockets	S-12	59.5-61	4-5-7	12		100	
58									
59									
60	638.41								
61									
62									
63									
64									
65	633.41								
66									
67		Top of rock 64.3: Bottom of boring							
68									
69									
70	628.41								
71									
72									
73									
74									
75	623.41								
76									
77									
78									
79									
80	618.41								
81									
82									
83									
84									
85	613.41								
86									
87									
88	610.41								

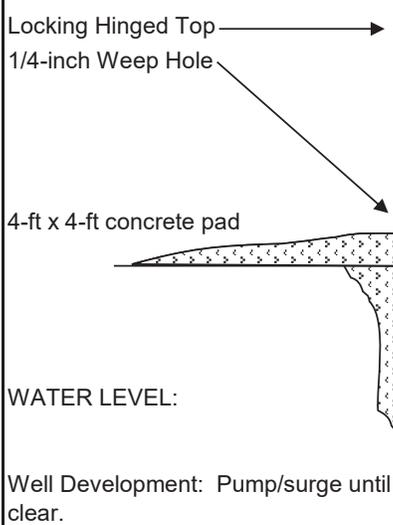
Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **699.00**
 Top of PVC Casing Elevation (feet, NAVD88): **702.02**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL NAME
Storage Facility	DRILLER: S. Denty	
LOCATION: Cells 1&2	RIG TYPE: CME 75	
LOGGER: K. Hobbs	DRILLING METHODS: HSA/HQ Rock Core w/Water	GWC-45R
DATE CONSTRUCTED: 5/22/07 - 9:00 am		

	DEPTH FEET	ELEVATION FT, NAVD88
Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap TOP OF RISER	3.02	702.02
4-ft x 4-ft concrete pad GROUND SURFACE	0.00	699.00
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING		
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 33 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL	110.40	588.60
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie TOP OF FILTER PACK	112.40	586.60
FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN	115.44	583.56
SCREEN DIA: 2-inch TYPE: Schedule 40 PVC OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN	125.44	573.56
BOTTOM OF CASING	125.74	573.26
HOLE DIA: 8"		



Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **699.00**
 Top of PVC Casing Elevation (feet, NAVD88): **702.02**



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 1 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **129.2** SURF.ELEV. **699.00**
 LOCATION **Cells 1 & 2** COORDINATES N **1504538.68** E **2071945.39**
 ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME 75**
 DRILLING METHOD **HSA/HQ rock core with water** NO. SAMPLES **17** NO. U.D. SAMPLES **0**
 CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____
 WATER TABLE DEPTH _____ ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____
 TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE **5/17/2007**
 DRILLER **S. Denty** RECORDER **L. Millet** APPROVED _____ DRILLING COMP. DATE **5/17/2007**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	699.00								
1									
2									
3									
4		Red silty CLAY, dry, firm, tan mottling, small pebbles and occasional roots	S-1	4.5-6	3-3-4	7		100	
5	694.00								
6									
7									
8									
9		Red silty CLAY, dry, firm, some coarse sand grains	S-2	9.5-11.0	4-4-6	10		100	
10	689.00								
11									
12									
13									
14		Red silty CLAY, dry, firm, small to medium chert & carbonate pebbles	S-3	14.5-16.0	5-6-9	15		100	
15	684.00								
16									
17									
18									
19		Red CLAY, dry, hard, some silt, occasional carbonate pebbles	S-4	19.5-21.0	6-11-17	28		100	
20	679.00								
21									
22									
23									
24	675.00								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 2 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 129.2 SURF.ELEV. 699.00

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	674.00	Dark red & tan silty CLAY, dry, firm, occasional chert pebbles	S-5	24.5-26.0	5-7-11	18		100	
26									
27									
28									
29		Brown and orange silty CLAY, dry, firm, degraded carbonated pebbles and cobbles	S-6	29.5-31.0	5-7-12	19		100	
30	669.00								
31									
32									
34		Tan silty CLAY, moist, firm, small degraded carbonate pebbles and coarse sand	S-7	34.5-36.0	3-4-5	9		100	
35	664.00								
36									
37									
39		Orangish tan CLAY, moist, firm, chert and carbonate sand and pebbles, black and light brown mottling	S-8	39.5-41.0	5-5-7	12		100	
40	659.00								
41									
42									
44		Orange and light tan CLAY, dry, firm, black mottling, occasional carbonate pebbles, some silt.	S-9	44.5-46	5-7-9	16		100	
45	654.00								
46									
47									
49		Tan clayey SILT, moist, moderately firm to moderately soft, black and dark red mottling	S-10	49.5-51	2-3-4	7		100	
50	649.00								
51									
52									
54		Tan clayey SILT, moist, moderately soft, degraded carbonate cobbles, black mottling, some sand	S-11	54.5-56	8-7-8	15		100	
55	644.00								
56	643.00								



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 3 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 129.2 SURF.ELEV. 699.46

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	642.00								
58									
59		Tan clayey SILT, w/ sand, saturated, soft, carbonate cobble in bottom of spoon	S-12	59.5-61	8-50-1	R		50	
60	639.00	60.8: Core through 8" boulder							
61									
62									
63									
64		Tan silty SAND, saturated, loose, medium-coarse grained w/ pebbles and gravel	S-13	64.5-66	3-1-4	5		50	
65	634.00								
66									
67									
68									
69									
70	629.00	Tan clayey SILT, saturated, soft, some black & orange mottling	S-14	69.5-71	2-3-4	7		10	
71									
72									
73									
74									
75	624.00								
76		No recovery	S-15	74.5-76	3-3-4	7		0	
77									
78									
79									
80	619.00								
81		Tan silty CLAY, soft, saturated	S-16	79.5-81	3-3-4	7		30	
82									
83									
84									
85	614.00								
86		Same as above	S-17	84.5-86	9-11-12	23		5	
87									
88	611.00								



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 4 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 129.2 SURF.ELEV. 699.00

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	610.00								
90									
91									
92									
93									
94									
95	604.00	95.1: Start coring							
96		Grey DOLOSTONE, some banding. Some fine fractures filled w/ white mineralization.							
97		96.7-102.2: Cavity							
98									
99									
100	599.00								
101									
102									
103		102.5-105.1: Cavity							
104									
105	594.00								
106									
107		Same as above							
108									
109									
110	589.00								
111									
112									
113									
114									
115	584.00								
116									
117									
118									
119									
120	579.00	119.5-122.5: Cavity							



DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 5 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 129.2 SURF.ELEV. 699.46

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121	578.00	124.1-129.2: Cavity							
122									
123									
124									
125	574.00								
126									
127									
128									
129									
130	569.00	129.2: Bottom of boring							
131									
132									
133									
134									
135	564.00								
136									
137									
138									
140	559.00								
141									
142									
143									
144									
145	554.00								
146									
147									
148									
149									
150	549.00								
151									
152									
153	546.00								

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **687.44**
 Top of PVC Casing Elevation (feet, NAVD88): **690.86**

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.: TriState (estimated)	WELL NAME
LOCATION:	Cells 9 and 10	RIG TYPE HSA (estimated)	GWC-47
LOGGER:		DRILLING METHODS: Auger (estimated)	
DATE CONSTRUCT	4/23/2014		

	DEPTH FEET	ELEVATION FT, MSL	
	TOP OF RISER	3.42	690.86
	GROUND SURFACE	0.00	687.44
	TOP OF SEAL	50.00	637.44
	TOP OF FILTER PACK	55.00	632.44
	BOTTOM OF RISER / TOP OF SCREEN	57.00	630.44
	BOTTOM OF SCREEN	67.00	620.44
	BOTTOM OF CASING	67.33	620.11

HOLE DIA: 6"



GWC-47 BORING LOG

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **687.44**
 Top of PVC Casing Elevation (feet, NAVD88): **690.86**

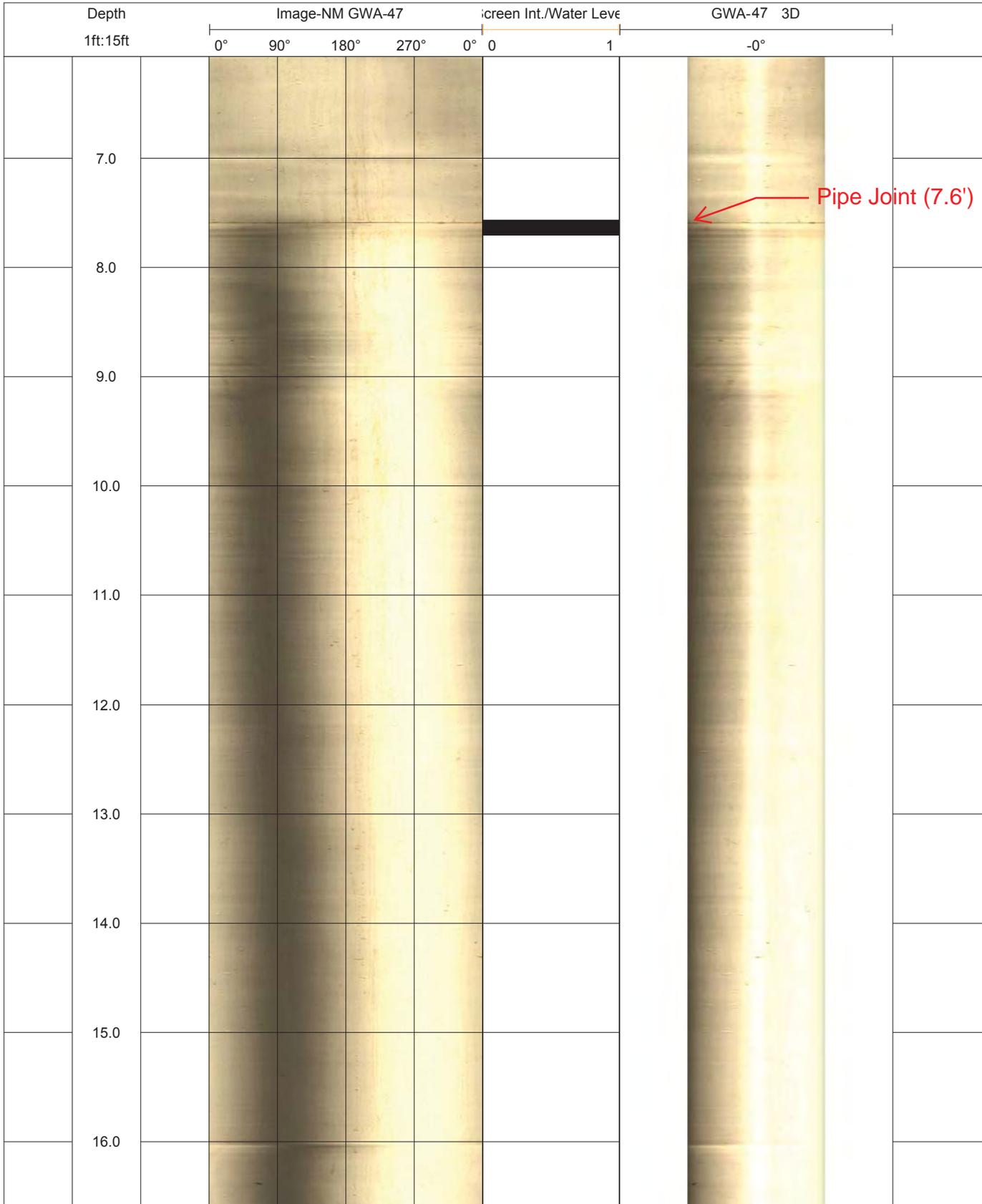
PROJECT NUMBER 6122160287.2101	DRILLING COMPANY N/A	COORDINATES N 1504543.69, E 072481.34
PROJECT NAME Plant Bowen	DRILLER N/A	COORD SYS Ga State Plane West (NAD 83)
CLIENT Georgia Power	RIG TYPE/ METHOD N/A	COMPLETION Stick-up w/ protective casing
ADDRESS 317 Covered Bridge Rd SW	CASING DIA. N/A	SURFACE ELEVATION 687.44 ft amsl
LOCATION Gypsum Landfill Cells 1 & 2	BORING DEPTH N/A	WELL TOC 690.86 ft amsl

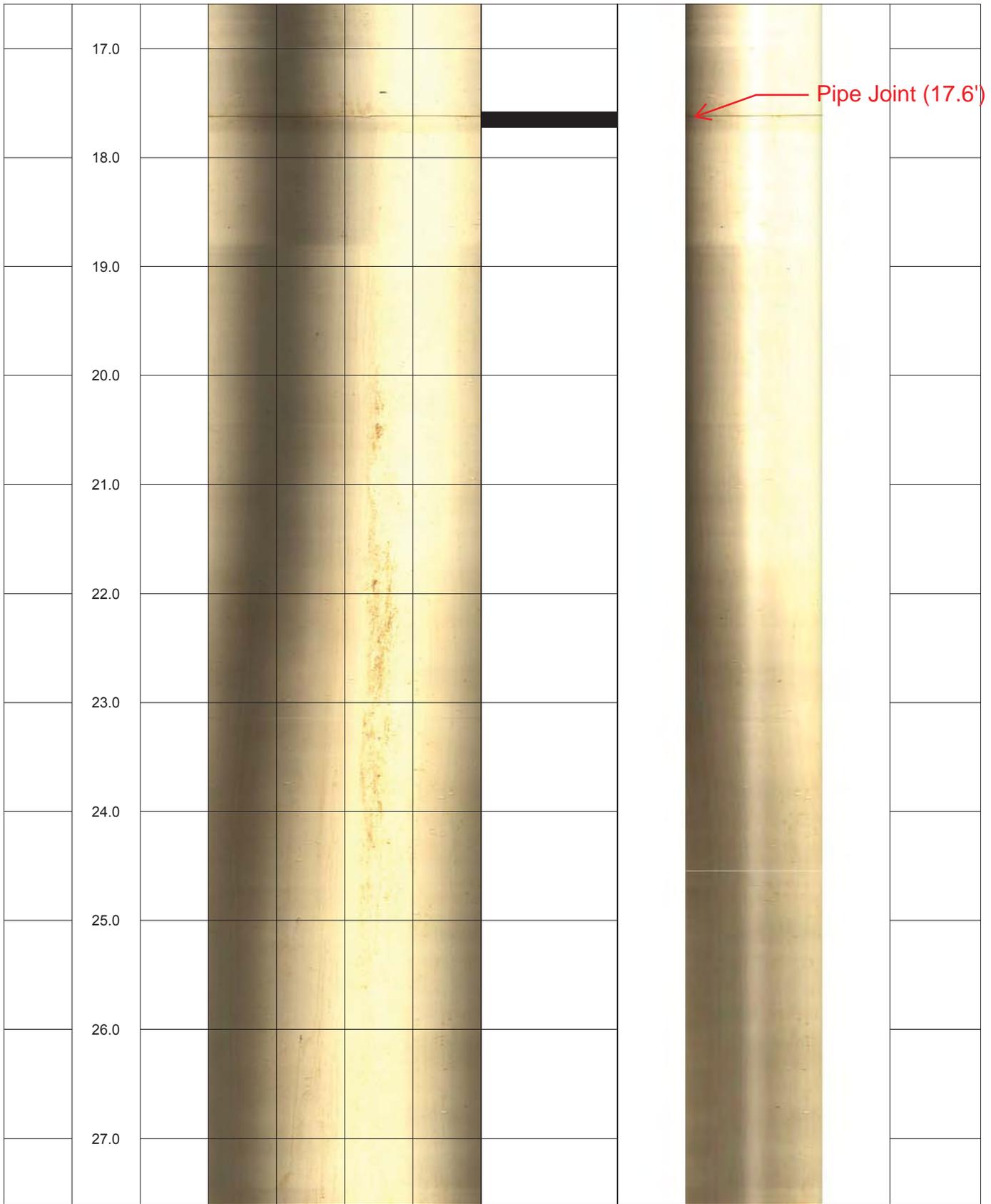
COMMENTS Lithologic descriptions are those recorded for the installation of neighboring well GWC-47R (previously GWC-46R) drilled on 4/22/2014 and completed on 4/24/2104. **LOGGED BY** N/A
CHECKED BY A. Shoredits & R. Quinn

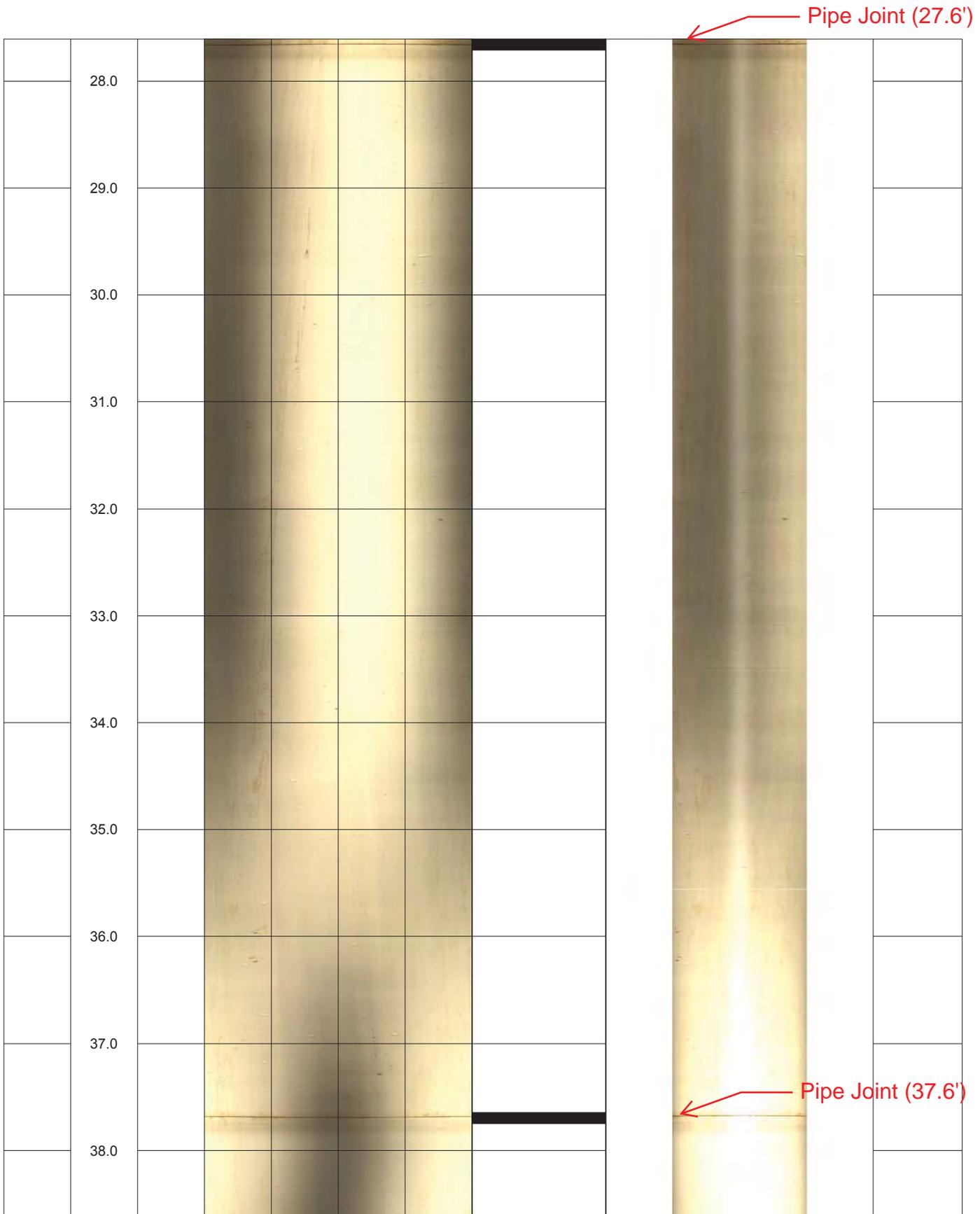
Depth (ft)	Graphic Log	Material Description	USCS	Elevation (ft)
4		Silty CLAY, orange w h red and yellow mottling, medium stiff, moist, residuum & partially weathered rock fragments	L-ML	698
6				696
8				694
10				692
12				690
14		SILT with clay, orange/ yellow with red/ brown/ orange/ yellow mottling, medium stiff, moist, residuum Partially weathered rock fragments 15-25 ft Trace sand 20-35 ft	ML	688
16				686
18				684
20				682
22				680
24				678
26				676
28				674
30				672
32				670
34	668			
36		Silty CLAY, orange with red and yellow mottling, stiff, wet, sands present	CL-ML	666
38				662
40				660
42		SILT with clay, orange with red/ brown/ yellow/ light grey mottling, going from very soft to stiff with increasing depth, moist, residuum & partially weathered rock fragments, trace sand throughout	ML	658
44				656
46				654
48				652
48				650

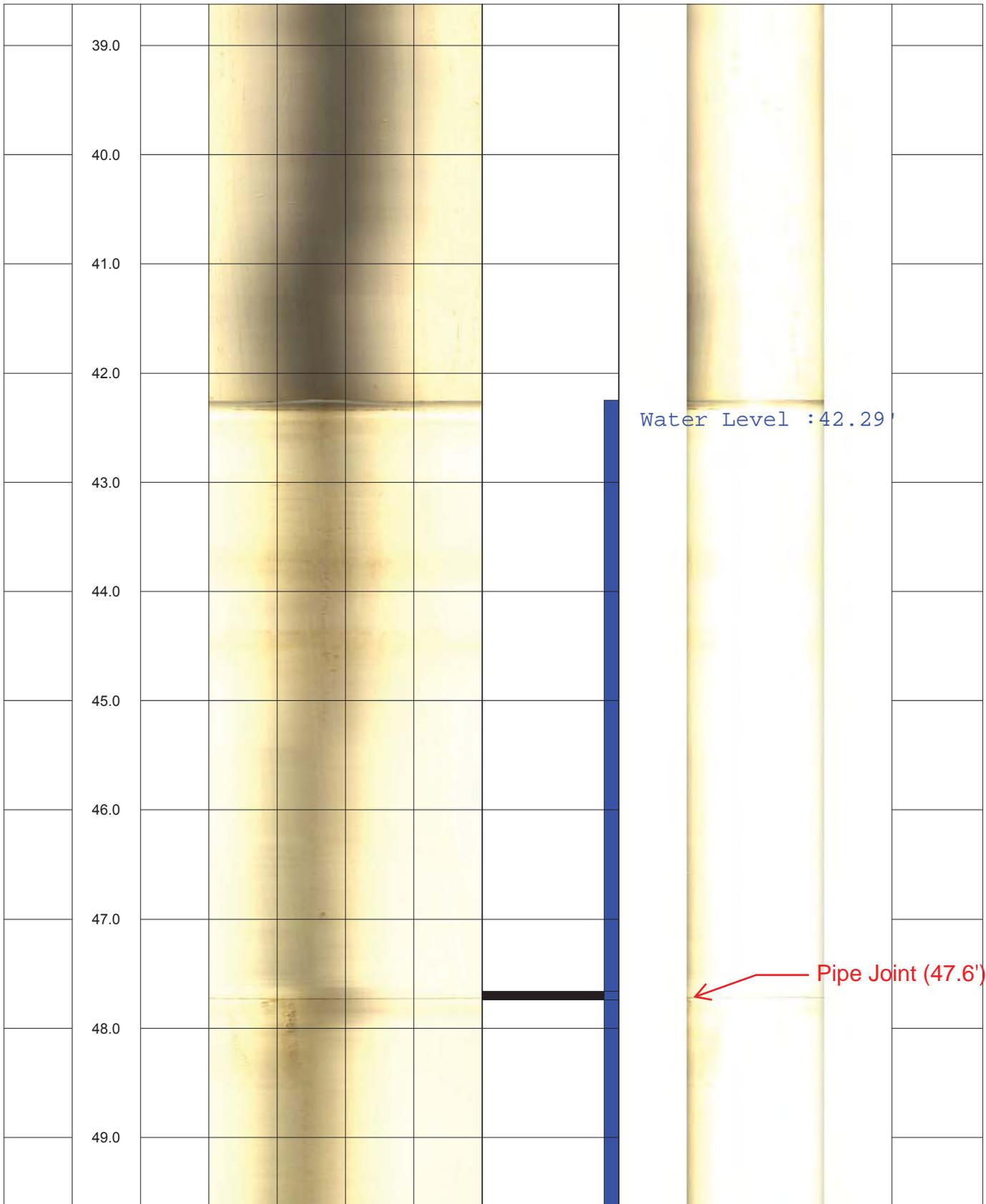
Depth (ft)	Graphic Log	Material Description	USCS	Elevation (ft)
50				648
52				646
54				644
56		Chert lens, grey unweathered	N/A	642
58		No sample		640
60		Sandy CLAY, orange with red mottling, very soft, moist, silt laminations	CL-SC	638
62				636
64				634
66		Dolomite, grey, hard, slightly to moderately weathered, slightly to moderately decomposed with increasing depth, slightly fractured		632
68		Boring terminated @ 68.0 ft		630
70				628
72				626
74				624
76				622
78				620
80				618
82				616
84				614
86				612
88				610
90				608
92				606
94				604
96				602
98				600
100				598
102				596
104				594
106				592
108				

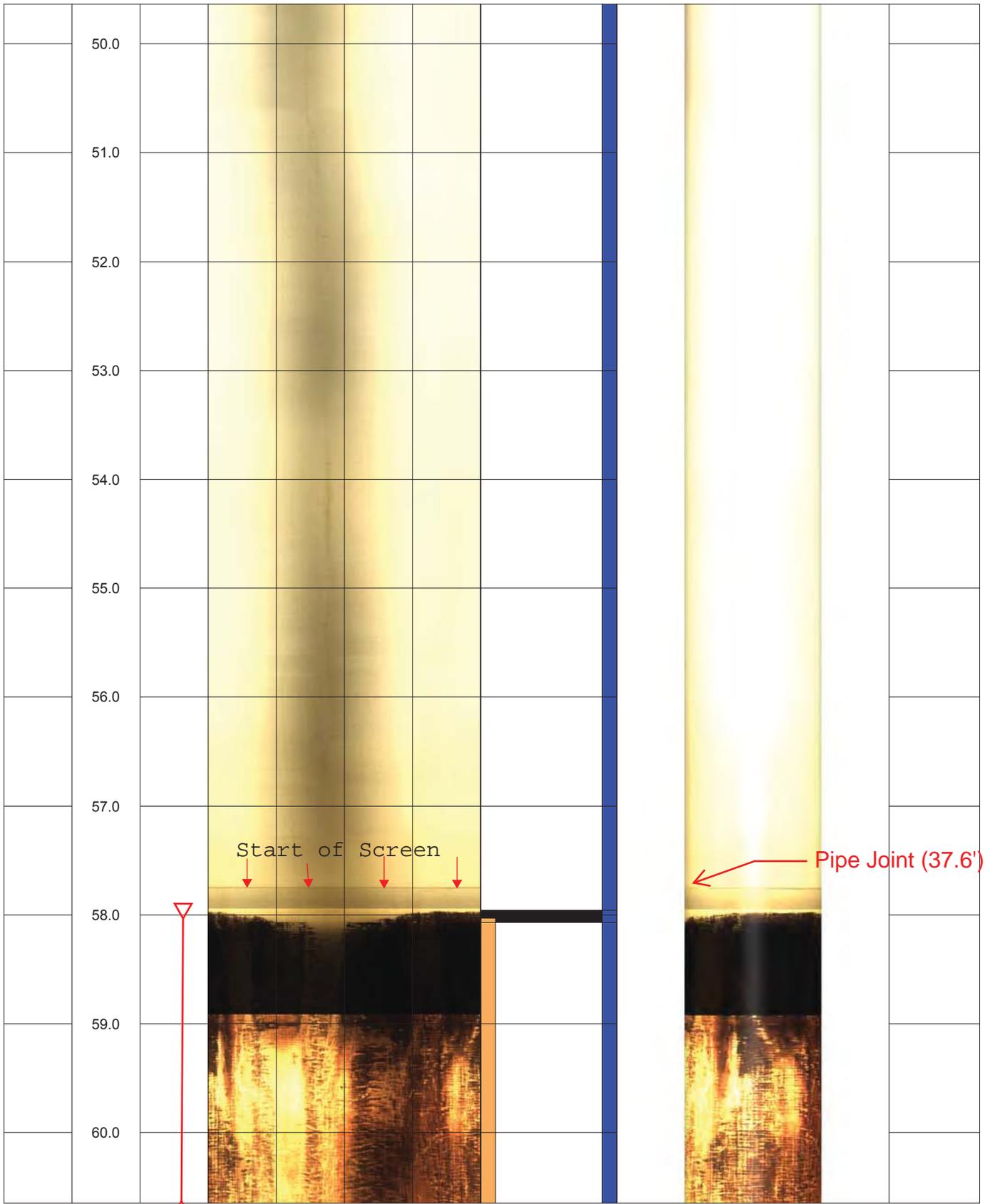
**PLANT BOWEN
Optical Television
Magnetic North and 3D Image
GWA-47**







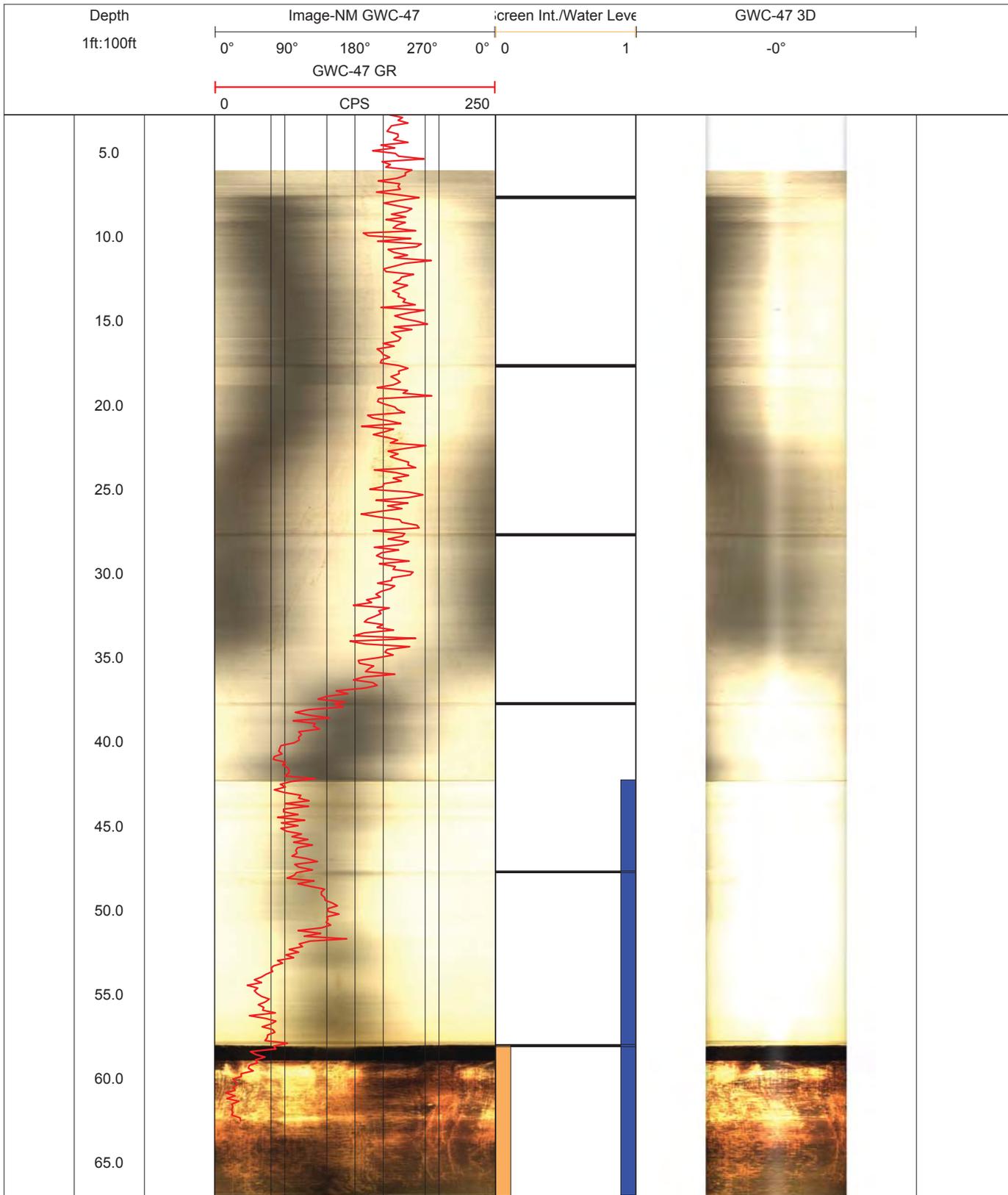


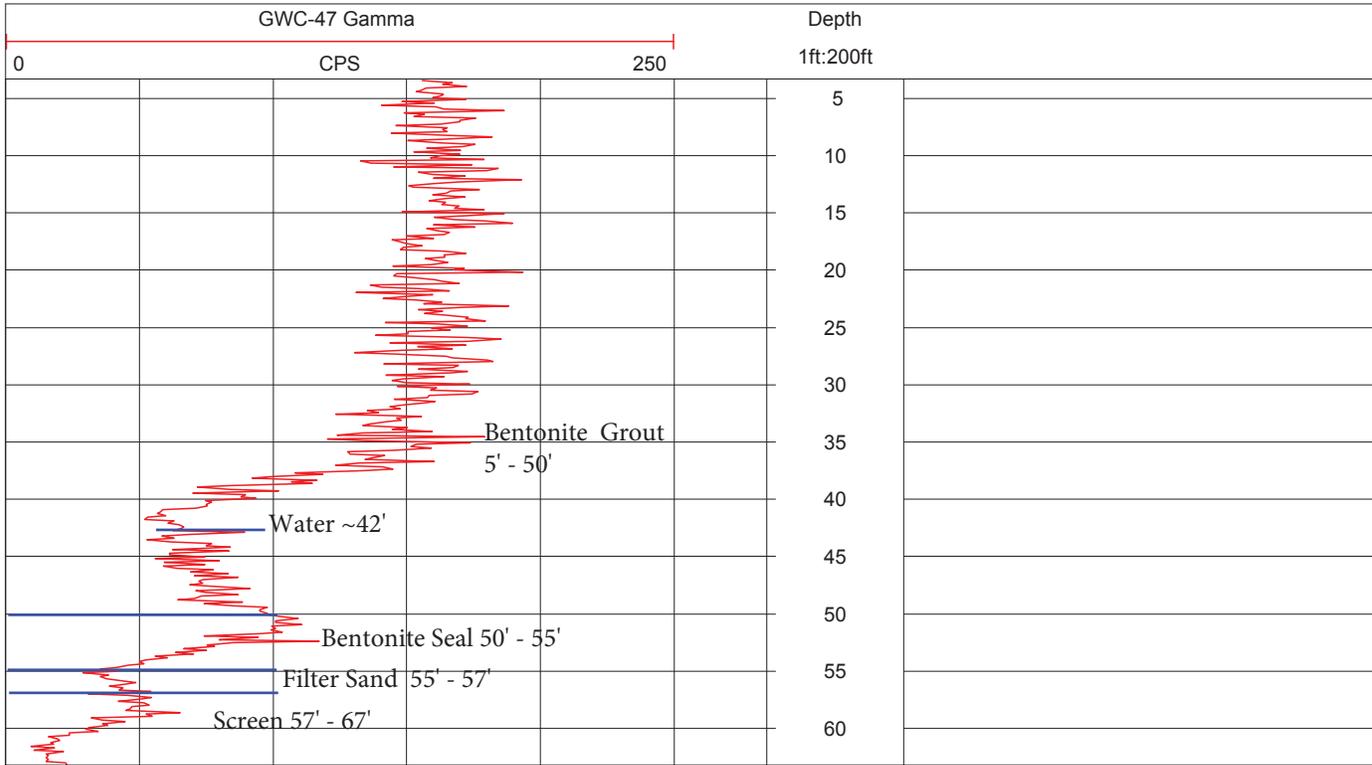


Borehole inundated
 with dark material
 growing on sidewalls.
 In order to view better
 exposure and light
 were turned up.

	61.0							
	62.0							
	63.0							
	64.0							
	65.0							
	66.0							
	67.0							

BOH:
67.33'





Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **687.71**
 Top of PVC Casing Elevation (feet, NAVD188): **691.13**

BORING GWC-47R
 PAGE 1 OF 2
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LOG OF TEST BORING AND WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT 9 & 10 Landfill Wells
 LOCATION Plant Bowen

DATE STARTED 4/22/2014 COMPLETED 4/24/2014 SURF. ELEV. 687.71' NAVD88 COORDINATES: N:1504539.25 E:2072467.10

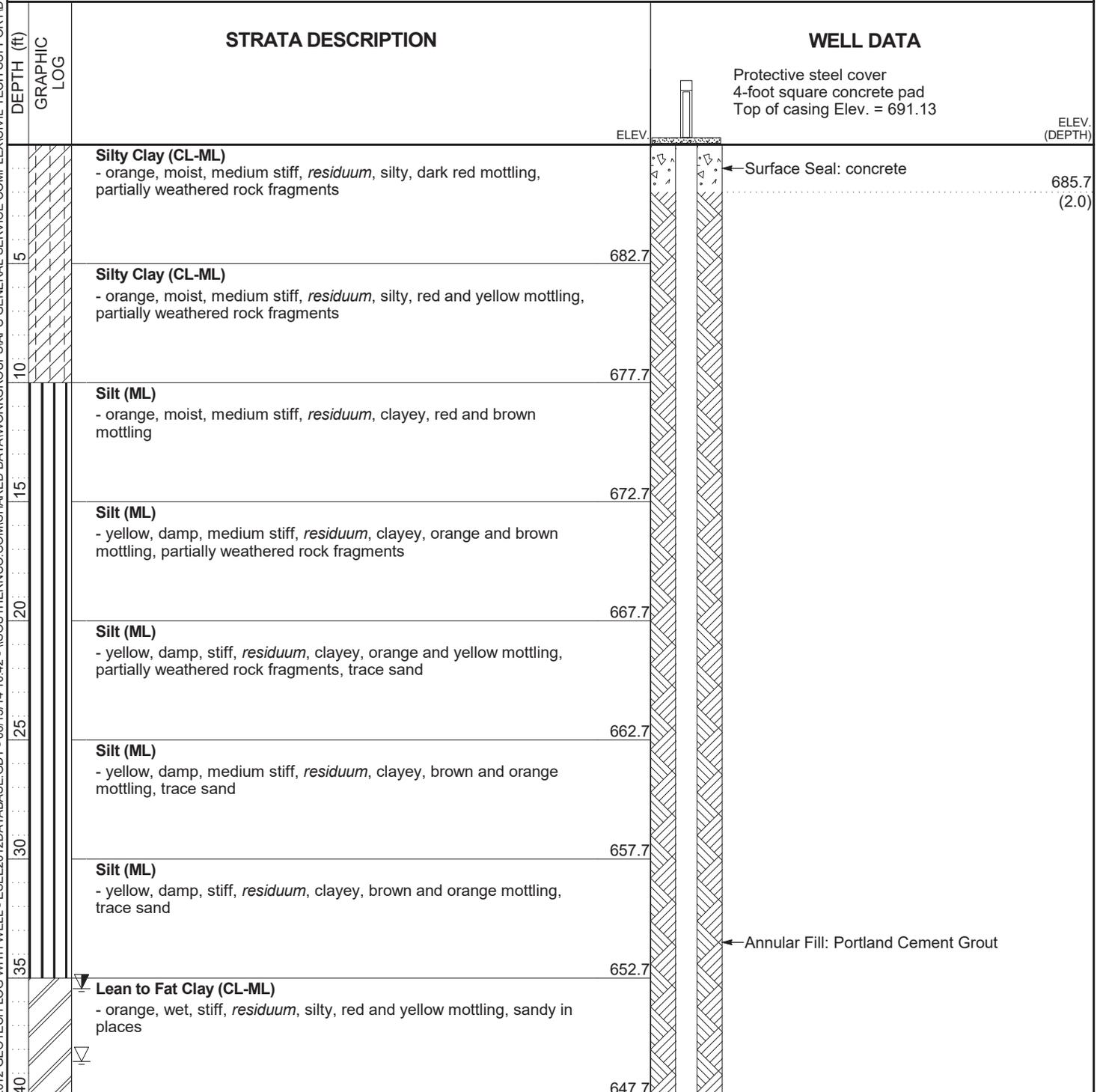
CONTRACTOR Tristate Drilling EQUIPMENT CME550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core

DRILLED BY D. Wright LOGGED BY L. Millet CHECKED BY L. Millet ANGLE -90 BEARING 0

BORING DEPTH 81.2 ft. GROUND WATER DEPTH: DURING 38.5 ft. COMP. _____ DELAYED 35.45 ft. after 192 hrs.

NOTES _____

2012 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:42 - \\SOUTHERNCO.COM\SHARED DATA\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MMW49-49R-47R.GPJ



(Continued Next Page)



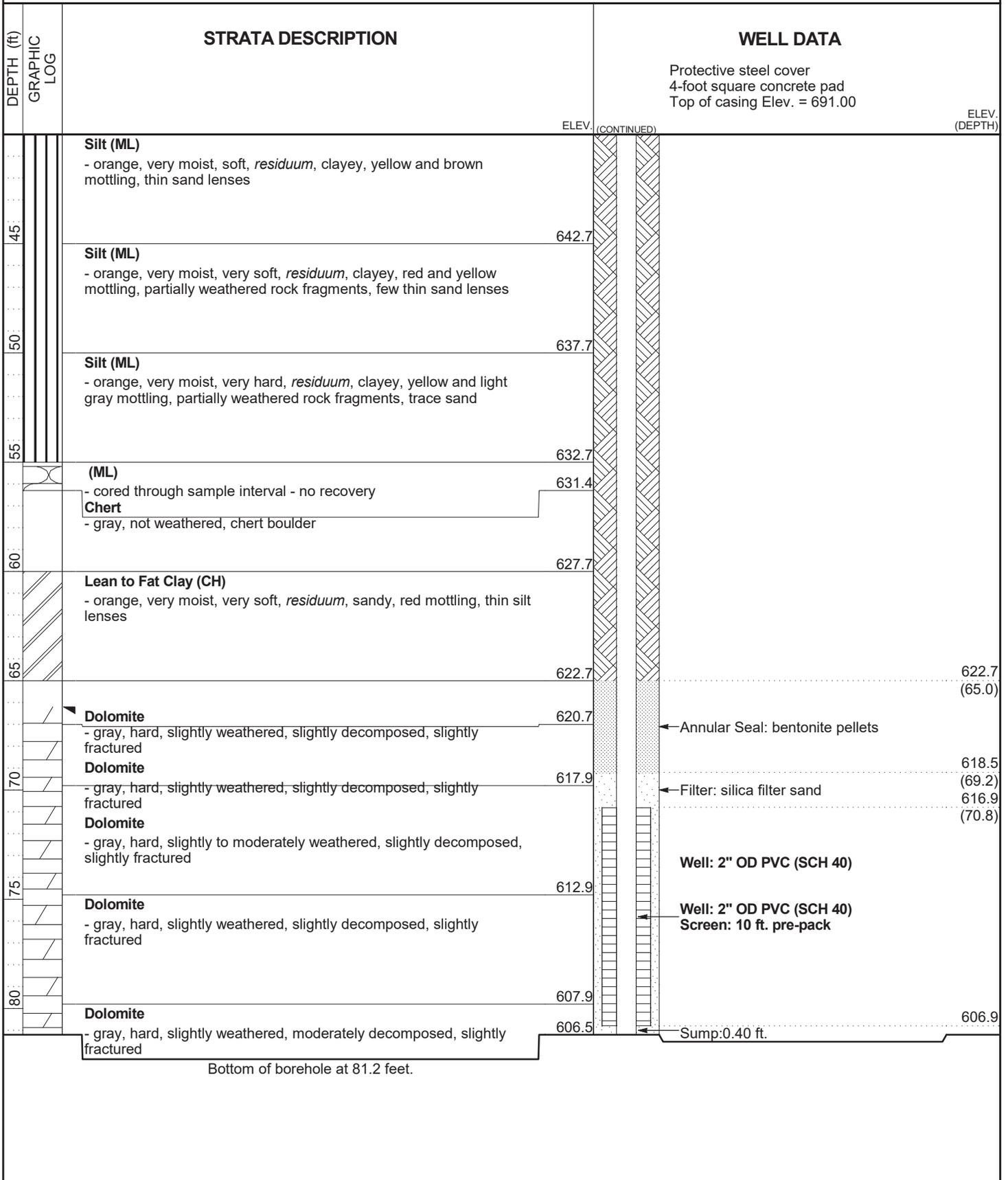
LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-47R
PAGE 2 OF 2
ECS18611

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT 9 & 10 Landfill Wells
LOCATION Plant Bowen

2012 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:42 - \\SOUTHERNCO.COM\SHARED DATA\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MMW49-49R-47R.GPJ



Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **686.20**
 Top of PVC Casing Elevation (feet, NAVD188): **688.33**



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-48**

Sheet 1 of 2

SITE Plant Bowen		HOLE DEPTH 57'	SURFELEV 686.20 FT
LOCATION Landfill Cells 9 & 10		COORDINATES 1504490.63	2072851.71
ANGLE _____	BEARING _____	CONTRACTOR Boart	DRILL NO. _____
DRILLING METHOD Rotosonic		NO. SAMPLES _____	NO. U.D. SAMPLES _____
CASING SIZE 2"	LENGTH 10'	CORE SIZE _____	TOTAL % REC. _____
WATER TABLE DEPTH 39.73 FT	ELEV. 648.76 FT	TIME AFTER COMP. _____	DATE TAKEN 8/25/2014
TYPE GROUT _____	QUANTITY _____	MIX _____	DRILLING START DATE 6/8/2011
DRILLER _____	RECORDER Dyer / Abraham	APPROVED _____	DRILLING COMP. DATE 6/8/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	686.20								
1		CLAYEY SILT (0 - 3 FT) White to tan and orange, weakly-cemented, clayey silt; few dolomitic fragments; dry.							
2									
3									
4		SILTY SAND (3 - 8 FT) Orange to red-brown silty sand with minor angular to sub-angular gravels; dry.							
5	681.20								
6									
7		CLAYEY SILT (8 - 16 FT) Tan to white clayey silt with few gravels; dark colored banding - likely manganese bands with contorted bedding; moist.							
8									
9									
10	676.20								
11		GRAVELLY SAND (16 - 22 FT) Brownish gravelly sand with wet clay layers; Low plastic clay.							
12									
13									
14									
15	671.20								
16									
17									
18									
19									
20	666.20								
21									
22									
23									
24	662.20								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-48**

Sheet 2 of 2

SITE **Plant Bowen** TOTAL DEPTH **57'** SURF.ELEV. **686.20 FT**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
25	661.20								
26									
27									
28									
29									
30	656.20	SILT							
31		Tan to orange silt (70%) with clay (15%) and sandy gravel (15%); low plastic clay; lacks structure; wet.							
32									
33									
34									
35	651.20								
36									
37									
38									
39									
40	646.20								
41									
42									
43									
44									
45	641.20	SILT (46 - 50 FT)							
46		Tan to orange silt (70%) with clay (15%) and sandy gravel (15%); low plastic clay; lacks structure; wet.							
47									
48									
49									
50	636.20	CLAYEY SILT (50 - 56 FT)							
51		Tan to orange silt (65%) with clay (20%) and sandy gravel (15%); low plastic clay; lacks structure; wet.							
52									
53									
54									
55	631.20								
56	630.20	END OF BORING, 57 FT							

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 5/5/16 16:54 - S:\WORKGROUP\SIAPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT



Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **706.12**
 Top of PVC Casing Elevation (feet, NAVD88): **709.11**

BORING GWC-49 Z
 PAGE 1 OF 3
 GPC633179

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells
 LOCATION Plant Bowen

DATE STARTED 2/23/2016 COMPLETED 3/1/2016 SURF. ELEV. 706.12' NAVD88 COORDINATES: N:1505238.30 E:2072896.49

CONTRACTOR Cascade EQUIPMENT Tracked METHOD Rotosonic

DRILLED BY T. Ardito LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 107 ft. GROUND WATER DEPTH DURING 48 ft. COMP. 47.3 ft. DELAYED 47.2 ft. after 96 hrs.

NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA	
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad	
5		Sandy Silt (ML) - mottled grayish brown (10YR 5/2), strong brown (7.5YR 5/6) and brownish yellow / dark yellowish orange (10YR 6/6) very damp, soft, some clay and gravel - medium stiff					Surface Seal: Concrete
10		- mottled reddish yellow (7.5YR 6/8) and yellowish red (5YR 4/6) moist, medium stiff, medium plasticity, some clay and gravel - stiff					
15		Dolostone (COBBLES AND BOULDERS) - dolostone boulder, about 2 ft. thick, gray, fresh					Annular Fill: Portland Cement-Bentonite Grout (4 - 94lbs bags PC, 1 - 50lbs bags Gel, 40 gal. Water)
20		- mottled strong brown (7.5YR 5/8) and red (2.5YR 4/6) dry, medium stiff, medium plasticity, some clay and gravel - stiff					
25		- mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8)					
30		Silt (ML) - mottled brownish yellow (10YR 6/8) and red (2.5yr 4/8) dry, medium stiff, low to medium plasticity, some sand - damp					
35							Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (0.5 - 5gal buckets (77.0'-74.0')) and Baroid Hole Plug 3/8 Chips (10 - 50lbs bags (74.0'-25.0'))
40		Elastic Silt (MH) - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) wet, medium stiff					

(Continued Next Page)

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 5/5/16 16:54 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT



LOG OF TEST BORING

BORING GWC-49 Z
 PAGE 2 OF 3
 GPC633179

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Elastic Silt (MH) (Con't)				(CONTINUED)
45		- red (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam				
50		Sandy Lean Clay (CL) - very pale brown (10YR 8/3), strong brown (7.5YR 5/6) and red (2.5YR 4/6) wet, medium stiff, medium plasticity, some gravel				
55						
60		- red (2.5YR 4/8), light gray (10YR 7/1) and black (10YR 2/1) wet, medium stiff, medium to high plasticity, some gravel, interbedded zones of CHS Sandy Fat Clay				Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (0.5 - 5gal buckets (77.0'-74.0')) and Baroid Hole Plug 3/8 Chips (10 - 50lbs bags (74.0'-25.0'))
65						
70		- yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel				
75						
80		- and dark yellowish brown (10YR 4/6) saturated, very soft, high plasticity, with cobbles and gravel				Filter: Filter Media 20/40 Silica Sand (4 - 50 lbs bags)
85						Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-49 Z
 PAGE 2 OF 3
 GPC633179

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 5/15/16 16:52 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
45		Elastic Silt (MH) (Con't) - red (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam			(Con't)			
50		Sandy Lean Clay (CL) - very pale brown (10YR 8/3), strong brown (7.5YR 5/6) and red (2.5YR 4/6) wet, medium stiff, medium plasticity, some gravel			(Recovery=100% between 47 and 57ft.)			
60		- red (2.5YR 4/8), light gray (10YR 7/1) and black (10YR 2/1) wet, medium stiff, medium to high plasticity, some gravel, interbedded zones of CHS Sandy Fat Clay			(Recovery=65% between 57 and 67ft.)			
70		- yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel			(Recovery=65% between 67 and 77ft.)			
80		- and dark yellowish brown (10YR 4/6) saturated, very soft, high plasticity, with cobbles and gravel			(Recovery=17% between 77 and 92ft.)			
85								

(Continued Next Page)

Log updated with revised survey certified 3/23/2021
 Ground Surface Elevation (feet, NAVD88): **706.24**
 Top of PVC Casing Elevation (feet, NAVD88): **709.56**

BORING GWC-49R
 PAGE 1 OF 3
 ECS18611



LOG OF TEST BORING AND WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT 9 & 10 Landfill Wells
 LOCATION Plant Bowen

DATE STARTED 4/16/2014 COMPLETED 4/17/2014 SURF. ELEV. 706.24' NAVS88 COORDINATES: N:1504246.02 E:2072918.76

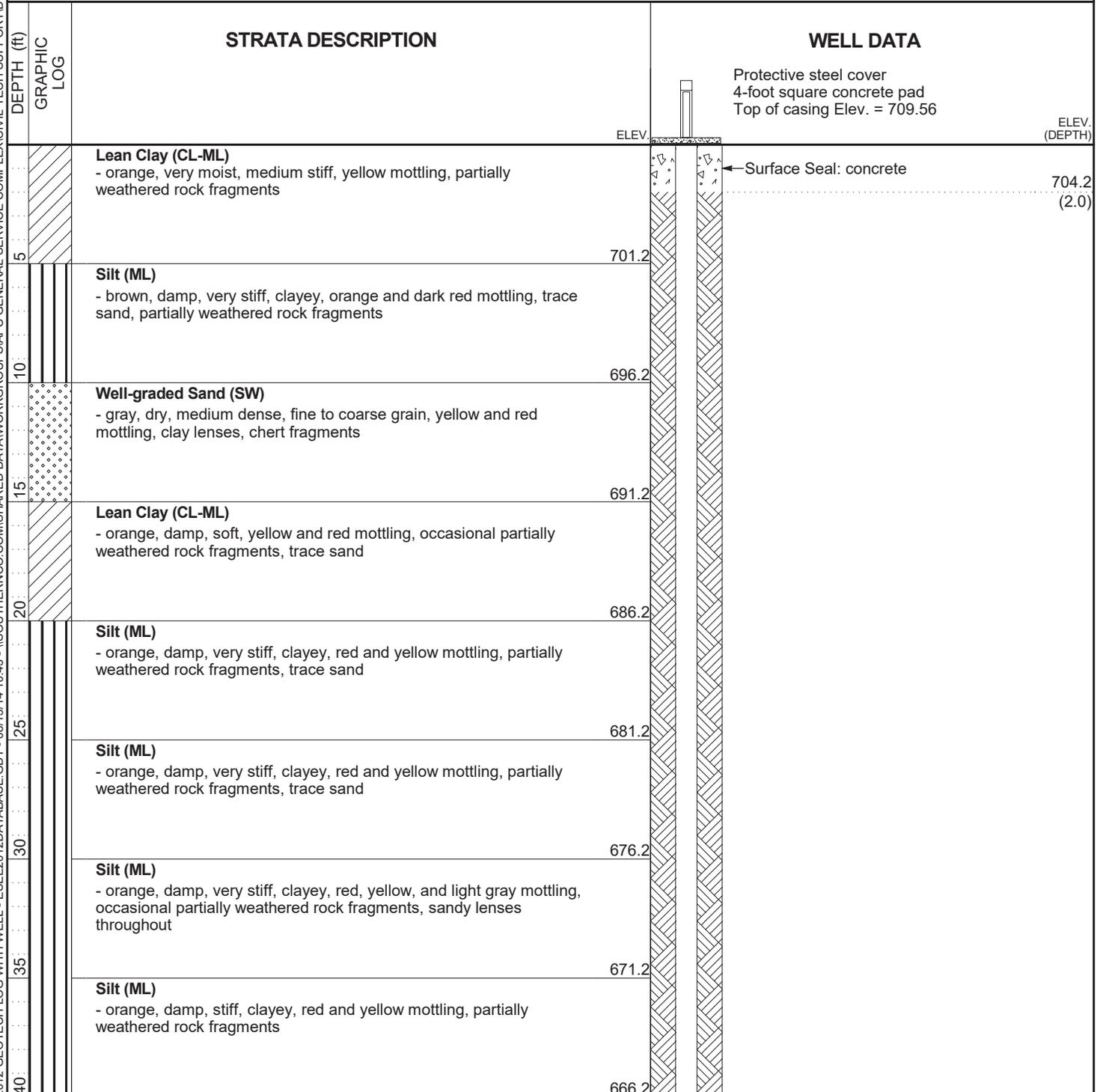
CONTRACTOR Tristate EQUIPMENT SME550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core

DRILLED BY D. Wright LOGGED BY L. Millet CHECKED BY L. Millet ANGLE -90 BEARING 0

BORING DEPTH 131.1 ft. GROUND WATER DEPTH: DURING 63.5 ft. COMP. 44.9 ft. DELAYED 49.3 ft. after 12 hrs.

NOTES _____

2012 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:43 - \\SOUTHERNCO.COM\SHARED\DATA\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MMW49-49R-47R.GPJ



(Continued Next Page)



LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-49R
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT 9 & 10 Landfill Wells
LOCATION Plant Bowen

2012 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:43 - \\SOUTHERNCO.COM\SHARED DATA\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MMW49-49R-47R.GPJ

DEPTH (ft) GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA	
		ELEV. (DEPTH)	ELEV. (CONTINUED)
45	Lean to Fat Clay (CH) - red, damp, stiff, low to medium plasticity, yellow mottling, silty, trace sand	661.2	
50	Silt (ML) - orange, damp, medium stiff, clayey, yellow and light yellow mottling, clayey lenses	656.2	
55	Silt (ML) - yellow, very moist, stiff, clayey, light yellow mottling, few sand lenses	651.2	
60	Silt (ML) - yellow, wet, medium stiff, clayey, brown mottling, few thin sand lenses, trace clay	646.2	← Annular Fill: Portland Cement Grout
65	Clayey Sand (SC) - brown, wet, medium dense, medium to coarse grain	636.2	
70	Elastic Silt (MH) - yellow, wet, hard, medium plasticity, clayey, orange and black mottling, partially weathered rock fragments	631.2	
75	Silt (MH) - yellow, wet, soft, medium plasticity, clayey, orange and black mottling, trace sand	626.2	
80	Elastic Silt (ML) - yellow, wet, stiff, clayey, orange and dark brown mottling, clay lenses, partially weathered rock fragments	621.2	
85	(MH) - yellow, wet, very hard, medium plasticity, clayey, brown mottling, sand lenses, partially weathered rock fragments		

(Continued Next Page)



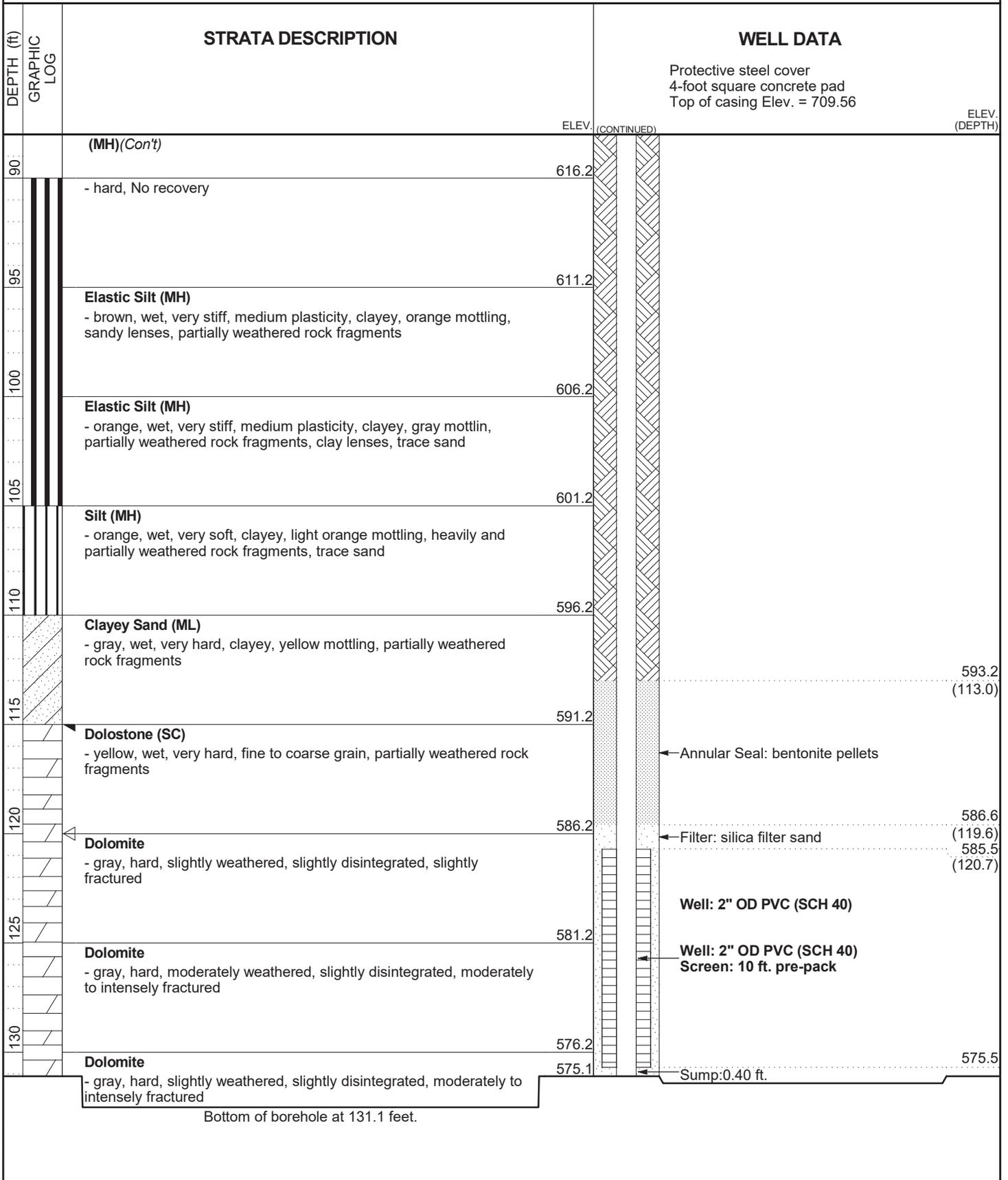
LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-49R
PAGE 3 OF 3
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT 9 & 10 Landfill Wells
LOCATION Plant Bowen

2012 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:43 - \\SOUTHERNCO.COM\SHARED DATA\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MMW49-49R-47R.GPJ



ATTACHMENT A2

WELL DRILLING CONTRACTOR PROOF OF BONDING



Power of Attorney

KNOW ALL MEN BY THESE PRESENTS, that ATLANTIC SPECIALTY INSURANCE COMPANY, a New York corporation with its principal office in Plymouth, Minnesota, does hereby constitute and appoint: **Deanna M. French, Susan B. Larson, Elizabeth R. Hahn, Jana M. Roy, Scott McGilvray, Mindee L. Rankin, Ronald J. Lange, John R. Claeys, Roger Kaltenbach, Guy Armfield, Scott Fisher, Andrew P. Larsen, Nicholas Fredrickson, William M. Smith, Derek Sabo, Charla M. Boadle**, each individually if there be more than one named, its true and lawful Attorney-in-Fact, to make, execute, seal and deliver, for and on its behalf as surety, any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof; provided that no bond or undertaking executed under this authority shall exceed in amount the sum of: **unlimited** and the execution of such bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof in pursuance of these presents, shall be as binding upon said Company as if they had been fully signed by an authorized officer of the Company and sealed with the Company seal. This Power of Attorney is made and executed by authority of the following resolutions adopted by the Board of Directors of ATLANTIC SPECIALTY INSURANCE COMPANY on the twenty-fifth day of September, 2012:

Resolved: That the President, any Senior Vice President or Vice-President (each an "Authorized Officer") may execute for and in behalf of the Company any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof, and affix the seal of the Company thereto; and that the Authorized Officer may appoint and authorize an Attorney-in-Fact to execute on behalf of the Company any and all such instruments and to affix the Company seal thereto; and that the Authorized Officer may at any time remove any such Attorney-in-Fact and revoke all power and authority given to any such Attorney-in-Fact.

Resolved: That the Attorney-in-Fact may be given full power and authority to execute for and in the name and on behalf of the Company any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof, and any such instrument executed by any such Attorney-in-Fact shall be as binding upon the Company as if signed and sealed by an Authorized Officer and, further, the Attorney-in-Fact is hereby authorized to verify any affidavit required to be attached to bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof.

This power of attorney is signed and sealed by facsimile under the authority of the following Resolution adopted by the Board of Directors of ATLANTIC SPECIALTY INSURANCE COMPANY on the twenty-fifth day of September, 2012:

Resolved: That the signature of an Authorized Officer, the signature of the Secretary or the Assistant Secretary, and the Company seal may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing an Attorney-in-Fact for purposes only of executing and sealing any bond, undertaking, recognizance or other written obligation in the nature thereof, and any such signature and seal where so used, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed.

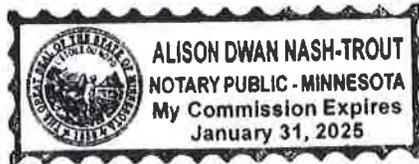
IN WITNESS WHEREOF, ATLANTIC SPECIALTY INSURANCE COMPANY has caused these presents to be signed by an Authorized Officer and the seal of the Company to be affixed this twenty-seventh day of April, 2020.



By *Paul J. Brehm*
Paul J. Brehm, Senior Vice President

STATE OF MINNESOTA
HENNEPIN COUNTY

On this twenty-seventh day of April, 2020, before me personally came Paul J. Brehm, Senior Vice President of ATLANTIC SPECIALTY INSURANCE COMPANY, to me personally known to be the individual and officer described in and who executed the preceding instrument, and he acknowledged the execution of the same, and being by me duly sworn, that he is the said officer of the Company aforesaid, and that the seal affixed to the preceding instrument is the seal of said Company and that the said seal and the signature as such officer was duly affixed and subscribed to the said instrument by the authority and at the direction of the Company.



Alison Nash-Trout
Notary Public

I, the undersigned, Secretary of ATLANTIC SPECIALTY INSURANCE COMPANY, a New York Corporation, do hereby certify that the foregoing power of attorney is in full force and has not been revoked, and the resolutions set forth above are now in force.

Signed and sealed. Dated 12 day of April, 2021.

This Power of Attorney expires
January 31, 2025



Kara Barrow
Kara Barrow, Secretary

CONTINUATION
CERTIFICATE

Atlantic Specialty Insurance Company

, Surety upon

a certain Bond No. 800033976

dated effective 09/27/2017
(MONTH-DAY-YEAR)

on behalf of Ricky Davis / Cascade Drilling, L.P.
(PRINCIPAL)

and in favor of Department of Natural Resources, State of Georgia
(OBLIGEE)

Issued on 9/27/2017
Expires on 6/30/2021
Renewed on 4/12/2021
Expires on 6/30/2023

does hereby continue said bond in force for the further period

beginning on 06/30/2021
(MONTH-DAY-YEAR)

and ending on 06/30/2023
(MONTH-DAY-YEAR)

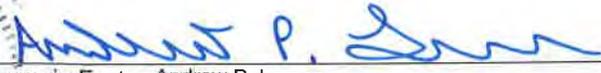
Amount of bond Thirty Thousand and 00/100 Dollars (\$30,000.00)

Description of bond Performance Bond for Water Well Contractors

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on April 12th, 2021
(MONTH-DAY-YEAR)

Atlantic Specialty Insurance Company

By 
Attorney-in-Fact Andrew P. Larsen

Parker, Smith & Feek, Inc.

Agent
2233 112th Ave NE Bellevue, WA 98004

Address of Agent

425-709-3600

Telephone Number of Agent

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective June 30, 1987
(MONTH-DAY-YEAR)

on behalf of Southern Company Services, Inc.
(PRINCIPAL)

and in favor of Georgia Department of Natural Resources, Environmental Protection Division
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30, 2021
(MONTH-DAY-YEAR)

and ending on June 30, 2022
(MONTH-DAY-YEAR)

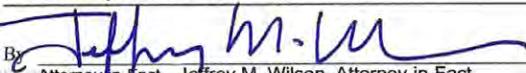
Amount of bond Fifteen Thousand Dollars and 00/100 (\$15,000.00)

Description of bond Water Well Contractors & Drillers

Premium: \$100.00

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on 05/06/2021
(MONTH-DAY-YEAR)
SAFECO Insurance Company of America
175 Berkeley Street, Boston, MA 02116

By 
Attorney-in-Fact Jeffrey M. Wilson, Attorney-in-Fact

McGriff Insurance Services, Inc.
Agent
2211 7th Avenue South, Birmingham, AL 35233
Address of Agent
(205) 252-9871
Telephone Number of Agent



This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

American States Insurance Company
First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

Certificate No: 8205019-016032

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That American States Insurance Company is a corporation duly organized under the laws of the State of Indiana, that First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Alisa B. Ferris; Anna Childress; Jeffrey M. Wilson; Mark W. Edwards II, Richard H. Mitchell, Robert R. Frecl; Sam Audia; William M. Smith

all of the city of Birmingham state of AL each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 11th day of March, 2021.

American States Insurance Company
First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: [Signature]
David M. Carey, Assistant Secretary



State of PENNSYLVANIA
County of MONTGOMERY

On this 11th day of March, 2021 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.



Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: [Signature]
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorney-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 6th day of May, 2021.



By: [Signature]
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective June 30, 1987
(MONTH-DAY-YEAR)

on behalf of Southern Company Services, Inc.
(PRINCIPAL)

and in favor of Georgia Department of Natural Resources, Environmental Protection Division
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30, 2022
(MONTH-DAY-YEAR)

and ending on June 30, 2023
(MONTH-DAY-YEAR)

Amount of bond Fifteen Thousand Dollars and 00/100 (\$15,000.00)

Description of bond Water Well Contractors & Drillers

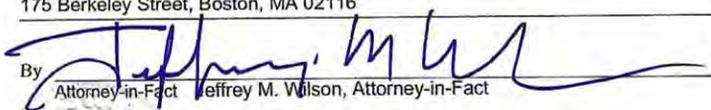
Premium: \$100.00

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on 05/06/2021
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

175 Berkeley Street, Boston, MA 02116

By 

Attorney-in-Fact Jeffrey M. Wilson, Attorney-in-Fact

McGriff Insurance Services, Inc.

Agent

2211 7th Avenue South, Birmingham, AL 35233

Address of Agent

(205) 252-9871

Telephone Number of Agent



This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

American States Insurance Company
First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

Certificate No: 8205019-016032

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That American States Insurance Company is a corporation duly organized under the laws of the State of Indiana, that First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Alisa B. Ferris; Anna Childress; Jeffrey M. Wilson; Mark W. Edwards II, Richard H. Mitchell, Robert R. Frecl; Sam Audia; William M. Smith

all of the city of Birmingham state of AL each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 11th day of March, 2021.

American States Insurance Company
First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: [Signature]
David M. Carey, Assistant Secretary



State of PENNSYLVANIA
County of MONTGOMERY

On this 11th day of March, 2021 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.



Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: [Signature]
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorney-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, of American States Insurance Company, First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 6th day of May, 2021.



By: [Signature]
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CONTINUATION
CERTIFICATE

Atlantic Specialty Insurance Company

, Surety upon

a certain Bond No. 800033976

dated effective 09/27/2017
(MONTH-DAY-YEAR)

on behalf of Ricky Davis / Cascade Drilling, L.P.
(PRINCIPAL)

and in favor of Department of Natural Resources, State of Georgia
(OBLIGEE)

Issued on 9/27/2017
Expires on 6/30/2019
Renewed on 3/4/2019
Expires on 6/30/2021

does hereby continue said bond in force for the further period

beginning on 06/30/2019
(MONTH-DAY-YEAR)

and ending on 06/30/2021
(MONTH-DAY-YEAR)

Amount of bond Thirty Thousand and 00/100 Dollars (\$30,000.00)

Description of bond Performance Bond for Water Well Contractors

Premium: \$1200.00

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on March 4th, 2019
(MONTH-DAY-YEAR)

Atlantic Specialty Insurance Company

By Andrew P. Larsen
Attorney-in-Fact Andrew P. Larsen

Parker, Smith & Feek, Inc.

Agent
2233 112th Ave NE Bellevue, WA 98004

Address of Agent

425-709-3600

Telephone Number of Agent

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 6125754

First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Chaun M. Wilson; D-Ann Kleidosty; Gary D. Eklund; Sharon J. Potts; Sylvia M. Ogle; Tracey D. Watson; William G. Moody

all of the city of Atlanta, state of GA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 15th day of May, 2013.



First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

STATE OF WASHINGTON ss
COUNTY OF KING

On this 15th day of May, 2013, before me personally appeared Gregory W. Davenport, who acknowledged himself to be the Assistant Secretary of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Seattle, Washington, on the day and year first above written.



By: KD Riley
KD Riley, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS - Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Gregory W. Davenport, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, David M. Carey, the undersigned, Assistant Secretary, of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 9th day of April, 2014.



By: David M. Carey
David M. Carey, Assistant Secretary

not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

Southern Company Services, Inc.
30 Ivan Allen Jr. Boulevard NW
Atlanta, Georgia 30308



May 8, 2013

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

Re: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104

Dear Mr. McCook:

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2014.

Please let me know if you need additional assistance.

Sincerely,

Clementine Broaders
Clementine Broaders
Risk Management Associate
cbbroade@southernco.com
404-506-0701

/cb

Enclosure

cc: Sarah Roberts

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. 4993104

dated effective June 30, 1987
(MONTH-DAY-YEAR)

on behalf of Southern Company Services, Inc.
(PRINCIPAL)

and in favor of Georgia - Dept. of Natural Resources
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30, 2013
(MONTH-DAY-YEAR)

and ending on June 30, 2014
(MONTH-DAY-YEAR)

Amount of bond \$10,000.00

Description of bond Water Well Contractors & Drillers

Premium: \$100.00

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on May 03, 2013
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By *D-Ann Kleidosty*
D-Ann Kleidosty, Attorney-In-Fact

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 5634691

First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Chaun M. Wilson; D-Ann Kleidosty; Gary D. Eklund; Sylvia M. Ogle; Tracey D. Watson; William G. Moody

all of the city of Atlanta, state of GA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 31st day of October, 2012.



First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

STATE OF WASHINGTON ss
COUNTY OF KING

On this 31st day of October, 2012, before me personally appeared Gregory W. Davenport, who acknowledged himself to be the Assistant Secretary of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Seattle, Washington, on the day and year first above written.



By: KD Riley
KD Riley, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Gregory W. Davenport, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, David M. Carey, the undersigned, Assistant Secretary, of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 31st day of May, 2013.



By: David M. Carey
David M. Carey, Assistant Secretary

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

Not valid for mortgage, note, loan, letter of credit, bank deposit, currency rate, interest rate or residual value guarantees.

Southern Company Services, Inc.
30 Ivan Allen Jr. Boulevard, NW
Atlanta, Georgia 30301



April 20, 2012

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

Re: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104

Dear Mr. McCook:

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2013.

Please let me know if you need additional assistance.

Sincerely,


Clementine Broaders
Risk Management Associate
cbbroade@southernco.com
404-506-0701

/cb

Enclosure

cc: Stacy Sprayberry, SCS

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 1987**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2012**
(MONTH-DAY-YEAR)

and ending on **June 30, 2013**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on **April 11, 2012**
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By 
D-Ann Kleidosty, Attorney-In-Fact

This Power of Attorney limits the authority of those named herein, and they have no authority over the Company except in the manner and to the extent herein stated.

SAFECO INSURANCE COMPANY OF AMERICA
SEATTLE, WASHINGTON
POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS: That Safeco Insurance Company of America (the "Company"), a Washington stock insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint GARY D. EKLUND, CHAUN M. WILSON, MICHAEL F. YADACH, NORMANDY SUTTON, WILLIAM G. MOODY, D-ANN KLEIDOSTY, TRACEY D. WATSON, SYLVIA M. OGLE, ALL OF THE CITY OF ATLANTA, STATE OF GEORGIA.....

each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding TWO HUNDRED FIFTY MILLION AND 00/100..... DOLLARS (\$ 250,000,000.00.....) each, and the execution of such undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE IV - Officers: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitations as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article IV, Section 12 of the By-laws, David M. Carey, Assistant Secretary of Safeco Insurance Company of America, is authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

That the By-law and the Authorization set forth above are true copies thereof and are now in full force and effect.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Company and the corporate seal of Safeco Insurance Company of America has been affixed thereto in Plymouth Meeting, Pennsylvania this 24th day of February, 2012.



SAFECO INSURANCE COMPANY OF AMERICA

By David M. Carey
David M. Carey, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 24th day of February, 2012, before me, a Notary Public, personally came David M. Carey, to me known, and acknowledged that he is an Assistant Secretary of Safeco Insurance Company of America; that he knows the seal of said corporation; and that he executed the above Power of Attorney and affixed the corporate seal of Safeco Insurance Company of America thereto with the authority and at the direction of said corporation.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



Notarial Seal
Teresa Pastella, Notary Public
Plymouth Twp., Montgomery County
My Commission Expires Mar. 28, 2013
Member, Pennsylvania Association of Notaries

By Teresa Pastella
Teresa Pastella, Notary Public

CERTIFICATE

I, the undersigned, Vice President of Safeco Insurance Company of America, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer or official who executed the said power of attorney is an Officer specially authorized by the chairman or the president to appoint attorneys-in-fact as provided in Article IV, Section 12 of the By-laws of Safeco Insurance Company of America.

This certificate and the above power of attorney may be signed by facsimile or mechanically reproduced signatures under and by authority of the following vote of the board of directors of Safeco Insurance Company of America at a meeting duly called and held on the 18th day of September, 2009.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company, wherever appearing upon a certified copy of any power of attorney issued by the company in connection with surety bonds, shall be valid and binding upon the company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 11th day of April, 2012



Gregory W. Davenport
Gregory W. Davenport, Vice President

Not valid for mortgage, note, loan, letter of credit, bank deposit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

Southern Company Services, Inc.
30 Ivan Allen Jr. Boulevard NW
Atlanta, Georgia 30308



May 2, 2011

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

Re: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2012.

Please let us know if you need additional information.

Sincerely,

A handwritten signature in cursive script that reads "Clementine Broaders".

Clementine Broaders
Southern Company Services, Inc.
Risk Management Department

/cb

Enclosure

cc: Stacy Sprayberry, SCS



SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 2005**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **State of Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2011**
(MONTH-DAY-YEAR)

and ending on **June 30, 2012**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **License Bond - Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on April 21, 2011
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By Barbara S. MacArthur
Barbara S. MacArthur, Attorney-In-Fact

COPY

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

**SAFECO INSURANCE COMPANY OF AMERICA
SEATTLE, WASHINGTON
POWER OF ATTORNEY**

KNOW ALL PERSONS BY THESE PRESENTS: That Safeco Insurance Company of America (the "Company"), a Washington stock insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint **VIRGINIA B. MCMANUS, GARY D. EKLUND, BARBARA S. MACARTHUR, CHAUN M. WILSON, MICHAEL F. YADACH, ALL OF THE CITY OF ATLANTA, STATE OF GEORGIA**.....

, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding **ONE HUNDRED MILLION AND 00/100**** ***** DOLLARS (\$ 100,000,000.00***** *****)** each, and the execution of such undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE IV - Execution of Contracts: Section 12. Surety Bonds and Undertakings.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitations as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article IV, Section 12 of the By-laws, Garnet W. Elliott, Assistant Secretary of Safeco Insurance Company of America, is authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

That the By-law and the Authorization set forth above are true copies thereof and are now in full force and effect.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Company and the corporate seal of Safeco Insurance Company of America has been affixed thereto in Plymouth Meeting, Pennsylvania this 14th day of October, 2010.



SAFECO INSURANCE COMPANY OF AMERICA

By Garnet W. Elliott
Garnet W. Elliott, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 14th day of October, 2010, before me, a Notary Public, personally came Garnet W. Elliott, to me known, and acknowledged that he is an Assistant Secretary of Safeco Insurance Company of America; that he knows the seal of said corporation; and that he executed the above Power of Attorney and affixed the corporate seal of Safeco Insurance Company of America thereto with the authority and at the direction of said corporation.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



By Teresa Pastella
Teresa Pastella, Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of Safeco Insurance Company of America, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer or official who executed the said power of attorney is an Assistant Secretary specially authorized by the chairman or the president to appoint attorneys-in-fact as provided in Article IV, Section 12 of the By-laws of Safeco Insurance Company of America.

This certificate and the above power of attorney may be signed by facsimile or mechanically reproduced signatures under and by authority of the following vote of the board of directors of Safeco Insurance Company of America at a meeting duly called and held on the 18th day of September, 2009.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company, wherever appearing upon a certified copy of any power of attorney issued by the company in connection with surety bonds, shall be valid and binding upon the company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 21st day of April, 2011.



By David M. Carey
David M. Carey, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, bank deposit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 2005**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **State of Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2010**
(MONTH-DAY-YEAR)

and ending on **June 30, 2011**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **License Bond - Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on **April 15, 2010**
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By 
Barbara S. MacArthur, Attorney-In-Fact

POWER OF ATTORNEY

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

*****GARY D. EKLUND; BARBARA S. MACARTHUR; VIRGINIA B. MCMANUS; CHAUN M. WILSON; MICHAEL F. YADACH; Atlanta, Georgia*****

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 2nd day of February 2010

Dexter R. Legg

TAMIKOLAJEWSKI

Dexter R. Legg, Secretary

Timothy A. Mikolajewski, Vice President

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business... On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
(ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
(iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, Dexter R. Legg, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 15th day of April 2010



Dexter R. Legg

Dexter R. Legg, Secretary

Southern Company Services, Inc.
30 Ivan Allen Jr. Boulevard NW
Atlanta, Georgia 30308



May 27, 2009

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

**RE: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104**

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2010.

Please let us know if you need additional information.

Best Regards,

A handwritten signature in cursive script that reads "Annie Jackson".

Annie Jackson
Southern Company Services, Inc.
Risk Management Department

/aj

Enclosure

cc: Alan Garrard, SCS

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 2005**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **State of Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2009**
(MONTH-DAY-YEAR)

and ending on **June 30, 2010**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **License Bond - Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on **April 24, 2009**
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By

Barbara S. MacArthur
Barbara S. MacArthur, Attorney-In-Fact



POWER OF ATTORNEY

Safeco Insurance Company of America
General Insurance Company of America
1001 4th Avenue
Suite 1700
Seattle, WA 98154

KNOW ALL BY THESE PRESENTS:

No. 6724

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; GARY D. EKLUND; BARBARA S. MACARTHUR; VIRGINIA B. MCMANUS; EDWARD L. MITCHELL; NANCY G. NIX; CHAUN M. WILSON; Atlanta, Georgia

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 21st day of March, 2009

Dexter R. Legg

TAMIKOLAJEWSKI

Dexter R. Legg, Secretary

Timothy A. Mikolajewski, Vice President

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business...

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
(ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
(iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, Dexter R. Legg, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 24th day of April, 2009



Dexter R. Legg

Dexter R. Legg, Secretary



June 26, 2008

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

**RE: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104**

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2009.

Please let us know if you need additional information.

Best Regards,

A handwritten signature in black ink that reads "Annie Jackson". The signature is written in a cursive style with a large initial "A".

Annie Jackson
Southern Company Services, Inc.
Risk Management Department

/aj

Enclosure

cc: Alan Garrard, SCS



SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 2005**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **State of Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2008**
(MONTH-DAY-YEAR)

and ending on **June 30, 2009**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **License Bond - Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on **April 25, 2008**
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By *Barbara S. MacArthur*
Barbara S. MacArthur, Attorney-In-Fact

COPY



POWER OF ATTORNEY

Safeco Insurance Company of America
General Insurance Company of America
Safeco Plaza
Seattle, WA 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; GARY D. EKLUND; JUDITH S. FLEMING; BARBARA S. MACARTHUR; VIRGINIA B. MCMANUS; EDWARD L. MITCHELL; NANCY G. NIX; CHAUN M. WILSON; Atlanta, Georgia

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 28th day of February, 2008

Handwritten signature of Stephanie Daley-Watson

Handwritten signature of Tim Mikolajewski

STEPHANIE DALEY-WATSON, SECRETARY

TIM MIKOLAJEWSKI, SENIOR VICE-PRESIDENT, SURETY

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business...

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
(ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
(iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof.

I, Stephanie Daley-Watson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 25th day of April, 2008



Handwritten signature of Stephanie Daley-Watson

STEPHANIE DALEY-WATSON, SECRETARY

Safeco and the Safeco logo are registered trademarks of Safeco Corporation.

Southern Company Services, Inc.
30 Ivan Allen Jr. Boulevard NW
Atlanta, Georgia 30308



August 14, 2007

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King Jr. Dr. SW
Room 400
Atlanta, GA 30334

**RE: Performance Bond for Water Well Contractors and Drillers
Safeco Bond #4993104**

Attached is the original signed Continuation Certificate for the above referenced bond on behalf of Southern Company Services, Inc. This certificate keeps this bond in force until June 30, 2008.

Please let us know if you need additional information.

Best Regards,

A handwritten signature in cursive script that reads "Annie Jackson".

Annie Jackson
Southern Company Services, Inc.
Risk Management Department

/aj

Enclosure

cc: Alan Garrard, SCS



CONTINUATION
CERTIFICATE

SAFECO INSURANCE COMPANY OF AMERICA

, Surety upon

a certain Bond No. 4993104

dated effective June 30 2005
(MONTH-DAY-YEAR)

on behalf of Southern Company Services, Inc.
(PRINCIPAL)

and in favor of Georgia - Dept. of Natural Resources
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30 2007
(MONTH-DAY-YEAR)

and ending on June 30 2008
(MONTH-DAY-YEAR)

Amount of bond \$10,000

Description of bond License Bond - Water Well Contractors and Drillers

Premium:

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on June 30 2007
(MONTH-DAY-YEAR)
SAFECO INSURANCE COMPANY OF AMERICA

By *Laurel D. Huss*
ATTORNEY-IN-FACT Laurel D. Huss

Marsh USA, Inc.
Agent
3475 Piedmont Road NE, Suite 1200, Atlanta, GA 30305
Address of Agent
(404) 995-3702
Telephone Number of Agent





POWER OF ATTORNEY

Safeco Insurance Company of America
General Insurance Company of America
Safeco Plaza
Seattle, WA 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; GARY D. EKLUND; JUDY S. FLEMING; LAUREL D. HUSS; BARBARA S. MACARTHUR; VIRGINIA B. MCMANUS; EDWARD L. MITCHELL; NANCY NIX; CHAUN M. WILSON; Atlanta, Georgia

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 17th day of August, 2006

Handwritten signature of Stephanie Daley-Watson

Handwritten signature of Tim Mikolajewski

STEPHANIE DALEY-WATSON, SECRETARY

TIM MIKOLAJEWSKI, SENIOR VICE-PRESIDENT, SURETY

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business...

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
(ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
(iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof.

I, Stephanie Daley-Watson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 30th day of June, 2007



Handwritten signature of Stephanie Daley-Watson

STEPHANIE DALEY-WATSON, SECRETARY

Safeco and the Safeco logo are registered trademarks of Safeco Corporation.

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

AND DRILLERS

Bond No. 4993104

WATER WELL CONTRACTOR OR DRILLER _____

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1985 (Ga. Laws 1985, p. 1192) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 2006

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 15th day of April, 2003.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: [Signature]
Title: SAM H. DABBS, JR.

ASSISTANT SECRETARY

Approved as to sufficiency
and accepted:



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE: SAFECO PLAZA
SEATTLE, WASHINGTON 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; JUDY GAY CERA; GARY D. EKLUND; JUDY S. FLEMING; VIRGINIA B. MCMANUS; BARBARA S. MACARTHUR; EDWARD L. MITCHELL; NANCY NIX; BARBARA THOMPSON; CYNTHIA I. RUDOLPH; LAUREL D. HUSS; Atlanta, Georgia***

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 14th day of November, 2001

R.A. Pierson

R.A. PIERSON, SECRETARY

Mike McGavick

MIKE MCGAVICK, PRESIDENT

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business... On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
- (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
- (iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, R.A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 15th day of April, 2003



R.A. Pierson

R.A. PIERSON, SECRETARY

IMPORTANT NOTICE TO SURETY BOND CUSTOMERS REGARDING THE TERRORISM RISK INSURANCE ACT OF 2002

As a surety bond customer of one of the SAFECO insurance companies (SAFECO Insurance Company of America, General Insurance Company of Americas, First National Insurance Company, American States Insurance Company or American Economy Insurance Company), it is our duty to notify you that the Terrorism Risk Insurance Act of 2002 extends to "surety insurance". This means that under certain circumstances, we may be eligible for reimbursement of certain surety bond losses by the United States government under a formula established by this Act.

Under this formula, the United States government pays 90% of losses caused by certified acts of terrorism that exceed a statutorily established deductible to be paid by the insurance company providing the bond. The Act also establishes a \$100 billion cap for the total of all losses to be paid by all insurers for certified acts of terrorism. Losses on some or all of your bonds may be subject to this cap.

This notice does not modify any of the existing terms and conditions of this bond, the underlying agreement guaranteed by this bond, any statutes governing the terms of this bond, or any generally applicable rules of law.

At this time, there is no premium charge resulting from this Act.

270 Peachtree Street NW
Atlanta, Georgia 30303-1205
Tel 404.506.6526



November 5, 2001

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King, Jr. Dr., SW
Room 400
Atlanta, Georgia 30334

RE: Performance Bond for Water Well Contractors and Drillers - 4993104

Dear Mr. McCook:

Enclosed is the original signed copy of the captioned bond effective through June 30, 2003.
Please call if you have any questions or need further information.

A handwritten signature in cursive script that reads "Annie Jackson".

Annie Jackson
Risk Management Associate

/aj

Enclosure

cc: Alan Garrard

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

AND DRILLERS

Bond No. 4993104

WATER WELL CONTRACTOR OR DRILLER _____

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1983 (Ga. Laws 1983, p. 1192) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 2003

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 30th day of October, 2001.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: [Signature] (L.S.)
Title: SAM H. DABBS, JR.
ASSISTANT SECRETARY

Approved as to sufficiency and accepted:

Environmental Protection Division,

Department of Natural Resources

SAFECO INSURANCE COMPANY OF AMERICA
Surety, By: [Signature] (L.S.)
Sandra J. Mathis, Attorney-In-Fact



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE: SAFECO PLAZA
SEATTLE, WASHINGTON 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

*****SANDRA S. CARTER; JUDY GAY CERA; GARY D. EKLUND; JUDY S. FLEMING; VIRGINIA B. MCMANUS; BARBARA S. MACARTHUR; SANDRA J. MATHIS; EDWARD L. MITCHELL; NANCY NIX; BARBARA THOMPSON; CYNTHIA I. RODOLPH; Atlanta, Georgia*****

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 2nd day of February, 2001

R.A. Pierson

R.A. PIERSON, SECRETARY

Boh A. Dickey

BOH A. DICKEY, PRESIDENT

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business... On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
- (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
- (iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, R.A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 30th day of October, 2001



R.A. Pierson

R.A. PIERSON, SECRETARY

Southern Company Services, Inc.

Bin 920
270 Peachtree Street NW
Atlanta, Georgia 30303
Tel 404.506 0701



July 24, 2000

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King, Jr. Dr., SW
Room 400
Atlanta, Georgia 30334

RE: Performance Bond for Water Well Contractors and Drillers - 4993104

Dear Mr. McCook:

Enclosed is the original signed copy of the captioned bond. Please call if you have any questions or need further information.

A handwritten signature in black ink, appearing to read "Annie Jackson".

Annie Jackson
Risk Management Associate

/aj

Enclosure

cc: Alan Garrard

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

AND DRILLERS

Bond No. 4993104

WATER WELL CONTRACTOR OR DRILLER _____

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1983 (Ga. Laws 1983, p. 1193) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 2001

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 11th day of July, 2000.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: Sam H. Dabbs, Jr. (L.S.)
Title: ASSISTANT SECRETARY

Approved as to sufficiency and accepted:

Environmental Protection Division,

Department of Natural Resources

SAFECO INSURANCE COMPANY OF AMERICA
Surety, By: Sandra J. Mathis
Sandra J. Mathis, Attorney-In-Fact



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE: SAFECO PLAZA
SEATTLE, WASHINGTON 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; JUDY GAY CERA; GARY D. EKLUND; JUDY S. FLEMING; VIRGINIA B. MCMANUS; BARBARA S. MACARTHUR; SANDRA J. MATHIS; EDWARD L. MITCHELL; NANCY NIX; BARBARA THOMPSON; RONALD A. SANTANIELLO; Atlanta, Georgia

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 21 day of October, 1999

R.A. Pierson (handwritten signature)

R.A. PIERSON, SECRETARY

W. Randall Stoddard (handwritten signature)

W. RANDALL STODDARD, PRESIDENT

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business...

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

On any certificate executed by the Secretary or an assistant secretary of the Company setting out, (i) The provisions of Article V, Section 13 of the By-Laws, and (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and (iii) Certifying that said power-of-attorney appointment is in full force and effect, the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof.

I, R.A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 11th day of July, 2000



R.A. Pierson (handwritten signature)

R.A. PIERSON, SECRETARY

270 Peachtree Street, NW.
Atlanta, Georgia 30303
Tel 770.393.0650



January 14, 1998

Mr. Tony McCook
Georgia Geologic Survey
19 Martin Luther King, Jr. Dr., SW
Room 400
Atlanta, Georgia 30334

RE: Performance Bond for Water Well Contractors and Drillers - 4993104

Dear Mr. McCook:

Enclosed is the original signed copy of the captioned bond. Please call if you have any questions or need further information.

A handwritten signature in cursive script that reads "Dean Jobko".

Dean Jobko
Manager, International
Risk & Insurance

DJ/aj

Enclosure

perfbnd.doc

cc: Alan Garrard

Sandra J. Mathis
Senior Client Administrator

J&H Marsh & McLennan
191 Peachtree Street, N.E.
Suite 3400
Atlanta, GA 30303-1762
(404) 586-8378 Fax: (404) 586-8208
Sandra_Mathis@jh.com

**J&H MARSH &
MCLENNAN**

January 6, 1998

Mr. Dean Jobko
Southern Company Services, Inc.
270 Peachtree Street, N. W.
Suite 1900
Atlanta, Georgia 30303

Subject: Performance Bond For Water Well Contractors and Drillers - 4993104

Dear Dean:

Enclosed is the captioned renewal bond in the amount of **\$10,000** with an expiration date of **June 30, 2000**, for your further handling.

Thank you and should you have questions, please let me know.

Sincerely,



Sandra J. Mathis
Surety

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

BOND #4993104

AND DRILLERS

WATER WELL CONTRACTOR OR DRILLER _____

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1985 (Ga. Law 1985, p. 1192) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 2000.

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 6th day of January, 1988.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: [Signature] (L.E.)
Title: Financial VP, Chief Executive Officer + Treasurer

Approved as to sufficiency and accepted:

Environmental Protection Division,

Department of Natural Resources

SAFECO INSURANCE COMPANY OF AMERICA
Surety, By: [Signature] (L.E.)
Sandra J. Mathis, Attorney-In-Fact



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE: SAFECO PLAZA
SEATTLE, WASHINGTON 98105

No. 4363

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint
***C. A. DRIVER; SANDRA J. MATHIS; EDWARD L. MITCHELL; SANDRA S. CARTER; NICOLE ALLEN;
CATHERINE M. LINDSAY; GLEN R. BAILEY; Atlanta, Georgia*****

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 17th day of January, 19 95

[Handwritten signature]

[Handwritten signature]

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS . . . the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business . . . On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
- (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
- (iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, R. A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 6th day of January, 19 98



[Handwritten signature]

Southern Company Services, Inc.
64 Perimeter Center East
Atlanta, Georgia 30346
Telephone (404) 393-0650



June 23, 1994

Mr. Michael Laitta
State of Georgia - Environmental Protection Department
Room 400
19 Martin Luther King, Jr. Drive
Atlanta, GA 30334

RE: Southern Company Services, Inc.
Water Well Contractors & Drillers Performance Bond

Dear Mr. Laitta:

Please find enclosed a renewal of the captioned bond. If you have any questions or need further information, please call me at (404)668-3274. Thank you.

Sincerely,

Dean Jobko
Sr. Risk Management Analyst

DMB300

cc: Alan Garrard

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

BOND #4993104

AND DRILLERS

WATER WELL CONTRACTOR OR DRILLER

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1983 (Ga. Laws 1983, p. 1192) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 1997.

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 19th day of May, 1994.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: [Signature] (L.S.)
Title: Vice President & Secretary

Approved as to sufficiency and accepted:

Environmental Protection Division,

Department of Natural Resources

SAFECO INSURANCE COMPANY OF AMERICA
Surety, By: [Signature]
Sandra J. Mathis, Attorney-in-Fact



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE SAFECO PLAZA
SEATTLE, WASHINGTON 98185

No. 4363

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint *****C. A. DRIVER; DEANNA L. FULTON; SANDRA J. MATHIS; EDWARD L. MITCHELL, Atlanta, Georgia*****

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 26th day of October, 19 93

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS . . . the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business . . . On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
(ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
(iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, R. A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 19th day of May, 19 94

ATTACHMENT A3

SURVEYOR'S CERTIFICATION

Wood PLC
Plant Bowen-Euharlee, Ga.
MONITORING WELL SURVEY DATA
March 23, 2021
DGA JOB # 6620-003-D1, C1399

WELL ID	NORTHING	EASTING	ELEVATIONS			
			GROUND ELEVATION	NAIL IN CONCRETE	TOP OF WELL PAD	TOP OF CASING
GWC-8RR	1502857.71	2073501.74	698.96	699.33		701.92
GWC-8Z	1502827.67	2073526.15	698.68	699.03		702.09
GWC-6RZ	1502502.00	2072900.50	728.66	729.07		731.91
GWC-7Z	1502640.13	2073193.22	709.70	710.04		713.04
GWC-6	1502520.08	2072962.89	725.97		726.32	728.64
GWC-5	1502341.56	2072677.44	735.11		735.19	737.56
GWA-3A	1502374.48	2072061.21	728.68	728.79		731.68
GWA-4RZ	1502238.85	2072329.55	740.04	740.34		742.84
GWA-4	1502241.02	2072318.24	740.40		740.57	743.06
GWA-4R	1502246.31	2072317.15	740.65	740.82		743.23
GWA-50	1502154.80	2072442.13	728.74		728.84	731.21
GWA-50R	1502150.85	2072448.35	727.87		728.08	730.37
SPRING WELL	1506642.00	2075342.34	652.80			
GWC-25R	1506494.89	2075088.90	673.59		673.91	676.42
GWC-18R	1506301.39	2072929.47	718.97	719.2		721.76
GWC-18	1506306.70	2072929.28	718.92	719.12		721.88
GWA-39RZ	1502618.73	2071164.20	729.57	730.1		732.62
GWA-39Z	1502655.66	2071120.65	731.80	732.49		735.15
GWC-13RZ	1503926.70	2073517.44	681.71	682.09		684.60
GWC-13R	1503908.53	2073501.95	683.17		683.77	685.97
GWC-13	1503898.17	2073495.16	684.19		684.62	686.76
GWC-12	1503662.54	2073693.63	674.66		675	677.25
GWC-11R	1503395.25	2073828.03	675.98		675.6	677.73
GWC-11	1503390.40	2073829.95	675.04		675.45	677.83
GWC-10R	1503154.01	2074020.44	685.33		685.95	687.95
GWC-10	1503162.70	2074019.96	684.89		685.05	687.87
GWC-9	1503018.96	2073781.05	691.99		691.93	694.67
GWA-2R	1502615.38	2071965.52	732.66		732.26	734.83
GWA-2	1502640.55	2071935.13	731.48		731.56	733.89
GWA-1	1502842.29	2071724.15	738.86		738.99	741.76
GWA-40	1503195.09	2071299.94	728.93	728.97		731.77
GWA-41R	1503527.39	2071050.84	737.95	740.13		743.08
GWA-41	1503519.02	2071046.18	738.91	739.32		742.35
GWA-42	1503823.34	2071049.95	734.45	735.11		738.05
GWA-43R	1504117.39	2070973.14	707.80	708.14		711.19
GWA-43	1504129.20	2070982.44	707.61	707.93		710.94
GWC-44	1504436.66	2071414.30	710.15	710.13		712.89

GWC-45	1504539.38	2071956.71	698.41	698.8		701.53
GWC-45R	1504538.68	2071945.39	699.00	399.6		702.02
GWC-46R	1504522.23	2072184.47	687.94	688.18		690.49
GWC-47R	1504539.25	2072467.10	687.71	687.96		691.13
GWC-47	1504543.69	2072481.34	687.44	687.7		690.86
GWC-48	1504490.63	2072851.71	686.20	686.31		688.33
GWC-49Z	1504238.30	2072896.49	706.12	706.48		709.11
GWC-49R	1504246.02	2072918.76	706.24	706.39		709.56
GWC-15R	1503936.17	2072919.39	693.39		693.72	696.13
GWC-15	1503943.59	2072927.52	692.75		693.2	695.19
GWC-15Z	1503952.26	2072918.71	693.28	693.43		695.92
GWC-14Z	1504060.77	2073193.66	684.34	684.63		687.28
GWC-14	1504059.92	2073205.96	684.04		684.16	686.81
GWA-36R	1505051.72	2073384.47	681.41	681.39		684.16
GWA-36	1505057.77	2073384.03	681.89	681.94		684.50
GWA-37	1505345.45	2073069.32	700.44	701.08		703.72
GWA-38	1505501.33	2072831.77	713.32	713.6		716.24
GWC-24R	1506694.13	2074806.11	673.76	673.94		676.57
GWC-16R	1505877.86	2072607.38	727.77	727.87		730.59
GWC-17R	1506069.29	2072829.29	730.02	730.29		733.37
GWC-19R	1506395.96	2073158.36	723.13	723.63		726.31
GWC-20R	1506602.14	2073486.53	717.63	717.88		720.59
GWC-21R	1506695.89	2073784.42	720.45	720.47		723.07
GWC-22R	1506717.93	2074105.65	712.54	712.84		715.41
GWC-23R	1506701.61	2074446.53	688.02	688.41		690.94
GWA-56	1506128.38	2074633.08	689.14	689.25		692.17
GWA-55R	1506041.22	2074517.62	693.28	693.75		696.53
GWA-55	1506034.69	2074507.04	693.43	693.9		696.72
GWA-54	1505853.39	2074286.28	701.23	701.3		704.23
GWA-53	1505695.52	2074038.90	707.61	707.95		710.99
GWA-53R	1505689.06	2074032.00	708.38	708.45		711.58
GWA-52	1505459.85	2073876.00	706.56	706.78		709.77
GWA-51RZ	1505310.36	2073781.34	705.81	705.89		708.58

COORDINATES ARE GA STATE PLANE, WEST ZONE, NAD 83.

ELEVATIONS ARE BASED ON NAVD 88.

Survey data shown below has a horizontal positional tolerance of +/-0.5 feet and a vertical positional tolerance of +/- 0.01 feet at the 95% level of confidence.

Equipment used to obtain horizontal and vertical coordinates was a LEICA SYSTEM 1200 GPS RECEIVER WITH A LEICA RX1200 DATA COLLECTOR.

Benchmark used to establish horizontal and vertical positions was established from LEICA SMARTNET REAL TIME NETWORK.



Wood PLC
 Plant Bowen-Euharlee, Ga.
 MONITORING WELL SURVEY DATA
 July 7, 2021
 DGA JOB # 6620-003-D1, C1399

WELL ID	NORTHING	EASTING	ELEVATIONS			
			GROUND ELEVATION	NAIL IN CONCRETE	TOP OF WELL PAD	TOP OF CASING
GWA-36RA	1505060.13	2073365.45	682.26	682.50	n/a	685.20
COORDINATES ARE GA STATE PLANE, WEST ZONE, NAD 83.						
ELEVATIONS ARE BASED ON NAVD 88 DATUM.						

Survey data shown below has a horizontal positional tolerance of +/-0.5 feet and a vertical positional tolerance of +/- 0.01 feet at the 95% level of confidence.
 Equipment used to obtain horizontal and vertical coordinates was a LEICA SYSTEM 1200 GPS RECEIVER WITH A LEICA RX1200 DATA COLLECTOR.
 Benchmark used to establish horizontal and vertical positions was established from LEICA SMARTNET REAL TIME NETWORK.

GEORGIA
 REGISTERED
 No. 2466
 LAND SURVEYOR
 JAMES P. GARRETT

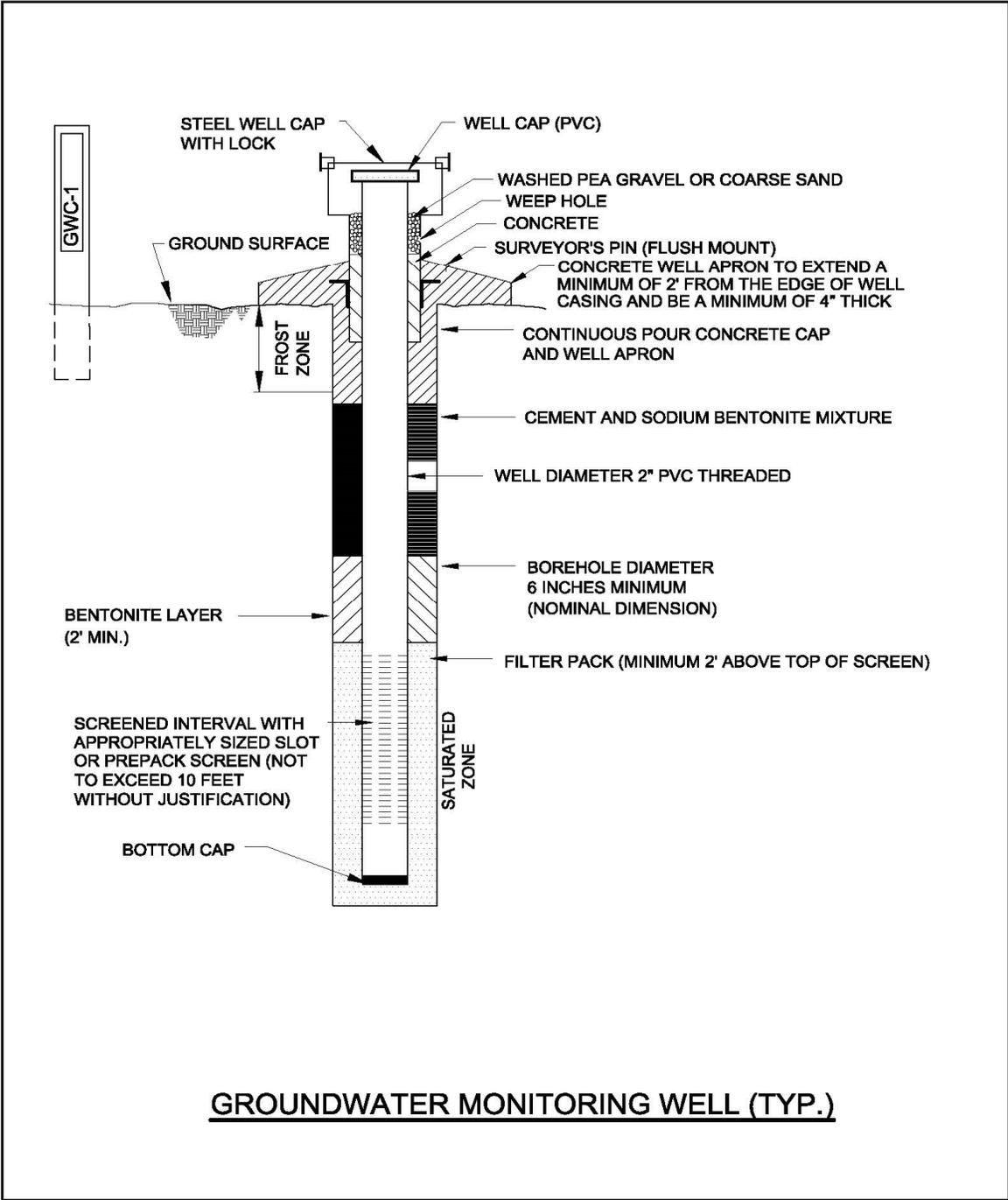
Wood PLC
 Plant Bowen-Euharlee, Ga.
 MONITORING WELL SURVEY DATA
 March 22, 2022
 DGA JOB # 6620-003-D1, C1399

WELL ID	NORTHING	EASTING	ELEVATIONS			
			GROUND ELEVATION	NAIL IN CONCRETE	TOP OF WELL PAD	TOP OF CASING
GWA-36A	1505026.95	2073357.46	680.63	680.85	n/a	683.75
COORDINATES ARE GA STATE PLANE, WEST ZONE, NAD 83.						
ELEVATIONS ARE BASED ON NAVD 88 DATUM.						

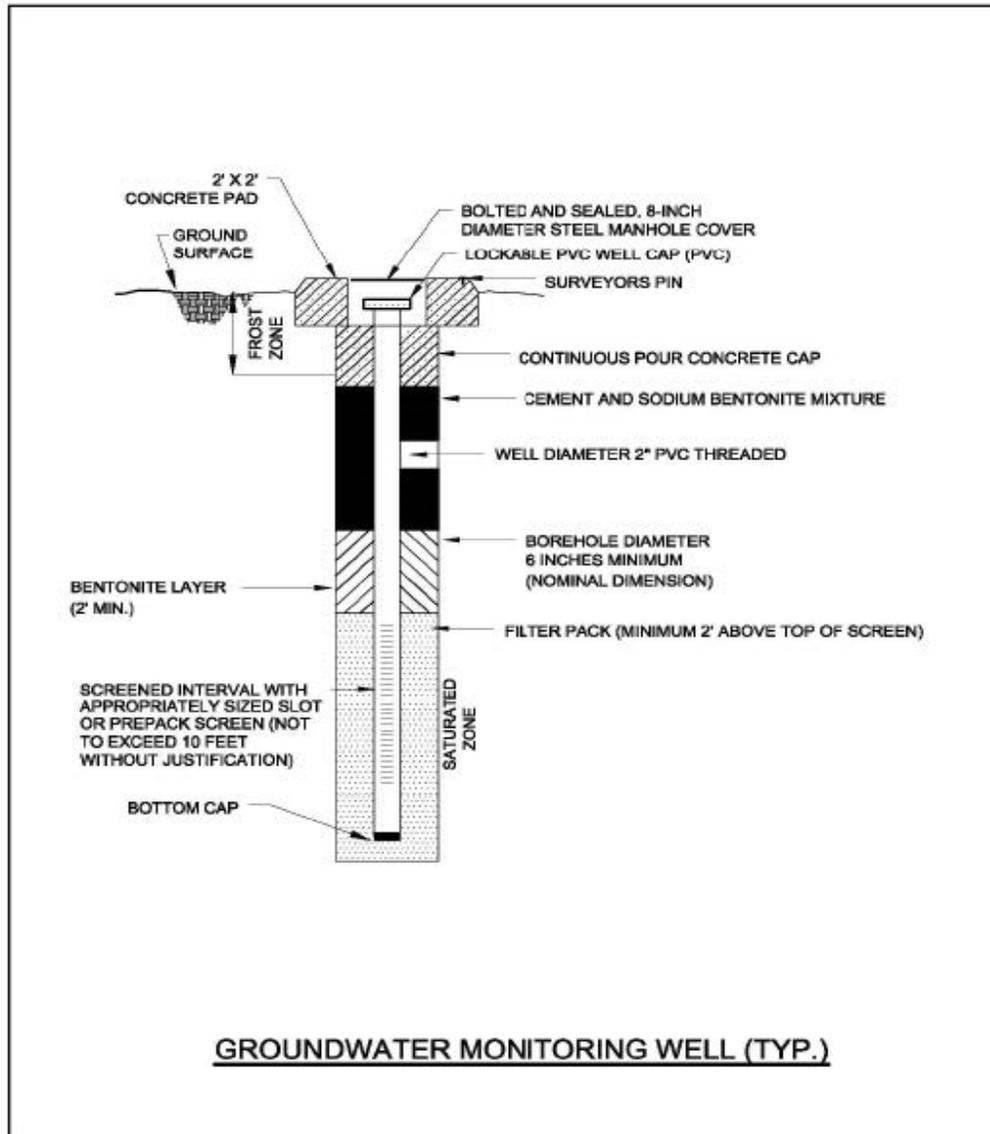
Survey data shown below has a horizontal positional tolerance of +/-0.5 feet and a vertical positional tolerance of +/- 0.01 feet at the 95% level of confidence.
 Equipment used to obtain horizontal and vertical coordinates was a LEICA SYSTEM 1200 GPS RECEIVER WITH A LEICA RX1200 DATA COLLECTOR.
 Benchmark used to establish horizontal and vertical positions was established from LEICA SMARTNET REAL TIME NETWORK.

B. GROUNDWATER MONITORING WELL DETAILS

B1. GROUNDWATER MONITORING WELL DETAIL POST TYPE SURFACE COMPLETION



B2. GROUNDWATER MONITORING WELL DETAIL FLUSH-MOUNT SURFACE COMPLETION



C. GROUNDWATER SAMPLING PROCEDURES

Groundwater sampling will be conducted using USEPA Region 4 Field Branches Quality System and Technical Procedures - Science and Ecosystem Support Division groundwater sampling procedure SESDPROC-301-R4 and updates as a guide. The following procedures describe the general methods associated with groundwater sampling at the Site. Prior to sampling, the well must be evacuated (purged) to make certain 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 or its contractor 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. 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. The water measuring device shall consist of a probe and measuring tape capable of measuring water levels with accuracy to 0.01 feet.
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 (2) 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 of the pump intake once positioned. All non-dedicated pumps and wiring will be decontaminated before use and between well locations using procedures described in the latest version of the Region 4 U.S. Environmental Protection Agency Laboratory Services and Applied Science Division (LSASD) Operating Procedure for Field Equipment Cleaning and Decontamination (LSASDPROC-205-R4 June 22, 2020) and updates as a guide.
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:

- pH ± 0.1 Standard Units (S.U.)
 - Specific Conductance $\pm 5\%$ (conductivity)
 - DO ± 10 percent or ± 0.2 milligrams per liter (mg/L) (whichever is greater) for DO where DO > 0.5 mg/L. If DO < 0.5 mg/L no stabilization criteria apply.
 - Turbidity measurements ≤ 5 nephelometric turbidity units (NTUs) or between 5 and 10 NTUs after 3 hours of purging.
 - Temperature – Record only, not used for stabilization criteria
 - ORP – Record only, not used for stabilization criteria.
7. Collect samples at a low-flow rate according to the most current version of USEPA Region 4 SESD guidance document, Operating Procedure – Groundwater Sampling (EPA, SESDPROC-301-R4), 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, 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. Filtered samples are not considered compliance samples and are only used to evaluate the effects of turbidity.
 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 chain-of-custody (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 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 NTUs; however, samples may be collected where turbidity is less than 10 NTUs and the stabilization criteria described above are met.

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

- If turbidity remains above 5 NTUs, but is less than 10 NTUs, and all other parameters are stabilized, the well can be sampled.
- Where turbidity remains above 10 NTUs, 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 COC form.

A brief overview of purging and sampling methodologies, including the type of sampling equipment used will be provided in routine monitoring reports.

D. SURFACE WATER SAMPLING AND ANALYSIS PROCEDURES

Surface water samples will be collected in accordance with the general procedures outlined below if flowing water is observed at each sampling location. These procedures were developed using field sampling guidelines described in the USEPA Region 4 Laboratory Services and Applied Science Division (LSASD) Operating Procedure for Surface Water Sampling (LSASDPROC-201-R5) and updates.

A small spring at the northeastern edge of Cells 3 & 4 will be monitored for the same parameters and at the same frequency as groundwater. The spring may not discharge water during the drier times of the year. When water is flowing from the spring, it will be sampled. The spring water samples will be analyzed for the same parameters using the same analytical methods as the groundwater samples listed in **Tables 2 and 3** of this plan. The minimum sampling frequency for surface water will be semi-annual; provided water is flowing from the spring.

Surface water samples will be collected from the flowing water of the spring and not from ponded water collected on the ground surface. If a dipper or other transfer vessel other than the sample container is used, it must be composed of a non-porous inert material such as glass, PVC, polyethylene, or stainless steel and decontaminated before use. The following procedures will be used to collect surface water samples:

- a. Hold the bottle near the base of the flow with one hand, and with the other, remove the cap.
- b. Rinse the sample container with the water to be sampled prior to filling the container, unless the sample containers are pre-preserved. Pre-preserved sample containers should not be rinsed prior to sampling.
- c. Hold the container partially submerged within the stream flow and allow the container to be filled with water. Remove the container from the flow and place the cap back on the container.
- d. Label the sample container, at a minimum, to include: Sample Number, Name of Collector, Date and Time of Collection, and Place/Point of Collection.
- e. Place the samples in a cooler containing water-ice, if required, for courier or hand delivery to the laboratory within the sample hold times.
- f. Follow COC and temperature protocols.