

GROUNDWATER MONITORING PLAN

PLANT BOWEN COAL COMBUSTION RESIDUALS (CCR) LANDFILL

BARTOW COUNTY, GEORGIA

FOR



Georgia
Power

November 20, 2018

wood.

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

Signature: _____

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1. INTRODUCTION

Groundwater and surface water monitoring is required by the Georgia Environmental Protection Division (EPD) to detect and quantify potential changes in groundwater chemistry. This Groundwater Monitoring Plan (plan) describes the groundwater monitoring program for the site. This plan meets the requirements of EPD rules and uses 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 - September 2018 for the Landfill Cells 1 & 2, 3 & 4, and 9 & 10 (**Appendix A: Monitoring System Details**).

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 Permit or the EPD rules (391-3-4-.10), the 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 and is included in Part B of the permit application. The existing monitoring wells were installed following the guidelines presented herein. Additionally, this plan documents the methods for future monitoring well installation and/or replacement, and procedures for well abandonment. As required by 391-3-4.10(6)(g), a minor modification will be submitted to the EPD prior to the unscheduled installation or abandonment of monitoring wells. Well installation and/or abandonment must be directed by a qualified groundwater scientist.

2. GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

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 A-1**).

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 Hydrostratigraphic (water-bearing zones) 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. Bedrock underlying the site (officially mapped as Knox undifferentiated) is host to complex solutional karst features of widely varying sizes, including cavities, and voids within the underlying carbonate bedrock are predominately formed along initial discontinuities including joints, fractures, and bedding planes. These karst features may be partially or completely filled with soft unconsolidated sediments or may be empty or filled with water.

General groundwater flow in the overburden in the Landfill area is to the north-northeast beneath Cells 1 & 2 and to the north-northwest beneath Cells 9 & 10 and to the west beneath Cells 3 & 4 (**Figure A-2: Potentiometric Surface - Overburden Wells – September 2018**). Groundwater flow direction in the bedrock is similar to the overburden, with flow to the north-northeast beneath Cells 1 & 2 and to the north-northwest beneath Cells 9 & 10 and to the west beneath Cells 3 & 4 (**Figure A-3: Potentiometric Surface – Rock Wells – September 2018**).

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 bedrock.

Horizontal groundwater flow rates in September 2018 at the site range approximately from approximately 0.01 to 0.15 feet per day in the overburden and from approximately 0.04 to 0.35 feet per day in the upper bedrock, based on horizontal hydraulic conductivity data reported 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.

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. 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 EPD in a future well installation report.

Monitoring wells will be located outside of areas with frequent auto traffic; however, wells maybe installed in heavily trafficked areas when necessary to meet the groundwater monitoring objectives of the 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 six monitoring wells (GWA-4, GWA-4R, GWC-13R, GWC-14, GWC-15, and GWA-39R) not included in the groundwater monitoring network because these wells were replaced by new monitoring wells at the same location and 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**. 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 roto sonic 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. Drilling equipment shall be decontaminated before use and between borehole locations using the procedures described in the latest version of the Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure for Field Equipment Cleaning and Decontamination as a 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.

Monitoring wells will be installed using the latest version of the 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.

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 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 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. 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 Detail**, 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 10 nephelometric turbidity units (NTUs); however, formation-specific conditions may not allow this target to be accomplished. Additionally, the stabilization criteria contained in **Appendix C** should be met. A variety of techniques may be used to develop site groundwater monitoring wells. The method used must create reversals or surges in flow to eliminate bridging by particles around the well screen. These reversals or surges can be created by using surge blocks, bailers, or pumps. The wells will be developed using a pump capable of inducing the stress necessary to achieve the development goals. All development equipment will be decontaminated prior to first use and between wells.

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

Many geologic formations contain clay and silt particles that are small enough to work their way through 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.

4.3 Abandonment

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. The wells will be abandoned under the direction of a geologist or engineer registered in Georgia. Neat Portland cement or bentonite will be used as appropriate to complete abandonment and seal the well borehole. Any piezometers or groundwater wells located within the footprint of future landfill expansion will be over-drilled prior to abandonment.

4.4 Documentation

The following information documenting the construction and development of each well will be submitted to EPD by a qualified groundwater scientist within 30 days after completing all planned well installations.

- 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 method and drilling fluid if used
- Well location (± 0.5 ft.)
- Borehole diameter and well casing diameter
- Well depth (± 0.1 ft.)
- Lithologic logs
- Well casing materials
- Screen materials and design
- Screen length
- Screen slot size
- Filter pack material/size and volume, and placement depths
- Sealant materials and volume, and placement depths
- Documentation of ground surface elevation (± 0.01 ft.)
- Documentation of top of casing elevation (± 0.01 ft.)
- Schematic of the well with dimensions

5. GROUNDWATER MONITORING PARAMETERS AND FREQUENCY

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

Table 1: Groundwater Monitoring Parameters and Frequency, presents the groundwater monitoring parameters and sampling frequency. A minimum of eight independent samples from each groundwater well will be collected and analyzed for 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) and §257.94(b), the detection monitoring frequency for the Appendix III parameters will be semi-annual during the active life of the facility and the post-closure care period. If required, assessment monitoring will be performed per Georgia Chapter 391-3-4-.10, Rules for Solid Waste Management and §257.95.

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

As shown on **Table 2: Analytical Methods**, the groundwater samples will be analyzed using methods specified in 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 Conference (NELAC) and will also have a Stipulation Letter from the Georgia EPD accepting the laboratory's NELAC certification. Field instruments used to measure pH must be accurate and reproducible to within 0.1 Standard Units (S.U.).

TABLE 1
GROUNDWATER MONITORING PARAMETERS & FREQUENCY

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

Note:

1. If the site is required to enter into Assessment Monitoring, an assessment monitoring plan will be prepared and sampling may include some or all Appendix III and Appendix IV parameters.
2. If any parameters contained in Appendix I or II of 40 CFR 258, Subpart E, as amended, 56 Fed. Reg. 51032 - 51039 (October 9, 1991) have been detected previously at statistically significant levels above background concentrations, these parameters will continue to be monitored.

**TABLE 2
ANALYTICAL METHODS**

Parameters	EPA Method Number
Boron	EPA 6010C/6020B
Calcium	EPA 6010C/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 6010C/6020B/7040/7041
Arsenic	EPA 6010C/6020B/7060A/7061A
Barium	EPA 6010C/6020B/7080A/7081
Beryllium	EPA 6010C/6020B/7090/7091
Cadmium	EPA 6010C/6020B/7130/7131A
Chromium	EPA 6010C/6020B/7190/7191
Cobalt	EPA 6010C/6020B/7200/7201
Fluoride	EPA 300.0/300.1/9214/9056A
Lead	EPA 6010C/6020B/7420/7421
Lithium	EPA 6010C/6020B/7430
Mercury	EPA 7470A
Molybdenum	EPA 6010C/6020B/7480/7481
Selenium	EPA 6010C/6020B/7740/7741A
Thallium	EPA 6010C/6020B/7840/7841
Radium 226 and 228 combined	EPA 903.0/9320/9315

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 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.

Groundwater wells that are determined to be dry for two consecutive sampling events should be replaced, unless an alternate schedule has been approved by EPD.

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 of possession by each individual

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.

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).

9. REPORTING RESULTS

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

1. A narrative describing sampling activities and findings including a summary of the number of samples collected, the dates the samples were collected and whether the samples were required by the detection or assessment monitoring programs.
2. A 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. Documentation of non-functioning wells, dry surface water sampling locations.
16. Table of current analytical results for each well, highlighting statistically significant increases and concentrations above maximum contaminant level (MCL).
17. Statistical analyses.
18. Certification by a qualified groundwater scientist.

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.

According to EPD rules (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 intra-well, inter-well, or combination of both.

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 Methods**, 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 Prediction Limits**, presents the logic that will be used to calculate site-specific 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.

Southern Company Services, Inc. 2002. Plant Bowen Coal Combustion By-Products Storage Facility Site Acceptability Report.

Southern Company Services, Inc. 2004. Plant Bowen Proposed Coal Combustion By-Product Monofill Addendum I Site Acceptability Report – Hydrogeological Assessment and Demonstration of Engineering Measures.

FIGURE 1: STATISTICAL ANALYSIS PLAN OVERVIEW

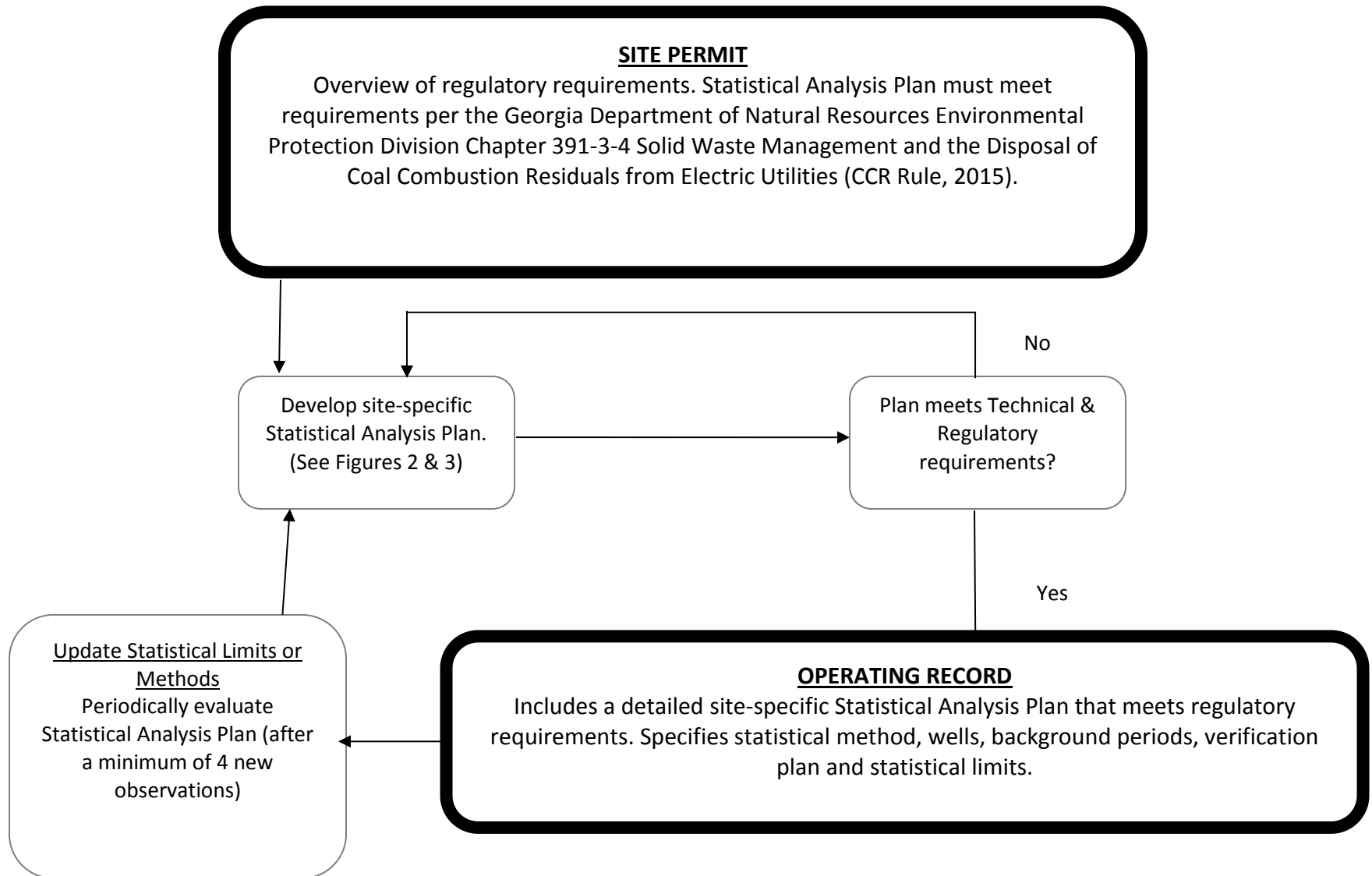


FIGURE 2. DECISION LOGIC FOR DETERMINING APPROPRIATE STATISTICAL METHOD

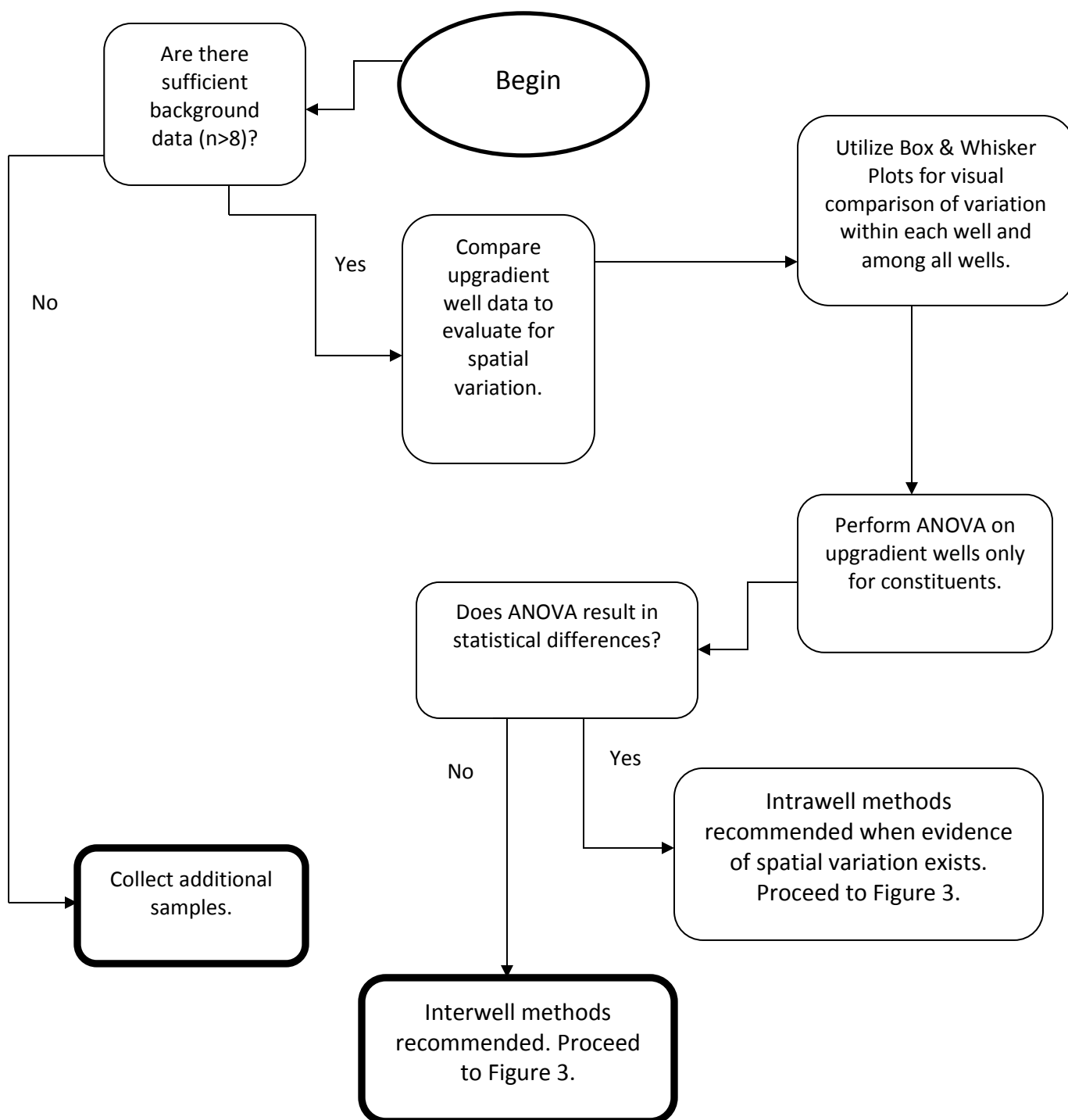
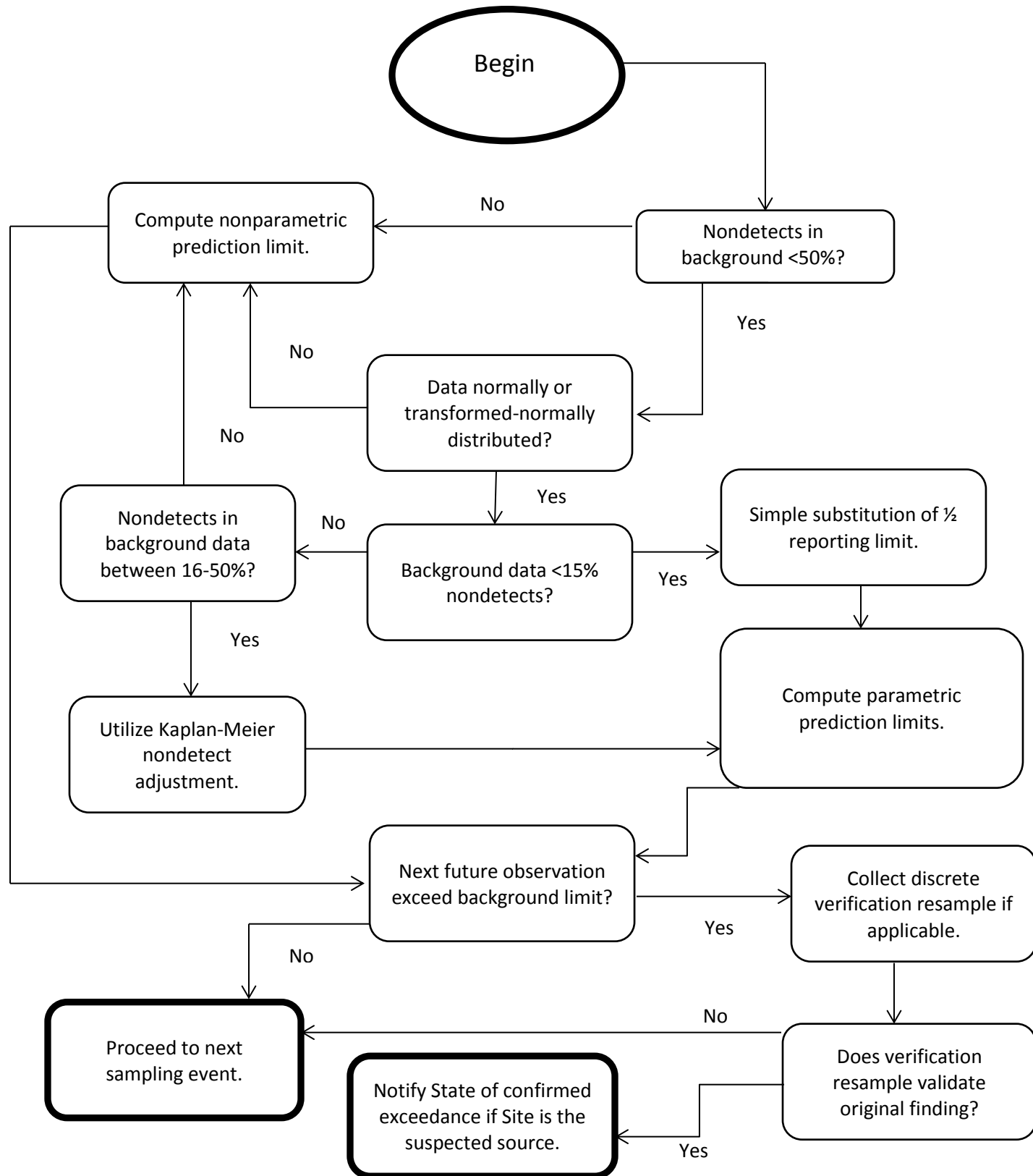


FIGURE 3. DECISION LOGIC FOR COMPUTING PREDICTION LIMITS



APPENDICES

- A. MONITORING SYSTEM DETAILS
- B. GROUNDWATER MONITORING WELL DETAIL
- C. GROUNDWATER SAMPLING PROCEDURES
- D. SURFACE WATER SAMPLING AND ANALYSIS PROCEDURES

A. MONITORING SYSTEM DETAILS

Table A-1: Summary of Well Installation Dates, Coordinates, Elevation Screen Interval, and Purpose

Figure A-1: Monitoring Well Network

Figure A-2: Potentiometric Surface - Overburden Wells – September 2018

Figure A-3: Potentiometric Surface - Rock Wells – September 2018

Attachment A1: Well Construction and Boring Logs

TABLE A-1:
SUMMARY of WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL, and PURPOSE

Well Name	Installation Date	Northing (ft NAD83)	Easting (ft NAD83)	Ground Surface Elevation	Top of Casing Elevation (ft NAVD88)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Total Well Depth measured in the field September 2017 (feet below top of casing)	Total Well Depth on Construction Log (feet below land surface)	Lithology Screened	Purpose
GWA-1	4/12/2007	1502840.52	2071724.11	739.4	742.20	601.7	591.7	151.8	148.0	Overburden/Bedrock	Cells 1 & 2 - Upgradient
GWA-2	4/4/2007	1502638.00	2071935.13	732.3	734.81	590.8	580.8	154.3	151.8	Overburden/Bedrock	Cells 1 & 2 - Upgradient
GWA-2R	8/3/2007	1502613.68	2071966.37	733.0	735.78	637.9	627.9	107.4	105.4	Bedrock	Cells 1 & 2 - Upgradient
GWA-3	4/11/2007	1502386.74	2072067.26	729.9	732.47	644.9	634.9	98.2	95.4	Overburden	Cells 1 & 2 - Upgradient
GWA-4RZ	10/28/2016	1502237.97	2072329.51	740.1	742.85	633.1	623.1	120.1	117.0	Bedrock	Cells 1 & 2 - Upgradient
GWA-50	6/4/2008	1502156.81	2072442.89	720.6	722.98	636.6	626.6	96.7	94.3	Overburden	Cells 1 & 2 - Upgradient
GWA-50R	6/10/2008	1502153.32	2072447.90	719.0	721.30	590.8	580.8	145.5	138.5	Bedrock	Cells 1 & 2 - Upgradient
GWC-10	9/6/2006	1503160.48	2074020.99	685.8	688.57	627.6	617.6	71.8	68.5	Overburden	Cells 1 & 2 - Downgradient
GWC-10R	5/15/2007	1503151.35	2074021.32	686.6	688.61	601.1	591.1	100.2	95.8	Bedrock	Cells 1 & 2 - Downgradient
GWC-11	6/1/2007	1503388.37	2073830.98	676.0	678.43	644.2	634.2	47.4	42.1	Overburden	Cells 1 & 2 - Downgradient
GWC-11R	5/31/2007	1503393.39	2073829.01	675.9	678.32	608.0	598.0	83.2	78.2	Bedrock	Cells 1 & 2 - Downgradient
GWC-12	6/4/2007	1503660.16	2073693.51	675.2	677.77	637.1	627.1	54.0	48.4	Overburden	Cells 1 & 2 - Downgradient
GWC-13	5/31/2007	1503896.00	2073496.30	684.9	687.13	614.4	604.4	84.8	80.7	Overburden	Cells 1 & 2 - Downgradient
GWC-13RZ	11/2/2016	1503927.54	2073517.10	681.8	684.61	589.8	579.8	104.3	102.0	Bedrock	Cells 1 & 2 - Downgradient
GWC-14Z	11/3/2016	1504061.38	2073193.18	684.4	687.33	621.4	611.4	76.3	73.0	Overburden	Cells 1 & 2 - Downgradient
GWC-15R	5/24/2007	1503934.08	2072920.90	693.8	696.44	611.6	601.6	97.5	92.4	Bedrock	Cells 1 & 2 - Downgradient
GWC-15Z	10/31/2016	1503952.79	2072917.89	693.1	695.89	631.1	621.1	74.9	72.0	Overburden	Cells 1 & 2 - Downgradient
GWC-5	4/18/2006	1502338.19	2072677.08	735.8	738.17	634.7	624.7	113.8	111.4	Overburden	Cells 1 & 2 - Downgradient
GWC-6	5/1/2007	1502517.79	2072964.10	726.7	729.02	629.1	619.1	111.4	107.9	Overburden	Cells 1 & 2 - Downgradient
GWC-6RZ	4/28/2015	1502502.98	2072900.19	729.3	732.10	634.3	624.3	108.1	105.3	Bedrock	Cells 1 & 2 - Downgradient
GWC-7Z	5/19/2016	1502639.99	2073192.07	710.1	713.12	606.4	596.4	117.0	113.7	Overburden	Cells 1 & 2 - Downgradient
GWC-8RR	6/27/2011	1502857.62	2073501.63		702.09	602	592	111.8	107.0	Bedrock	Cells 1 & 2 - Downgradient
GWC-8Z	4/28/2015	1502828.21	2073525.42	699.3	702.32	636.3	626.3	76.4	73.0	Overburden	Cells 1 & 2 - Downgradient
GWC-9	8/16/2006	1503017.30	2073782.56	692.8	695.50	632.6	622.7	77.2	70.5	Overburden	Cells 1 & 2 - Downgradient
GWA-36	6/15/2011	1505057.05	2073383.57	682.3	684.91	616.6	606.6	81.8	76.0	Overburden	Cells 3 & 4 - Upgradient
GWA-36R	6/15/2011	1505050.78	2073384.01	681.8	684.53	606.1	596.1	89.6	86.0	Bedrock	Cells 3 & 4 - Upgradient
GWA-37	9/11/2013	1505341.85	2073070.71	701.0	703.66	606.8	596.8	107.5	104.5	Overburden	Cells 3 & 4 - Upgradient
GWA-38	6/13/2011	1505501.65	2072833.09	713.8	716.43	659.1	649.1	69.4	65.0	Overburden	Cells 3 & 4 - Upgradient
GWA-51RZ	3/1/2016	1505310.38	2073781.45	706.3	708.98	625.5	615.5	94.2	91.0	Bedrock	Cells 3 & 4 - Upgradient
GWA-52	4/21/2015	1505460.21	2073875.23	707.1	710.12	636.5	626.5	84.0	80.9	Overburden	Cells 3 & 4 - Upgradient

TABLE A-1:
SUMMARY of WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL, and PURPOSE

Well Name	Installation Date	Northing (ft NAD83)	Easting (ft NAD83)	Ground Surface Elevation	Top of Casing Elevation (ft NAVD88)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Total Well Depth measured in the field September 2017 (feet below top of casing)	Total Well Depth on Construction Log (feet below land surface)	Lithology Screened	Purpose
GWA-53	4/10/2015	1505696.02	2074038.42	708.3	711.38	600.8	590.8	120.9	117.8	Overburden	Cells 3 & 4 - Upgradient
GWA-53R	4/10/2015	1505689.59	2074031.47	708.8	711.93	554.7	543.7	168.6	165.4	Bedrock	Cells 3 & 4 - Upgradient
GWA-54	4/14/2015	1505853.97	2074285.87	701.7	704.63	638.8	628.8	76.1	73.2	Overburden	Cells 3 & 4 - Upgradient
GWA-55	4/15/2015	1506035.38	2074506.56	694.2	697.01	642.1	632.1	65.2	62.4	Overburden	Cells 3 & 4 - Upgradient
GWA-55R	4/15/2015	1506041.83	2074517.12	694.0	696.84	601.5	591.5	105.7	102.8	Bedrock	Cells 3 & 4 - Upgradient
GWA-56	4/16/2015	1506128.94	2074632.63	689.5	692.45	616.9	606.9	85.9	82.9	Overburden	Cells 3 & 4 - Upgradient
GWC-16R	12/13/2011	1505877.37	2072608.08	728.1	730.69	646.0	636.0	98.1	95.0	Bedrock	Cells 3 & 4 - Downgradient
GWC-17R	12/8/2011	1506068.86	2072829.56	730.7	733.73	651.5	641.5	92.9	89.5	Bedrock	Cells 3 & 4 - Downgradient
GWC-18	6/6/2011	1506306.93	2072930.02	719.1	721.93	651.4	642.4	80.3	77.0	Overburden	Cells 3 & 4 - Downgradient
GWC-18R	6/2/2011	1506301.46	2072930.28	719.2	721.78	591.9	581.9	140.1	137.5	Bedrock	Cells 3 & 4 - Downgradient
GWC-19R	6/7/2011	1506395.14	2073158.91	724.0	726.58	590.3	580.3	146.6	144.0	Bedrock	Cells 3 & 4 - Downgradient
GWC-20R	6/9/2011	1506601.52	2073487.28	718.4	721.09	644.4	634.4	87.5	84.3	Bedrock	Cells 3 & 4 - Downgradient
GWC-21R	12/16/2011	1506694.91	2073784.63	720.9	723.46	641.7	631.7	90.6	89.5	Bedrock	Cells 3 & 4 - Downgradient
GWC-22R	6/14/2011	1506717.20	2074105.68	713.3	715.85	606.6	596.6	119.6	117.0	Bedrock	Cells 3 & 4 - Downgradient
GWC-23R	6/28/2011	1506700.85	2074447.26	688.9	691.41	652.2	642.2	49.6	47.0	Bedrock	Cells 3 & 4 - Downgradient
GWC-24R	6/21/2011	1506693.97	2074805.76	674.3	676.92	647.6	637.6	40.1	37.0	Bedrock	Cells 3 & 4 - Downgradient
GWC-25R	6/21/2011	1506495.03	2075088.24	674.2	676.75	587.5	577.5	100.0	97.0	Bedrock	Cells 3 & 4 - Downgradient
GWA-39RZ	11/4/2016	1502618.22	2071163.59	729.8	732.58	602.8	592.8	140.1	137.0	Bedrock	Cells 9 & 10 - Upgradient
GWA-39Z	3/1/2016	1502655.51	2071120.35	732.1	735.10	629.2	619.2	117.5	115.0	Overburden	Cells 9 & 10 - Upgradient
GWA-40	6/7/2011	1503195.11	2071300.70	728.6	731.73	586.5	576.5	155.0	153.0	Overburden	Cells 9 & 10 - Upgradient
GWA-41	6/6/2011	1503518.92	2071046.83	739.1	742.37	647	637	102.5	102.0	Overburden	Cells 9 & 10 - Upgradient
GWA-41R	6/1/2011	1503527.50	2071051.59	739.9	743.14	634.6	624.6	129.1	116.0	Bedrock	Cells 9 & 10 - Upgradient
GWA-42	6/1/2011	1503824.33	2071049.88	734.8	738.02	660.6	650.6	84.4	85.0	Overburden	Cells 9 & 10 - Upgradient
GWA-43	5/25/2011	1504128.26	2070982.13	707.7	710.97	635.5	625.5	92.6	93.0	Overburden	Cells 9 & 10 - Upgradient
GWA-43R	5/24/2011	1504117.91	2070972.79	707.9	711.21	601.7	591.7	112.8	127.0	Bedrock	Cells 9 & 10 - Upgradient
GWC-44	6/9/2011	1504436.07	2071414.77	709.9	712.95	634.7	624.7	91.1	86.0	Overburden	Cells 9 & 10 - Downgradient
GWC-45	5/17/2007	1504540.11	2071956.67	698.9	701.56	644.3	634.3	67.6	64.7	Overburden	Cells 9 & 10 - Downgradient
GWC-45R	5/22/2007	1504539.43	2071945.29	699.3	702.04	584.1	574.0	128.1	125.7	Bedrock	Cells 9 & 10 - Downgradient
GWC-46R	8/15/2014	1504523.07	2072184.48	687.9	690.51	642.3	632.3	59.1	56.5	Bedrock	Cells 9 & 10 - Downgradient
GWC-47	6/_/2011	1504544.69	2072481.32	687.4	690.84	630	620	67.6	66	Overburden	Cells 9 & 10 - Downgradient
GWC-47R	4/24/2014	1504540.46	2072467.37	687.7	691.13	617.0	607.0	84.6	81.2	Bedrock	Cells 9 & 10 - Downgradient
GWC-48	6/8/2011	1504490.41	2072850.47	686.0	688.31	641.0	631.0	59.5	56.0	Overburden	Cells 9 & 10 - Downgradient
GWC-49R	4/17/2014	1504246.61	2072916.91	706.0	709.50	585.7	575.7	134.4	131.1	Bedrock	Cells 9 & 10 - Downgradient
GWC-49Z	3/1/2016	1504238.74	2072896.12	706.2	709.12	627.2	617.2	94.5	90.0	Overburden	Cells 9 & 10 - Downgradient

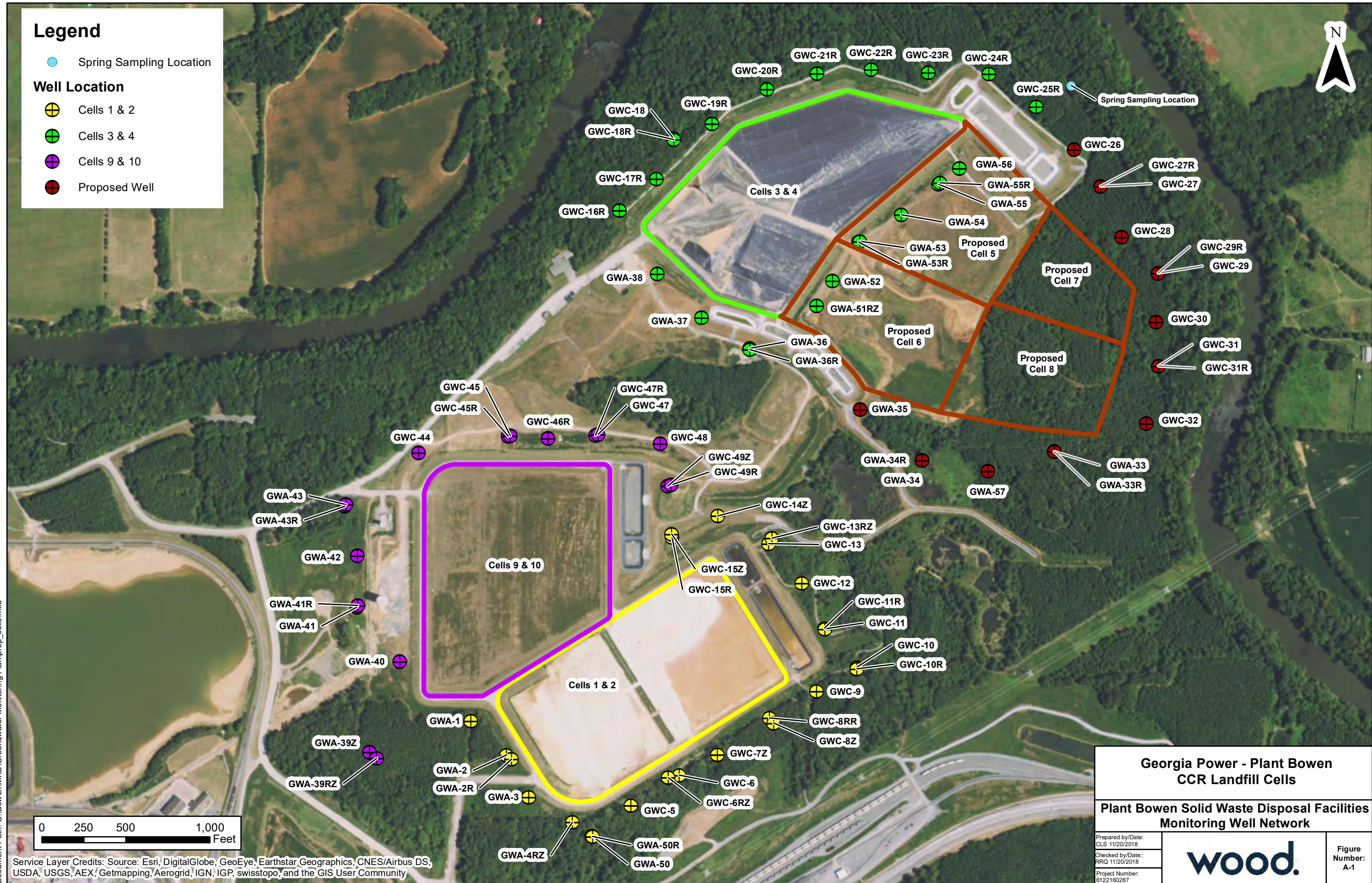
Notes:
1. ft NAD83 indicates feet referenced to the North American Datum of 1983.
2. NAVD88 indicates the North American Vertical Datum 1988.
3. TOC indicates top of casing.
4. The listed monitoring wells will be measured for water levels and sampled for groundwater quality.

Legend

Spring Sampling Location

Well Location

- Cells 1 & 2
- Cells 3 & 4
- Cells 9 & 10
- Proposed Well



Georgia Power - Plant Bowen
CCR Landfill Cells

Plant Bowen Solid Waste Disposal Facilities
Monitoring Well Network

Prepared by/Date:
CLS 11/20/2018
Checked by/Date:
RRQ 11/20/2018
Project Number:
6122160287

wood.

Figure
Number:
A-1

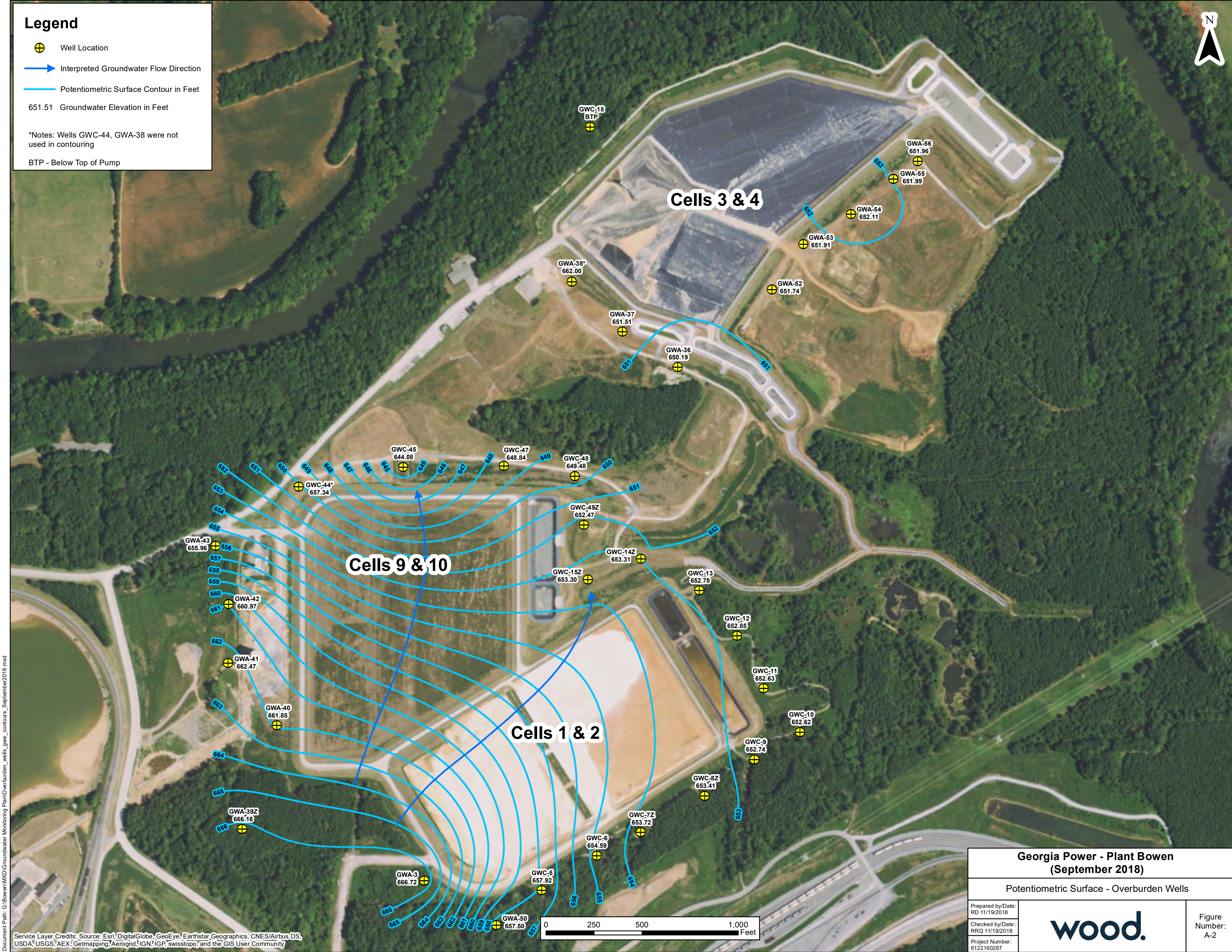
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Well Location
- Interpreted Groundwater Flow Direction
- Potentiometric Surface Contour in Feet
- 651.51 Groundwater Elevation in Feet

*Notes: Wells GWC-44, GWA-38 were not used in contouring

BTP - Below Top of Pump



Document Path: G:\Bowen\MXD\Groundwater Monitoring Plan\Overburden_wells_gwe_contours_September2018.mxd

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Georgia Power - Plant Bowen
(September 2018)

Potentiometric Surface - Overburden Wells

Prepared by/Date:
RD 11/19/2018
Checked by/Date:
RRQ 11/19/2018
Project Number:
6122160287

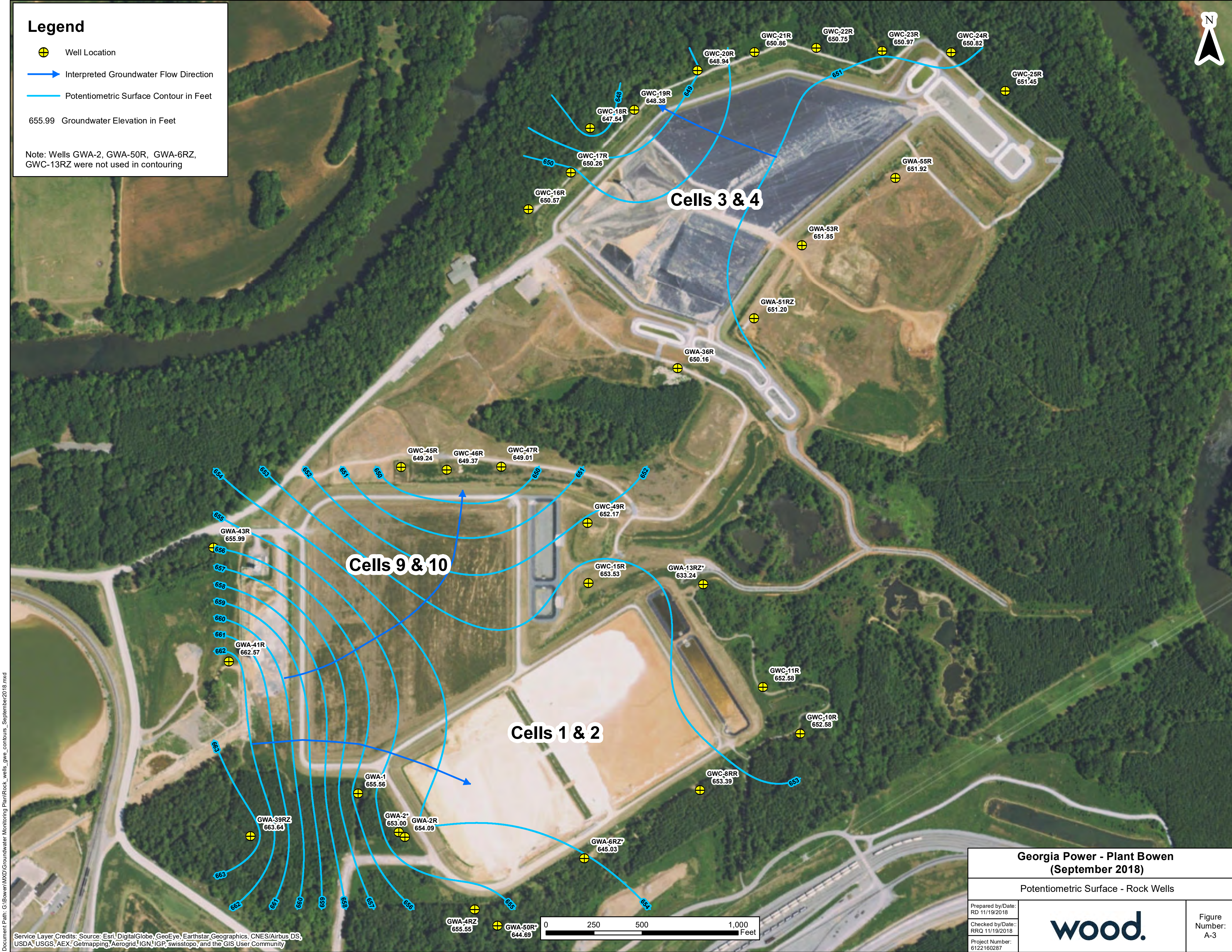


Figure
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A-2

Legend

- Well Location
- Interpreted Groundwater Flow Direction
- Potentiometric Surface Contour in Feet
- 655.99 Groundwater Elevation in Feet

Note: Wells GWA-2, GWA-50R, GWA-6RZ, GWC-13RZ were not used in contouring



Georgia Power - Plant Bowen
(September 2018)

Potentiometric Surface - Rock Wells

Prepared by/Date:
RD 11/19/2018
Checked by/Date:
RRQ 11/19/2018
Project Number:
6122160287



Figure
Number:
A-3

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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	GWA-1
LOGGER: J. Lippert		DRILLING METHODS: HSA	
DATE CONSTRUCTED: 4/12/2007 - 9:00 am			
		DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top 1/4-inch Weep Hole	TOP OF RISER	2.77	742.20
4-ft x 4-ft concrete pad	GROUND SURFACE	0.00	739.43
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING			
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	604.93
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	602.93
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	601.70
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		147.73	591.70
BOTTOM OF CASING		148.03	591.40
HOLE DIA: 6-5/8"			

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-1

Sheet 1 of 5

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 149'	SURF.ELEV. 739.43
LOCATION Cells 1 & 2	COORDINATES N 2071724.11	E 1502840.52	
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. 633.93	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	N			
0	739.43								
1	738.43	Stiff, light brown, silty CLAY with trace organics and limestone pebbles, dry	S-1	3.5-5	4-5-6	11		90	
2	736.43								
3	733.43								
4	729.43								
5	724.43								
6	718.43	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	
7	711.43								
8	703.43								
9	694.43								
10	684.43								
11	673.43	Very stiff, reddish brown, sandy SILT with chert fragments, slightly moist	S-3	13.5-15	7-10-13	23		100	
12	661.43								
13	648.43								
14	634.43								
15	619.43								
16	603.43	Same as above	S-4	18.5-20	9-11-16	27		90	
17	586.43								
18	568.43								
19	549.43								
20	529.43								
21	508.43								
22	486.43								
23	463.43								
24	439.43								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 2 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **149'** SURF.ELEV. **739.43**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	714.43	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	713.43								
27	712.43								
28	711.43								
29	710.43								
30	709.43	Same as above	S-6	28.5-30	6-8-10	18		100	
31	708.43								
32	707.43								
33	706.43								
34	705.43								
35	704.43	Same as above, stiff with chert pebbles	S-7	33.5-35	4-6-8	14		100	
36	703.43								
37	702.43								
38	701.43								
39	700.43								
40	699.43	Same as above, very moist, blocky structure	S-8	38.5-40	3-4-5	9		100	
41	698.43								
42	697.43								
43	696.43								
44	695.43								
45	694.43	Stiff, yellowish brown silty CLAY with chert, sand, and small pebbles, moist	S-9	43.5-45	3-4-5	9		100	
46	693.43								
47	692.43								
48	691.43								
49	690.43								
50	689.43	Same as above, very stiff with large limestone gravel, some manganese oxide nodules	S-10	48.5-50	6-8-9	17		100	
51	688.43								
52	687.43								
53	686.43								
54	685.43								
55	684.43	Same as above with mottled gray	S-11	53.5-55	11-13-11	24		90	
56	683.43								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 3 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **149'** SURF.ELEV. **739.43**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	682.43	Stiff, light brown and reddish brown CLAY, high plasticity with quartz pebbles, moist	S-12	58.5-60	4-5-7	12		90	
58	681.43								
59	680.43								
60	679.43								
61	678.43								
62	677.43								
63	676.43								
64	675.43	Same as above, very moist	S-13	63.5-65	4-5-7	12		100	
65	674.43								
66	673.43								
67	672.43								
68	671.43								
69	670.43								
70	669.43								
71	668.43	Same as above	S-14	68.5-70	4-6-8	14		100	
72	667.43								
73	666.43								
74	665.43								
75	664.43								
76	663.43								
77	662.43								
78	661.43	Very stiff, light brown, sandy CLAY with chert fragments, moist	S-15	73.5-75	4-7-10	17		100	
79	660.43								
80	659.43								
81	658.43								
82	657.43								
83	656.43								
84	655.43								
85	654.43	Chert seam from approximately 84.5-85.5	S-17	83.5-85	5-27-47	74		100	
86	653.43								
87	652.43								
88	651.43								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 4 of 5

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	149'	SURF.ELEV.	739.43
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	650.43	Same as above, very stiff	S-18	88.5-90	6-8-10	18		100	
90	649.43								
91	648.43								
92	647.43								
93	646.43								
94	645.43	Same as above, stiff with highly weathered quartz pebbles, very moist	S-19	93.5-95	4-5-7	12		100	
95	644.43								
96	643.43								
97	642.43								
98	641.43								
99	640.43	Same as above	S-20	98.5-100	4-4-6	10		100	
100	639.43								
101	638.43								
102	637.43								
103	636.43								
104	635.43	Same as above, with very highly weathered dolomite gravel	S-21	103.5-105	4-5-7	12		100	
105	634.43								
106	633.43								
107	632.43								
108	631.43								
109	630.43	Same as above	S-22	108.5-110	6-4-6	10		100	
110	629.43								
111	628.43								
112	627.43								
113	626.43								
114	625.43	Same as above	S-23	113.5-115	2-4-5	9		100	
115	624.43								
116	623.43								
117	622.43								
118	621.43								
119	620.43	Same as above, firm	S-24	118.5-120	2-2-4	6		90	
120	619.43								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-1

Sheet 5 of 5

SITE				Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		149'		SURF.ELEV.		739.43	
Depth	Elev.	Material Description, Classification and Remarks			Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
					From To	Blows	N						
121	618.43	Firm, light brown, sandy CLAY with yellowish brown SILT and chert gravel, wet			S-25	123.5-125	2-3-5	8		100			
122	617.43												
123	616.43												
124	615.43												
125	614.43												
126	613.43												
127	612.43												
128	611.43												
129	610.43	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			
130	609.43												
131	608.43												
132	607.43												
133	606.43												
134	605.43												
135	604.43												
136	603.43												
137	602.43	Same as above, very soft, few chert fragments, less structured			S-27	133.5-135	WOH	0		100			
138	601.43												
139	600.43												
140	599.43												
141	598.43												
142	597.43												
143	596.43												
144	595.43												
145	594.43	Same as above, firm, some chert gravel			S-28	138.5-140	2-3-3	6		100			
146	593.43												
147	592.43												
148	591.43												
149	590.43												
150													
151													
152													
149	590.43	Very hard, weathered DOLOMITE, highly fractured			S-30	148.5-150	50/2-x-x	>50		90			
150		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, MSL
<p>Locking Hinged Top</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL: 77.8 ft.</p> <p>Well Development: Pump/surge until clear.</p> <p>HOLE DIA: 8"</p>	TOP OF RISER	2.55	734.81
	2" Threaded Riser Cap		
	GROUND SURFACE	0.00	732.26
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	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	596.46
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie		
	TOP OF FILTER PACK	137.80	594.46
	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	141.48	590.78
	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	151.48	580.78
	BOTTOM OF CASING	151.78	580.48

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 1 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **151** SURF.ELEV. **732.26**

LOCATION **Cells 1 & 2** COORDINATES N **2071935.81** E **1502638.77**

ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME-75**

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 **3/29/2007**

DRILLER **S. Denty** RECORDER **K. Hobbs** APPROVED _____ 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	732.26								
1	731.26	Stiff, dark brown/red SILT with some sand, slightly moist	S-1	4.5-6	3-6-8	14		100	
2	729.26								
3	726.26								
4	722.26								
5	717.26								
6	711.26	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	
7	704.26								
8	696.26								
9	687.26								
10	677.26								
11	666.26	Same as above	S-3	14.5-16	5-8-13	21		90	
12	654.26								
13	641.26								
14	627.26								
15	612.26								
16	596.26	Stiff, dark reddish brown sandy SILT with quartz sand grains up to 2 mm	S-4	19.5-21	4-9-11	20		90	
17	579.26								
18	561.26								
19	542.26								
20	522.26								
21	501.26								
22	479.26								
23	456.26								
24	432.26								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-2

Sheet 2 of 5

SITE			Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH		151		SURF.ELEV.		732.26	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD				
				From To	Blows	N							
25	707.26	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		100					
26	706.26												
27	705.26												
28	704.26												
29	703.26												
30	702.26	Same as above	S-6	29.5-31	5-7-11	18		100					
31	701.26												
32	700.26												
33	699.26												
34	698.26												
35	697.26	Dark reddish brown sandy pebbly SILT, approximately 10% pebbles, slightly moist, but still crumbly	S-7	34.5-36	5-10-15	25		60					
36	696.26												
37	695.26												
38	694.26												
39	693.26												
40	692.26	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					
41	691.26												
42	690.26												
43	689.26												
44	688.26												
45	687.26	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					
46	686.26												
47	685.26												
48	684.26												
49	683.26												
50	682.26	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					
51	681.26												
52	680.26												
53	679.26												
54	678.26												
55	677.26	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					
56	676.26												

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-2

Sheet 3 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **151** SURF.ELEV. **732.26**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	675.26	Firm, light brown, tan, and white silty SAPROLITE, mottled, moist	S-12	59.5-61	6-7-9	16			
58	674.26								
59	673.26								
60	672.26								
61	671.26								
62	670.26								
63	669.26								
64	668.26	Same as above, wet	S-13	64.5-66	5-6-7	13			
65	667.26								
66	666.26								
67	665.26								
68	664.26								
69	663.26								
70	662.26								
71	661.26	Same as above	S-14	69.5-71	3-4-7	11			
72	660.26								
73	659.26								
74	658.26								
75	657.26								
76	656.26								
77	655.26								
78	654.26	Same as above	S-15	74.5-76	5-6-12	18			
79	653.26								
80	652.26								
81	651.26								
82	650.26								
83	649.26								
84	648.26								
85	647.26	Firm, Brown to white CLAY with silt	S-17	84.5-86	4-5-11	16			
86	646.26								
87	645.26								
88	644.26								
		White decomposed boulder	S-16	79.5-81	2-21-45	66			


DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2

Sheet 4 of 5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 151 JRF.ELEV. 732.26

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	643.26	Same as above	S-18	89.5-91	2-7-8	15			
90	642.26								
91	641.26								
92	640.26								
93	639.26								
94	638.26	Same as above	S-19	94.5-96	29-15-8	23			
95	637.26								
96	636.26								
97	635.26								
98	634.26								
99	633.26	Firm, brown to white CLAY with sand and silt	S-20	99.5-101	2-5-8	13			
100	632.26								
101	631.26								
102	630.26								
103	629.26								
104	628.26	Same as above	S-21	104.5-106	1-3-5	8			
105	627.26								
106	626.26								
107	625.26								
108	624.26								
109	623.26	Same as above	S-22	109.5-111	2-3-8	11			
110	622.26								
111	621.26								
112	620.26								
113	619.26								
114	618.26	Same as above	S-23	114.5-116	2-3-5	8			
115	617.26								
116	616.26								
117	615.26								
118	614.26								
119	613.26	Firm, brown CLAY with rock fragments	S-24	119.5-121	1-2-2	4			
120	612.26								

<div>  <div> <div>DRILLING LOG</div> <div>GEOLOGICAL SERVICES</div> </div> </div>							Hole No. GWA-2		
							Sheet 5 of 5		
SITE Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH 151		IRF.ELEV. 732.26			
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121	611.26	Soft, brown SILT, loose, with rock fragments	S-25	124.5-126	WOR	0			
122	610.26								
123	609.26								
124	608.26								
125	607.26								
126	606.26								
127	605.26								
128	604.26								
129	603.26	Same as above	S-26	129.5-131	WOR	0			
130	602.26								
131	601.26								
132	600.26								
133	599.26	Same as above	S-27	134.5-136	WOR	0			
134	598.26								
135	597.26								
136	596.26								
137	595.26								
138	594.26								
139	593.26	Same as above	S-28	139.5-141	1-0-0	0			
140	592.26								
141	591.26								
142	590.26								
143	589.26	Rods dropped from 146-150.6							
144	588.26								
145	587.26								
146	586.26								
147	585.26								
148	584.26								
149	583.26								
150	582.26								
151	581.26	Top of Rock							
		Bottom of boring							
152	580.26								

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL
Storage Facility	DRILLER: S. Milam	NAME
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, MSL	
<p>Locking Hinged Top</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL: 78.0 ft.</p> <p>Well Development: Pump/surge until clear.</p> <p>HOLE DIA: 7.5"</p>	<p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 32 bags</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie</p> <p>FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 4 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water</p> <p>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</p>	<p>TOP OF RISER</p> <p>GROUND SURFACE</p> <p>BOTTOM OF PROTECTIVE CASING</p> <p>TOP OF SEAL</p> <p>TOP OF FILTER PACK</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF CASING</p>	<p>2.77</p> <p>0.00</p> <p>81.50</p> <p>88.50</p> <p>95.13</p> <p>105.13</p> <p>105.43</p>	<p>735.78</p> <p>733.01</p> <p>651.51</p> <p>644.51</p> <p>637.88</p> <p>627.88</p> <p>627.58</p>

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-2R

Sheet 1 of 4

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 103'	SURF.ELEV. 733.01
LOCATION Cells 1 & 2	COORDINATES N 2071966.37	E 1502613.68	
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 78	CORE SIZE HQ	TOTAL % REC. 87.2
WATER TABLE DEPTH 78	ELEV. 655.01	TIME AFTER COMP. 15 hrs	DATE TAKEN 8/2/2007
TYPE GROUT 	QUANTITY 	MIX 	DRILLING START DATE 7/31/2007
DRILLER S. Milam	RECORDER J. Lippert	APPROVED 	DRILLING COMP. DATE 8/2/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	733.01								
1	732.01	Stiff brownish red sandy CLAY with silt, moist, residuum	S-1	4.5-6	2 - 4 - 5	9			
2	731.01								
3	730.01								
4	729.01								
5	728.01								
6	727.01	Same as above, very stiff with micaceous subrounded gravel	S-2	9.5-11	5 - 9 - 11	20			
7	726.01								
8	725.01								
9	724.01								
10	723.01								
11	722.01	Same as above	S-3	14.5-16	4 - 10 - 10	20			
12	721.01								
13	720.01								
14	719.01								
15	718.01								
16	717.01	Same as above	S-4	19.5-21	4 - 9 - 10	19			
17	716.01								
18	715.01								
19	714.01								
20	713.01								
21	712.01								
22	711.01								
23	710.01								
24	709.01								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-2R

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **103'** SURF.ELEV. **733.01**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	708.01	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	707.01								
27	706.01								
28	705.01								
29	704.01								
30	703.01	Same as above, some very fine sand grains in matrix	S-6	29.5-31	2 - 18 - 10	28			
31	702.01								
32	701.01								
33	700.01								
34	699.01								
35	698.01	Stiff brownish yellow SILT, wet, very homogeneous	S-7	34.5-36	4 - 5 - 5	10			
36	697.01								
37	696.01								
38	695.01								
39	694.01								
40	693.01	Hard brownish yellow and white SILT with highly weathered and friable chert gravel, wet	S-8	39.5-41	5 - 14 - 21	35			
41	692.01								
42	691.01								
43	690.01								
44	689.01								
45	688.01	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	687.01								
47	686.01								
48	685.01								
49	684.01								
50	683.01	Very stiff yellowish brown SILT with chert gravel, moist	S-10	49.5-51	4 - 13 - 13	26			
51	682.01								
52	681.01								
53	680.01								
54	679.01								
55	678.01	Same as above, very hard with abundant chert gravel	S-11	54.5-56	50/4	R			
56	677.01								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-2R

Sheet 3 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH		103'		SURF.ELEV.		733.01	
Depth	Elev.	Material Description, Classification and Remarks			Sample No.	Standard Penetration Test			Comments	% Rec	RQD	
					From To	Blows	N					
57	676.01	Stiff brownish yellow, yellowish white, and dark brown SILT, moist, elastic where dark brown			S-12	59.5-61	3 - 4 - 5	9				
58	675.01											
59	674.01											
60	673.01											
61	672.01											
62	671.01											
63	670.01											
64	669.01	Same as above, very stiff with rounded gravel, some black stained inclusions			S-13	64.5-66	4 - 14 - 15	29				
65	668.01											
66	667.01											
67	666.01											
68	665.01											
69	664.01											
70	663.01											
71	662.01	Hard yellowish brown sandy SILT, wet			S-14	69.5-71	8 - 14 - 16	30				
72	661.01											
73	660.01											
74	659.01											
75	658.01											
76	657.01											
77	656.01											
78	655.01	Auger refusal at 78.0			S-15	78-83	50/4 - X - X	R	5.0/2.3	46		
79	654.01	DOLOMITE, slightly to moderately weathered, hard, aphanitic, slightly fractured										
80	653.01	79.2-80.7: Cavity, mud-filled										
81	652.01	81.0-81.5: Cavity, mud-filled										
82	651.01	Partial void 81.7 - 82.2										
83	650.01											
84	649.01											
85	648.01											
86	647.01											
87	646.01											
88	645.01								83-88	5.0/4.3	86	

DRILLING LOG
GEOLOGICAL SERVICES

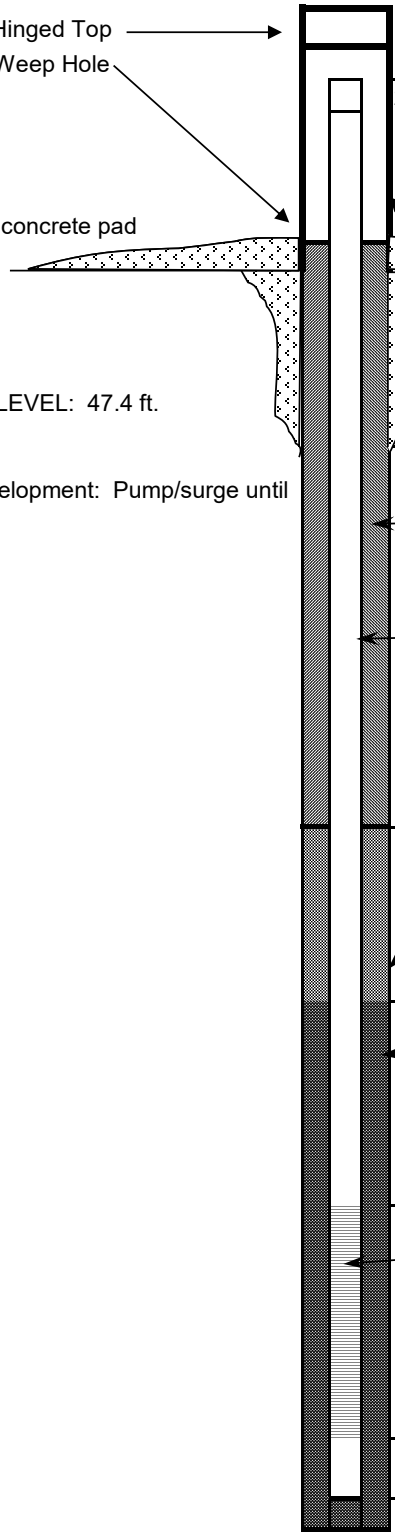
Hole No. GWA-2R

Sheet 4 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	103'	SURF.ELEV.	733.01
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
89	644.01	Unweathered, moderately to slightly fractured		88-93			5.0/4.8	96	
90	643.01								
91	642.01								
92	641.01								
93	640.01								
94	639.01	High angle (~70° - 75°) healed fractures		93-98			5.0/5.2	104	
95	638.01								
96	637.01								
97	636.01								
98	635.01								
99	634.01	Split along high angle joint		98-103			5.0/5.2	104	
100	633.01								
101	632.01								
102	631.01								
103	630.01								
104	629.01	Thin cherty seam at 102.5 Bottom of boring							
105	628.01								
106	627.01								
107	626.01								
108	625.01								
109	624.01								
110	623.01								
111	622.01								
112	621.01								
113	620.01								
114	619.01								
115	618.01								
116	617.01								
117	616.01								
118	615.01								
119	614.01								
120	613.01								

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		GWA-3		
DATE CONSTRUCTED: 4/11/2007 - 16:00						
				DEPTH FEET	ELEVATION FT, MSL	
				TOP OF RISER	2.55	732.47
GROUND SURFACE				0.00	729.92	
BOTTOM OF PROTECTIVE CASING						
TOP OF SEAL				80.30	649.62	
TOP OF FILTER PACK				83.30	646.62	
BOTTOM OF RISER / TOP OF SCREEN				85.06	644.86	
BOTTOM OF SCREEN				95.06	634.86	
BOTTOM OF CASING				95.36	634.56	

Locking Hinged Top

1/4-inch Weep Hole

4-ft x 4-ft concrete pad

WATER LEVEL: 47.4 ft.

Well Development: Pump/surge until clear.

2" Threaded Riser Cap

PROTECTIVE CASING
SIZE: 4x4-inch
TYPE: Anodized Aluminum

BACKFILL MATERIAL
TYPE: Portland Cement Grout
AMOUNT: 50 bags

RISER CASING
DIA: 2-inch
TYPE: Schedule 40 PVC
JOINT TYPE: Flush Threaded

ANNULAR SEAL
TYPE: 1/4-inch coated bentonite pellets
5-gal buckets
AMOUNT: 0.5 bucket
PLACEMENT: Tremie

FILTER PACK
TYPE: DSI Sand - 1A (20/30)
Drillers Services, Inc.
AMOUNT: 3.2 bags; 50 lbs/bag
PLACEMENT: Tremie; wash with water

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

HOLE DIA: 8"

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-3

Sheet 1 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **95.7** SURF.ELEV. **729.92**
LOCATION **Cells 1 & 2** COORDINATES N **2072067.9** E **1502387.58**
ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME-75**
DRILLING METHOD **HSA** NO. SAMPLES **19** NO. U.D. SAMPLES **0**
CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____
WATER TABLE DEPTH **47.4** ELEV. **682.52** TIME AFTER COMP. **17 hrs** DATE TAKEN **4/11/2007**
TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE **4/9/2007**
DRILLER **S. Denty** 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	N			
0	729.92								
1	728.92	Hard, dark brownish red sandy CLAY with chert pebbles and gravel, slightly moist	S-1	4.5-6	4-16-23	39		100	
2	727.92								
3	726.92								
4	725.92								
5	724.92								
6	723.92	Same as above, very stiff, light brown and dark brownish red	S-2	9.5-11	4-8-12	20		75	
7	722.92								
8	721.92								
9	720.92								
10	719.92								
11	718.92	Stiff, brownish red, light brown, and grayish white mottled CLAY, high plasticity, moist	S-3	14.5-16	3-5-8	13		90	
12	717.92								
13	716.92								
14	715.92								
15	714.92								
16	713.92	Stiff, white kaolinitic CLAY, moist, some reddish brown banding	S-4	19.5-21	3-4-5	9		100	
17	712.92								
18	711.92								
19	710.92								
20	709.92								
21	708.92								
22	707.92								
23	706.92								
24	705.92								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-3

Sheet 2 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **95.7** SURF.ELEV. **729.92**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	704.92	Same as above, very stiff, brownish yellow, white, and light red mottled	S-5	24.5-26	2-5-11	16		100	
26	703.92								
27	702.92								
28	701.92								
29	700.92								
30	699.92	Same as above, white and brownish yellow	S-6	29.5-31	4-8-18	26		100	
31	698.92								
32	697.92								
33	696.92								
34	695.92								
35	694.92	Very stiff, brown sandy CLAY with abundant chert fragments, moist	S-7	34.5-36	4-7-14	21		90	
36	693.92								
37	692.92								
38	691.92								
39	690.92								
40	689.92	Same as above, hard	S-8	39.5-41	4-25-19	44		100	
41	688.92								
42	687.92								
43	686.92								
44	685.92								
45	684.92	Very stiff, light yellowish brown silty CLAY with very highly weathered chert fragments, very moist	S-9	44.5-46	6-9-10	19		100	
46	683.92								
47	682.92								
48	681.92								
49	680.92								
50	679.92	Same as above, very hard, abundant (about 40 to 50%) highly weathered chert fragments, wet	S-10	49.5-51	9-19-39	58		100	
51	678.92								
52	677.92								
53	676.92								
54	675.92								
55	674.92	Very stiff, yellowish brown silty CLAY, few chert fragments, wet, some layering visible	S-11	54.5-56	8-8-13	21		100	
56	673.92								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-3

Sheet 3 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **95.7** SURF.ELEV. **729.92**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	672.92	Very hard, white DOLOMITE, very highly weathered, wet	S-12	59.5-61	9-32-23	55		100	
58	671.92								
59	670.92								
60	669.92								
61	668.92								
62	667.92	Very stiff, yellowish brown silty CLAY, wet, saprolitic structure in parts	S-13	64.5-66	5-8-12	20		100	
63	666.92								
64	665.92								
65	664.92								
66	663.92								
67	662.92	Same as above, stiff with highly weathered quartz pebbles	S-14	69.5-71	3-6-9	15	Allowed hole to sit 20 minutes, water at 57 feet	100	
68	661.92								
69	660.92								
70	659.92								
71	658.92								
72	657.92	72.9-74.0: Wet drill through chert boulder	S-15	74.5-76	6-8-9	17		50	
73	656.92								
74	655.92								
75	654.92								
76	653.92								
77	652.92	Very stiff, yellowish brown sandy clayey SILT with abundant chert fragments, wet	S-16	79.5-81	6-5-5	10		100	
78	651.92								
79	650.92								
80	649.92								
81	648.92								
82	647.92	Same as above, stiff	S-17	84.5-86	6-9-28	37			
83	646.92								
84	645.92								
85	644.92								
86	643.92								
87	642.92	Same as above, hard abundant chert and highly weathered dolomite fragments around 86'							
88	641.92								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-3

Sheet 4 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	95.7	SURF.ELEV.	729.92
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	640.92	Same as above, very hard, abundant chert and highly weathered dolomite throughout sample, relict structure visible in soil matrix	S-18	89.5-91	15-50-15	65		50	
90	639.92								
91	638.92								
92	637.92								
93	636.92								
94	635.92	Same as above, stiff	S-19	94.5-96	9-7-6	13		50	
95	634.92								
96	633.92	Bottom of boring							
97	632.92								
98	631.92								
99	630.92								
100	629.92								
101	628.92								
102	627.92								
103	626.92								
104	625.92								
105	624.92								
106	623.92								
107	622.92								
108	621.92								
109	620.92								
110	619.92								
111	618.92								
112	617.92								
113	616.92								
114	615.92								
115	614.92								
116	613.92								
117	612.92								
118	611.92								
119	610.92								
120	609.92								

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-4	
DATE CONSTRUCTED: 3/14/2007 - 16:00					
				DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top 1/4-inch Weep Hole				TOP OF RISER	2.51 743.47
2" Threaded Riser Cap					
4-ft x 4-ft concrete pad				GROUND SURFACE	0.00 740.96
WATER LEVEL:					
Well Development: Pump/surge until clear.					
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum					
BOTTOM OF PROTECTIVE CASING					
BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 59 bags					
RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded					
TOP OF SEAL				53.90	687.06
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie					
TOP OF FILTER PACK				56.90	684.06
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				59.49	681.47
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				69.49	671.47
BOTTOM OF CASING				69.79	671.17
HOLE DIA: 8"					

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-4

Sheet 1 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **68.6'** SURF.ELEV. **740.96**

LOCATION **Cells 1 & 2** COORDINATES N **2072318.41** E **1502239.16**

ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME-75**

DRILLING METHOD **HSA/HQ Rock core with water** NO. SAMPLES **9** NO. U.D. SAMPLES **0**

CASING SIZE **4.25" ID & 8.5" OD** LENGTH **5'** CORE SIZE **HQ** TOTAL % REC.

WATER TABLE DEPTH **66.5** ELEV. **674.46** TIME AFTER COMP. DATE TAKEN **3/14/2007**

TYPE GROUT **Portland Cement** QUANTITY MIX DRILLING START DATE **3/7/2007**

DRILLER **S. Denty** RECORDER **L. Millet** APPROVED DRILLING COMP. DATE **3/14/2007**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	740.96								
1	739.96	Light tan clayey SILT, dry, heavy dark red mottling	S-1	4.5-6	5-10-16	26		80	
2	738.96								
3	737.96								
4	736.96								
5	735.96								
6	734.96	Light gray to white silty CLAY, dry, heavy dark red mottling, 3" limestone lense at bottom, white, dry	S-2	9.5-11	6-24-50/3	R		60	
7	733.96								
8	732.96								
9	731.96								
10	730.96								
11	729.96	Light tan and light gray clayey SILT, dry, heavy red mottling, limestone pebbles	S-3	14.5-16	4-5-8	13		80	
12	728.96								
13	727.96								
14	726.96								
15	725.96								
16	724.96	Light orange and tan silty CLAY, dry, with limestone pebbles, white	S-4	19.5-21	4-7-9	16			
17	723.96								
18	722.96								
19	721.96								
20	720.96								
21	719.96								
22	718.96								
23	717.96								
24	716.96								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-4

Sheet 2 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	68.6'	SURF.ELEV.	740.96
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	715.96	Same as above	S-5	24.5-26	6-15-25	40			
26	714.96								
27	713.96								
28	712.96								
29	711.96								
30	710.96	Same as above, with chert	S-6	29.5-31	13-7-8	15		50	
31	709.96								
32	708.96								
33	707.96								
34	706.96								
35	705.96	Light orange silty CLAY, moist, with small chert pebbles	S-7	34.5-36	7-12-13	25		20	
36	704.96								
37	703.96								
38	702.96								
39	701.96								
40	700.96	Orange and brown clayey SILT, dry, with sand, chert pebbles and cobbles	S-8	39.5-41	12-17-21	38		50	
41	699.96								
42	698.96								
43	697.96								
44	696.96								
45	695.96	Tan and orange silty CLAY, light brown mottling, chert pebbles and cobbles	S-9	44.5-46	19-47-25	72		15	
46	694.96								
47	693.96								
48	692.96								
49	691.96								
50	690.96	50: fracture, no obvious water movement		47.5-57.5			10.0/10.0		
51	689.96								
52	688.96								
53	687.96								
54	686.96								
55	685.96	51.7: fracture with clay rinds, soil buildup							
56	684.96								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWA-4

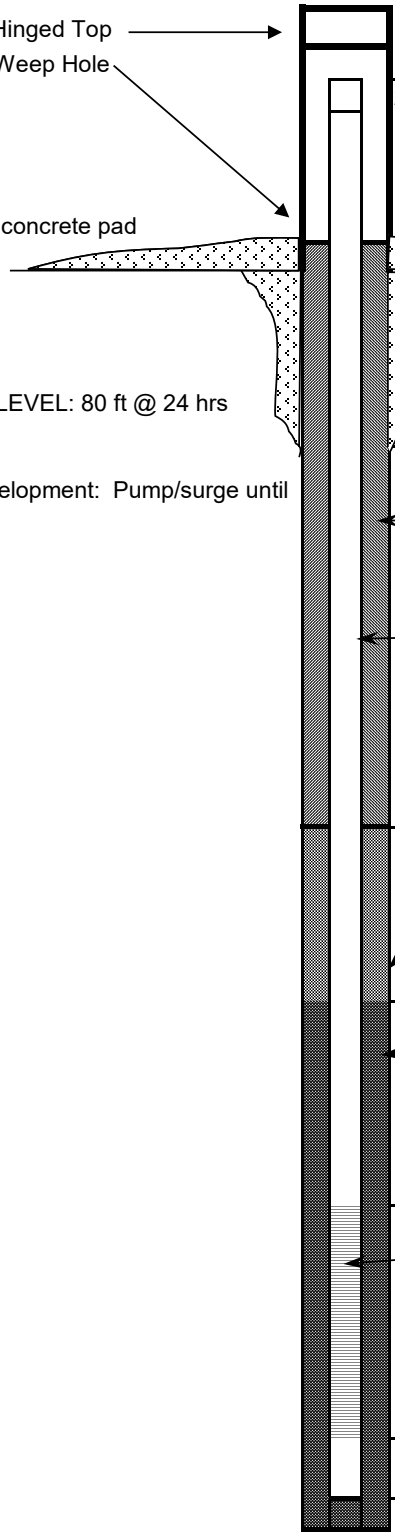
Sheet 3 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **68.6'** SURF.ELEV. **740.96**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	683.96	57.5: fracture with extensive chemical weathering		57.6-66.1			8.6/8.6		
58	682.96								
59	681.96								
60	680.96								
61	679.96								
62	678.96								
63	677.96	63.9: fracture with weathering, clay rinds							
64	676.96								
65	675.96								
66	674.96	66.1-69.5: cavity with minimum 1.5' soil fill (orange silty CLAY, plastic, with carbonate, large sand/small pebbles)							
67	673.96								
68	672.96								
69	671.96	Bottom of boring							
70	670.96								
71	669.96								
72	668.96								
73	667.96								
74	666.96								
75	665.96								
76	664.96								
77	663.96								
78	662.96								
79	661.96								
80	660.96								
81	659.96								
82	658.96								
83	657.96								
84	656.96								
85	655.96								
86	654.96								
87	653.96								
88	652.96								

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, MSL			
				TOP OF RISER	2.40	743.84		
				GROUND SURFACE	0.00	741.44		
				PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum				
				BOTTOM OF PROTECTIVE CASING				
				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	663.44
				ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie				
				TOP OF FILTER PACK			80.00	661.44
				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	658.39
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	648.39				
BOTTOM OF CASING			93.35	648.09				
HOLE DIA: 8"								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-4R

Sheet 1 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **92.5'** SURF.ELEV. **741.44**

LOCATION **Cells 1 & 2** COORDINATES N **2072317.65** E **1502244.98**

ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO. **CME-75**

DRILLING METHOD **HSA/HQ Rock core with water** NO. SAMPLES **11** 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 **3/6/2007**

DRILLER **S. Denty** RECORDER **L. Millet** APPROVED _____ 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	741.44								
1	740.44	Orange, red, tan, and light gray clayey SILT, dry	S-1	4.5-6	8-11-13	24		80	
2	739.44								
3	738.44								
4	737.44								
5	736.44								
6	735.44	Red clayey SILT, dry, with 3" limestone lense at bottom, white, dry	S-2	9.5-11	9-32-34	68		85	
7	734.44								
8	733.44								
9	732.44								
10	731.44								
11	730.44	Light tan and orange silty CLAY, dry, occasional dark red mottling	S-3	14.5-16	6-11-17	28		85	
12	729.44								
13	728.44								
14	727.44								
15	726.44								
16	725.44	Light tan silty CLAY, dry, with carbonate rubble, fine dark red mottling	S-4	19.5-21	7-12-23	35			
17	724.44								
18	723.44								
19	722.44								
20	721.44								
21	720.44								
22	719.44								
23	718.44								
24	717.44								

**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.	741.44
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	716.44	Light orange silty CLAY, dry, occasional dolostone pebbles	S-5	24.5-26	3-6-17	23			
26	715.44								
27	714.44								
28	713.44								
29	712.44	26.3': drilled through 6" to 8" of rock							
30	711.44								
31	710.44								
32	709.44								
33	708.44	Light orange silty CLAY, moist, occasional light gray and black mottling, occasional dolostone pebbles	S-6	29.5-31	9-9-9	18		50	
34	707.44								
35	706.44								
36	705.44								
37	704.44	Same as above, large dolostone cobble stuck in bottom of spoon	S-7	34.5-36	10-11-9	20		15	
38	703.44								
39	702.44								
40	701.44								
41	700.44	Light orange silty CLAY, moist, occasional light gray and black mottling, small carbonate shards	S-8	39.5-41	7-7-9	16		50	
42	699.44								
43	698.44								
44	697.44								
45	696.44	41.6' - 44.0': rock ledge, about 2.5' thick	S-9	44.5-46	8-8-8	16		75	
46	695.44								
47	694.44								
48	693.44								
49	692.44	Light orange silty CLAY, dry, black mottling, degraded carbonate pebbles	S-10	49.5-51	2-4-4	8		20	
50	691.44								
51	690.44								
52	689.44								
53	688.44	Brown clayey SILT, moist, occasional black mottling, carbonate pebbles and sand throughout	S-11	53.5-56	50/2	R		5	
54	687.44								
55	686.44								
56	685.44								
		54.0' Top of rock		54-57.5			3.5/2.9	83	
		54.0: Light gray DOLOSTONE, some secondary mineralization in minor fractures							

**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.		741.44					
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD							
				From To	Blows	N										
57	684.44	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	683.44															
59	682.44									58.6' - 59.4': Top of open cavity						
60	681.44									60.0: Pitted DOLOSTONE, thicker clay rinds with some iron staining in fractures						
61	680.44															
62	679.44															
63	678.44															
64	677.44															
65	676.44	64.2' - 65.7': Cavity, appears to be some soil deposition at bottom, possible chert about 2" thick														
66	675.44															
67	674.44	65.7' - 67.2': Gray DOLOMITE, secondary crystalization in minor fractures														
68	673.44	67.5-77.5											10/9.9	99		
69	672.44															
70	671.44															
71	670.44															
72	669.44															
73	668.44															
74	667.44															
75	666.44															
76	665.44															
77	664.44															
78	663.44									77.5-87.5				10/8.6	86	
79	662.44															
80	661.44	79.3' - 84.4': Gray DOLOSTONE, same as above														
81	660.44															
82	659.44															
83	658.44															
84	657.44															
85	656.44															
86	655.44									85.7': Fracture with iron oxide staining and light clay rind						
87	654.44															
88	653.44															

**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.		741.44
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	652.44	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	651.44								
91	650.44								
92	649.44								
93	648.44	92.5: Bottom of boring							
94	647.44								
95	646.44								
96	645.44								
97	644.44								
98	643.44								
99	642.44								
100	641.44								
101	640.44								
102	639.44								
103	638.44								
104	637.44								
105	636.44								
106	635.44								
107	634.44								
108	633.44								
109	632.44								
110	631.44								
111	630.44								
112	629.44								
113	628.44								
114	627.44								
115	626.44								
116	625.44								
117	624.44								
118	623.44								
119	622.44								
120	621.44								

SIMPLE GEO W/ WELL AND GAMMA - ESEE2012DATABASE, GDT - 1/6/17 11:12 - C:\USERS\MACKENZIE\FIOCADESKTOP\PLANT BOWEN, SOUTHERN COMPANY.GPJ												
DEPTH (ft)		GRAPHIC LOG		MATERIAL DESCRIPTION		Natural Gamma			HCL REACTION		WELL DATA	
						ELEV.			Weak Moderate Strong		Completion: Protective casing set in concrete pad; 2-foot square concrete pad	
						44.25					ELEV. (DEPTH)	
						88.5						
						132.75						
5				- SILT (ML), orange, tan and red (2.5 YR 6/4), loose, dry							Annular Fill: Aquadguard Grout Mixture	
10												
15				725.1								
				- silty CLAY (CL), orange, tan and red (2.5 YR 6/4)								
20												
25				714.1								
				- same as above, (5 YR 8/2), chert nodules, dry								
30				- same as above, (7.5 YR 8/6), without chert nodules, dry								
35				702.1								
				- clayey SILT (ML), mottled light tan and black, chert nodules, dry								
40												



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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma			HCL REACTION	WELL DATA
			ELEV.	44.25	88.5	132.75	
		(Cont.)					Completion: Protective casing set in concrete pad; 2-foot square concrete pad
45							Annular Fill: Aquaguard Grout Mixture
50		- same as above					
55							
60							
65		- same as above, dolomite gravel present					Annular Seal: 3/8" bentonite chips
70		- same as above, increasing gravel, saturated					
75							
80		- Top of competent dolomitic bedrock, gray, saturated	660.1				
85							
							665.1 (75.0)
							665.1

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



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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma			HCL REACTION	WELL DATA
			ELEV.	44.25	88.5	132.75	
90		(Cont.) - same as above, possible horizontal fractures					Completion: Protective casing set in concrete pad; 2-foot square concrete pad
95							Annular Seal: 3/8" bentonite chips
100		- same as above					640.1 (100.0) Annular Seal: 3/8" bentonite pellets (non-coated)
105							635.1 (105.0) Filter: silica filter sand
110		- same as above, vertical fractures present					633.1 (107.0) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
115		623.1					
120		Bottom of borehole at 117.0 feet.					
125							
130							
135							

S:\GEO\W\WELL AND GAMMA - ESEE2012\DATABASE.GDT - 1/6/17 11:12 - 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
Storage Facility		DRILLER: S. Denty		NAME
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, MSL
Locking Hinged Top 1/4-inch Weep Hole				TOP OF RISER
2" Threaded Riser Cap				2.33
4-ft x 4-ft concrete pad				0.00
GROUND SURFACE				735.84
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
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie				
TOP OF FILTER PACK				101.00
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
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
BOTTOM OF CASING				111.41
HOLE DIA: 8"				

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-5

Sheet 1 of 4

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 114.2'	SURF.ELEV. 735.84
LOCATION Cells 1 & 2	COORDINATES N 2072677.08	E 1502338.19	
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. 661.84	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	735.84								
1	734.84	Very stiff, dark reddish brown sandy CLAY, slightly moist	S-1	4.5-6	6-8-11	19		100	
2	733.84								
3	732.84								
4	731.84								
5	730.84								
6	729.84	Same as above	S-2	9.5-11	5-13-15	28		100	
7	728.84								
8	727.84								
9	726.84								
10	725.84								
11	724.84	Same as above with black and light brown mottled with reddish brown	S-3	14.5-16	4-8-12	20		100	
12	723.84								
13	722.84								
14	721.84								
15	720.84								
16	719.84	Same as above	S-4	19.5-21	4-11-15	26		100	
17	718.84								
18	717.84								
19	716.84								
20	715.84								
21	714.84								
22	713.84								
23	712.84								
24	711.84								

**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.	735.84
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	710.84	Same as above with chert pebbles in matrix, some chert lenses	S-5	24.5-26	3-7-22	29		100	
26	709.84								
27	708.84								
28	707.84								
29	706.84								
30	705.84	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	704.84								
32	703.84								
33	702.84								
34	701.84								
35	700.84	Very stiff, brownish red CLAY, high plasticity, with trace dolomite pebbles, moist	S-7	34.5-36	7-7-11	18		100	
36	699.84								
37	698.84								
38	697.84								
39	696.84								
40	695.84	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	694.84								
42	693.84								
43	692.84								
44	691.84								
45	690.84	Very stiff, brown silty CLAY with some sandy lenses, moist	S-9	44.5-46	8-9-10	19		100	
46	689.84								
47	688.84								
48	687.84								
49	686.84								
50	685.84	Same as above, brown and reddish brown, wet	S-10	49.5-51	3-7-5	12		100	
51	684.84								
52	683.84								
53	682.84								
54	681.84								
55	680.84	Chert lense	S-11	54.5-56	50/5	R		75	
56	679.84								

**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. **735.84**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	678.84		S-12	59.5-61	5-4-3	7		0	
58	677.84								
59	676.84								
60	675.84								
61	674.84								
62	673.84								
63	672.84								
64	671.84	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	
65	670.84								
66	669.84								
67	668.84								
68	667.84								
69	666.84								
70	665.84								
71	664.84	Same as above, white silt more abundant	S-14	69.5-71	16-25-17	42		100	
72	663.84								
73	662.84								
74	661.84								
75	660.84								
76	659.84								
77	658.84								
78	657.84	77.6: Rock seam	S-15	74.5-76	18-33-14	47		100	
79	656.84								
80	655.84								
81	654.84								
82	653.84								
83	652.84								
84	651.84								
85	650.84	Very stiff, brown sandy CLAY with chert fragments ranging from coarse sand to gravel, wet	S-16	79.5-81	30-13-23	36		75	
86	649.84								
87	648.84								
88	647.84								

**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. **735.84**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	646.84	Same as above, hard with highly weathered dolomitic sand	S-18	89.5-91	14-25-19	44		50	
90	645.84								
91	644.84								
92	643.84								
93	642.84								
94	641.84	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	640.84								
96	639.84								
97	638.84								
98	637.84								
99	636.84		S-20	99.5-101	17-5-7	12		0	
100	635.84								
101	634.84								
102	633.84								
103	632.84								
104	631.84	Very stiff, light brown silty CLAY with white silt lenses, wet	S-21	104.5-106	10-7-10	17		90	
105	630.84								
106	629.84								
107	628.84								
108	627.84								
109	626.84	Hard, white silty SAND, dolomitic, very fine to medium grained, wet	S-22	109.5-111	10-14-16	30		75	
110	625.84								
111	624.84								
112	623.84								
113	622.84								
114	621.84	Top of rock							
115	620.84	Bottom of boring							
116	619.84								
117	618.84								
118	617.84								
119	616.84								
120	615.84								

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, MSL
<p>Locking Hinged Top</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL:</p> <p>Well Development: Pump/surge until clear.</p> <p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 40 bags</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.75 bucket PLACEMENT: Tremie</p> <p>FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 12 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water</p> <p>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</p> <p>HOLE DIA: 8"</p>	<p>TOP OF RISER</p> <p>GROUND SURFACE</p> <p>TOP OF SEAL</p> <p>TOP OF FILTER PACK</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF CASING</p>	<p>2.28</p> <p>0.00</p> <p>88.80</p> <p>94.30</p> <p>97.62</p> <p>107.62</p> <p>107.92</p>
		729.02
		726.74
		637.94
		632.44
		629.12
		619.12
		618.82

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-6

Sheet 1 of 4

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 109.3	SURF.ELEV. 726.74
LOCATION Cells 1 & 2	COORDINATES N 2072964.1	E 1502517.79	
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	726.74								
1	725.74	Very stiff, red sandy SILT, crumbly, some quartz pebbles	S-1	4.5-6	5-8-12	20			
2	723.74								
3	720.74								
4	716.74								
5	711.74								
6	705.74	Very stiff, red silty gravelly CLAY, dry, crumbly, with dolomite fragments	S-2	9.5-11	4-6-15	21			
7	698.74								
8	690.74								
9	681.74								
10	671.74								
11	660.74	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			
12	648.74								
13	635.74								
14	621.74								
15	606.74								
16	590.74	Stiff, light brown SILT, moist, 1.5" thick white dolomite lense	S-4	19.5-21	5-7-6	13			
17	573.74								
18	555.74								
19	536.74								
20	516.74								
21	495.74								
22	473.74								
23	450.74								
24	426.74								

**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.	726.74
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	701.74	Very stiff, light brown SILT, slightly moist	S-5	24.5-26	3-10-8	18			
26	700.74								
27	699.74								
28	698.74								
29	697.74								
30	696.74	Very stiff, sandy SILT, moist, banded light brown, brown, and red brown	S-6	29.5-31.0	3-8-11	19			
31	695.74								
32	694.74								
33	693.74								
34	692.74								
35	691.74	Very stiff, light brown sandy SILT, moist, some white dolomite fragments	S-7	34.5-36	6-7-13	20			
36	690.74								
37	689.74								
38	688.74								
39	687.74								
40	686.74	Same as above, wet, some quartz fragments	S-8	39.5-41	7-8-10	18			
41	685.74								
42	684.74								
43	683.74								
44	682.74								
45	681.74	Hard, white SILT, wet, with layers of light brown weathered dolomite	S-9	44.5-46	4-9-38	47			
46	680.74								
47	679.74								
48	678.74								
49	677.74								
50	676.74	Hard, white gravelly SILT, wet, some bands of light brown, quartz fragments	S-10	49.5-51	19-39-19	58			
51	675.74								
52	674.74								
53	673.74								
54	672.74								
55	671.74	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	670.74								

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.	726.74
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	669.74	Stiff, light brown sandy SILT, wet, some dolomite fragments	S-12	59.5-61	8-7-8	15			
58	668.74								
59	667.74								
60	666.74								
61	665.74								
62	664.74	Stiff, light brown SILT, wet, with gravel	S-13	64.5-66	4-6-8	14			
63	663.74								
64	662.74								
65	661.74								
66	660.74								
67	659.74	Stiff, light brown gravelly SILT, one band of quartz	S-14	69.5-71	7-5-7	12			
68	658.74								
69	657.74								
70	656.74								
71	655.74								
72	654.74	Stiff, light brown SILT, wet, some banding and quartz fragments	S-15	74.5-76	6-10-10	20			
73	653.74								
74	652.74								
75	651.74								
76	650.74								
77	649.74	Stiff, light brown SILT, wet, with black/gray chert, banding, chert and quartz fragments	S-16	79.5-81	5-6-9	15			
78	648.74								
79	647.74								
80	646.74								
81	645.74								
82	644.74	Very stiff, light brown to reddish brown sandy SILT, wet, with chert fragments	S-17	84.5-86	8-3-24	27			
83	643.74								
84	642.74								
85	641.74								
86	640.74								
87	639.74								
88	638.74								

**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.	726.74
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	637.74	Medium stiff, light brown clayey SILT, wet, red mottling, some chert fragments	S-18	89.5-91	2-3-3	6			
90	636.74								
91	635.74								
92	634.74								
93	633.74								
94	632.74	Soft, light brown silty CLAY, saturated, with some sandy bands	S-19	94.5-96	2-2-2	4			
95	631.74								
96	630.74								
97	629.74								
98	628.74								
99	627.74	Soft, light brown silty CLAY, saturated, with few rock fragments	S-20	99.5-101	0-1-2	3			
100	626.74								
101	625.74								
102	624.74								
103	623.74								
104	622.74	Light brown clayey sandy SILT, with rock fragments chert, and dolomite	S-21	104.5-106	1-1-15	16			
105	621.74								
106	620.74								
107	619.74								
108	618.74								
109	617.74	Top of rock							
110	616.74	Bottom of boring							
111	615.74								
112	614.74								
113	613.74								
114	612.74								
115	611.74								
116	610.74								
117	609.74								
118	608.74								
119	607.74								
120	606.74								

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**
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

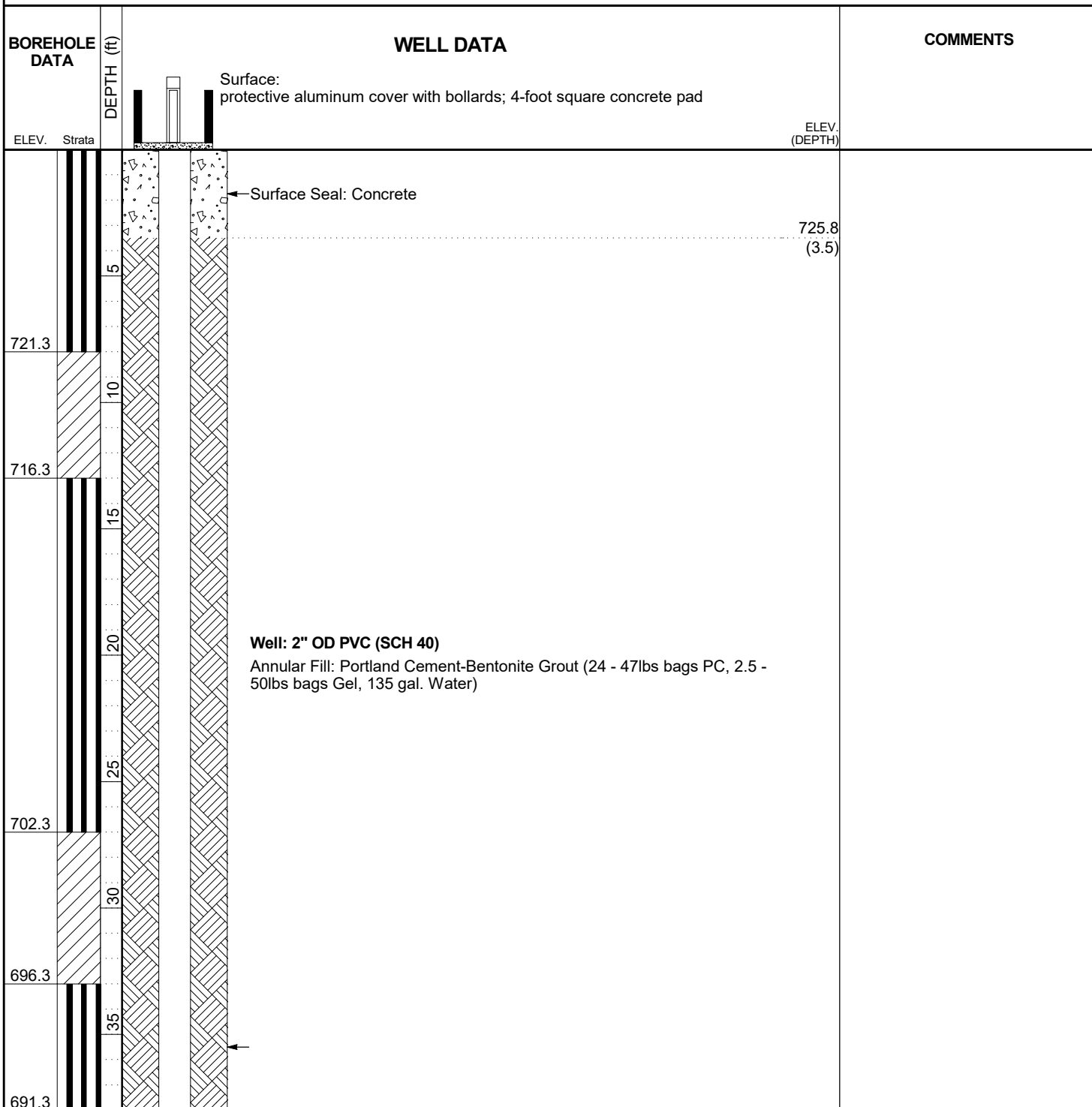
DATE STARTED 4/22/2015 COMPLETED 4/28/2015 SURF. ELEV. 729.3 COORDINATES: N:34.128150 E:-84.905832

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 732.10, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core



(Continued Next Page)

(Continued Next Page)

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 7/2/15 09:24 - S:\WORKGROUP\SPC 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
PAGE 3 OF 3
841443

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)		
641.3		85		
		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'))	
635.8		95	Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)	636.2 (93.1)
		100	Screen: 10 ft. 0.010" Slot Prepack	634.3 (95.0)
		105	Sump: 0.30 ft.	624.3 (105.0)
		110	Backfill: Caving	624.0 (105.3)
619.3				622.3 (107.0)

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 OF TEST BORING

BORING 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.** 729.3 **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 732.10, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Casing in Rock, 4"OD Core

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS
5		Elastic Silt (MH) - dark red (10R 3/6) fill dry, very stiff, low plastic, clayey, some white to light gray brittle friable 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)

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 Weak Moderate Strong	COMMENTS
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.)

(Continued Next Page)

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. PROJECT Plant Bowen Cells 1 & 2 Replacement Wells
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	COMMENTS
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					
110					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'.
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 OF TEST BORING

BORING GWC-07 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		Sandy Lean Clay (CL)(Con't) - 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				
50		- increased gravel content than above, weathered chert				
55		Well-graded Sandy Gravel (GW) - light gray (5YR 7/1) coarse chert gravel				
55		Sandy Fat Clay (CH) - mottled yellowish brown (10YR 5/6) and red (2.5YR 5/8) moist, high - pale yellow (2.5Y 8/3) moist, fine to coarse weathered chert gravel - mottled yellow (10YR 7/6), red (2.5YR 5/8) and reddish yellow (7.5YR 6/6)				
60						
65		- 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)				
70						
75		light gray (10YR 7/1) angular chert gravel - red (2.5YR 5/8), brownish yellow (10YR 6/8) and white (10YR 8/1) wet, high, fine angular gravel, light gray chert cobbles				
80		- increased sand content than above				
85						

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RECORD OF WELL CONSTRUCTION

WELL: GWC-07 Z
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GPC633179

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

BOREHOLE DATA		WELL DATA		COMMENTS
ELEV.	Strata	DEPTH (ft)	(CONTINUED)	ELEV. (DEPTH)
		45	<p>Surface: protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>Annular Fill: Bentonite Grout (3 - 50lbs bags Aquagaurd, 80 gal. water)</p>	
		50		
658.1		55		
656.1		60		
		65		
		70		
		75		
		80		
		85		
				<p>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'))</p>
				655.1 (55.0)

(Continued Next Page)

BOREHOLE DATA		WELL DATA		COMMENTS
ELEV.	Strata	DEPTH (ft)		
620.1		90		
		95		
		100		
		105		
604.1		110		
		115		
		120		
		125		
582.6				

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

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'))

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')

Screen: 10 ft. 0.010" Slot Prepack

Sump:0.30 ft.

Backfill:Baroid Hole Plug, 3/8" chips, 127.5'-116.0', (3-50lbs bags)

609.1 (101.0)	606.4 (103.7)	596.4 (113.7)	596.1 (114.0)	594.1 (116.0)
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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

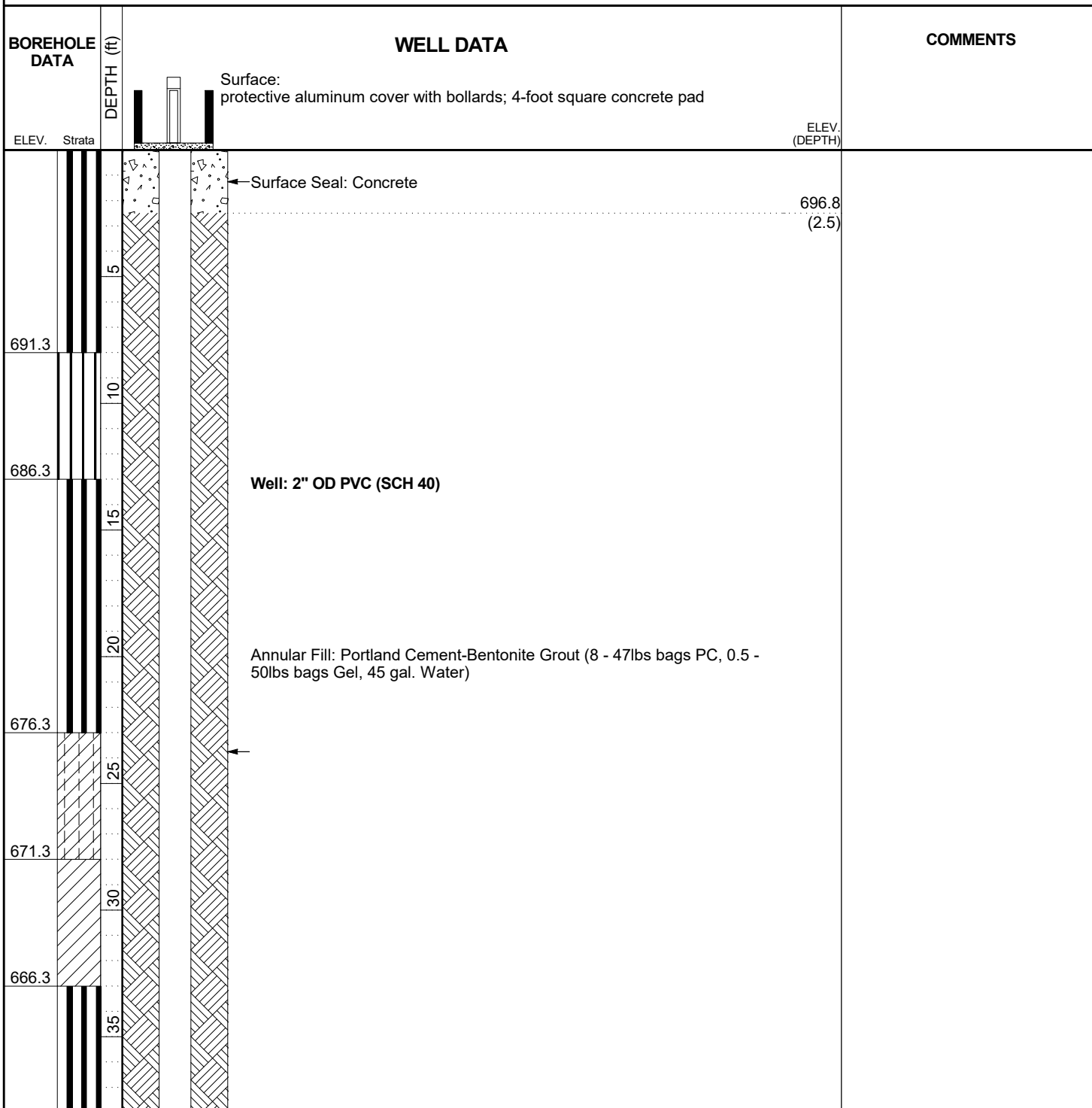
WELL: GWC-8Z
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells

LOCATION Cartersville, GA

DATE STARTED 4/17/2015 COMPLETED 4/28/2015 SURF. ELEV. 699.3 COORDINATES: N:34.129056 E:-84.903773
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 702.32, 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)	(CONTINUED)	ELEV. (DEPTH)
656.3		40	Surface: protective aluminum cover with bollards; 4-foot square concrete pad	
		45	Annular Fill: Portland Cement-Bentonite Grout (8 - 47lbs bags PC, 0.5 - 50lbs bags Gel, 45 gal. Water)	654.3 (45.0)
651.3		50		
		55	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'))	
641.3		60		
		65	Filter: Filter Media 1A Silica Sand (6 - 50 lbs bags)	638.3 (61.0)
636.3		70	Screen: 10 ft. 0.010" Slot Prepack	636.3 (63.0)
626.3			Sump: 0.30 ft.	626.3

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 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.** 699.3 **COORDINATES:** N:34.129056 E:-84.903773

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 702.32, 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)

SAMPLE 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



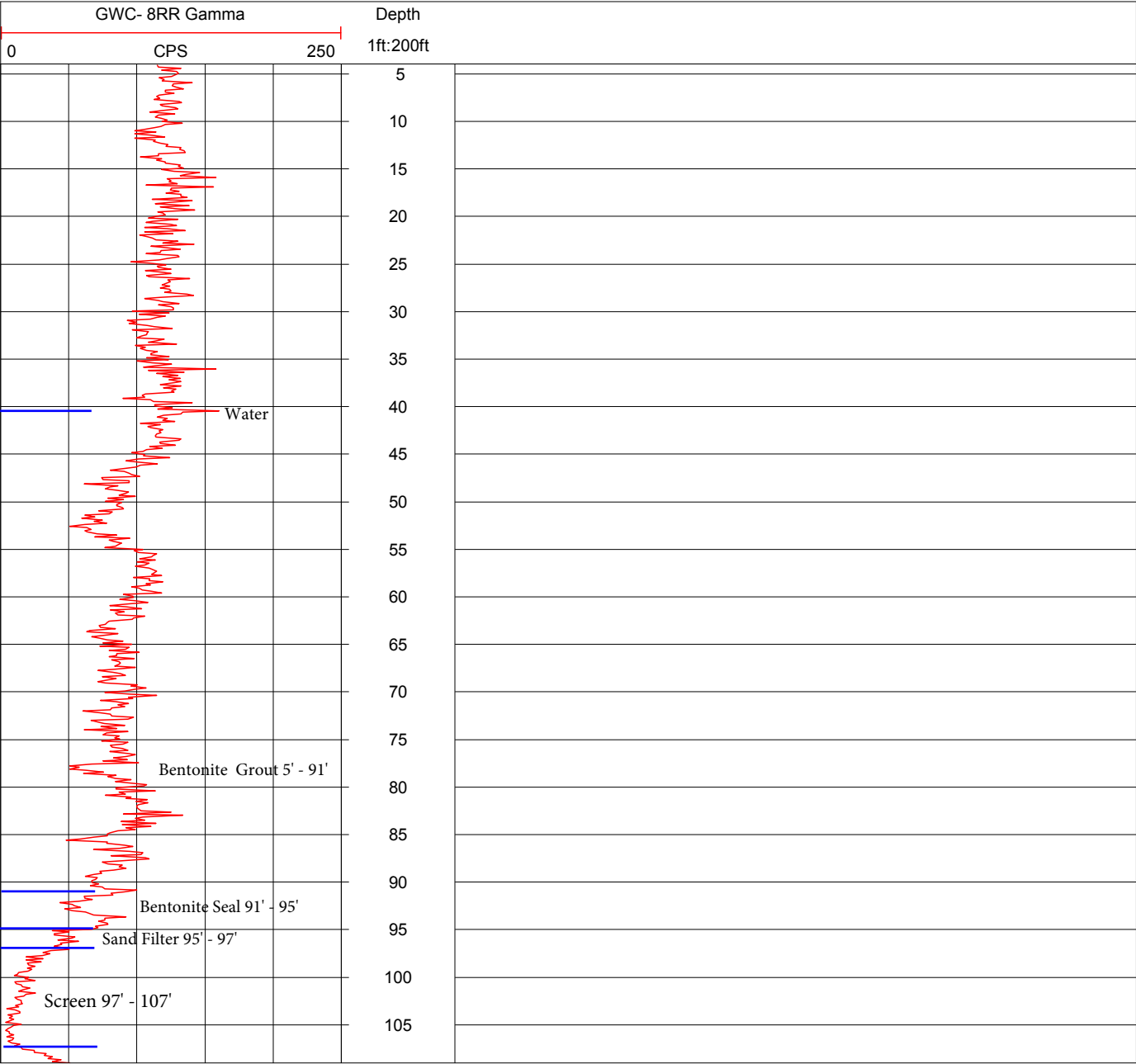
LOG OF TEST BORING

BORING GWC-8Z
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841443

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 <small>Weak Moderate Strong</small>	COMMENTS
40		Elastic Silt (MH) (Con't) - 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					



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-8RR**
Sheet 1 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **107** SURF. ELEV. **NM**
LOCATION **Cells 1 & 2** COORDINATES N **2073501.63** E **1502857.62**
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. **NM** 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	N			
0	NM								
1		CLAY, Sandy; brownish red; fine grained sand							
2									
3									
4									
5									
6		CLAY, Silty; yellowish red; traces of chert gravel							
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-8RR

Sheet 2 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		107		SURF.ELEV.		NM	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
				From To	Blows	N					
25		CLAY, Silty; yellowish red; traces chert gravel									
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
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**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-8RR

Sheet 3 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH		107		SURF.ELEV.		NM	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD				
				From To	Blows	N							
57		Silt; yellow; wet											
58													
59													
60													
61													
62													
63													
64		SILT; yellow; sandy with chert gravel											
65													
66													
67													
68													
69										SAA with increasing gravel content			
70													
71													
72													
73													
74													
75													
76													
77													
78													
79													
80													
81													
82													
83													
84											Top of rock at 84'		
85											Dolostone; blue grey; iron stained fractures		
86													
87													
88													

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-8RR

Sheet 4 of 4

SITE		Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		107		SURF.ELEV.		NM	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
				From To	Blows	N					
89		SAA									
90											
91											
92											
93											
94											
95											
96											
97											
98											
99											
100											
101											
102											
103											
104											
105											
106											
107											
108		BOH @ 107'									
109											
110											
111											
112											
113											
114											
115											
116											
117											
118											
119											
120											

Southern Company Generation

Locking Hinged Top

1/4-inch Weep Hole

4-ft x 4-ft concrete pad

WATER LEVEL:

Well Development: Pump/surge until clear.

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-9

Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 70'	SURF.ELEV. 692.83
LOCATION Cells 1 & 2	COORDINATES N 2073782.56	E 1503017.3	
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	692.83								
1	691.83	Hard, dark reddish brown sandy CLAY, dry, with large chert fragments	S-1	3.5-5	10-14-18	32			
2	690.83								
3	689.83								
4	688.83								
5	687.83								
6	686.83								
7	685.83								
8	684.83								
9	683.83	Same as above	S-2	8.5-10	2-5-9	14			
10	682.83								
11	681.83								
12	680.83								
13	679.83								
14	678.83	Same as above	S-3	13.5-15	5-10-13	23			
15	677.83								
16	676.83								
17	675.83								
18	674.83								
19	673.83	Stiff, yellowish orange silty CLAY, fairly dry, with few small rock fragments	S-4	18.5-20	4-4-5	9			
20	672.83								
21	671.83								
22	670.83								
23	669.83								
24	668.83								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-9

Sheet 2 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **70'** SURF.ELEV. **692.83**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	667.83	Same as above, with many large chert fragments	S-5	23.5-25	4-7-6	13			
26	666.83								
27	665.83								
28	664.83								
29	663.83	Same as above, with small amount of chert	S-6	28.5-30	2-3-4	7			
30	662.83								
31	661.83								
32	660.83								
33	659.83	Same as above, with small amount of chert	S-7	33.5-35	4-3-5	8			
34	658.83								
35	657.83								
36	656.83								
37	655.83	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	654.83								
39	653.83								
40	652.83								
41	651.83	Same as above	S-9	43.5-45	WOH-1-1	2			
42	650.83								
43	649.83								
44	648.83								
45	647.83	Firm, light brown sandy CLAY, fairly dry, with a few chert fragments	S-10	48.5-50	1-2-3	5			
46	646.83								
47	645.83								
48	644.83								
49	643.83	Soft, yellowish orange slightly sandy CLAY, slightly moist, with trace of chert	S-11	53.5-55	1-2-2	4			
50	642.83								
51	641.83								
52	640.83								
53	639.83								
54	638.83								
55	637.83								
56	636.83								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-9

Sheet 3 of 3

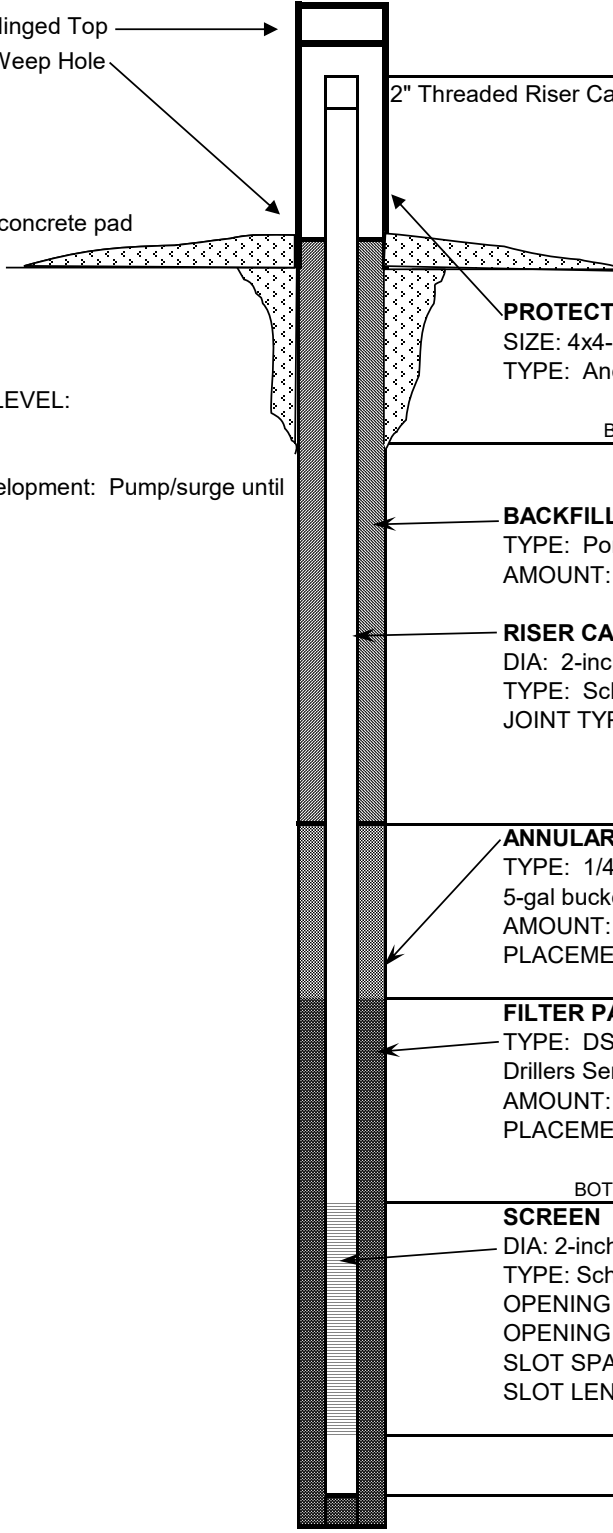
SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **70'** SURF.ELEV. **692.83**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	635.83	Very soft, yellowish orange sandy CLAY, with trace of pebbles	S-12	58.5-60	WOR	0			
58	634.83								
59	633.83								
60	632.83								
61	631.83								
62	630.83								
63	629.83	Same as above, with many rock fragments	S-13	63.5-65	1-1-1	2			
64	628.83								
65	627.83								
66	626.83								
67	625.83								
68	624.83								
69	623.83	Same as above	S-14	68.5-70	50/2	R			
70	622.83	Top of rock							
71		Bottom of boring							
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, MSL
 <p>Locking Hinged Top →</p> <p>1/4-inch Weep Hole →</p> <p>2" Threaded Riser Cap</p> <p>4-ft x 4-ft concrete pad</p> <p>GROUND SURFACE</p> <p>WATER LEVEL:</p> <p>Well Development: Pump/surge until clear.</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 19.5 bags</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie</p> <p>FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 4 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water</p> <p>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</p> <p>HOLE DIA: 6-5/8"</p>	<p>TOP OF RISER</p> <p>2.82</p> <p>GROUND SURFACE</p> <p>0.00</p> <p>TOP OF SEAL</p> <p>54.00</p> <p>TOP OF FILTER PACK</p> <p>56.00</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>58.19</p> <p>BOTTOM OF SCREEN</p> <p>68.19</p> <p>BOTTOM OF CASING</p> <p>68.49</p>	<p>688.57</p> <p>685.75</p> <p>631.75</p> <p>629.75</p> <p>627.56</p> <p>617.56</p> <p>617.26</p>

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10

Sheet 1 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **65** SURF.ELEV. **685.75**

LOCATION **Cells 1 & 2** COORDINATES N **2074020.99** E **1503160.48**

ANGLE **0** BEARING **0** CONTRACTOR **SCS** DRILL NO.

DRILLING METHOD **HSA** NO. SAMPLES **13** NO. U.D. SAMPLES **0**

CASING SIZE **4.25" ID** LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE **8/24/2006**

DRILLER **B. Filipovich** RECORDER **M. Hughes** APPROVED 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	685.75								
1	684.75	Red CLAY, with medium to large quartz pebbles	S-1	4-5.5	5-11-18	29			
2	682.75								
3	679.75								
4	675.75								
5	670.75								
6	664.75								
7	657.75								
8	649.75								
9	640.75	Same as above	S-2	9-10.5	6-10-11	21			
10	630.75								
11	619.75								
12	607.75								
13	594.75	Same as above	S-3	14-15.5	5-11-13	24			
14	580.75								
15	565.75								
16	549.75								
17	532.75	Same as above	S-4	19-20.5	5-15-11	26			
18	514.75								
19	495.75								
20	475.75								
21	454.75								
22	432.75								
23	409.75								
24	385.75								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-10

Sheet 2 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	65	SURF.ELEV.	685.75
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	660.75	Orange and light tan CLAY with chert and rock fragments	S-5	From To	Blows	N			
26	659.75			24-25.5	5-6-6	12			
27	658.75								
28	657.75								
29	656.75								
30	655.75	Same as above	S-6	29-30.5	7-5-5	10			
31	654.75								
32	653.75								
33	652.75								
34	651.75								
35	650.75	Same as above	S-7	34-35.5	11-8-5	13			
36	649.75								
37	648.75								
38	647.75								
39	646.75								
40	645.75	Same as above	S-8	39-40.5	4-4-4	8			
41	644.75								
42	643.75								
43	642.75								
44	641.75								
45	640.75	Same as above	S-9	44-45.5	3-4-7	11			
46	639.75								
47	638.75								
48	637.75								
49	636.75								
50	635.75	Brown CLAY with large and small rock fragments	S-10	49-50.5	3-4-6	10			
51	634.75								
52	633.75								
53	632.75								
54	631.75								
55	630.75	Orange and reddish brown CLAY with rock fragments and trace sand	S-11	54-55.5	WOH-2-0	2			
56	629.75								

**DRILLING LOG
GEOLOGICAL SERVICES**

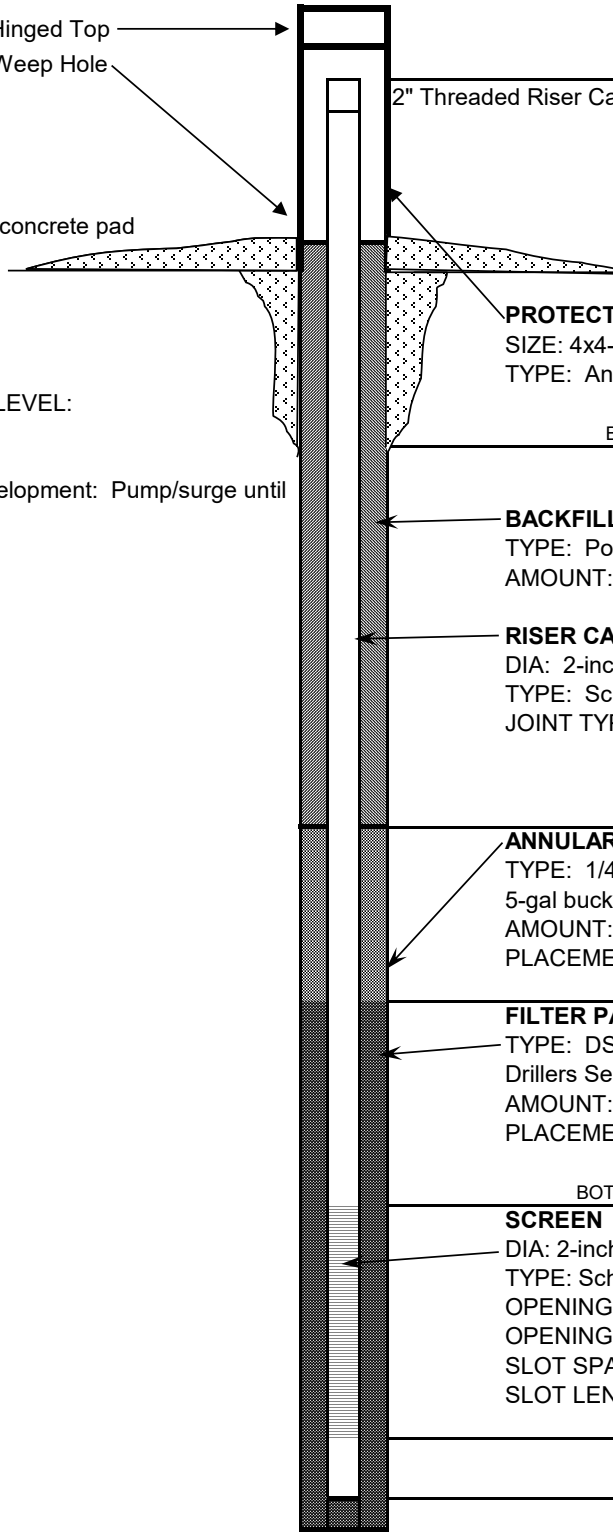
Hole No. GWC-10

Sheet 3 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	65	SURF.ELEV.	685.75
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	628.75	Brown and orange CLAY with rock fragments, trace sand	S-12	59-60.5	1-2-11	13			
58	627.75								
59	626.75								
60	625.75								
61	624.75								
62	623.75								
63	622.75								
64	621.75	No recovery Bottom of boring	S-13	64-35.5	WOH	0			
65	620.75								
66									
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, MSL	
			TOP OF RISER	2.00	688.61
GROUND SURFACE			0.00	686.61	
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum 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	606.41	
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF FILTER PACK			85.00	601.61	
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	601.11	
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	591.11	
BOTTOM OF CASING			95.80	590.81	
HOLE DIA: 8"					

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-10R

Sheet 1 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **97.8** SURF.ELEV. **686.61**

LOCATION **Cells 1 & 2** COORDINATES N **2074021.32** E **1503151.35**

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. _____ 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	686.61								
1	685.61	Dark red silty CLAY, dry, hard, occasional carbonate sand	S-1	4.5-6	6-8-12	20			
2	683.61								
3	680.61								
4	676.61								
5	671.61								
6	665.61	Same as above with carbonate pebbles	S-2	9.5-11	8-10-13	23			
7	658.61								
8	650.61								
9	641.61								
10	631.61								
11	620.61	Dark orange silty CLAY, dry, hard, carbonate sand and cobbles	S-3	14.5-16	10-13-42	55			
12	608.61								
13	595.61								
14	581.61								
15	566.61								
16	550.61	Same as above	S-4	19.5-21	9-7-8	15			
17	533.61								
18	515.61								
19	496.61								
20	476.61								
21	455.61								
22	433.61								
23	410.61								
24	386.61								

**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.	686.61
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	661.61	Orange silty CLAY, dry, firm, carbonate sand and pebbles	S-5	24.5-26	6-9-12	21			
26	660.61								
27	659.61								
28	658.61								
29	657.61								
30	656.61	Same as above	S-6	29.5-31	12-18-4	22			
31	655.61								
32	654.61								
33	653.61								
34	652.61								
35	651.61	Same as above	S-7	34.5-36	8-8-10	18			
36	650.61								
37	649.61								
38	648.61								
39	647.61								
40	646.61	Orange silty CLAY, dry, firm, occasional dark red mottling, occasional carbonate sand	S-8	39.5-40	2-3-5	8			
41	645.61								
42	644.61								
43	643.61								
44	642.61								
45	641.61	Orange silty CLAY, damp, firm, occasional black mottling, carbonate pebbles	S-9	44.5-46	5-5-8	13			
46	640.61								
47	639.61								
48	638.61								
49	637.61								
50	636.61	Orange and dark brown silty CLAY, damp, soft, occasional black mottling, carbonate sand and pebbles	S-10	49.5-51	2-2-3	5			
51	635.61								
52	634.61								
53	633.61								
54	632.61								
55	631.61	Same as above	S-11	54.5-56	4-5-6	11			
56	630.61								

**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.	686.61
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	629.61	Orange silty CLAY, moist, firm, light to heavy black mottling, carbonate sand and pebbles	S-12	59.5-61	4-6-7	13			
58	628.61								
59	627.61								
60	626.61								
61	625.61								
62	624.61	Orange and light gray CLAY, saturated, firm (gray) and soft (orange), occasional dark brown mottling,	S-13	64.5-66	10-20-12	32			
63	623.61								
64	622.61								
65	621.61								
66	620.61								
67	619.61	Light orange and medium brown silty CLAY, saturated, soft, carbonate pebbles and sand	S-14	69.5-71	2-10-6	16			
68	618.61								
69	617.61								
70	616.61								
71	615.61								
72	614.61	73.1 - Top of rock							
73	613.61								
74	612.61								
75	611.61								
76	610.61								
77	609.61	Dark gray DOLOSTONE, shaley		77.6-82.6			5.0/4.7		
78	608.61								
79	607.61								
80	606.61								
81	605.61								
82	604.61	Dark gray DOLOSTONE, shaley		82.6-87.6			5.0/5.0		
83	603.61								
84	602.61								
85	601.61								
86	600.61								
87	599.61	85.2- Fracture with minimal clay rind							
88	598.61								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-10R

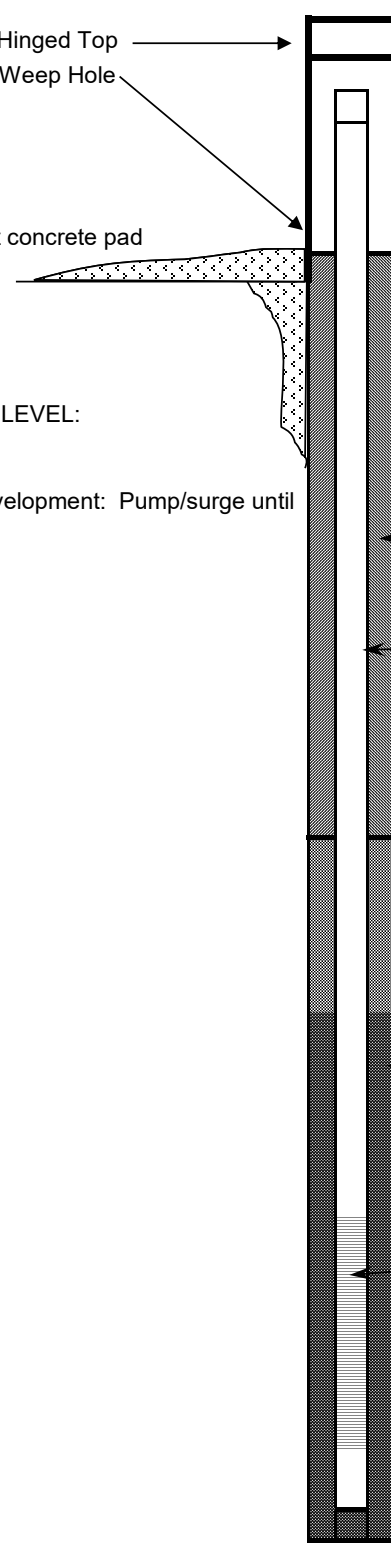
Sheet 4 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **97.8** SURF.ELEV. **686.61**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	597.61	88.6- Fracture over shale lense							
90	596.61	90.4-91.4 Open space with soil and clay rind							
91	595.61								
92	594.61			87.6-92.6			5.0/4.0		
93	593.61								
94	592.61								
95	591.61								
96	590.61	Shaley DOLOMITE/DOLOSTONE		92.6-97.6			5.0/5.0		
97	589.61								
98	588.61	Bottom of boring							
99	587.61								
100	586.61								
101	585.61								
102	584.61								
103	583.61								
104	582.61								
105	581.61								
106	580.61								
107	579.61								
108	578.61								
109	577.61								
110	576.61								
111	575.61								
112	574.61								
113	573.61								
114	572.61								
115	571.61								
116	570.61								
117	569.61								
118	568.61								
119	567.61								
120	566.61								

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, MSL	
				TOP OF RISER	2.44	678.43
2" Threaded Riser Cap						
4-ft x 4-ft concrete pad				GROUND SURFACE	0.00	675.99
WATER LEVEL:						
Well Development: Pump/surge until clear.						
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum						
BOTTOM OF PROTECTIVE CASING						
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	647.99	
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie						
TOP OF FILTER PACK				31.00	644.99	
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	644.23	
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	634.23	
BOTTOM OF CASING				42.06	633.93	
HOLE DIA: 7.5"						

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-11

Sheet 1 of 2

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 46'	SURF.ELEV. 675.99
LOCATION Cells 1 & 2	COORDINATES N 2073830.98	E 1503388.37	
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	675.99								
1	674.99	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			
2	673.99								
3	672.99								
4	671.99								
5	670.99								
6	669.99	Same as above.	S-2	9.5-11.0	4-10-15	25			
7	668.99								
8	667.99								
9	666.99								
10	665.99								
11	664.99	Very stiff, light reddish brown, sandy CLAY with chert gravel, slightly moist	S-3	14.5-16.0	7-12-12	24			
12	663.99								
13	662.99								
14	661.99								
15	660.99								
16	659.99	Stiff, light reddish brown, silty CLAY (CL) with chert gravel, moist	S-4	19.5-21.0	2-4-7	11			
17	658.99								
18	657.99								
19	656.99								
20	655.99								
21	654.99								
22	653.99								
23	652.99								
24	651.99								

DRILLING LOG
GEOLOGICAL SERVICES

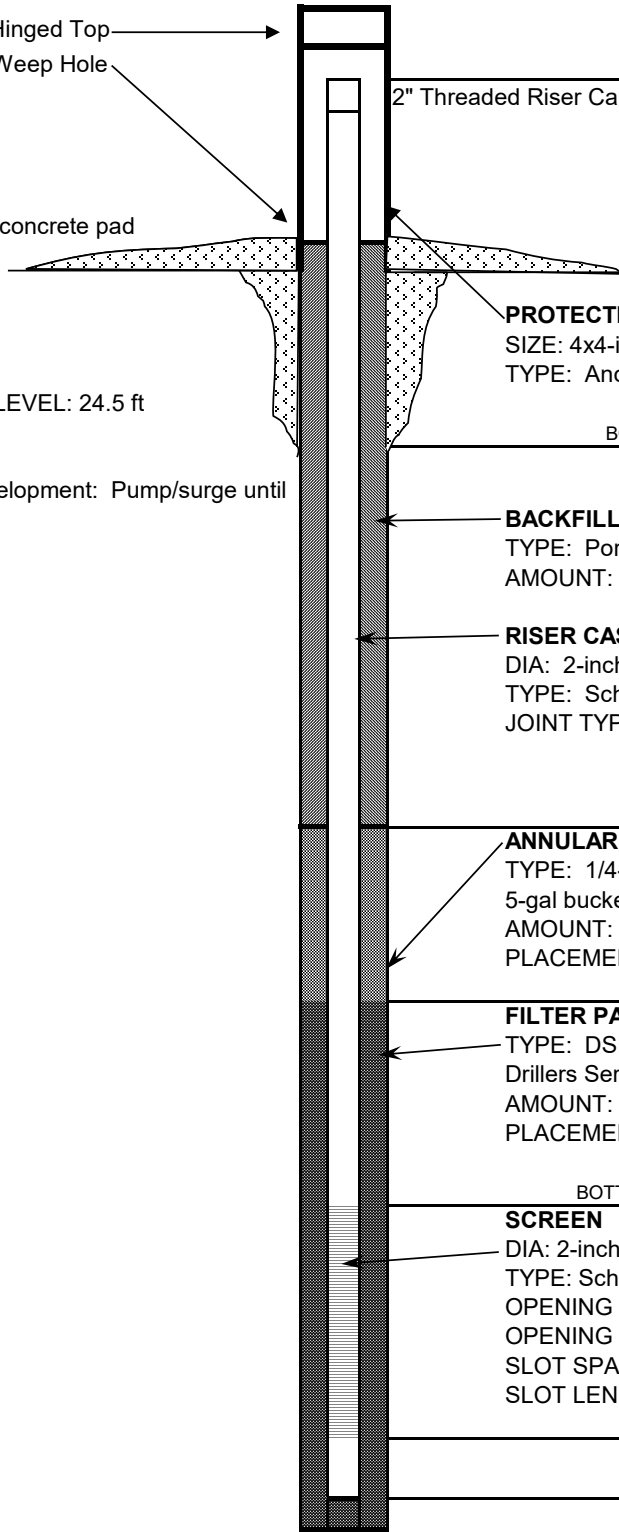
Hole No. GWC-11

Sheet 2 of 2

SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	46'	SURF.ELEV.	675.99
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	650.99	Same as above, light brown	S-5	24.5-26.0	3-4-5	9			
26	649.99								
27	648.99								
28	647.99								
29	646.99								
30	645.99	Same as above, firm, very moist	S-6	29.5-31.0	2-4-3	7			
31	644.99								
32	643.99								
33	642.99								
34	641.99								
35	640.99	Firm, light brown and gray, plastic CLAY, some dolomite pebbles, very moist	S-7	34.5-36.0	2-2-3	5			
36	639.99								
37	638.99								
38	637.99								
39	636.99								
40	635.99	Very soft, light brown, sandy CLAY, wet	S-8	39.5-41.0	WOR	0			
41	634.99								
42	633.99								
43	632.99								
44	631.99								
45	630.99	Same as above, very hard, with angular dolomite fragments	S-9	44.5-46.0	50/1-x-x	R			
46	629.99								
47	628.99								
48	627.99	Bottom of boring @ 46'							
49	626.99								
50	625.99								
51	624.99								
52	623.99								
53	622.99								
54	621.99								
55	620.99								
56	619.99								

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, MSL	
				TOP OF RISER	2.40	678.32
GROUND SURFACE				0.00	675.92	
BOTTOM OF PROTECTIVE CASING						
TOP OF SEAL				65.20	610.72	
TOP OF FILTER PACK				68.20	607.72	
BOTTOM OF RISER / TOP OF SCREEN				67.90	608.02	
BOTTOM OF SCREEN				77.90	598.02	
BOTTOM OF CASING				78.20	597.72	

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. **675.16**

LOCATION **Cells 1 & 2** COORDINATES N **2073829.01** E **1503393.39**

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	675.16								
1	674.16	Very stiff light brown silty CLAY with chert fragments, slightly moist	S-1	4.5-6	7-12-14	26			
2	673.16								
3	672.16								
4	671.16								
5	670.16								
6	669.16	Same as above, hard, light brown & red	S-2	9.5-11.0	8-12-26	36			
7	668.16								
8	667.16								
9	666.16								
10	665.16								
11	664.16	Same as above, very stiff, light grey & brownish red, moist moist	S-3	14.5-16.0	8-12-15	27			
12	663.16								
13	662.16								
14	661.16								
15	660.16								
16	659.16	Same as above, light brown	S-4	19.5-21.0	8-8-8	16			
17	658.16								
18	657.16								
19	656.16								
20	655.16								
21	654.16								
22	653.16								
23	652.16								
24	651.16								

**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.		675.16
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
				From To	Blows	N					
25	650.16	Same as above, stiff, very moist	S-5	24.5-26.0	4-5-6	11					
26	649.16										
27	648.16										
28	647.16										
29	646.16										
30	645.16	Same as above.	S-6	29.5-31.0	3-4-6	10					
31	644.16										
32	643.16										
33	642.16										
34	641.16										
35	640.16	Same as above.	S-7	34.5-36.0	2-3-6	9					
36	639.16										
37	638.16										
38	637.16										
39	636.16										
40	635.16	Dolomite gravel	S-8	39.5-41.0	36-50/1-X	R					
41	634.16	Start coring @ 40.1									
42	633.16	DOLOMITE, very hard, fresh, some Fe staining									
43	632.16	41.6-47.1: Mud filled cavity									
44	631.16										
45	630.16	DOLOMITE, highly weathered joints		40.1-48.1			8.0/2.2	28	28		
46	629.16										
47	628.16										
48	627.16										
49	626.16										
50	625.16	48.1-51.4: Cavity		48.1-53.1			5.0/1.3	27	12		
51	624.16										
52	623.16										
53	622.16										
54	621.16										
55	620.16	DOLOMITE, very hard, fresh, grey		53.1-58.1			5.0/5.0	100	100		
56	619.16										

**DRILLING LOG
GEOLOGICAL SERVICES**

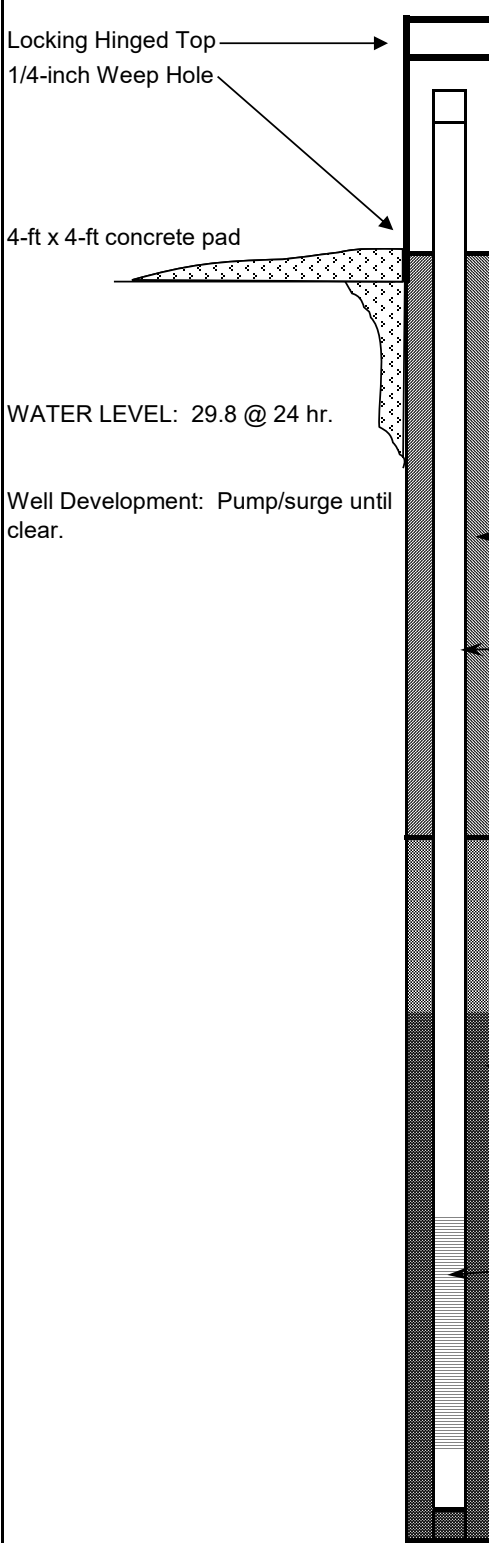
Hole No. GWC-11R

Sheet 3 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		83.1	SURF.ELEV.		675.16
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	618.16	56.5: Chemically weathered joint							
58	617.16			58.1-63.1			5.0/4.0	98	98
59	616.16								
60	615.16								
61	614.16								
62	613.16								
63	612.16	69.4-72.4: Cavity		63.1-68.1			5.0/5.0	100	100
64	611.16								
65	610.16								
66	609.16								
67	608.16								
68	607.16			68.1-73.1			5.0/2.1	42	33
69	606.16	DOLOMITE 73.1-74.7: Cavity							
70	605.16			73.1-78.1			5.0/1.1	22	7
71	604.16	Very highly weathered top of rock							
72	603.16								
73	602.16	75.8: Chemically weathered joint							
74	601.16								
75	600.16								
76	599.16								
77	598.16								
78	597.16			78.1-83.1			5.0/4.8	95	92
79	596.16	79.5: Slightly weathered joint							
80	595.16								
81	594.16								
82	593.16								
83	592.16								
84	591.16								
85	590.16	83.1: Bottom of boring							
86	589.16								
87	588.16								
88	587.16								

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, MSL	
				TOP OF RISER	2.60	677.77
2" Threaded Riser Cap						
4-ft x 4-ft concrete pad				GROUND SURFACE	0.00	675.17
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	638.17	
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 2 bucket PLACEMENT: Tremie TOP OF FILTER PACK				39.50	635.67	
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	637.07	
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	627.07	
				BOTTOM OF CASING	48.40	626.77
HOLE DIA: 7.5"						

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-12

Sheet 1 of 2

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 51'	SURF.ELEV. 675.17
LOCATION Cells 1 & 2	COORDINATES N 2073693.51	E 1503660.16	
ANGLE 0	BEARING 0	CONTRACTOR SCS	DRILL NO. CME-550
DRILLING METHOD HSA	NO. SAMPLES 10	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 6/4/2007
DRILLER S. Milam	RECORDER J. Lippert	APPROVED	DRILLING COMP. DATE 6/4/2007

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	675.17								
1	674.17								
2	673.17								
3	672.17								
4	671.17								
5	670.17	Stiff, gray and light brown, silty CLAY, moist	S-1	4.5-6.0	3-6-6	12			
6	669.17								
7	668.17								
8	667.17								
9	666.17								
10	665.17	Same as above, firm	S-2	9.5-11.0	3-4-4	8			
11	664.17								
12	663.17								
13	662.17								
14	661.17								
15	660.17	Same as above, some sand	S-3	14.5-16.0	3-3-5	8			
16	659.17								
17	658.17								
18	657.17								
19	656.17								
20	655.17	Same as above, some rounded chert pebbles	S-4	19.5-21.0	1-2-2	4			
21	654.17								
22	653.17								
23	652.17								
24	651.17								

**DRILLING LOG
GEOLOGICAL SERVICES**

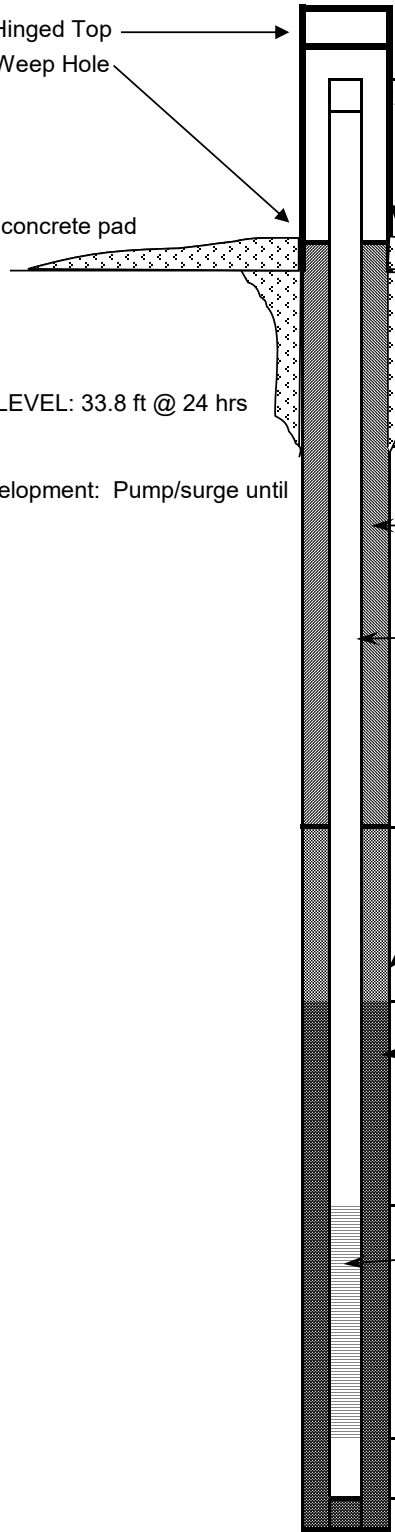
Hole No. GWC-12

Sheet 2 of 2

SITE			Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		51'		SURF.ELEV.		675.17	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD			
				From To	Blows	N						
25	650.17	Same as above	S-5	24.5-26.0	2-3-4	7						
26	649.17											
27	648.17											
28	647.17											
29	646.17											
30	645.17	Same as above, soft, very moist	S-6	29.5-31.0	1-2-2	4						
31	644.17											
32	643.17											
33	642.17											
34	641.17											
35	640.17	Same as above	S-7	34.5-36.0	1-1-2	3						
36	639.17											
37	638.17											
38	637.17											
39	636.17											
40	635.17	Same as above, firm, some dark brown mottling and angular chert fragments	S-8	39.5-41.0	2-2-3	5						
41	634.17											
42	633.17											
43	632.17											
44	631.17											
45	630.17	Same as above, dark brown with abundant organics	S-9	44.5-46.0	2-2-4	6						
46	629.17											
47	628.17											
48	627.17											
49	626.17											
50	625.17	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	624.17											
52	623.17	51.0: Bottom of boring										
53	622.17											
54	621.17											
55	620.17											
56	619.17											

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, MSL	
				TOP OF RISER	2.26	687.13
GROUND SURFACE				0.00	684.87	
BOTTOM OF PROTECTIVE CASING						
TOP OF SEAL				63.60	621.27	
TOP OF FILTER PACK				66.60	618.27	
BOTTOM OF RISER / TOP OF SCREEN				70.44	614.43	
BOTTOM OF SCREEN				80.44	604.43	
BOTTOM OF CASING				80.74	604.13	

Locking Hinged Top

1/4-inch Weep Hole

4-ft x 4-ft concrete pad

WATER LEVEL: 33.8 ft @ 24 hrs

Well Development: Pump/surge until clear.

2" Threaded Riser Cap

PROTECTIVE CASING
SIZE: 4x4-inch
TYPE: Anodized Aluminum

BACKFILL MATERIAL
TYPE: Portland Cement Grout
AMOUNT: 30 bags

RISER CASING
DIA: 2-inch
TYPE: Schedule 40 PVC
JOINT TYPE: Flush Threaded

ANNULAR SEAL
TYPE: 1/4-inch coated bentonite pellets
5-gal buckets
AMOUNT: 1/2 buckets
PLACEMENT: Tremie

FILTER PACK
TYPE: DSI Sand - 1A (20/30)
Drillers Services, Inc.
AMOUNT: 2 bags; 50 lbs/bag
PLACEMENT: Tremie; wash with water

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

HOLE DIA: 7.5"



DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GWC-13

Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility				HOLE DEPTH 61'		SURF.ELEV. 684.87	
LOCATION Cells 1 & 2		COORDINATES N 2073496.3		E 1503896.0			
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	684.87								
1	683.87	Very stiff, reddish brown, sandy silty CLAY, slightly moist	S-1	4.5-6.0	8-13-16	29			
2	682.87								
3	681.87								
4	680.87								
5	679.87								
6	678.87								
7	677.87	Very stiff, reddish brown, sandy clayey SILT with rounded chert gravel, slightly moist	S-2	9.5-11.0	8-11-13	24			
8	676.87								
9	675.87								
10	674.87								
11	673.87								
12	672.87								
13	671.87	Firm, light reddish brown, SILTY SAND, some clay, moist	S-3	14.5-16.0	4-9-9	18			
14	670.87								
15	669.87								
16	668.87								
17	667.87								
18	666.87								
19	665.87	Chert gravel	S-4	19.5-21.0	8-13-16	29			
20	664.87								
21	663.87								
22	662.87								
23	661.87								
24	660.87								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-13

Sheet 2 of 3

SITE		Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		61'		SURF.ELEV.		684.87	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
				From To	Blows	N					
25	659.87	Very stiff, light grayish brown, sandy CLAY, moist	S-5	24.5-26.0	13-7-16	23					
26	658.87										
27	657.87										
28	656.87										
29	655.87										
30	654.87	Same as above, stiff, light reddish brown, some chert fragments, very moist	S-6	29.5-31.0	WOH-4-6	10					
31	653.87										
32	652.87										
33	651.87										
34	650.87										
35	649.87	Same as above	S-7	34.5-36.0	2-5-5	10					
36	648.87										
37	647.87										
38	646.87										
39	645.87										
40	644.87	Firm, light brown and light gray, sandy SILT, wet	S-8	39.5-41.0	3-4-4	8					
41	643.87										
42	642.87										
43	641.87										
44	640.87										
45	639.87	Same as above, stiff, some black sand interbeds	S-9	44.5-46.0	2-4-5	9					
46	638.87										
47	637.87										
48	636.87										
49	635.87										
50	634.87	Same as above, firm, some chert gravel	S-10	49.5-51.0	3-5-3	8					
51	633.87										
52	632.87										
53	631.87										
54	630.87										
55	629.87	Same as above	S-11	54.5-56.0	2-3-2	5					
56	628.87										

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-13

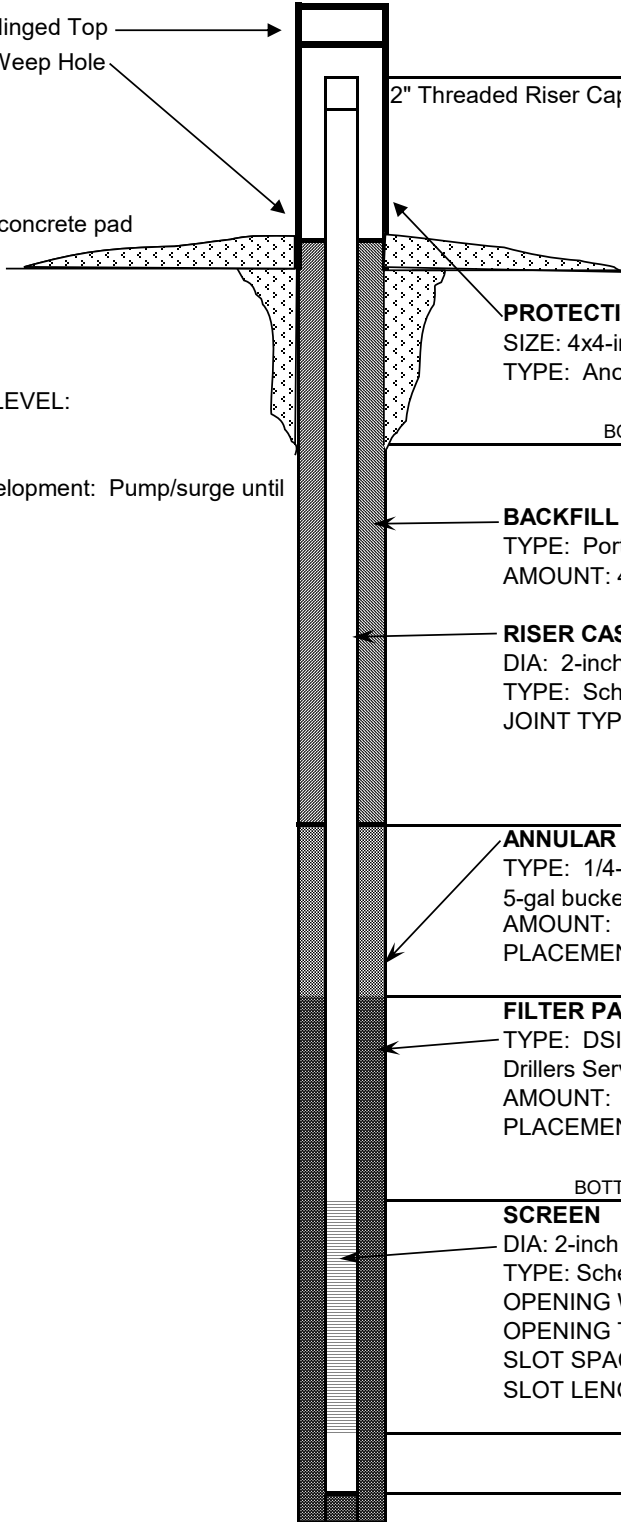
Sheet 3 of 3

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **61'** SURF.ELEV. **684.87**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	627.87	Same as above, very soft	S-12	59.5-61.0	WOR	0			
58	626.87								
59	625.87								
60	624.87								
61	623.87								
62	622.87	61.0: Bottom of boring							
63	621.87								
64	620.87								
65	619.87								
66	618.87								
67	617.87								
68	616.87								
69	615.87								
70	614.87								
71	613.87								
72	612.87								
73	611.87								
74	610.87								
75	609.87								
76	608.87								
77	607.87								
78	606.87								
79	605.87								
80	604.87								
81	603.87								
82	602.87								
83	601.87								
84	600.87								
85	599.87								
86	598.87								
87	597.87								
88	596.87								

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, MSL
		2.60	686.53
WATER LEVEL:			
Well Development: Pump/surge until clear.			
GROUND SURFACE		0.0	683.93
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum			
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	599.03
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie			
TOP OF FILTER PACK		88.90	595.03
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	594.93
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	584.93
BOTTOM OF CASING		99.30	584.63
HOLE DIA: 8"			

**DRILLING LOG
GEOLOGICAL SERVICES**

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 2073503.07	E 1503906.4	
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	682.93	Very stiff, dark red, sandy CLAY, some rounded pebbles, very moist	S-1	4.5-6.0	8-12-14	26			
2	681.93								
3	680.93								
4	679.93								
5	678.93								
6	677.93	Same as above, brownish red and light brown, slightly moist	S-2	9.5-11.0	9-12-16	28			
7	676.93								
8	675.93								
9	674.93								
10	673.93								
11	672.93	Very firm, light brown, SILTY SAND with chert fragments, moist	S-3	14.5-16.0	9-10-11	21			
12	671.93								
13	670.93								
14	669.93								
15	668.93								
16	667.93	Same as above, dense, abundant chert fragments	S-4	19.5-21.0	10-20-19	39			
17	666.93								
18	665.93								
19	664.93								
20	663.93								
21	662.93								
22	661.93								
23	660.93								
24	659.93								

**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	657.93								
27	656.93								
28	655.93								
29	654.93								
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	652.93								
32	651.93								
33	650.93								
34	649.93								
35	648.93	Stiff, light brown, sandy clayey SILT, wet	S-7	34.5-36.0	3-5-4	9			
36	647.93								
37	646.93								
38	645.93								
39	644.93								
40	643.93	Same as above, some rock fragments	S-8	39.5-41.0	12-5-6	11			
41	642.93								
42	641.93								
43	640.93								
44	639.93								
45	638.93	Same as above, firm	S-9	44.5-46.0	2-3-2	5			
46	637.93								
47	636.93								
48	635.93								
49	634.93								
50	633.93	Same as above, light grayish brown	S-10	49.5-51.0	3-3-5	8			
51	632.93								
52	631.93								
53	630.93								
54	629.93								
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	627.93								

**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	626.93	Same as above, soft	S-12	59.5-61.0	2-2-2	4			
58	625.93								
59	624.93								
60	623.93								
61	622.93								
62	621.93								
63	620.93								
64	619.93	Same as above	S-13	64.5-66.0	1-1-1	2			
65	618.93								
66	617.93								
67	616.93								
68	615.93								
69	614.93	No recovery	S-14	69.5-71.0	WOR	0			
70	613.93								
71	612.93								
72	611.93								
73	610.93								
74	609.93	No recovery	S-15	74.5-76.0	WOR	0			
75	608.93								
76	607.93								
77	606.93								
78	605.93								
79	604.93	No recovery	S-16	79.5-81.0	WOR	0			
80	603.93								
81	602.93								
82	601.93								
83	600.93								
84	599.93	82.1: Top of rock DOLOMITE, very hard, fresh, gray, excellent rock quality		82.1-87.1			5.0/4.8	97	97
85	598.93								
86	597.93								
87	596.93								
88	595.93								
		87.0-87.8: Cavity		87.1-92.1			lost water 5.0/4.5	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	N			
89	594.93	Dolomite							
90	593.93								
91	592.93								
92	591.93								
93	590.93	Same as above		92.1-97.1			5.0/5.0	100	100
94	589.93								
95	588.93								
96	587.93								
97	586.93	Same as above		97.1-102.1			5.0/5.0	100	100
98	585.93								
99	584.93								
100	583.93								
101	582.93	102.1: Bottom of boring							
102	581.93								
103	580.93								
104	579.93								
105	578.93								
106	577.93								
107	576.93								
108	575.93								
109	574.93								
110	573.93								
111	572.93								
112	571.93								
113	570.93								
114	569.93								
115	568.93								
116	567.93								
117	566.93								
118	565.93								
119	564.93								
120	563.93								



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. 681.80 ft msl COORDINATES: N:34.1320764 E:-84.9038271

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

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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV.	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	ELEV. (DEPTH)
5		- sandy SILT (ML), reddish brown (3 YR 4/6), dry				Completion: Protective casing set in concrete pad; 2-foot square concrete pad	
10							
15		- same as above, (5 YR 5/6)					
20							
25		- same as above, (5 YR 5/6)					
26.0			656.8				
26.0		- CLAY (CH), brown (10 YR 6/8), high plasticity, moist				Annular Fill: Aquaguard Grout Mixture	
30							
35							
40						Annular Seal: 3/8" bentonite chips	655.8 (26.0)

(Continued Next Page)



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

SAMPLE 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	ELEV. (DEPTH)
		(Cont.) - same as above, (10 YR 6/8), chert nodules				Completion: Protective casing set in concrete pad; 2-foot square concrete pad	
45							
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	601.8				
85						Annular Seal: 3/8" bentonite pellets (non-coated)	597.8 (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	ELEV. (DEPTH)
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	
		(Cont.)					592.8 (89.0)
90		- same as above				Filter: silica filter sand	
							589.8 (92.0)
95						Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack	
100		- same as above					
			579.8				
		Bottom of borehole at 102.0 feet.					
105							
110							
115							
120							
125							
130							
135							

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



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. 684.40 ft msl COORDINATES: N:34.1324377 E:-84.9049006

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

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 Weak Moderate Strong REACTION	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad
5		- SILT (ML), brown (7.5 YR 4/4), dry				Annular Fill: Aquaguard Grout Mixture
			677.4			
10		- CLAY (CL), red, brown and white (7.5 YR 5/3 - 8/1), tight, low plasticity, dry				
			674.4			
15		- CLAY (CL) with chert lenses, gray (7.5 YR 8/6), tight, medium stiff, low plasticity, dry				
			667.4			
20		- SILT (ML), light gray (7.5 YR 5/0), medium stiff, moist				
			663.4			
25		- SILT (ML), beige (7.5 YR 8/6), medium stiff, moist				
30						Annular Seal: 3/8" bentonite chips
35						
			647.4			
40		- SILT (ML), brown (7.5 YR 5/8), medium stiff, white nodules, moist				

656.9
(27.5)

(Continued Next Page)



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

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	
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	ELEV. (DEPTH)
		(Cont.)					
45			639.4			Annular Seal: 3/8" bentonite chips	
50		- CLAY (CL), brown (7.5 YR 5/8), moderate plasticity, moist					
55		- same as above, black and white layering, wet					628.4 (56.0)
60		- same as above, wet				Annular Seal: 3/8" bentonite pellets (non-coated)	
65						Filter: silica filter sand	623.4 (61.0)
70		- same as above, wet	614.4			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack	621.4 (63.0)
		- Top of Rock @ 73.0 feet	611.4				
75		Bottom of borehole at 73.0 feet.					
80							
85							

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. 683.56
LOCATION Cells 1 & 2	COORDINATES N 2073214.9	E 1504081.44	
ANGLE 0	BEARING 0	CONTRACTOR Ranger	DRILL NO. CME 550
DRILLING METHOD HSA	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 8/22/2007
DRILLER Ranger	RECORDER K. Hobbs	APPROVED	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	683.56								
1	682.56	Light brown sandy SILT, dry with some pebbles	S-1	4-5.5	4-4-9	13			
2	680.56								
3	677.56								
4	673.56								
5	668.56								
6	662.56	White, tan, light brown SILT, dry, with rock flakes and pockets of sand	S-2	9-10.5	5-9-14	23			
7	655.56								
8	647.56								
9	638.56								
10	628.56								
11	617.56	Dark brown sandy SILT, dry, with dolomite fragments	S-3	14-15.5	6-14-19	33			
12	605.56								
13	592.56								
14	578.56								
15	563.56								
16	547.56	White to light brown SILT, moist, with few quartz fragments	S-4	19-20.5	2-4-7	11			
17	530.56								
18	512.56								
19	493.56								
20	473.56								
21	452.56								
22	430.56								
23	407.56								
24	383.56								

**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								
82	601.56	80.5: Bottom of boring							
83	600.56								
84	599.56								
85	598.56								
86	597.56								
87	596.56								
88	595.56								

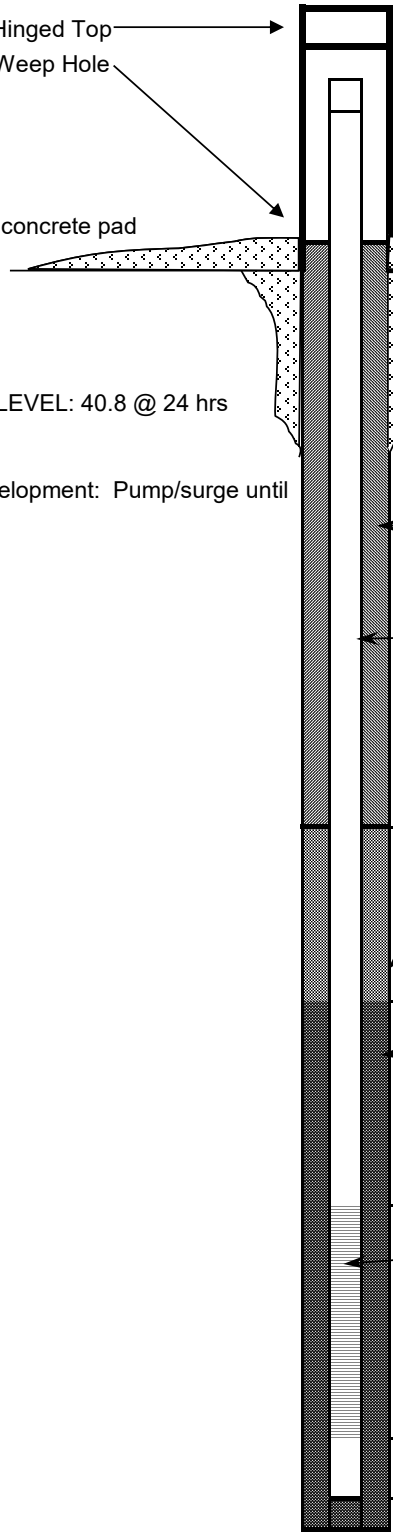
WELL CONSTRUCTION LOG

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, MSL	
				TOP OF RISER	2.74	686.30
GROUND SURFACE				0.00	683.56	
BOTTOM OF PROTECTIVE CASING						
TOP OF SEAL				63.00	620.56	
TOP OF FILTER PACK				65.00	618.56	
BOTTOM OF RISER / TOP OF SCREEN				67.74	615.82	
BOTTOM OF SCREEN				77.74	605.82	
BOTTOM OF CASING				78.04	605.52	
HOLE DIA: 8"						

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, MSL	
				TOP OF RISER	2.24	695.51
2" Threaded Riser Cap						
4-ft x 4-ft concrete pad				GROUND SURFACE	0.00	693.27
WATER LEVEL: 40.8 @ 24 hrs						
Well Development: Pump/surge until clear.						
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum 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				53.60	639.67	
ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1.75 buckets PLACEMENT: Tremie TOP OF FILTER PACK				56.60	636.67	
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	636.26	
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	626.26	
BOTTOM OF CASING				67.31	625.96	
HOLE DIA: 7.5"						

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15

Sheet 1 of 3

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 70	SURF.ELEV. 693.27
LOCATION Cells 1 & 2	COORDINATES N 2072928.57	E 1503941.08	
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	693.27								
1	692.27	Firm, reddish brown, silty sandy CLAY, moist	S-1	4.5-6.0	4-3-3	6			
2	691.27								
3	690.27								
4	689.27								
5	688.27								
6	687.27	Same as above, very stiff, reddish brown and light brown	S-2	9.5-11.0	3-10-8	18			
7	686.27								
8	685.27								
9	684.27								
10	683.27								
11	682.27	Stiff, reddish brown and light yellowish gray banded, clayey SILT, moist	S-3	14.5-16.0	4-6-8	14			
12	681.27								
13	680.27								
14	679.27								
15	678.27								
16	677.27	Same as above, firm, predominantly yellowish gray	S-4	19.5-21.0	4-4-4	8			
17	676.27								
18	675.27								
19	674.27								
20	673.27								
21	672.27								
22	671.27								
23	670.27								
24	669.27								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-15

Sheet 2 of 3

SITE				Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		70		SURF.ELEV.		693.27	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD				
				From To	Blows	N							
25	668.27	Firm, reddish brown and yellowish brown, silty CLAY, moist	S-5	24.5-26.0	3-3-4	7							
26	667.27												
27	666.27												
28	665.27												
29	664.27												
30	663.27	Firm, yellowish brown, clayey SILT, very moist	S-6	29.5-31.0	2-3-5	8							
31	662.27												
32	661.27												
33	660.27												
34	659.27												
35	658.27	Same as above, soft	S-7	34.5-36.0	2-2-2	4							
36	657.27												
37	656.27												
38	655.27												
39	654.27												
40	653.27	Same as above, very stiff, with chert gravel, wet	S-8	39.5-41.0	4-8-8	16							
41	652.27												
42	651.27												
43	650.27												
44	649.27												
45	648.27	Same as above, very hard	S-9	44.5-46.0	4-5-50/2	>100							
46	647.27												
47	646.27												
48	645.27												
49	644.27												
50	643.27	No recovery	S-10	49.5-51.0	3-3-2	5							
51	642.27												
52	641.27												
53	640.27												
54	639.27												
55	638.27	Firm, brown, sandy SILT, wet	S-11	54.5-56.0	8-5-3	8							
56	637.27												

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-15

Sheet 3 of 3

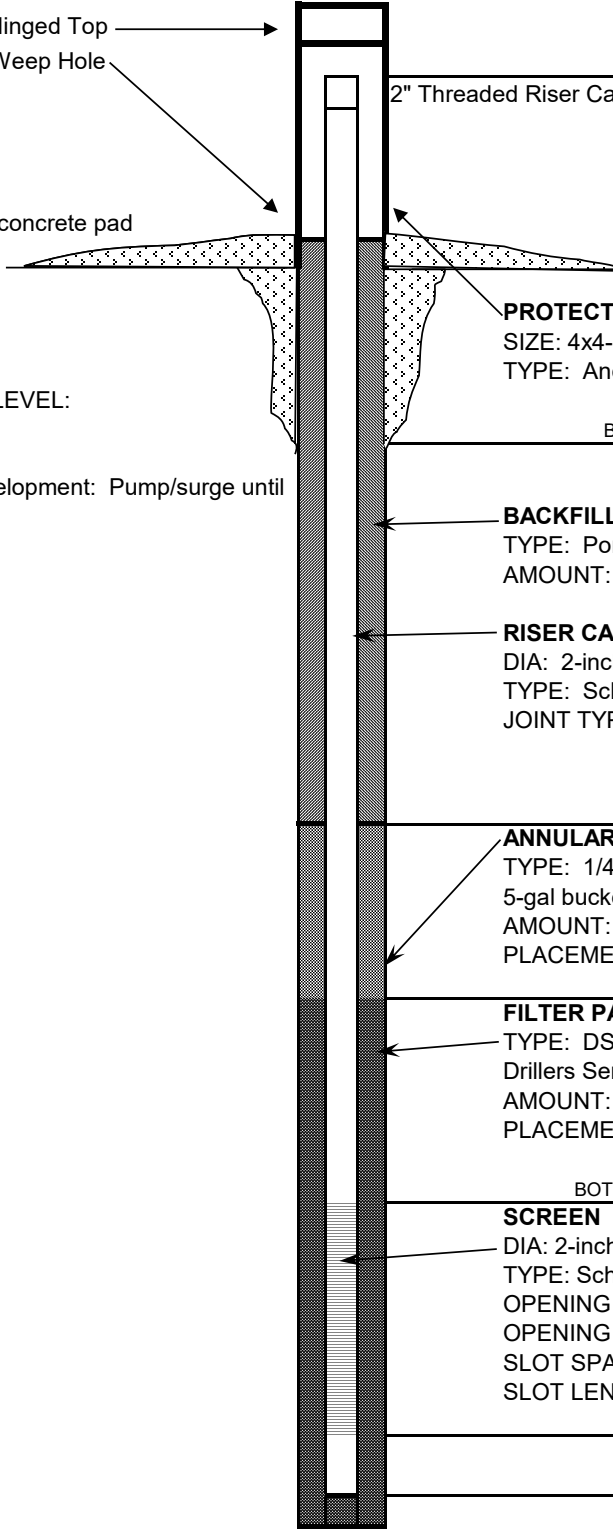
SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **70** SURF.ELEV. **693.27**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	636.27	Same as above, light brown and brown	S-12	59.5-61.0	1-3-2	5			
58	635.27								
59	634.27								
60	633.27								
61	632.27								
62	631.27								
63	630.27								
64	629.27	Same as above	S-13	64.5-66.0	0-0-2	2			
65	628.27								
66	627.27								
67	626.27								
68	625.27								
69	624.27								
70	623.27								
71	622.27	70.0: Bottom of boring							
72	621.27								
73	620.27								
74	619.27								
75	618.27								
76	617.27								
77	616.27								
78	615.27								
79	614.27								
80	613.27								
81	612.27								
82	611.27								
83	610.27								
84	609.27								
85	608.27								
86	607.27								
87	606.27								
88	605.27								

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, MSL
 <p>Locking Hinged Top →</p> <p>1/4-inch Weep Hole →</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL:</p> <p>Well Development: Pump/surge until clear.</p> <p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie</p> <p>FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1.5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water</p> <p>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</p> <p>HOLE DIA: 8"</p>	<p>TOP OF RISER</p> <p>GROUND SURFACE</p> <p>TOP OF SEAL</p> <p>TOP OF FILTER PACK</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF CASING</p>	<p>2.66</p> <p>0.00</p> <p>79.20</p> <p>81.20</p> <p>82.14</p> <p>92.14</p> <p>92.44</p>
		696.44
		693.78
		614.58
		612.58
		611.64
		601.64
		601.34

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-15R

Sheet 1 of 4

SITE **Plant Bowen Dry Gypsum Storage Facility** HOLE DEPTH **95.5** SURF.ELEV. **693.78**

LOCATION **Cells 1 & 2** COORDINATES N **2072920.9** E **1503934.08**

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	693.78								
1	692.78	Light brown sandy SILT, slightly moist quartz sands	S-1	3.5-5	2-3-4	7		40	
2	691.78								
3	690.78								
4	689.78								
5	688.78								
6	687.78								
7	686.78								
8	685.78	Same as above w/ mottling	S-2	8.5-11.0	4-7-14	21		100	
9	684.78								
10	683.78								
11	682.78								
12	681.78								
13	680.78								
14	679.78								
15	678.78	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	
16	677.78								
17	676.78								
18	675.78								
19	674.78								
20	673.78								
21	672.78								
22	671.78	Mottled light brown clayey SILT w/ tan & red brown areas, slightly moist.	S-4	19.5-21.0	3-5-7	12			
23	670.78								
24	669.78								

**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.	693.78
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	668.78	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	667.78								
27	666.78								
28	665.78								
29	664.78								
30	663.78	SAA	S-6	29.5-31.0	15-5-5	10		100	
31	662.78								
32	661.78								
33	660.78								
34	659.78								
35	658.78	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	
36	657.78								
37	656.78								
38	655.78								
39	654.78								
40	653.78	Soft light brown SILT w/ some small pebbles, wet	S-8	39.5-41.0	2-1-3	4		100	
41	652.78								
42	651.78								
43	650.78								
44	649.78								
45	648.78	Soft light brown SILT, very homogenous, wet	S-9	44.5-46	1-1-2	3		100	
46	647.78								
47	646.78								
48	645.78								
49	644.78								
50	643.78	Soft, wet light brown SILT w/ small pebbles, saturated	S-10	49.5-51	1-2-2	4		100	
51	642.78								
52	641.78								
53	640.78								
54	639.78								
55	638.78	Very soft, saturated, light brown SILT, few pebbles	S-11	54.5-56	WOR	0			
56	637.78								

**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. **693.78**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD					
				From To	Blows	N								
57	636.78	Very soft light brown SILT w/thin bands of tan/white sand, saturated	S-12	59.5-61	W.O.R	0		100						
58	635.78													
59	634.78													
60	633.78													
61	632.78													
62	631.78													
63	630.78	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						
64	629.78													
65	628.78													
66	627.78													
67	626.78													
68	625.78													
69	624.78	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						
70	623.78													
71	622.78													
71.1: Top of rock, start coring														
72	621.78	Chert rich DOLOMITE w/ stylolites								74.5-77.9		3.4/3.4	100	
73	620.78													
74	619.78													
75	618.78													
76	617.78													
77	616.78													
78	615.78	Grey DOLOMITE w/thin shale interbeds		77.9-82.9		5.0/5.0	100							
79	614.78													
80	613.78													
81	612.78	Grey DOLOMITE w/ some calcite filled fractures								82.9-88.5		6.0/6.0	100	
82	611.78													
83	610.78													
84	609.78													
85	608.78													
86	607.78													
87	606.78													
88	605.78													

**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.		693.78
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	604.78	Grey DOLOSTONE w/ very small calcite filled fractures		88.5-95.5			7.0/7.0	100	
90	603.78								
91	602.78								
92	601.78								
93	600.78								
94	599.78								
95	598.78								
96	597.78								
96	597.78	95.5: Bottom of boring							
97	596.78								
98	595.78								
99	594.78								
100	593.78								
101	592.78								
102	591.78								
103	590.78								
104	589.78								
105	588.78								
106	587.78								
107	586.78								
108	585.78								
109	584.78								
110	583.78								
111	582.78								
112	581.78								
113	580.78								
114	579.78								
115	578.78								
116	577.78								
117	576.78								
118	575.78								
119	574.78								
120	573.78								



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.** 693.10 ft msl **COORDINATES:** N:34.1321338 E:-84.9058077**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	688.1			Annular Fill: Aquaguard Grout Mixture	
		- clayey SILT (ML), dark red (5 YR 4/6), dry	686.1				
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	665.1				
35						Annular Seal: 3/8" bentonite chips	660.1 (33.0)
40			653.1				

(Continued Next Page)

S:\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 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, MSL
Locking Hinged Top		
TOP OF RISER	3.07	733.73
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	730.66
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	660.66
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2.5 bags PLACEMENT: Tremie, Wash with water		
TOP OF FILTER PACK	82.90	647.76
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	645.96
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	635.96
Flush-threaded end cap		
BOTTOM OF CASING	95.00	635.66
HOLE DIA: 6.25"/4.25"		



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-16R

Sheet 1 of 4

SITE	Plant Bowen CCB Disposal Facility			HOLE DEPTH	95'	SURF.ELEV.	728.07
LOCATION	Cells 3 and 4			COORDINATES	N 1505877.37	E 2072608.08	
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	N			
0	728.07	SAND, Silty; brown; dry; very fine to fine grained							
1	727.07								
2	726.07								
3	725.07								
4	724.07								
5	723.07	SAND, Clayey; red; dry; fine grained with chert fragments							
6	722.07								
7	721.07								
8	720.07								
9	719.07	SAA with pieces of limestone							
10	718.07								
11	717.07								
12	716.07								
13	715.07								
14	714.07	CLAY, Sandy; orange; damp; contains fine grained sand and chert fragments							
15	713.07								
16	712.07								
17	711.07								
18	710.07								
19	709.07	CLAY, Silty, Sandy; damp; red; fine grained with chert fragments							
20	708.07								
21	707.07								
22	706.07	SAND, Silty; damp; reddish yellow; very fine to fine grained							
23	705.07								
24	704.07	CLAY, Sandy; reddish yellow; damp; very fine to fine grained							



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-16R

Sheet 2 of 4

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **95'** SURF.ELEV. **728.07**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	703.07	CLAY, Sandy; reddish yellow; damp; very fine to fine grained with pieces of chert							
26	702.07								
27	701.07								
28	700.07								
29	699.07								
30	698.07								
31	697.07								
32	696.07								
33	695.07	CLAY, Silty, with Sand; orange; damp; very fine to fine grained with pieces of chert and blue grey dolomite							
34	694.07								
35	693.07								
36	692.07								
37	691.07								
38	690.07								
39	689.07								
40	688.07								
41	687.07								
42	686.07								
43	685.07								
44	684.07								
45	683.07								
46	682.07								
47	681.07								
48	680.07								
49	679.07								
50	678.07								
51	677.07								
52	676.07	SAA with less sand							
53	675.07								
54	674.07								
55	673.07								
56	672.07								



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. GWC-16R

Sheet 3 of 4

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **95'** SURF.ELEV. **728.07**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	671.07	Auger refusal at 57' bgs					6 inch steel casing to 57' bgs		
58	670.07	Dolomite; blue grey; hard; slightly weathered							
59	669.07								
60	668.07								
61	667.07								
62	666.07								
63	665.07	Clay filled void from 59' to 66.4'							
64	664.07								
65	663.07								
66	662.07								
67	661.07	Dolomite; blue grey; hard; slightly weathered							
68	660.07								
69	659.07								
70	658.07	Clay filled void from 67.1' to 74.4'							
71	657.07								
72	656.07								
73	655.07								
74	654.07								
75	653.07								
76	652.07								
77	651.07	Dolomite; blue grey; hard; slightly weathered; contains multiple small horizontal iron stained fractures							
78	650.07								
79	649.07								
80	648.07								
81	647.07								
82	646.07								
83	645.07								
84	644.07								
85	643.07								
86	642.07	Dolomite; blue grey; hard; slightly weathered							
87	641.07								
88	640.07								

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. **728.07**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	639.07	Dolomite; blue grey; hard; slightly weathered; multiple horizontal fractures show iron staining and some solutioning along fracture faces							
90	638.07								
91	637.07								
92	636.07								
93	635.07								
94	634.07								
95	633.07								
96	632.07	BOH @ 95' bgs							
97	631.07								
98	630.07								
99	629.07								
100	628.07								
101	627.07								
102	626.07								
103	625.07								
104	624.07								
105	623.07								
106	622.07								
107	621.07								
108	620.07								
109	619.07								
110	618.07								
111	617.07								
112	616.07								
113	615.07								
114	614.07								
115	613.07								
116	612.07								
117	611.07								
118	610.07								
119	609.07								
120	608.07								

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-17R
LOGGER:	D. Brooks	DRILLING METHODS:	Hollow stem/ HQ rock core	
DATE CONSTRUCTED:	12/8/2011			

	DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top		
TOP OF RISER	3.07	733.73
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	730.66
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	64.00	666.66
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2.5 bags PLACEMENT: Tremie, Wash with water		
TOP OF FILTER PACK	77.50	653.16
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 2.5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water		
BOTTOM OF RISER / TOP OF SCREEN	79.20	651.46
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	641.46
Flush-threaded end cap		
BOTTOM OF CASING	89.50	641.16
HOLE DIA: 6.25"/4.25"		



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-17R**

Sheet **1** of **4**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 89.5' bgs	SURF.ELEV. 730.66
LOCATION Cells 3 and 4		COORDINATES N 1506068.86	E 2072829.56
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	730.66	SAND, Silty; brown; dry; very fine to fine grained with white chert fragments							
1	729.66								
2	728.66	CLAY, sandy; yellowish brown; dry; fine grained sand sand with chert fragments							
3	727.66								
4	726.66								
5	725.66								
6	724.66								
7	723.66								
8	722.66								
9	721.66								
10	720.66								
11	719.66								
12	718.66								
13	717.66								
14	716.66								
15	715.66								
16	714.66								
17	713.66								
18	712.66	CLAY; yellowish brown; moist; soft; slightly plastic							
19	711.66								
20	710.66								
21	709.66								
22	708.66								
23	707.66								
24	706.66								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-17R

Sheet 2 of 4

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **89.5'** SURF.ELEV. **730.66**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	705.66	SAA							
26	704.66	3" bed of white chert, HCl-							
27	703.66	CLAY; yellowish brown; moist; soft; slightly plastic							
28	702.66								
29	701.66								
30	700.66								
31	699.66	Auger refusal at 30.7' bgs					6 inch steel casing to 30.7' bgs		
32	698.66	DOLOMITE; blue grey; micritic; small near vertical fractures with iron stained faces							
33	697.66								
34	696.66								
35	695.66								
36	694.66								
37	693.66								
38	692.66								
39	691.66								
40	690.66								
41	689.66								
42	688.66								
43	687.66								
44	686.66								
45	685.66								
46	684.66	DOLOMITE; blue grey; hard; fresh; some small horizontal fractures with iron staining							
47	683.66								
48	682.66								
49	681.66								
50	680.66								
51	679.66								
52	678.66								
53	677.66								
54	676.66								
55	675.66								
56	674.66								

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. **730.66**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	673.66	DOLOMITE; blue grey; hard; fresh							
58	672.66								
59	671.66								
60	670.66								
61	669.66								
62	668.66								
63	667.66								
64	666.66								
65	665.66								
66	664.66								
67	663.66								
68	662.66								
69	661.66								
70	660.66	SAA							
71	659.66								
72	658.66								
73	657.66								
74	656.66								
75	655.66								
76	654.66								
77	653.66								
78	652.66	DOLOMITE; blue grey; hard; fresh; some horizontal fractures with iron staining; some solutioning along faces							
79	651.66								
80	650.66								
81	649.66								
82	648.66								
83	647.66								
84	646.66								
85	645.66								
86	644.66								
87	643.66								
88	642.66								

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.		730.66	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD			
				From To	Blows	N						
89	641.66	DOLOMITE; blue grey; hard; fresh; some horizontal fractures with iron staining; some solutioning along faces										
90	640.66											
91	639.66	BOH @ 89.5' bgs										
92	638.66											
93	637.66											
94	636.66											
95	635.66											
96	634.66											
97	633.66											
98	632.66											
99	631.66											
100	630.66											
101	629.66											
102	628.66											
103	627.66											
104	626.66											
105	625.66											
106	624.66											
107	623.66											
108	622.66											
109	621.66											
110	620.66											
111	619.66											
112	618.66											
113	617.66											
114	616.66											
115	615.66											
116	614.66											
117	613.66											
118	612.66											
119	611.66											
120	610.66											

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	ELEVATION	
				FEET	FT, MSL	
Locking Hinged Top				TOP OF RISER	2.80	721.93
1/4-inch Vent						
1/4-inch Weep Hole						
4-ft x 4-ft concrete pad				GROUND SURFACE	0.00	719.13
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	658.73	
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2 bags PLACEMENT: Wash with water						
TOP OF FILTER PACK				64.90	654.23	
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	651.43	
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				76.70	642.43	
Flush-threaded end cap				BOTTOM OF CASING	77.00	642.13
HOLE DIA: 6"						

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-18**

Sheet **1** of **3**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 77	SURF.ELEV. 719.13
LOCATION Cells 3 and 4	COORDINATES N 1506306.93	E 2072930.02	
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 71.3	ELEV. 647.83	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	N			
0	719.13								
1	718.13	Top Soil							
2	717.13								
3	716.13	CLAY; sandy; red; dry; very fine							
4	715.13								
5	714.13	SILT; white; very fine							
6	713.13								
7	712.13	SAND; silty; reddish brown							
8	711.13								
9	710.13								
10	709.13	CLAY; sandy; red; dry; fine							
11	708.13								
12	707.13								
13	706.13								
14	705.13	SAND; silty; yellow; damp							
15	704.13								
16	703.13								
17	702.13	SAA; yellow-brown; dry							
18	701.13	CHERT; gravel; black							
19	700.13	SAND; silty; brownish yellow; moist							
20	699.13								
21	698.13								
22	697.13								
23	696.13								
24	695.13								

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. **719.13**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	694.13	CLAY; reddish brown; wet							
26	693.13								
27	692.13								
28	691.13	SAND; silty; yellow-brown; very fine; moist; had some red and brown mixed throughout							
29	690.13								
30	689.13								
31	688.13								
32	687.13								
33	686.13	SAA; with black banding; moist							
34	685.13								
35	684.13								
36	683.13								
37	682.13								
38	681.13	SAA							
39	680.13								
40	679.13								
41	678.13								
42	677.13								
43	676.13								
44	675.13								
45	674.13								
46	673.13								
47	672.13								
48	671.13	SAA; chert gravel							
49	670.13								
50	669.13								
51	668.13								
52	667.13								
53	666.13								
54	665.13								
55	664.13								
56	663.13	SAND; silty; dolostone gravel							

**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. **719.13**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	662.13	Chert gravel; wet					6 inch steel casing to 57' bgs		
58	661.13								
59	660.13								
60	659.13								
61	658.13								
62	657.13								
63	656.13								
64	655.13								
65	654.13								
66	653.13								
67	652.13	Gravel; chert and dolostone; silty sand; yellowish brown; saturated							
68	651.13								
69	650.13								
70	649.13								
71	648.13								
72	647.13								
73	646.13								
74	645.13								
75	644.13								
76	643.13								
77	642.13	BOH @ 77.0' bgs							
78	641.13								
79	640.13								
80	639.13								
81	638.13								
82	637.13								
83	636.13								
84	635.13								
85	634.13								
86	633.13								
87	632.13								
88	631.13								

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, MSL
Locking Hinged Top	→		TOP OF RISER	2.80	721.93
1/4-inch Vent	→	2" Threaded Riser Cap			
1/4-inch Weep Hole	→				
4-ft x 4-ft concrete pad	→		GROUND SURFACE	0.00	719.13
		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	635.13
		ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 11 bags PLACEMENT: Wash with water	TOP OF FILTER PACK	127.00	592.13
		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	591.93
		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	581.93
Flush-threaded end cap	→		BOTTOM OF CASING	137.50	581.63
HOLE DIA: 6"					

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-18R**

Sheet **1** of **4**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 137.5	SURF.ELEV. 719.23
LOCATION Cells 3 and 4	COORDINATES N 1506301.46	E 2072930.28	
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. 647.83	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	719.23								
1	718.23	Top Soil							
2	717.23								
3	716.23	CLAY; sandy; red; dry; very fine							
4	715.23								
5	714.23	SILT; white; very fine							
6	713.23								
7	712.23	SAND; silty; reddish brown							
8	711.23								
9	710.23								
10	709.23	CLAY; sandy; red; dry; fine							
11	708.23								
12	707.23								
13	706.23								
14	705.23	SAND; silty; yellow; damp							
15	704.23								
16	703.23								
17	702.23	SAA; yellow-brown; dry							
18	701.23	CHERT; gravel; black							
19	700.23	SAND; silty; brownish yellow; moist							
20	699.23								
21	698.23								
22	697.23								
23	696.23								
24	695.23								

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. **719.23**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	694.23	CLAY; reddish brown; wet							
26	693.23								
27	692.23								
28	691.23	SAND; silty; yellow-brown; very fine; moist; had some red and brown mixed throughout							
29	690.23								
30	689.23								
31	688.23								
32	687.23								
33	686.23								
34	685.23	SAA; with black banding; moist							
35	684.23								
36	683.23								
37	682.23								
38	681.23	SAA							
39	680.23								
40	679.23								
41	678.23								
42	677.23								
43	676.23								
44	675.23								
45	674.23								
46	673.23								
47	672.23								
48	671.23	SAA; chert gravel							
49	670.23								
50	669.23								
51	668.23								
52	667.23								
53	666.23								
54	665.23								
55	664.23								
56	663.23								

**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. **719.23**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	662.23	SAA; wet							
58	661.23								
59	660.23								
60	659.23								
61	658.23								
62	657.23								
63	656.23								
64	655.23	Chert Gravel; black; with dry cobbles							
65	654.23	SAND; silty; yellowish brown; damp							
66	653.23								
67	652.23	SAND; silty; yellowish white; dry							
68	651.23	SILT; sandy; brownish yellow; with dolostone gravel							
69	650.23								
70	649.23								
71	648.23								
72	647.23								
73	646.23								
74	645.23								
75	644.23								
76	643.23								
77	642.23								
78	641.23								
79	640.23								
80	639.23								
81	638.23								
82	637.23								
83	636.23								
84	635.23								
85	634.23								
86	633.23	Dolostone; blue gray; slightly weathered							
87	632.23								
88	631.23								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-18R

Sheet 5 of 5

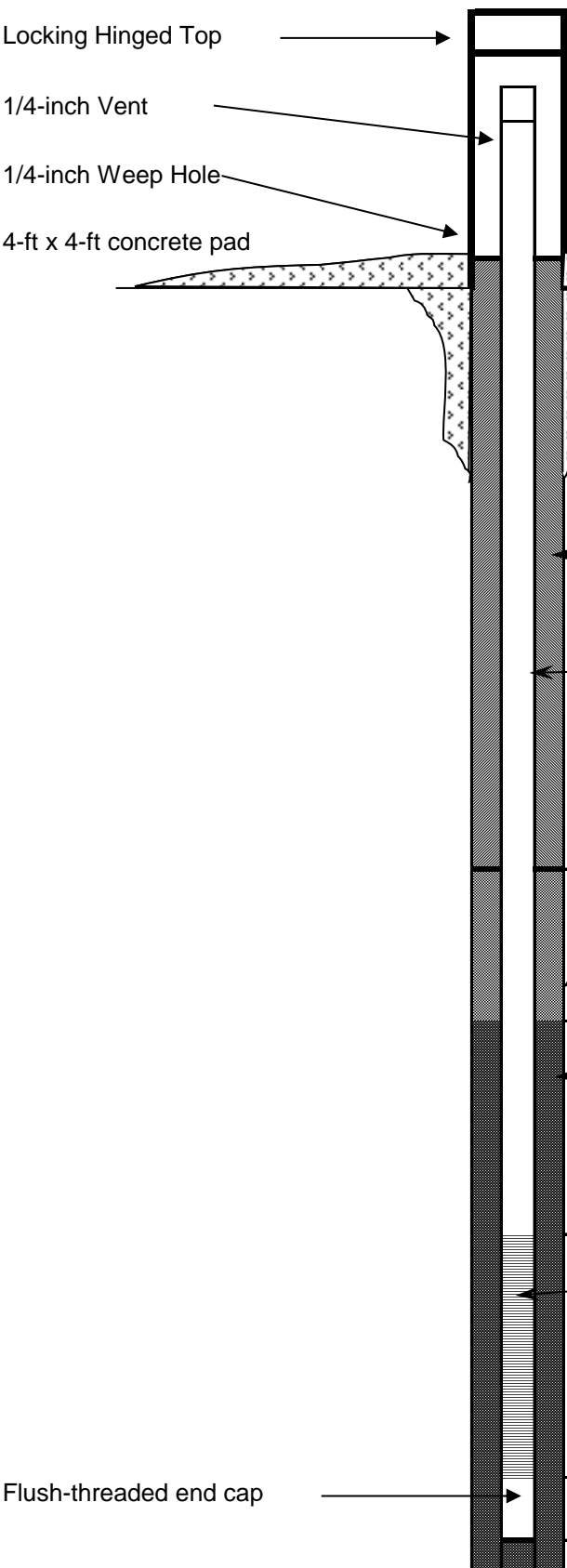
SITE **Plant Bowen CCB Disposal Facility** TOTAL DEPTH **137.5** SURF.ELEV. **719.23**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD																					
				From To	Blows	N																								
121	598.23																													
122	597.23																													
123	596.23																													
124	595.23																													
125	594.23																													
126	593.23																													
127	592.23																													
128	591.23																													
129	590.23																													
130	589.23																													
131	588.23	Dolostone; blue gray; slightly weathered																												
132	587.23																													
133	586.23	Dolostone; heavily fractured, gravel sized fragments																												
134	585.23																													
135	584.23																													
136	583.23																													
137	582.23																													
138	581.23	BOH @ 137.5' bgs																												
139	580.23																													
140	579.23																													
141	578.23																													
142	577.23																													
143	576.23																													
144	575.23																													
145	574.23																													
146	573.23																													
147	572.23																													
148	571.23																													
149	570.23																													
150	569.23																													
151	568.23																													
152	567.23																													

WELL CONSTRUCTION LOG

Southern Company Generation

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

		DEPTH FEET	ELEVATION FT, MSL	
 <p>Locking Hinged Top</p> <p>1/4-inch Vent</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 225 gal</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2 bags PLACEMENT: Wash with water</p> <p>FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags PLACEMENT: Wash with water</p> <p>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</p> <p>Flush-threaded end cap</p> <p>HOLE DIA: 6"</p>	TOP OF RISER	2.60	726.58	
	GROUND SURFACE	0.00	723.98	
	BOTTOM OF PROTECTIVE CASING			
	TOP OF SEAL	119.40	604.58	
	TOP OF FILTER PACK	122.50	601.48	
	BOTTOM OF RISER / TOP OF SCREEN	133.70	590.28	
	BOTTOM OF SCREEN	143.70	580.28	
	BOTTOM OF CASING	144.00	579.98	



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWC-19R**

Sheet **1** of **5**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 144.0'	SURF.ELEV. 723.98
LOCATION Cells 3 and 4		COORDINATES N 1506395.14	E 2073158.91
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. 648.73	TIME AFTER COMP. 1 hour
TYPE GROUT NA		QUANTITY NA	MIX NA
DRILLER Boart		RECORDER C. Sellers	APPROVED D. Brooks
		DRILLING START DATE 6/7/2011	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	723.98								
1	722.98	Top Soil							
2	721.98								
3	720.98	CLAY; brownish red; dry							
4	719.98								
5	718.98	Chert; white; weathered; dry							
6	717.98								
7	716.98								
8	715.98								
9	714.98	CLAY; sandy; light brown; trace chert gravel							
10	713.98								
11	712.98								
12	711.98								
13	710.98								
14	709.98	SAA; yellowish orange							
15	708.98								
16	707.98								
17	706.98								
18	705.98	CLAY; silty; light brown; damp							
19	704.98								
20	703.98								
21	702.98								
22	701.98	SAND; silty; fine-grained; chert gravel; throughout; yellowish orange to light brown							
23	700.98								
24	699.98								

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. **723.98**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	698.98								
26	697.98								
27	696.98								
28	695.98								
29	694.98	SAND; silty; light brown; fine-grained; damp							
30	693.98								
31	692.98								
32	691.98								
33	690.98								
34	689.98	CLAY; silty; yellowish orange; chert gravel; damp							
35	688.98	trace sand @ 35'							
36	687.98								
37	686.98								
38	685.98								
39	684.98								
40	683.98								
41	682.98								
42	681.98	SAA; saturated							
43	680.98								
44	679.98								
45	678.98								
46	677.98								
47	676.98								
48	675.98								
49	674.98								
50	673.98								
51	672.98								
52	671.98	Chert; very fractured							
53	670.98								
54	669.98								
55	668.98	CLAY; silty; yellowish orange; some chert gravel; damp							
56	667.98								

**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. **723.98**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	666.98								
58	665.98								
59	664.98								
60	663.98								
61	662.98	SAND; silty; coarse chert gravel; saturated							
62	661.98								
63	660.98								
64	659.98								
65	658.98	sand; silty; light tan; very fine-grained							
66	657.98								
67	656.98								
68	655.98								
69	654.98								
70	653.98								
71	652.98	No recovery; evidence of sand							
72	651.98								
73	650.98								
74	649.98								
75	648.98								
76	647.98								
77	646.98								
78	645.98								
79	644.98	Dolostone; blue gray; fractured							
80	643.98								
81	642.98								
82	641.98								
83	640.98								
84	639.98	Void; no recovery							
85	638.98								
86	637.98	Dolostone and chert gravel; heavily fractured							
87	636.98								
88	635.98								

**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. **723.98**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	634.98	SAA							
90	633.98								
91	632.98								
92	631.98	Void; no recovery							
93	630.98								
94	629.98								
95	628.98	Dolostone; chert gravel; fractured							
96	627.98								
97	626.98								
98	625.98								
99	624.98								
100	623.98								
101	622.98								
102	621.98								
103	620.98	Void; mud filled							
104	619.98								
105	618.98								
106	617.98	Dolostone; blue gray; heavily fractured							
107	616.98								
108	615.98								
109	614.98								
110	613.98								
111	612.98								
112	611.98	Void; mud filled							
113	610.98								
114	609.98	Dolostone; blue gray; heavily fractured							
115	608.98								
116	607.98								
117	606.98								
118	605.98								
119	604.98								
120	603.98								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-19R

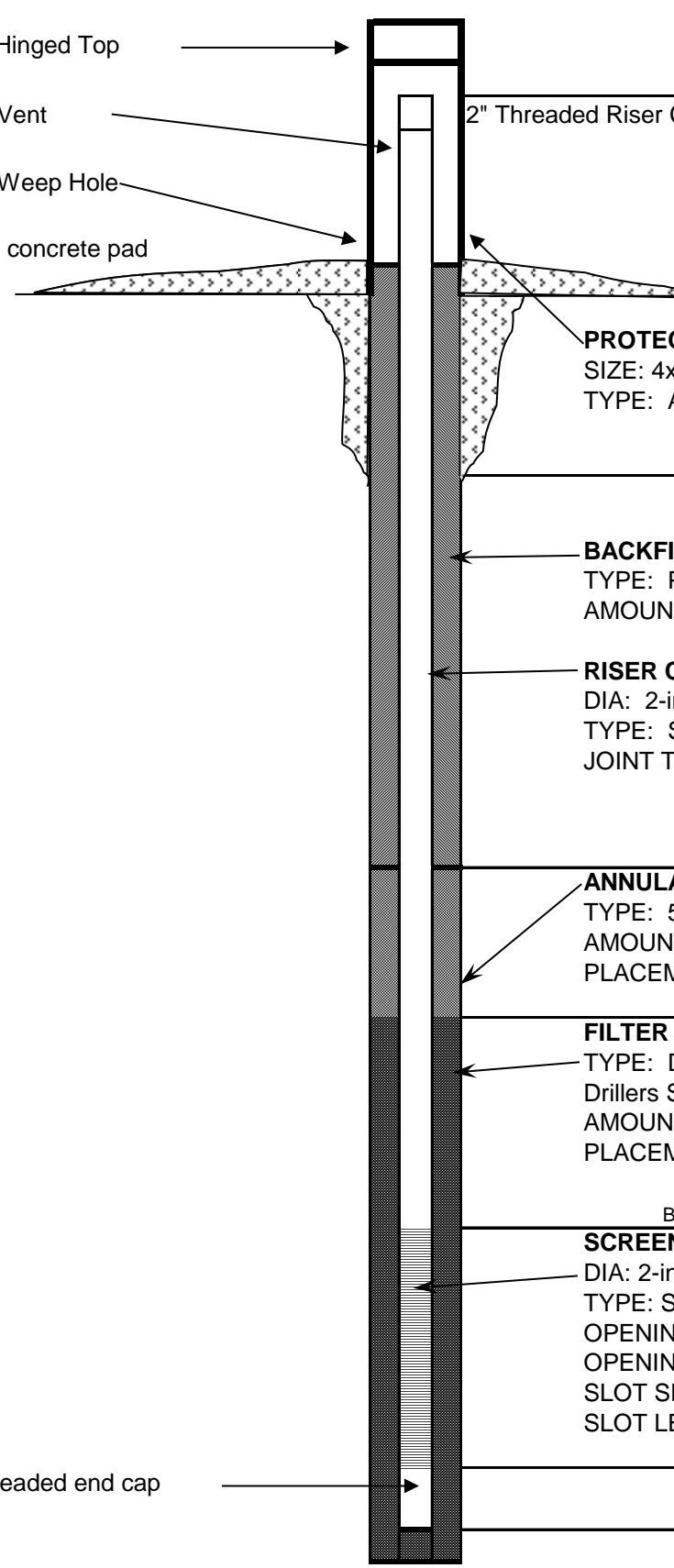
Sheet 5 of 55

SITE **Plant Bowen CCB Disposal Facility** TOTAL DEPTH **144.0'** SURF.ELEV. **723.98**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121	602.98	Dolostone; blue gray; heavily fractured							
122	601.98								
123	600.98								
124	599.98								
125	598.98								
126	597.98	Void; gravel filled							
127	596.98								
128	595.98								
129	594.98								
130	593.98	Dolostone; blue gray; heavily fractured							
131	592.98								
132	591.98								
133	590.98								
134	589.98								
135	588.98								
136	587.98								
137	586.98								
138	585.98								
139	584.98								
140	583.98								
141	582.98								
142	581.98								
143	580.98								
144	579.98	BOH @ 144' bgs							
145	578.98								
146	577.98								
147	576.98								
148	575.98								
149	574.98								
150	573.98								
151	572.98								
152	571.98								

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG				Southern Company Generation	
PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL	
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWC-20R	
LOGGER:	Sellers/Dyer	DRILLING METHODS:	Rotosonic		
DATE CONSTRUCTED:			6/9/2011		
				DEPTH FEET	ELEVATION FT, MSL
				TOP OF RISER	2.71
				GROUND SURFACE	0.00
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING					721.09
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					718.38
				67.00	651.38
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 3 bags PLACEMENT: Wash with water TOP OF FILTER PACK				72.00	646.38
FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 6 bags PLACEMENT: Wash with water BOTTOM OF RISER / TOP OF SCREEN				74.00	644.38
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	634.38
Flush-threaded end cap BOTTOM OF CASING				84.30	634.08
HOLE DIA: 6"					



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-20R**

Sheet **1** of **3**

SITE	Plant Bowen CCB Disposal Facility				HOLE DEPTH	100.0'	SURF.ELEV.	718.38
LOCATION	Cells 3 and 4		COORDINATES	N	1506601.52	E	2073487.28	
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.	634.08	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	718.38	Top Soil							
1	717.38								
2	716.38								
3	715.38								
4	714.38	CLAY; sandy; light brown; med-grained;							
5	713.38								
6	712.38								
7	711.38								
8	710.38	SAA							
9	709.38								
10	708.38								
11	707.38								
12	706.38								
13	705.38								
14	704.38								
15	703.38								
16	702.38	SAA							
17	701.38								
18	700.38								
19	699.38								
20	698.38	CLAY; silty; yellowish orange							
21	697.38								
22	696.38								
23	695.38								
24	694.38								

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. **718.38**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	693.38	SILT; sandy; trace clays; med-grained sand; yellowish orange							
26	692.38								
27	691.38								
28	690.38	SILT; sandy; chert gravel throughout; yellow; damp							
29	689.38								
30	688.38								
31	687.38								
32	686.38								
33	685.38								
34	684.38								
35	683.38								
36	682.38								
37	681.38								
38	680.38								
39	679.38								
40	678.38								
41	677.38								
42	676.38								
43	675.38	SILT; clayey; 20% chert gravel; some med-grained sand							
44	674.38								
45	673.38								
46	672.38								
47	671.38								
48	670.38	Dolostone @ 47.5'; blue gray; red staining; very fractured							
49	669.38								
50	668.38								
51	667.38								
52	666.38								
53	665.38	Void @ 52' to 67'							
54	664.38								
55	663.38								
56	662.38								

**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. **718.38**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	661.38	Void							
58	660.38								
59	659.38								
60	658.38								
61	657.38								
62	656.38								
63	655.38								
64	654.38								
65	653.38								
66	652.38								
67	651.38								
68	650.38								
69	649.38								
70	648.38								
71	647.38	Dolomicrite; fine-grained; gray; contains prevalent calcine veining in a unimodal direction; sparse oxidation staining; weakly laminated in some individual samples							
72	646.38								
73	645.38								
74	644.38								
75	643.38								
76	642.38								
77	641.38								
78	640.38								
79	639.38								
80	638.38								
81	637.38								
82	636.38								
83	635.38								
84	634.38								
85	633.38	BOH @ 84.3' bgs							
86	632.38								
87	631.38								
88	630.38								

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, MSL
Locking Hinged Top		
TOP OF RISER	2.61	723.46
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	720.85
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	656.85
ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2.5 bags PLACEMENT: Tremie, Wash with water		
TOP OF FILTER PACK	77.40	643.45
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	641.65
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	631.65
Flush-threaded end cap		
BOTTOM OF CASING	89.50	631.35
HOLE DIA: 6.25"/4.25"		



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-21R**

Sheet **1** of **4**

SITE	Plant Bowen CCB Disposal Facility			HOLE DEPTH	89.5	SURF.ELEV.	720.85
LOCATION	Cells 3 and 4			COORDINATES	N 1506694.91	E 2073784.63	
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	49'	CORE SIZE	4.25"		TOTAL % REC. NA
WATER TABLE DEPTH	56.55	ELEV.	664.3	TIME AFTER COMP.	1 hour		DATE TAKEN 12/16/2011
TYPE GROUT	NA			QUANTITY	NA		DRILLING START DATE 12/15/2011
DRILLER	Milam	RECORDER	D. Brooks	APPROVED	D. Brooks		DRILLING COMP. DATE 12/16/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	730.66	Top Soil							
1	719.85								
2	718.85								
3	717.85								
4	716.85								
5	715.85	CLAY; sandy; light brown							
6	714.85								
7	713.85								
8	712.85								
9	711.85								
10	710.85	SILT; clayey with trace sand and chert gravel; light brown							
11	709.85								
12	708.85								
13	707.85								
14	706.85								
15	705.85	SILT; clayey; light brown							
16	704.85								
17	703.85								
18	702.85								
19	701.85								
20	700.85	SAA; with chert gravel throughout							
21	699.85								
22	698.85								
23	697.85								
24	696.85								

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. **720.85**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	695.85	SAA							
26	694.85								
27	693.85								
28	692.85	SILT; clayey; yellowish orange							
29	691.85								
30	690.85								
31	689.85								
32	688.85								
33	687.85								
34	686.85								
35	685.85								
36	684.85								
37	683.85								
38	682.85	SAA; 10% sand							
39	681.85								
40	680.85								
41	679.85								
42	678.85								
43	677.85								
44	676.85								
45	675.85								
46	674.85								
47	673.85								
48	672.85	Dolostone; blue gray; no fractures							
49	671.85								
50	670.85								
51	669.85								
52	668.85								
53	667.85								
54	666.85								
55	665.85								
56	664.85								

**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. **720.85**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	663.85	Dolostone; blue gray; fractured; slight red staining							
58	662.85								
59	661.85								
60	660.85								
61	659.85								
62	658.85								
63	657.85								
64	656.85								
65	655.85								
66	654.85								
67	653.85								
68	652.85								
69	651.85								
70	650.85								
71	649.85								
72	648.85								
73	647.85	SAA							
74	646.85								
75	645.85								
76	644.85								
77	643.85								
78	642.85								
79	641.85								
80	640.85								
81	639.85								
82	638.85								
83	637.85								
84	636.85								
85	635.85								
86	634.85								
87	633.85								
88	632.85								

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. **720.85**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89	631.85	SAA							
90	630.85	BOH @ 89.5 bgs							
91	629.85								
92	628.85								
93	627.85								
94	626.85								
95	625.85								
96	624.85								
97	623.85								
98	622.85								
99	621.85								
100	620.85								
101	619.85								
102	618.85								
103	617.85								
104	616.85								
105	615.85								
106	614.85								
107	613.85								
108	612.85								
109	611.85								
110	610.85								
111	609.85								
112	608.85								
113	607.85								
114	606.85								
115	605.85								
116	604.85								
117	603.85								
118	602.85								
119	601.85								
120	600.85								

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					
<p>Locking Hinged Top</p> <p>1/4-inch Vent</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>2" Threaded Riser Cap</p> <p>GROUND SURFACE</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 150 gallons</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1- 50 lbs bags PLACEMENT: Wash with water</p> <p>FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5 bags / 50 lbs bags PLACEMENT: Wash with water</p> <p>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</p> <p>Flush-threaded end cap</p> <p>HOLE DIA: 6"</p>					DEPTH FEET	ELEVATION FT, MSL	
					TOP OF RISER	2.60	715.85
					GROUND SURFACE	0.00	713.25
					BOTTOM OF PROTECTIVE CASING		
					TOP OF SEAL	102.00	611.25
					TOP OF FILTER PACK	105.30	607.95
					BOTTOM OF RISER / TOP OF SCREEN	106.70	606.55
					BOTTOM OF SCREEN	116.70	596.55
					BOTTOM OF CASING	117.00	596.25

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-22R**

Sheet **1** of **4**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 117'	SURF. ELEV. 713.25
LOCATION Cells 3 and 4	COORDINATES N 1506717.2	E 2074105.68	
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. 645' msl	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	N			
0	713.25	SAND, Silty; brick red; dry; fine grained							
1	712.25								
2	711.25								
3	710.25								
4	709.25								
5	708.25								
6	707.25								
7	706.25								
8	705.25	SAND, Clayey; brick red; dry; fine grained with white chert fragments							
9	704.25								
10	703.25								
11	702.25								
12	701.25								
13	700.25								
14	699.25								
15	698.25								
16	697.25	CLAY, Sandy; red and reddish yellow; damp; fine grained sand; low plasticity							
17	696.25								
18	695.25								
19	694.25								
20	693.25								
21	692.25								
22	691.25								
23	690.25								
24	689.25								

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. **713.25**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	688.25	CLAY, Sandy; red and reddish yellow; damp; fine grained sand; low plasticity							
26	687.25								
27	686.25								
28	685.25								
29	684.25								
30	683.25								
31	682.25								
32	681.25								
33	680.25								
34	679.25								
35	678.25								
36	677.25								
37	676.25								
38	675.25								
39	674.25	SAA except fine to medium sand; moist							
40	673.25								
41	672.25								
42	671.25								
43	670.25								
44	669.25								
45	668.25								
46	667.25								
47	666.25								
48	665.25								
49	664.25	SAND, Silty; tan; moist; medium grained sand with pieces of highly solutioned limestone							
50	663.25								
51	662.25								
52	661.25								
53	660.25								
54	659.25								
55	658.25	CLAY, Sandy; tan; moist; fine to medium grained sand; no plasticity							
56	657.25								

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. **713.25**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	656.25	1' bed of white chert					6 inch steel casing to 57' bgs		
58	655.25								
59	654.25	Mud filled void from 58' to 69'							
60	653.25								
61	652.25								
62	651.25								
63	650.25								
64	649.25								
65	648.25								
66	647.25								
67	646.25								
68	645.25								
69	644.25								
70	643.25	DOLOMITE; blue grey; hard; slightly weathered							
71	642.25	Void with no recovery from 70' to 85'							
72	641.25								
73	640.25								
74	639.25								
75	638.25								
76	637.25								
77	636.25								
78	635.25								
79	634.25								
80	633.25								
81	632.25								
82	631.25								
83	630.25								
84	629.25								
85	628.25								
86	627.25	DOLOMITE; blue grey; hard; slightly weathered							
87	626.25								
88	625.25								

**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. **713.25**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	624.25	Void with no recovery from 88' to 103.5'							
90	623.25								
91	622.25								
92	621.25								
93	620.25								
94	619.25								
95	618.25								
96	617.25								
97	616.25								
98	615.25								
99	614.25								
100	613.25								
101	612.25								
102	611.25								
103	610.25								
104	609.25	DOLOSTONE; blue grey; hard; slightly weathered; contains purple chert inclusions							
105	608.25								
106	607.25								
107	606.25	DOLOMITE; blue grey; hard; slightly weathered; horizontal fractures with iron staining along faces							
108	605.25								
109	604.25								
110	603.25								
111	602.25								
112	601.25								
113	600.25								
114	599.25								
115	598.25								
116	597.25								
117	596.25	BOH @ 117' bgs							
118	595.25								
119	594.25								
120	593.25								

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, MSL



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-23R**

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

SITE	Plant Bowen CCB Disposal Facility			HOLE DEPTH	47.0'	SURF. ELEV.	688.87	
LOCATION	Cells 3 and 4			COORDINATES	N 1506700.85	E 2074447.26		
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.	655.52	TIME AFTER COMP.	1 hour		DATE TAKEN	6/28/2011
TYPE GROUT	NA			QUANTITY	NA		MIX	NA
DRILLER	Boart			RECORDER	C. Sellers		APPROVED	D. Brooks
							DRILLING START DATE	6/28/2011
							DRILLING COMP. DATE	6/28/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	730.66								
1	687.87	Top Soil							
2	686.87								
3	685.87								
4	684.87								
5	683.87	CLAY; silty; reddish brown							
6	682.87								
7	681.87	Chert; white; dry							
8	680.87								
9	679.87	SILT; clayey; brown; trace chert gravel							
10	678.87								
11	677.87								
12	676.87								
13	675.87								
14	674.87								
15	673.87								
16	672.87								
17	671.87	dolostone; some chert; dry							
18	670.87								
19	669.87								
20	668.87								
21	667.87								
22	666.87	CLAY; silty; reddish brown; chert gravel throughout							
23	665.87								
24	664.87								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-23R

Sheet 2 of 2

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **47.0'** SURF.ELEV. **688.87**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	663.87								
26	662.87								
27	661.87								
28	660.87								
29	659.87								
30	658.87								
31	657.87								
32	656.87	Dolostone; blue gray; very little fractures red staining at 28'							
33	655.87								
34	654.87								
35	653.87								
36	652.87								
37	651.87								
38	650.87								
39	649.87								
40	648.87								
41	647.87								
42	646.87								
43	645.87								
44	644.87	Dolostone; blue gray; very fractured; red staining							
45	643.87								
46	642.87								
47	641.87								
48	640.87	BOH @ 47.0' bgs							
49	639.87								
50	638.87								
51	637.87								
52	636.87								
53	635.87								
54	634.87								
55	633.87								
56	632.87								

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, MSL
				2.65	676.92
TOP OF RISER					
1/4-inch Vent					
1/4-inch Weep Hole					
4-ft x 4-ft concrete pad					
GROUND SURFACE				0.00	674.27
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	664.27
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 8 - 50 lbs bags PLACEMENT: Wash with water					
TOP OF FILTER PACK				24.80	649.47
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	647.57
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	637.57
Flush-threaded end cap					
BOTTOM OF CASING				37.00	637.27
HOLE DIA: 6"					



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWC-24R**

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

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 37.0'	SURF. ELEV. 674.27
LOCATION Cells 3 and 4		COORDINATES N 1506693.97	E 2074805.76
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. 651.03	TIME AFTER COMP. 1 hour
TYPE GROUT NA		QUANTITY NA	MIX NA
DRILLER Boart		RECORDER C. Sellers	APPROVED D. Brooks
		DRILLING START DATE 6/20/2011	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	674.27								
1	673.27	Top Soil							
2	672.27								
3	671.27	SAND; silty; brownish red; very fine grained							
4	670.27								
5	669.27								
6	668.27	SAND; silty; red; more silt; 10% clay							
7	667.27								
8	666.27								
9	665.27	SAA							
10	664.27								
11	663.27								
12	662.27	Dolostone; blue gray; dry							
13	661.27								
14	660.27								
15	659.27	Chert gravel; with silty clay; trace dolostone pieces							
16	658.27								
17	657.27								
18	656.27								
19	655.27								
20	654.27	Dolostone; blue gray; very fracture; minimal staining							
21	653.27								
22	652.27								
23	651.27								
24	650.27								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-24R

Sheet 2 of 2

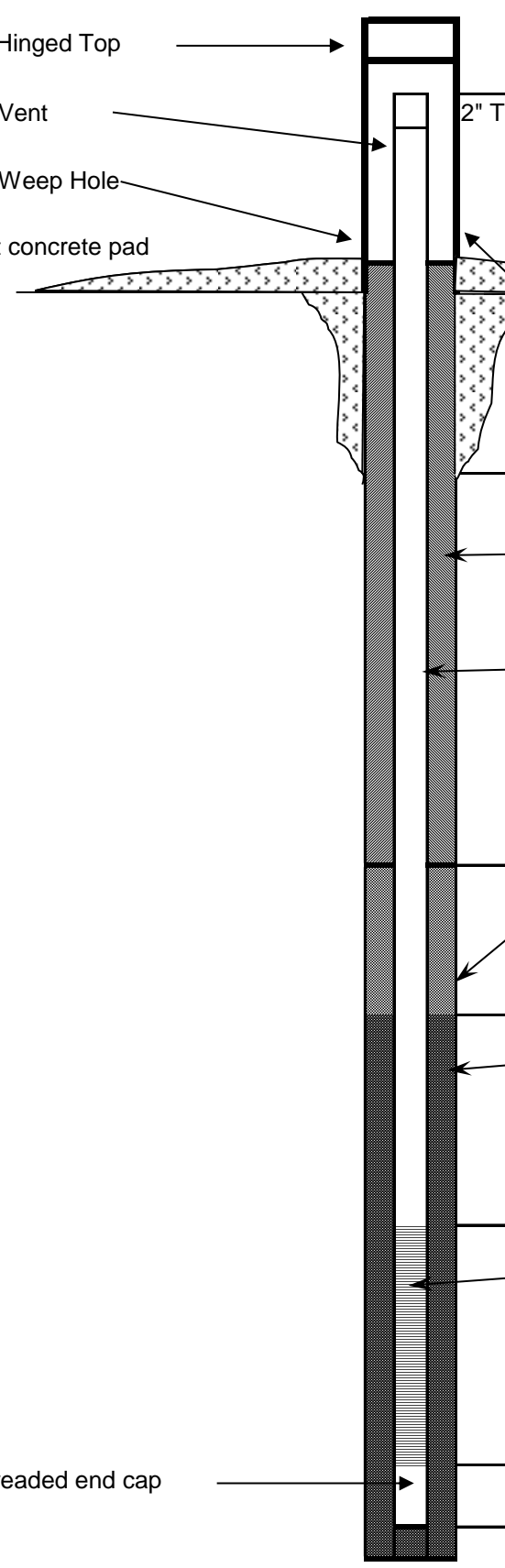
SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **37.0'** SURF.ELEV. **674.27**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	649.27	Dolostone and Chert gravel; red staining on the dolostone							
26	648.27								
27	647.27								
28	646.27								
29	645.27								
30	644.27								
31	643.27								
32	642.27								
33	641.27								
34	640.27								
35	639.27	BOH @ 37.0' bgs							
36	638.27								
37	637.27								
38	636.27								
39	635.27								
40	634.27								
41	633.27								
42	632.27								
43	631.27								
44	630.27								
45	629.27								
46	628.27								
47	627.27								
48	626.27								
49	625.27								
50	624.27								
51	623.27								
52	622.27								
53	621.27								
54	620.27								
55	619.27								
56	618.27								

WELL CONSTRUCTION LOG

Southern Company Generation

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

	DEPTH FEET	ELEVATION FT, MSL
 <p>Locking Hinged Top</p> <p>1/4-inch Vent</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement/Grout Slurry AMOUNT: 100 gallons</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 3 - 50 lbs bags PLACEMENT: Wash with water</p> <p>FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags / 50 lbs bags PLACEMENT: Wash with water</p> <p>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</p> <p>Flush-threaded end cap</p> <p>HOLE DIA: 6"</p>	<p>TOP OF RISER</p> <p>GROUND SURFACE</p> <p>TOP OF SEAL</p> <p>TOP OF FILTER PACK</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF CASING</p>	<p>2.55</p> <p>0.00</p> <p>75.00</p> <p>84.80</p> <p>86.70</p> <p>96.70</p> <p>97.00</p>
		676.75
		674.20
		599.20
		589.40
		587.50
		577.50
		577.20

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWC-25R**

Sheet **1** of **4**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 97.0'	SURF.ELEV. 674.2
LOCATION Cells 3 and 4	COORDINATES N 1506495.03	E 2071414.69	
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. 651.58	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	674.20								
1	673.20	Top Soil							
2	672.20								
3	671.20								
4	670.20								
5	669.20	SILT; clayey; light brown; trace sand; fine; dry							
6	668.20								
7	667.20								
8	666.20								
9	665.20								
10	664.20								
11	663.20								
12	662.20	SILT; trace sand; very micaceous; yellowish orange							
13	661.20								
14	660.20								
15	659.20								
16	658.20	Chert gravel; well rounded							
17	657.20	SILT; sandy; medium grained sand; some chert gravel; light brown							
18	656.20								
19	655.20	SAND;with chert gravel; brownish yellow; medium grained; wet							
20	654.20								
21	653.20								
22	652.20								
23	651.20								
24	650.20								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-25R

Sheet 2 of 4

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **97.0'** SURF.ELEV. **674.2**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	649.20	Dolostone and chert gravel mixed							
26	648.20								
27	647.20								
28	646.20	Dolostone; cherty; blue gray; heavy red staining; very fractured;							
29	645.20								
30	644.20								
31	643.20								
32	642.20								
33	641.20								
34	640.20								
35	639.20								
36	638.20								
37	637.20								
38	636.20								
39	635.20								
40	634.20								
41	633.20								
42	632.20								
43	631.20	SAA							
44	630.20								
45	629.20								
46	628.20								
47	627.20								
48	626.20								
49	625.20								
50	624.20								
51	623.20								
52	622.20								
53	621.20	SAA							
54	620.20								
55	619.20								
56	618.20								

**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. **674.2**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	617.20	SAA							
58	616.20								
59	615.20								
60	614.20								
61	613.20								
62	612.20								
63	611.20								
64	610.20								
65	609.20								
66	608.20								
67	607.20	VOID; clay filled with dolostone gravel and trace sand							
68	606.20								
69	605.20								
70	604.20								
71	603.20								
72	602.20								
73	601.20								
74	600.20								
75	599.20								
76	598.20								
77	597.20	Dolostone; blue gray							
78	596.20	Dolostone; blue gray; very fracture; heavy red staining Clay filled void from 83' to 84'							
79	595.20								
80	594.20								
81	593.20								
82	592.20								
83	591.20								
84	590.20								
85	589.20								
86	588.20								
87	587.20								
88	586.20								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-25R

Sheet 4 of 4

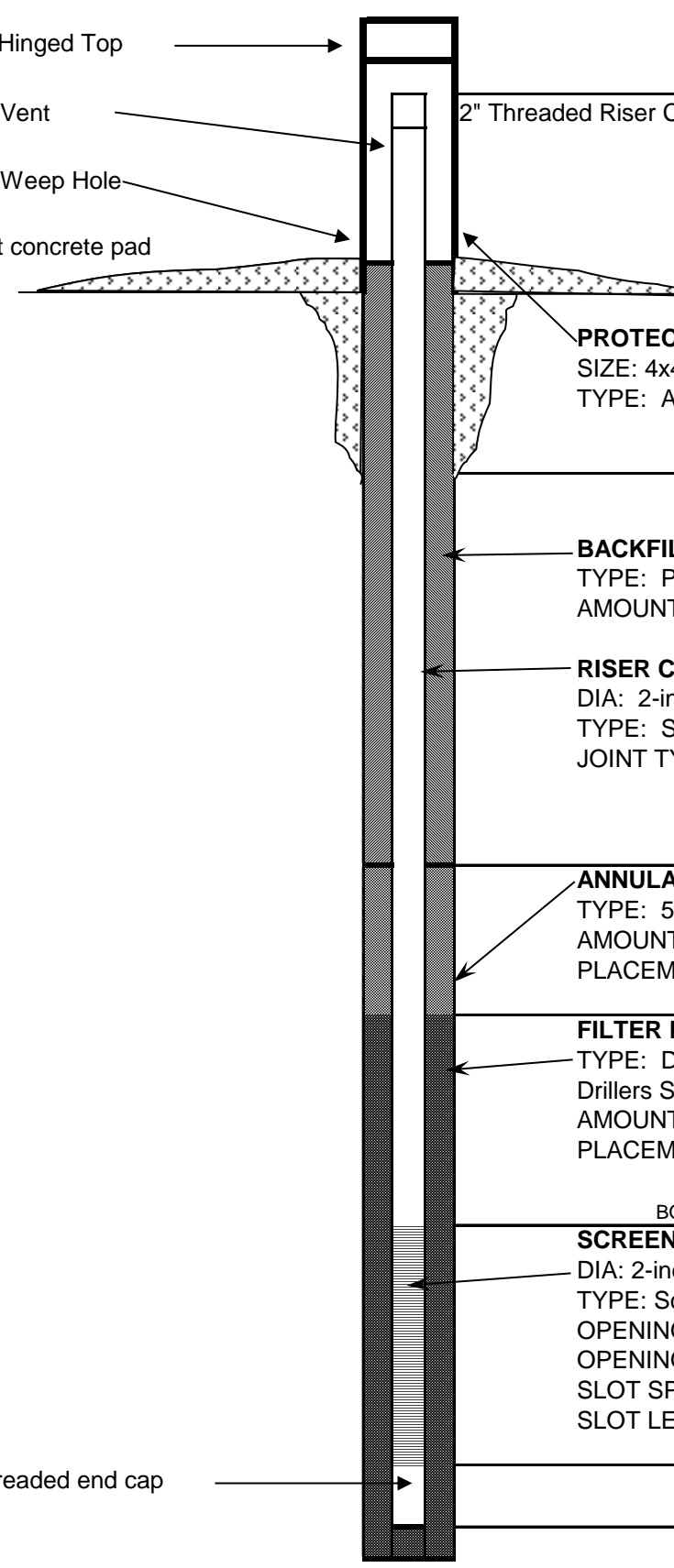
SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **97.0'** SURF.ELEV. **674.2**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
89	585.20	Dolostone; blue gray; heavy red staining; with coarse angular sand							
90	584.20								
91	583.20								
92	582.20								
93	581.20								
94	580.20								
95	579.20								
96	578.20								
97	577.20								
98	576.20	BOH @ 97' bgs							
99	575.20								
100	574.20								
101	573.20								
102	572.20								
103	571.20								
104	570.20								
105	569.20								
106	568.20								
107	567.20								
108	566.20								
109	565.20								
110	564.20								
111	563.20								
112	562.20								
113	561.20								
114	560.20								
115	559.20								
116	558.20								
117	557.20								
118	556.20								
119	555.20								
120	554.20								

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWA-36
LOGGER:	D. Brooks	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/15/2011			

	DEPTH FEET	ELEVATION FT, MSL
 <p>Locking Hinged Top</p> <p>1/4-inch Vent</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>2" Threaded Riser Cap</p> <p>GROUND SURFACE</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement/ Grout Slurry AMOUNT: 90 gallons</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 4 - 50 lbs bags PLACEMENT: Wash with water</p> <p>FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5 bags / 50 lbs bags PLACEMENT: Wash with water</p> <p>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</p> <p>Flush-threaded end cap</p> <p>HOLE DIA: 6"</p>	<p>TOP OF RISER 2.61</p> <p>GROUND SURFACE 0.00</p> <p>TOP OF SEAL 46.00</p> <p>TOP OF FILTER PACK 64.00</p> <p>BOTTOM OF RISER / TOP OF SCREEN 65.70</p> <p>BOTTOM OF SCREEN 75.70</p> <p>BOTTOM OF CASING 76.00</p>	<p>684.91</p> <p>682.30</p> <p>636.30</p> <p>618.30</p> <p>616.60</p> <p>606.60</p> <p>606.30</p>



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-36**

Sheet **1** of **3**

SITE	Plant Bowen CCB Disposal Facility			HOLE DEPTH	76'	SURF.ELEV.	682.3
LOCATION	Cells 3 and 4			COORDINATES	N 1505057.05	E 2073383.57	
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	31.8	ELEV.	650.5	TIME AFTER COMP.	1 hour	DATE TAKEN	6/16/2011
TYPE GROUT	NA	QUANTITY	NA	MIX	NA	DRILLING START DATE	6/16/2011
DRILLER	Boart	RECORDER	D. Brooks	APPROVED	D. Brooks	DRILLING COMP. DATE	6/16/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	682.30	SAND, Silty; brick red; dry; fine grained							
1	681.30								
2	680.30								
3	679.30								
4	678.30								
5	677.30								
6	676.30	CLAY, Sandy; reddish yellow; damp; very fine to fine grained sand with grey chert fragments; low plasticity							
7	675.30								
8	674.30								
9	673.30								
10	672.30								
11	671.30								
12	670.30								
13	669.30								
14	668.30								
15	667.30								
16	666.30	SAND, Silty; pale yellow; damp; very fine grained							
17	665.30								
18	664.30								
19	663.30								
20	662.30								
21	661.30								
22	660.30								
23	659.30								
24	658.30	CLAY, Silty; orange and white; low plasticity							



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. GWA-36

Sheet 2 of 3

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **76'** SURF.ELEV. **682.3**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	657.30	CLAY, Silty; orange and white; low plasticity							
26	656.30								
27	655.30								
28	654.30								
29	653.30								
30	652.30								
31	651.30								
32	650.30								
33	649.30								
34	648.30								
35	647.30								
36	646.30								
37	645.30								
38	644.30								
39	643.30								
40	642.30								
41	641.30	SAND, Clayey; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone							
42	640.30								
43	639.30								
44	638.30	CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite							
45	637.30								
46	636.30								
47	635.30								
48	634.30								
49	633.30								
50	632.30								
51	631.30								
52	630.30								
53	629.30								
54	628.30								
55	627.30								
56	626.30								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-36

Sheet 3 of 3

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **76'** SURF.ELEV. **682.3**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	625.30	CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite							
58	624.30								
59	623.30								
60	622.30								
61	621.30								
62	620.30								
63	619.30								
64	618.30								
65	617.30								
66	616.30								
67	615.30								
68	614.30								
69	613.30								
70	612.30								
71	611.30								
72	610.30								
73	609.30								
74	608.30								
75	607.30								
76	606.30								
77	605.30	BOH @76' bgs							
78	604.30								
79	603.30								
80	602.30								
81	601.30								
82	600.30								
83	599.30								
84	598.30								
85	597.30								
86	596.30								
87	595.30								
88	594.30								

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG		Southern Company Generation		
PROJECT:	Plant Bowen CCB	DRILLING CO.:	Boart Longyear	WELL
LOCATION:	Cells 3 and 4	RIG TYPE:	Rotosonic	GWA-36R
LOGGER:	D. Brooks	DRILLING METHODS:	Rotosonic	
DATE CONSTRUCTED:	6/15/2011			

	DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top	2.71	684.53
TOP OF RISER		
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	681.82
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	46.00	635.82
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 4.5 - 50 lbs bags PLACEMENT: Wash with water		
TOP OF FILTER PACK	74.00	607.82
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	75.70	606.12
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	85.70	596.12
Flush-threaded end cap		
BOTTOM OF CASING	86.00	595.82
HOLE DIA: 6"		



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWA-36R**
Sheet **1** of **3**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 86'	SURF.ELEV. 681.82
LOCATION Cells 3 and 4	COORDINATES N 1505050.78	E 2073384.01	
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 32	ELEV. 649.82	TIME AFTER COMP. 1 hour	DATE TAKEN 6/15/2011
TYPE GROUT NA	QUANTITY NA	MIX NA	DRILLING START DATE 6/14/2011
DRILLER Boart	RECORDER D. Brooks	APPROVED D. Brooks	DRILLING COMP. DATE 6/15/2011

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	681.82	SAND, Silty; brown; dry; fine grained							
1	680.82								
2	679.82								
3	678.82	SAA except yellowish red							
4	677.82								
5	676.82								
6	675.82								
7	674.82	CLAY, Sandy; reddish and pale yellow; damp; very fine to fine grained sand with grey chert fragments; low plasticity							
8	673.82								
9	672.82								
10	671.82								
11	670.82								
12	669.82								
13	668.82								
14	667.82								
15	666.82								
16	665.82								
17	664.82								
18	663.82	SAND, Silty; pale yellow and white; damp; very fine grained							
19	662.82								
20	661.82								
21	660.82								
22	659.82	CLAY, Silty; orange and white; low plasticity							
23	658.82								
24	657.82								



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. GWA-36R

Sheet 2 of 3

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **86'** SURF.ELEV. **681.82**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	656.82	CLAY, Silty; orange and white; low plasticity							
26	655.82								
27	654.82								
28	653.82								
29	652.82								
30	651.82								
31	650.82	No Recovery 26' to 36'							
32	649.82								
33	648.82								
34	647.82								
35	646.82								
36	645.82								
37	644.82	CLAY, Sandy; strong brown, white, and orange; damp very fine to fine grained with pieces of grey chert							
38	643.82								
39	642.82								
40	641.82								
41	640.82	SAND, Clayey; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone							
42	639.82								
43	638.82								
44	637.82	CLAY, Sandy; orange, white, and brown; moist; fine fine grained sand with pieces of chert and dolomite							
45	636.82								
46	635.82								
47	634.82								
48	633.82								
49	632.82								
50	631.82								
51	630.82								
52	629.82								
53	628.82								
54	627.82								
55	626.82								
56	625.82								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-36R

Sheet 3 of 3

SITE **Plant Bowen CCB Disposal Facility Cells 3 and 4** TOTAL DEPTH **86'** SURF.ELEV. **681.82**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	624.82	1' bed of dolomitic gravel							
58	623.82	CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite							
59	622.82								
60	621.82								
61	620.82								
62	619.82								
63	618.82								
64	617.82								
65	616.82								
66	615.82								
67	614.82								
68	613.82								
69	612.82								
70	611.82								
71	610.82								
72	609.82	DOLOMITE; blue grey; hard; slightly weathered; some horizontal fractures with sand infilling							
73	608.82								
74	607.82								
75	606.82								
76	605.82								
77	604.82								
78	603.82								
79	602.82								
80	601.82								
81	600.82								
82	599.82								
83	598.82								
84	597.82								
85	596.82								
86	595.82								
87	594.82	BOH @ 86' bgs							
88	593.82								

WELL CONSTRUCTION LOG

Southern Company Generation

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

	DEPTH FEET	ELEVATION FT, MSL
	2.64	703.66
TOP OF RISER		
1/4-inch Vent		
1/4-inch Weep Hole		
4-ft x 4-ft concrete pad		
GROUND SURFACE	0.00	701.02
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	612.02
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1 - 50 lbs bags PLACEMENT: Wash with water		
TOP OF FILTER PACK	92.50	608.52
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	606.82
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	596.82
Flush-threaded end cap		
BOTTOM OF CASING	104.50	596.52
HOLE DIA: 6"		



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-37**

Sheet **1** of **4**

SITE	Plant Bowen CCB Disposal Facility			HOLE DEPTH	104.5'	SURF.ELEV.	701.02
LOCATION	Cells 3 and 4			COORDINATES	N 1505341.85	E 2073070.71	
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' bgs		ELEV.	656.02		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	701.02	SAND, Silty; reddish brown; dry; very fine to fine grained sand							
1	700.02								
2	699.02								
3	698.02	SAA except red; fine grained							
4	697.02								
5	696.02								
6	695.02	SAND, Clayey; brick red; damp; very fine to fine grained							
7	694.02								
8	693.02								
9	692.02	SAA except red and yellow							
10	691.02								
11	690.02								
12	689.02								
13	688.02								
14	687.02								
15	686.02								
16	685.02								
17	684.02								
18	683.02								
19	682.02								
20	681.02								
21	680.02	SAND, Silty; yellow and white; damp; fine to medium grained with white chert fragments							
22	679.02								
23	678.02								
24	677.02								



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. **701.02**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	676.02	CLAY, Sandy; yellow and white; damp; very fine to fine grained sand with small grey chert fragments							
26	675.02								
27	674.02								
28	673.02								
29	672.02								
30	671.02								
31	670.02								
32	669.02								
33	668.02								
34	667.02								
35	666.02								
36	665.02								
37	664.02								
38	663.02								
39	662.02								
40	661.02								
41	660.02	SAA with grey chert increasing in content and size; moist							
42	659.02								
43	658.02								
44	657.02								
45	656.02								
46	655.02								
47	654.02								
48	653.02								
49	652.02	SAND, Clayey; yellow and white; moist; fine to medium grained							
50	651.02								
51	650.02	CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments							
52	649.02								
53	648.02								
54	647.02								
55	646.02								
56	645.02								

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. **701.02**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	644.02	CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments							
58	643.02								
59	642.02								
60	641.02								
61	640.02								
62	639.02								
63	638.02								
64	637.02								
65	636.02								
66	635.02								
67	634.02								
68	633.02								
69	632.02								
70	631.02								
71	630.02								
72	629.02								
73	628.02	SAA except mottled pale yellow, yellow, and brown							
74	627.02								
75	626.02								
76	625.02								
77	624.02								
78	623.02								
79	622.02								
80	621.02								
81	620.02								
82	619.02								
83	618.02								
84	617.02								
85	616.02								
86	615.02								
87	614.02	CLAY, Sandy; brownish yellow; wet; very soft; fine grained sand							
88	613.02								

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. **701.02**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89	612.02	CLAY, Sandy; brownish yellow; wet; very soft; fine grained sand							
90	611.02								
91	610.02	SAND, Clayey; yellow and brown; wet; fine grained with fragments of grey chert							
92	609.02								
93	608.02	CLAY, Sandy; yellow and brown; wet; fine to medium grained sand with chert and dolomite cobbles							
94	607.02								
95	606.02								
96	605.02								
97	604.02								
98	603.02								
99	602.02	SAND, Clayey; yellow and brown; wet; fine grained with fragments of grey chert							
100	601.02								
101	600.02								
102	599.02								
103	598.02	DOLOMITE; blue grey; hard; slightly weathered; fractured with iron staining BOH @ 104.5' bgs							
104	597.02								
105	596.02								
106	595.02								
107	594.02								
108	593.02								
109	592.02								
110	591.02								
111	590.02								
112	589.02								
113	588.02								
114	587.02								
115	586.02								
116	585.02								
117	584.02								
118	583.02								
119	582.02								
120	581.02								

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, MSL
				2.68	716.43
GROUND SURFACE				0.00	713.75
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	664.75
ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 1 - 50 lbs bags PLACEMENT: Wash with water TOP OF FILTER PACK				53.00	660.75
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	659.05
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	649.05
Flush-threaded end cap BOTTOM OF CASING				65.00	648.75
HOLE DIA: 6"					



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWA-38**

Sheet **1** of **3**

SITE Plant Bowen CCB Disposal Facility		HOLE DEPTH 76'	SURF.ELEV. 713.75
LOCATION Cells 3 and 4	COORDINATES N 1505501.65	E 2072833.09	
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. 668.86	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	N			
0	713.75	SAND, Silty; red and yellowish red; dry; very fine to fine grained							
1	712.75								
2	711.75								
3	710.75								
4	709.75								
5	708.75								
6	707.75								
7	706.75								
8	705.75	SAA except damp							
9	704.75								
10	703.75								
11	702.75								
12	701.75								
13	700.75								
14	699.75								
15	698.75	CLAY, Silty; white to pale yellow; damp; no plasticity							
16	697.75								
17	696.75								
18	695.75	CLAY, Sandy, Silty; mottled pale yellow and brown; damp; no plasticity							
19	694.75								
20	693.75								
21	692.75								
22	691.75								
23	690.75								
24	689.75								



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. **713.75**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	688.75	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	687.75								
27	686.75								
28	685.75								
29	684.75								
30	683.75	CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with pieces of weakly cemented sandstone							
31	682.75								
32	681.75								
33	680.75								
34	679.75								
35	678.75								
36	677.75								
37	676.75								
38	675.75								
39	674.75								
40	673.75								
41	672.75								
42	671.75								
43	670.75								
44	669.75								
45	668.75								
46	667.75								
47	666.75								
48	665.75								
49	664.75								
50	663.75								
51	662.75								
52	661.75								
53	660.75								
54	659.75								
55	658.75								
56	657.75								

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. **713.75**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	656.75	CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with pieces of weakly cemented sandstone							
58	655.75								
59	654.75								
60	653.75								
61	652.75								
62	651.75								
63	650.75								
64	649.75								
65	648.75								
66	647.75								
67	646.75	SAA with lenses of water bearing purple chert/ gravel							
68	645.75								
69	644.75								
70	643.75								
71	642.75								
72	641.75								
73	640.75								
74	639.75								
75	638.75								
76	637.75								
77	636.75	BOH @76' bgs							
78	635.75								
79	634.75								
80	633.75								
81	632.75								
82	631.75								
83	630.75								
84	629.75								
85	628.75								
86	627.75								
87	626.75								
88	625.75								



LOG OF TEST BORING

BORING GWA-39 Z

PAGE 1 OF 3

GPC633179

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

DATE STARTED 2/26/2016 COMPLETED 3/1/2016 SURF. ELEV. 733.0 COORDINATES: N:34.128534 E:84.911715

CONTRACTOR Cascade EQUIPMENT Tracked METHOD Rotosonic

DRILLED BY T. Ardito LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 115 ft. GROUND WATER DEPTH DURING 58 ft. COMP. 55.9 ft. DELAYED 55.5 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
		Sandy Lean Clay (CL) - and red (2.5YR 4/6) dry, stiff				
5		Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brown / very pale orange (10YR 8/2) dry, stiff, some gravel				
		Well-graded Gravelly Sand (SW) - and pinkish gray / grayish orange pink (5YR 7/2) pulverized rock/gravel				
10		Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brown / very pale orange (10YR 8/2) dry, stiff, some gravel				
		Dolostone (COBBLES AND BOULDERS) - dolostone boulders				
15		Sandy Silt (ML) - brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brown / very pale orange (10YR 8/2) dry, stiff, some gravel				
		Dolostone (COBBLES AND BOULDERS) - dolostone boulders				
20		Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brown / very pale orange (10YR 8/2) dry, stiff, some gravel				
		Sandy Lean Clay (CL) - mottled pale yellow (2.5Y 8/2) and brownish yellow / dark yellowish orange (10YR 6/6) dry, medium stiff, medium plasticity				
25		- with dolostone cobbles and gravel (pulverized rock)				
30		- pale yellow (5Y 8/2) and yellow (2.5Y 7/6) dry, medium stiff, medium plasticity				
35		- with dolostone cobbles and gravel (pulverized rock)				
40		- pale yellow (2.5Y 8/2) and white (N9) dry, medium plasticity				

Surface Seal:
Concrete

Annular Fill:
Portland Cement-Bentonite
Grout (4 - 94lbs bags PC, 1 -
50lbs bags Gel, 45 gal. Water)

Annular Seal:
Pel-Plug 3/8 Bentonite Coated
Pellets (0.5 - 5gal buckets
(101.5'-98.0')) and Baroid Hole
Plug 3/8 Chips (19 - 50lbs bags
(98.0'-25.0'))

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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. 729.80 ft msl COORDINATES: N:34.1284316 E:-84.9115724

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

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 Weak Moderate Strong REACTION	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad
						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			704.8			
30		- CLAY (CL), white and gray (5 YR 8/1 - 8/2), low plasticity, slightly moist				
35						
			693.8			
		- SILT (ML), light orange (5 YR 7/8), stiff, moist	692.8			
		- CLAY (CL), light brown, moist				
40						

(Continued Next Page)



LOG OF TEST BORING

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	
						Completion: Protective casing set in concrete pad; 2-foot square concrete pad	ELEV. (DEPTH)
		(Cont.)				(CONTINUED)	
45						Annular Fill: Aquaguard Grout Mixture	
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	667.8 (62.0)
70		- same as above, orangish brown (5 YR 6/6), very moist					
75		- sandy CLAY (CL), orangish brown (5 YR 6/6), black layering	654.8				
80							
85							
		- NO RECOVERY	642.8				

(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

S:\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)
		(Cont.)	640.8				
90		- sandy CLAY (CL), orangish brown (7.5 YR 5/6), gravel, stiff, very moist	638.8				Annular Seal: 3/8" bentonite chips
		- CLAY with gravel (CL), white (7.5 YR 8/1), stiff, saturated					
95							
		- competent DOLOMITE, gray, wet	630.8				
100							
105		- same as above					
110		- same as above					
115							
120		- same as above, white siliceous veins					Annular Seal: 3/8" bentonite pellets (non-coated)
125							Filter: silica filter sand
130		- same as above, white siliceous veins					Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
135							

(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	ELEV. (DEPTH)
	/	(Cont.)	592.8			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							

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

Southern Company Generation

HOLE DIA: 6"



LOG OF TEST BORING

BORING GWA-39 R
PAGE 1 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE STARTED 6/14/2011 COMPLETED 6/14/2011 SURF. ELEV. 732.51' COORDINATES: N:1502637.1009 E:2071145.5474

CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD Rotosonic

DRILLED BY _____ LOGGED BY D. Brooks CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 102 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 84.85 ft. after 24 hrs.

NOTES Well installed. Refer to well data sheet.

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, very fine to fine grain, Top Soil	748.0					
		- brick red, dry						
10		- mottled red, yellow and white, damp	744.0					
15		- yellow and white, fine to medium grain, with pieces of white chert	735.0					
20		Clayey Sand (SC) - reddish yellow, damp, very fine to fine grain, with pieces of white chert	732.0					
25								
30		Silty Sand (SM) - reddish yellow, damp, fine to medium grain, with white chert	724.0					
35								
40		Silt (ML) - reddish yellow, damp, low plasticity, with very fine grained sand	715.0					

(Continued Next Page)

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



LOG OF TEST BORING

BORING GWA-39 R
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
		Silt (ML)(con't)	709.0					
		Lean Clay (CL) - mottled reddish yellow and strong brown, damp, no plasticity, with silt	706.0					
45		Silty Sand (SM) - mottled red, yellow and pale yellow, fine to medium grain	701.0					
50		Sandy Lean Clay (CL) - pale yellow and white, damp, low plasticity, with very fine to fine grained sand	696.0					
55		Silty Sand (SM) - pale yellow and white, damp, fine to medium grain, with large pieces of chert	693.0					
60		Lean Clay (CL) - red and pale yellow, damp, low plasticity, with fine grained sand and small pieces of chert	686.0					
65		Silty Sand (SM) - brown, yellow and black, moist, medium grain, with chert	680.0					
70		Sandy Lean Clay (CL) - yellow brown with black organic specks, damp, low plasticity, with very fine to fine grained sand and chert and dolostone	670.0					
75								
80		- NO RECOVERY						
85								

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-39 R
PAGE 3 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

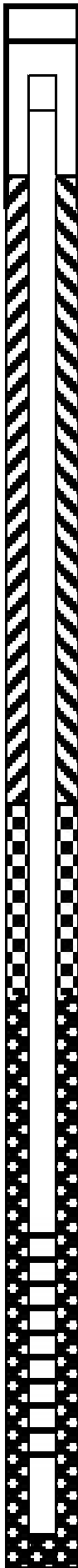
PROJECT Monitoring Wells

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
		Silty Sand (SM) - wet	663.0					
90		- Dolostone	661.0					Top of Dolostone.
95								
			653.0					
		- Dolostone with small (approximately 0.5 feet) sand filled solution zones						
100								
			648.0					
		Bottom of borehole at 102.0 feet.						Bottom of Hole.
105								
110								
115								
120								
125								
130								

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL				
		DRILLER: Boart		NAME				
LOCATION: Bowen		RIG TYPE: RotoSonic		GWA-40				
LOGGER: D. Brooks		DRILLING METHODS: RotoSonic						
DATE CONSTRUCTED: 6/7/2011								
<div><div><div>NOT APPLICABLE:</div><div>Locking Hinged Top</div><div>1/4-inch Vent</div><div>1/4-inch Weep Hole</div><div>2-ft x 2-ft concrete pad</div></div><div></div><div>HOLE DIA: 6"</div></div> <td>DEPTH FEET</td> <td>ELEVATION FT, MSL</td>				DEPTH FEET	ELEVATION FT, MSL			
				TOP OF RISER	0.00	731.95		
				2" Threaded Riser Cap				
				GROUND SURFACE			2.80	729.15
				<div>PROTECTIVE CASING</div> <div>SIZE: 4x4-inch</div> <div>TYPE: Anodized Aluminium</div> <div>BOTTOM OF PROTECTIVE CASING</div>				
				<div>BACKFILL MATERIAL</div> <div>TYPE: Portland Cement</div> <div>AMOUNT:</div> <div>RISER CASING</div> <div>DIA: 2-inch</div> <div>TYPE: Schedule 40 PVC</div> <div>JOINT TYPE: Flush Threaded</div> <div>TOP OF SEAL</div>	136.00	593.15		
				<div>ANNULAR SEAL</div> <div>TYPE: Hole Plug 3/8"</div> <div>Bentonite Pellets</div> <div>AMOUNT: 2 bags</div> <div>PLACEMENT: Free fall</div> <div>TOP OF FILTER PACK</div>	140.50	588.65		
				<div>FILTER PACK</div> <div>TYPE: DSI Sand - 2A (20/30)</div> <div>AMOUNT: 7 bags</div> <div>PLACEMENT Tremie; wash with water</div> <div>BOTTOM OF RISER / TOP OF SCREEN</div>	142.70	586.45		
				<div>SCREEN</div> <div>DIA: 2-inch 10ft U-Pack</div> <div>TYPE: Schedule 40 PVC</div> <div>OPENING WIDTH: 0.01-inch</div> <div>OPENING TYPE: Slotted</div> <div>SLOT SPACING: 0.25-inch</div> <div>SLOT LENGTH:</div> <div>BOTTOM OF SCREEN</div>	152.70	576.45		
				Flush-threaded end cap	BOTTOM OF CASING	153.00	576.15	



LOG OF TEST BORING

BORING GWA-40
PAGE 1 OF 4

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE STARTED _____ COMPLETED _____ SURF. ELEV. 729.15' COORDINATES: N:1503195.0681 E:2071300.6124

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\BOWEN2011\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	716.0					
20		- Zone of white, clayey silt	709.0 708.0					
25		- Sandy Silt; red-brown, few subangular fragments of quartz, chert and dolomite; dry - Clayey silt; mostly white but veins of brown-red mud cut through silt layers; Slightly damp; shows pressure/dissolution features	707.0 703.0					
30		- mottled tan, white and brown Gravelly Sand with prevalent fines; gravels are very large and angular quartz; slightly damp	698.0					
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	693.0					
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

BORING GWA-40
PAGE 2 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
		(cont)	688.0					
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			667.0					
70		- Gravelly silt to Gravelly clayey silt; tan, white and gray; pressure solution features, banding and flow paths; wet, low plasticity						
75			660.0					
80		- Clayey Silt and Silty Clay with few dolomitic gravels; tan, gray and white; very damp; low plasticity						
85			653.0					
		- Gravelly Sand; mottled tan, orange, gray and white; dry	651.0					
		- 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\BOWEN2011\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 (cont)						
95								
100								
105			623.0					
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

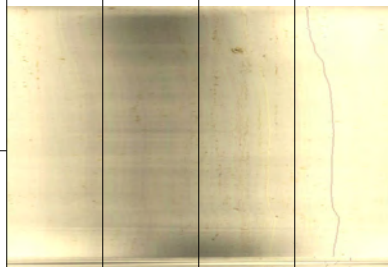

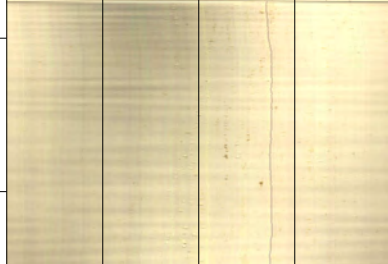

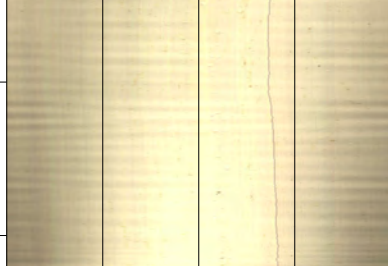
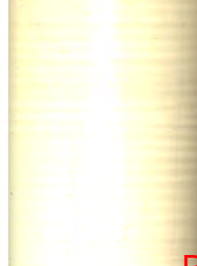

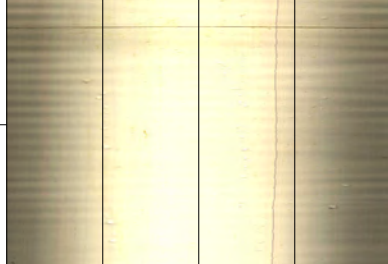
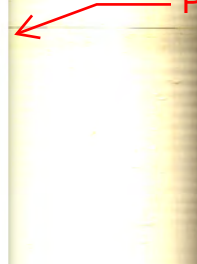
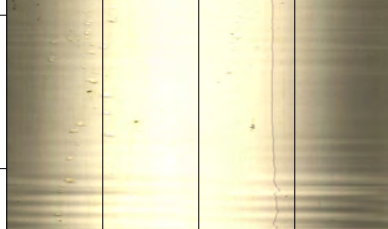

PROJECT Monitoring Wells

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)						
140								
145								
150								
			576.0					
155		Bottom of borehole at 153.0 feet.						Top of Rock: Bottom of Boring.
160								
165								
170								
175								
180								

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

Depth		NM Image GWA-41				Screen Int./Water Level		3D Image GWA-41	
1ft:15ft		0°	90°	180°	270°	0°	1	123°	
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								
									
	13								
	14								
	15								

← Pipe Joint (12.5')

← Pipe Joint (12.5')

	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								
	26								

← Pipe Joint (22.5')

	27							
	28							
	29							
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							

← Pipe Joint (32.5')

	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							

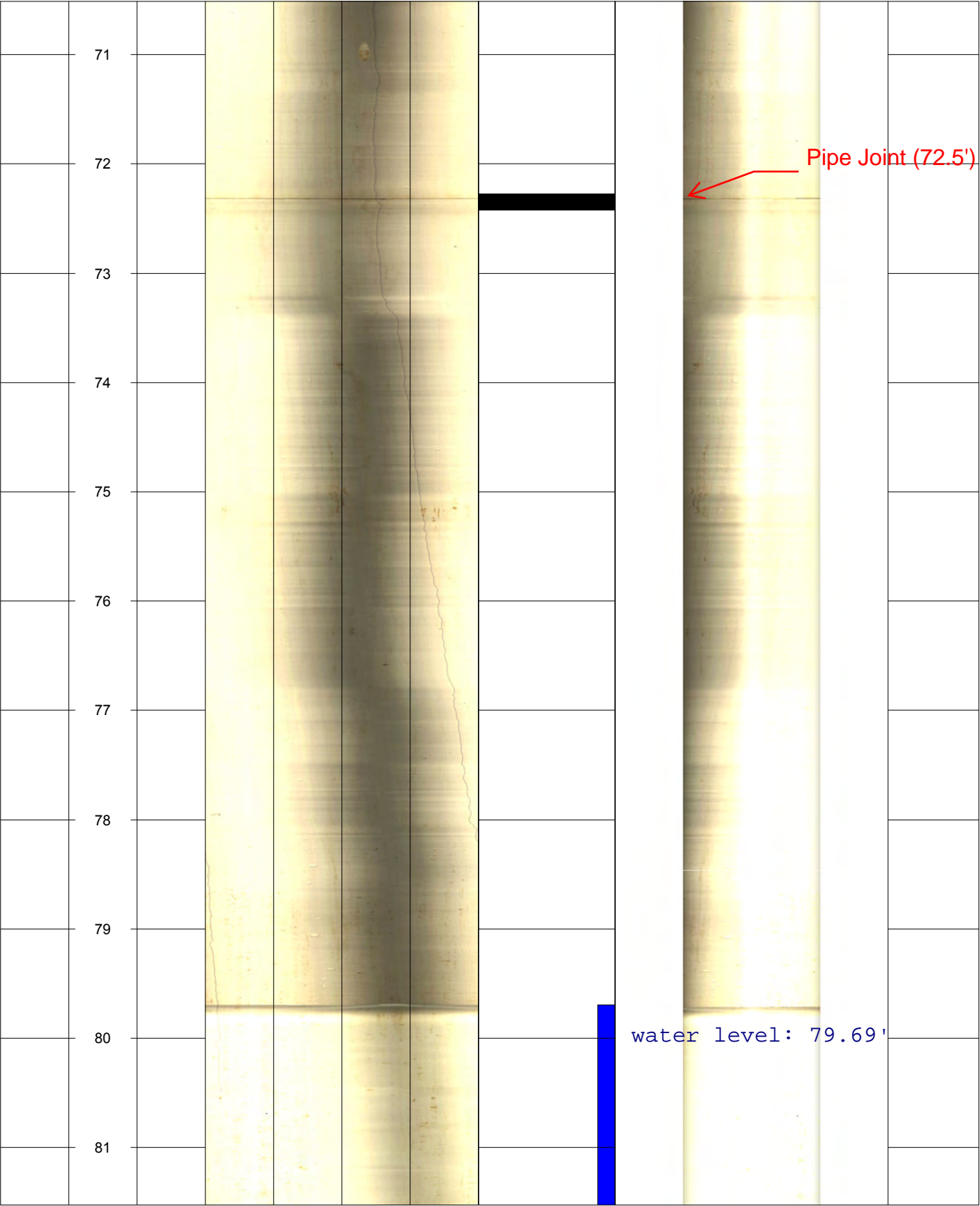
← Pipe Joint (42.5')

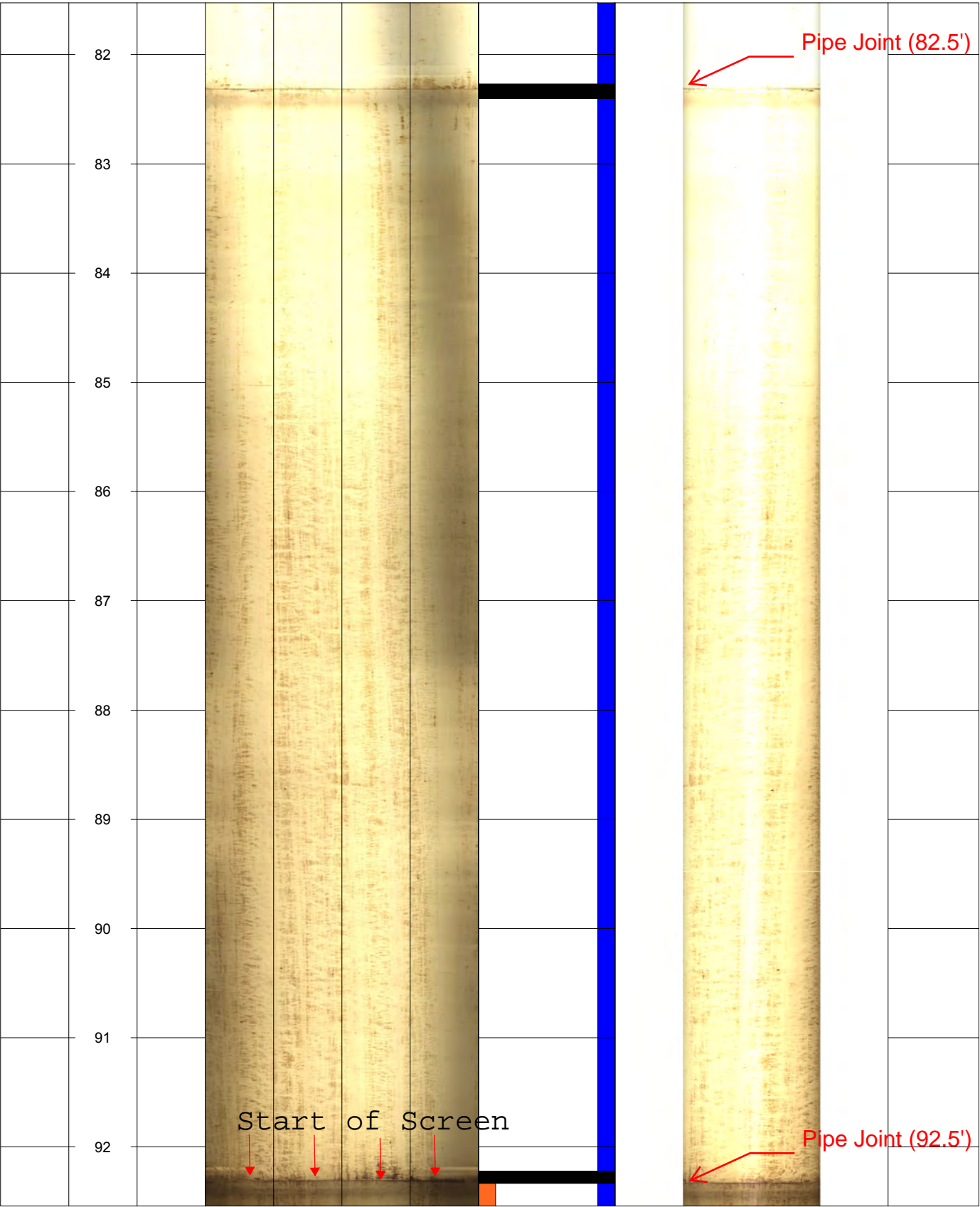
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								
	58								
	59								

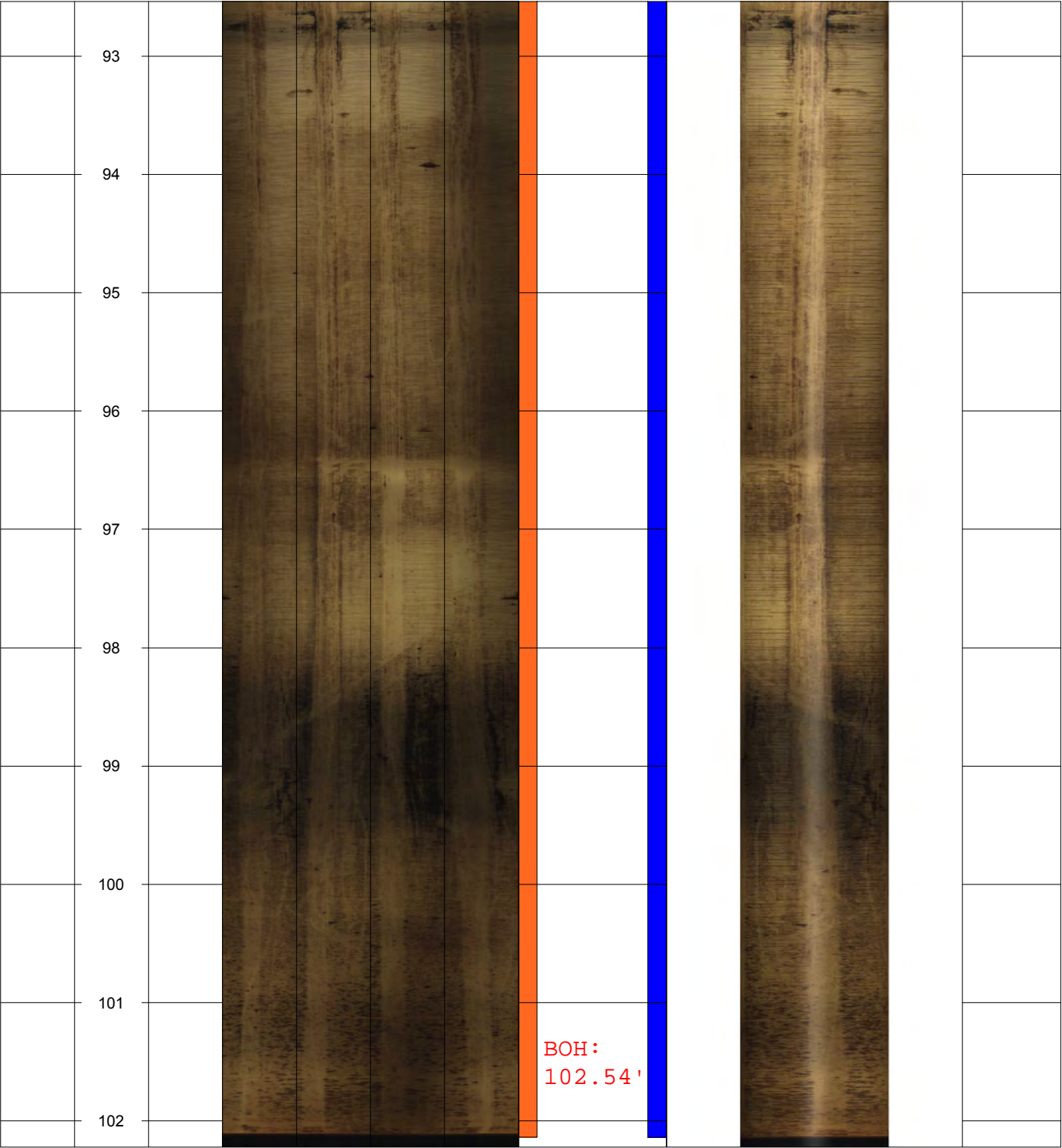
← Pipe Joint (52.5')

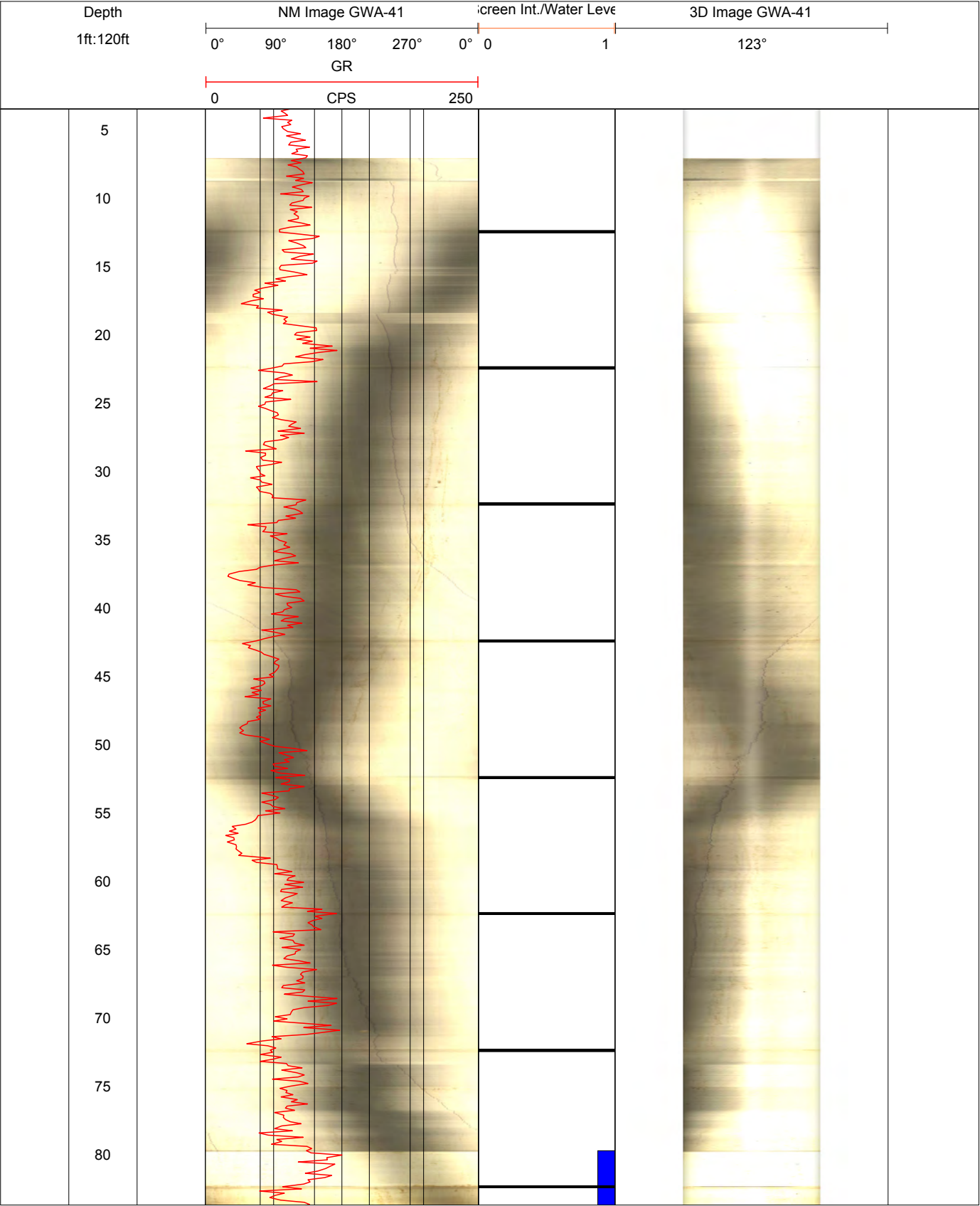
	60							
	61							
	62							
	63							
	64							
	65							
	66							
	67							
	68							
	69							
	70							

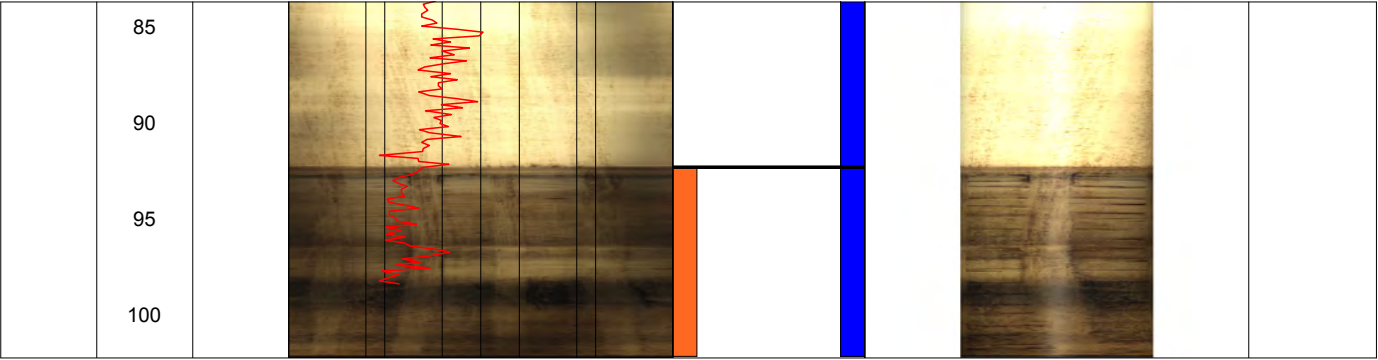
← Pipe Joint (62.5')













LOG OF TEST BORING

BORING GWA-41

PAGE 1 OF 2

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring WellsLOCATION Plant BowenDATE STARTED 6/6/2011 COMPLETED 6/6/2011 SURF. ELEV. 739.6' COORDINATES: N:1503518.8194 E:2071046.7655CONTRACTOR Boart Longyear EQUIPMENT _____ METHOD RotosonicDRILLED 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.

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						
			724.0					
5		- Silty sand with some clay; gray; dry; material is competent and clumped						
			721.0					
		- Clayey Silty Sandy; mottled gray, brown and tan; dry; root structures and organic material						
			719.0					
10		- Gravelly Sand; tan and brown; moist to wet; clay present; moisture decreasing with depth; fines increasing with depth						
			714.0					
15		- SAA						
20								
25								
			701.0					
		- Clayey Sand; tan to brown with large subangular clasts of chert; dry; clay increasing with depth; hard; low plasticity; fragments become smaller with depth						
30								
35								
			691.0					
		- Fine to medium sand; tan; wet						
			689.0					
40		- Clayey Sand; brown to tan with prevalent chert and dolomitic clasts; damp						

(Continued Next Page)

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN2011\ES042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ



LOG OF TEST BORING

BORING GWA-41

PAGE 2 OF 2

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)						
			684.5					
45		- SAA						
			681.0					
50		- Sandy Clay; tan (some brown) with few chert and dolomitic fragments; clay is hard and of low plasticity; slightly moist						
55			671.0					
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			661.0					
70		- Clayey Silty Sand; tan; very moist; coarse grained; few chert and dolomitic fragments (subangular); moisture content increasing with depth						
75			651.0					
80		- Gravelly Sand; tan; medium and coarse grained; wet; gravels are subangular; high yield zone from 76'-85'						
85			642.0					
		Bottom of borehole at 85.0 feet.						Bottom of Hole.

Southern Company Generation

HOLE DIA: 6"



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.** 740.3' **COORDINATES:** N:11503527.3473 E:2071051.389**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.

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	725.4					
		- Clayey Sand; gray; damp; very fine to fine grained; clay content increasing with depth	723.9					
10		- Sandy Clay with chert fragments; brown; damp; very fine to fine grained - Sandy Clay with quartz pebbles; brown; damp; very fine grained; medium plasticity						
15		- SAA except in reddish in color						
20		- Clayey Sand with quartz pebbles; orange reddish (brown); damp; very fine to fine grained	708.4					
25		- Sandy clay with quartz pebbles decreasing in size; brown; fine grained - SAA with chert pieces	704.9					
30		- Sandy clay with quartz and chert pieces; brownish yellow; moist; fine-grained						
35		- Sandy Clay with small quartz pebbles and large carbonate chunks; light brown; moist; very fine grained						
40		- Silty clay with small quartz fragments; light brown; moist; very fine grained - SAA with added chert pieces	690.4					

(Continued Next Page)

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ



LOG OF TEST BORING

BORING GWA-41R
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)						
		- SAA with increasing chert size fragments; sand content increasing as well	683.4					
45		- Clayey sand with weathered carbonate and chert pieces; mottled yellowish very pale brown; damp, fine to medium grained	680.4					
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	674.4					
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 OF TEST BORING

BORING GWA-41R
PAGE 3 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
90		(con't) - 0.5 feet lense of mottled purple, dark gray pieces of siltstone	635.9					
95		- Dolostone	631.4					
100		- Cavity	628.4					
105		- Dolostone, 0.5 feet of recovery and small amount of gravel, wet, driller indicatda no cavity-- drilled like gravel filled cavity						
110								
115		- Dolostone--red staining	611.4					
120		Bottom of borehole at 116.0 feet.						Bottom of hole, set well.
125								
130								

Southern Company Generation

PROJECT: CCB Disposal		DRILLING C Boart Longyear		WELL NAME	
		DRILLER: Boart			
LOCATION: Bowen		RIG TYPE: RotoSonic		GWA-42	
LOGGER: G. Dyer		DRILLING METHODS: RotoSonic			
DATE CONSTRUCTED: 6/1/2011					
NOT APPLICABLE:			DEPTH FEET	ELEVATION FT, MSL	
Locking Hinged Top					
			TOP OF RISER	0.00	738.27
1/4-inch Vent			2" Threaded Riser Cap		
1/4-inch Weep Hole					
2-ft x 2-ft concrete pad					
			GROUND SURFACE	2.94	735.33
			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 TYPEFlush Threaded		
			TOP OF SEAL		
			ANNULAR SEAL		
			TYPE: Hole Plug 3/8"		
			Bentonite Pellets		
			AMOUNT: 2 bags		
			PLACEMENT: Free fall		
			TOP OF FILTER PACK		
			FILTER PACK		
			TYPE: DSI Sand - 2A (20/30)		
			AMOUNT: 7 bags		
			PLACEMEN Tremie; wash with water		
			BOTTOM OF RISER / TOP OF SCREEN		
			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		
			84.70		
Flush-threaded end cap			BOTTOM OF CASING	85.00	650.33
HOLE DIA: 6"					



LOG OF TEST BORING

BORING GWC-42

PAGE 1 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE STARTED _____ COMPLETED _____ SURF. ELEV. 735.33 COORDINATES: N:1503824.2292 E:2071049.8535

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.

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)	726.5					
		- Silty sand; tan, orange and white; with angular chert fragments; dry; black weathering bands						
10		- Silty clay with highly weathered chert and dolomite clasts; light tan, gray and white; low plasticity; dry	722.0					
15		- Silty clay with angular to subangular chert clasts; mottled tan, orange and gray; dry; low plasticity						
20		- Silty clay with weathered chert and dolomite clasts; orange and white; damp; low plasticity	708.0					
25		- 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						
30		- Sandy, silty clay with few angular chert and dolomite fragments; orange; low plasticity; damp and hard	701.5					
35								
40		- Silty Sand; white to gray; sand is carbonate	693.0					
		- Clayey silty sand with small carbonate fragments; dry						

(Continued Next Page)

GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN2011\ES2042 - BAG HOUSE UNITS 1-4\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ



LOG OF TEST BORING

BORING GWC-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)	687.0					
		- 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	684.0					
		- Clayey sand; orange and tan; hard; few chert and dolostone fragments	682.0					
50								
		- SAA: less hard						
55		- SAA: harder						
60								
65		- Moist Zone from 64 to 66 feet						
70								
75								
80								
85		- SAA: tan and brown						
			642.0					
		- Lost sample						

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-42

PAGE 3 OF 3

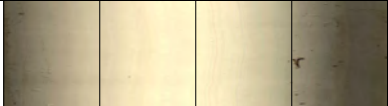


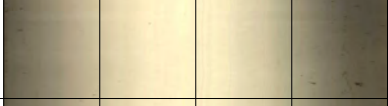
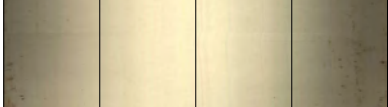

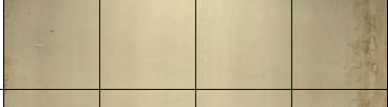
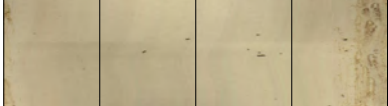
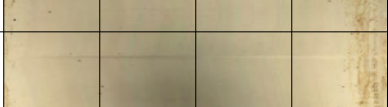
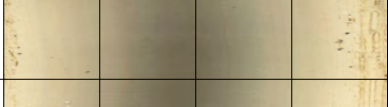
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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)						
90								
			636.0					
		- Clayey Silty Sand with few gravel sized fragments; orange and tan						
95								
100								
		- SAA: more gravel and moist to very moist						Bottom of Well Set (102 feet).
105			622.0					
		- Silty clay; orange; damp; medium to low plasticity; hard						
			620.0					
		- Weathered dolostone; gray with some sand and silt; dry						
110								
115								
			612.0					Bottom of hole.
		Bottom of borehole at 85.0 feet.						
120								
125								
130								

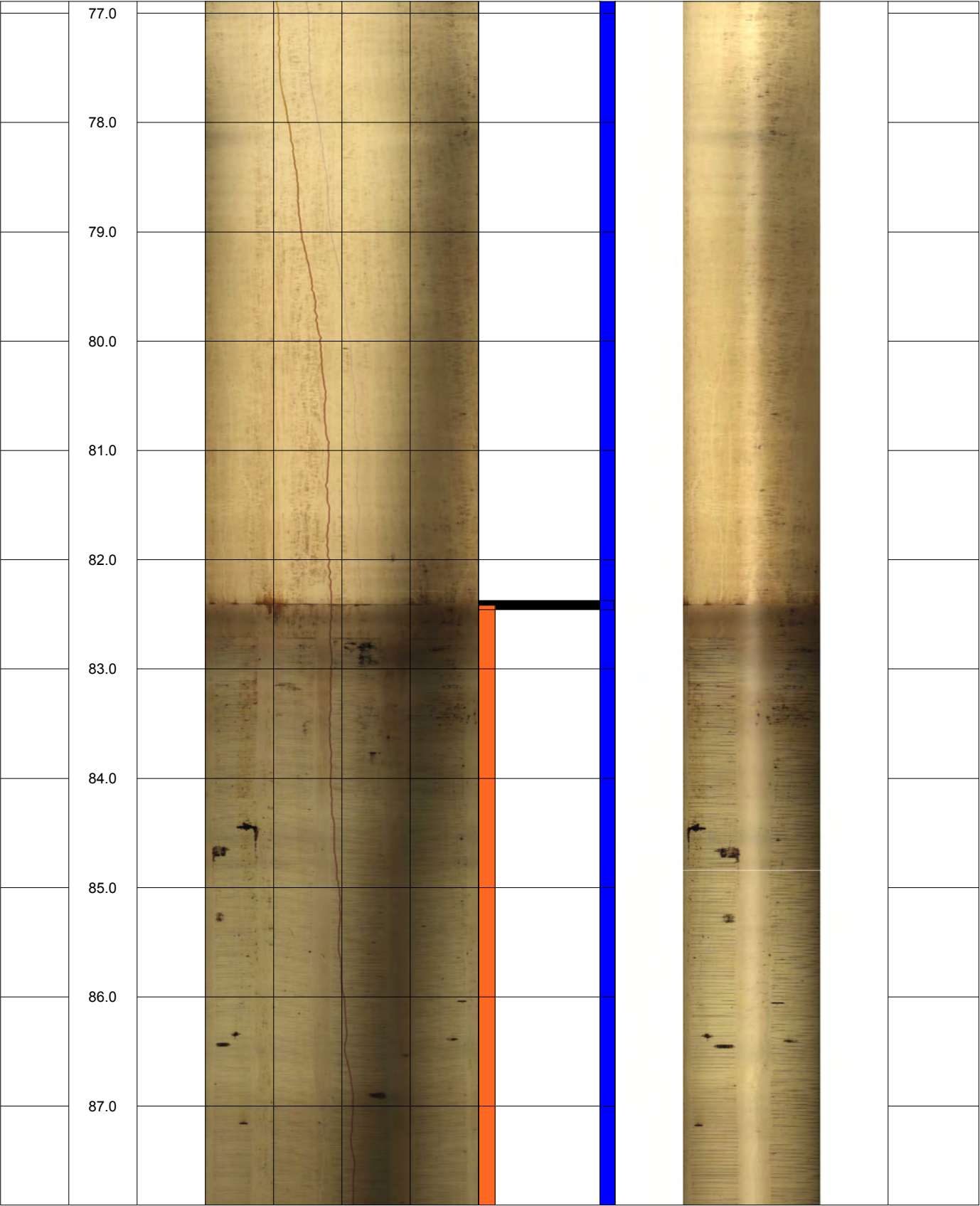
Depth		Image-NM GWA-43				Screen Int./Water Level		GWA-43 3D	
1ft:15ft		0°	90°	180°	270°	0°	0	1	-0°
	12.0								
	13.0								
	14.0								
	15.0								
	16.0								
	17.0								
	18.0								
	19.0								
	20.0								
	21.0								

	22.0								
	23.0								
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	31.0								
	32.0								

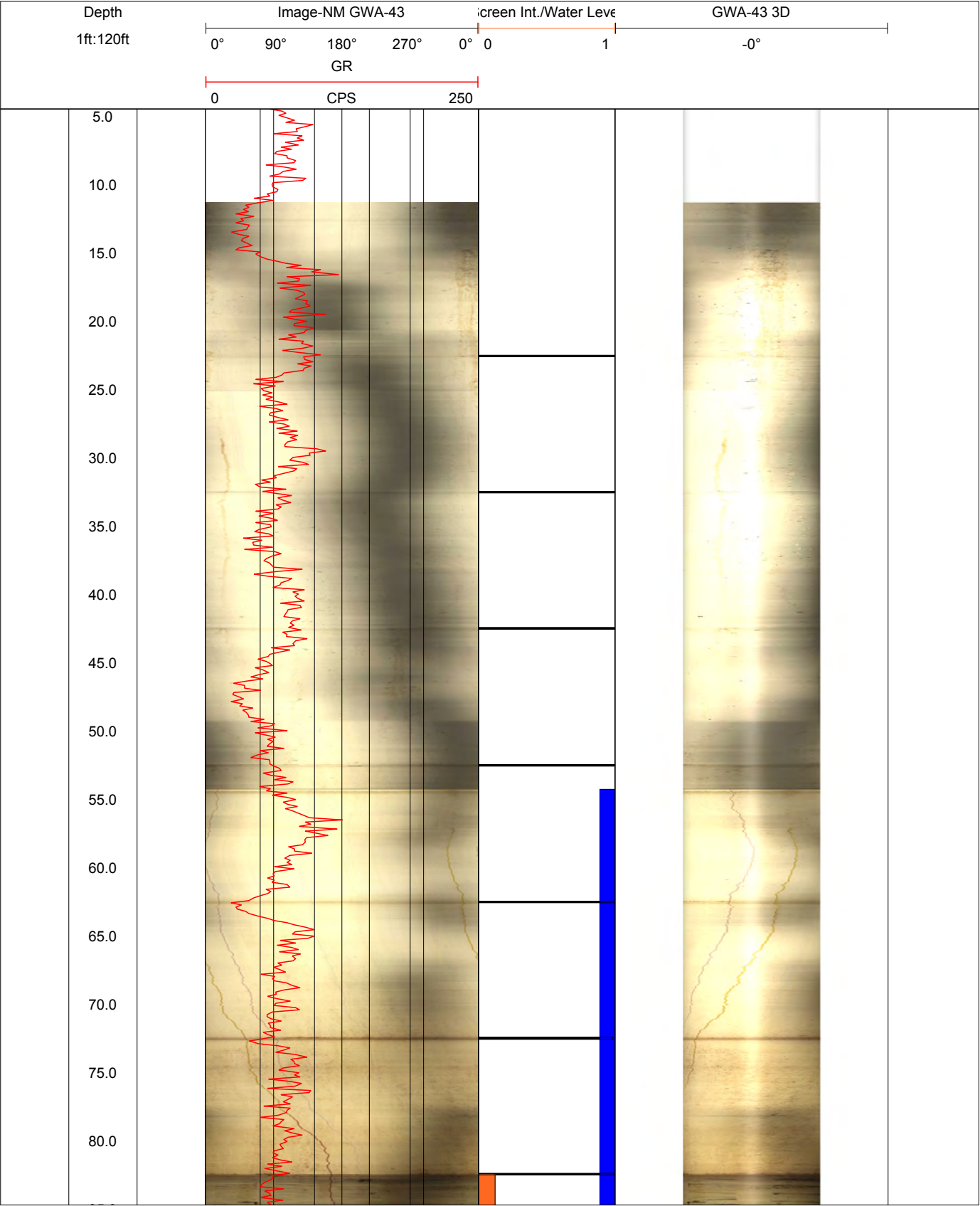
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	42.0								
	43.0								

	44.0								
	45.0								
	46.0								
	47.0								
	48.0								
	49.0								
	50.0								
	51.0								
	52.0								
	53.0								
	54.0								

	55.0										
	56.0										
	57.0										
	58.0										
	59.0										
	60.0										
	61.0										
	62.0										
	63.0										
	64.0										
	65.0										



	88.0										
	89.0										
	90.0										
	91.0										
	92.0										



	85.0													
	90.0													

Southern Company Generation

PROJECT:	CCB Disposal	DRILLING	Boart Longyear		WELL NAME
		DRILLER: Boart			
LOCATION:	Bowen	RIG TYPE: RotoSonic			
LOGGER:	G. Dyer	DRILLING METHODS: RotoSonic		GWA-43	
DATE CONSTRUCTED: 5/25/2011					
NOT APPLICABLE:				DEPTH FEET	ELEVATION FT, MSL
Locking Hinged Top					
				TOP OF RISER	0.00
1/4-inch Vent				2" Threaded Riser Cap	
1/4-inch Weep Hole					
2-ft x 2-ft concrete pad					
				GROUND SURFACE	2.80
PROTECTIVE CASING				BOTTOM OF PROTECTIVE CASING	
SIZE: 4x4-inch					
TYPE: Anodized Aluminium					
BACKFILL MATERIAL				TOP OF SEAL	78.70
TYPE: Portland Cement					
AMOUNT:					
RISER CASING					
DIA: 2-inch					
TYPE: Schedule 40 PVC					
JOINT TYPE: Flush Threaded					
				TOP OF SEAL	78.70
ANNULAR SEAL				TOP OF FILTER PACK	80.70
TYPE: Hole Plug 3/8"					
Bentonite Pellets					
AMOUNT: 3.25 bags					
PLACEMENT: Free fall					
FILTER PACK				BOTTOM OF RISER / TOP OF SCREEN	82.70
TYPE: DSI Sand - 2A (20/30)					
AMOUNT: 2 bags					
PLACEMENT Tremie; wash with water				BOTTOM OF SCREEN	92.70
SCREEN				BOTTOM OF CASING	93.00
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	92.70
Flush-threaded end cap				BOTTOM OF CASING	93.00
HOLE DIA: 6"					



LOG OF TEST BORING

BORING GWC-43

PAGE 1 OF 3

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.** 708.14 **COORDINATES:** N:1504128.209 E:2070982.0551**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.

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	715.0					
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			698.0					
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	694.5					
30		- Silty Clay with pebble sized chert and calcite/dolomite clasts; yellow-red; damp						
35		- Clay; yellow-red, mottled to white due to weathering of chert and carbonate material; low plasticity; damp	689.0					
40								

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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



LOG OF TEST BORING

BORING GWC-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\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		(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	652.5					
75		- Silty Clay; tan and orange; low plasticity; damp	647.0					
80		- Silty clay; tan and orange; low plasticity; damp						
85		- Gravelly, sandy clay; brown and tan; moist; gravels are composed of weathered chert and	636.0					

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LOG OF TEST BORING

BORING GWC-43
PAGE 3 OF 3

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

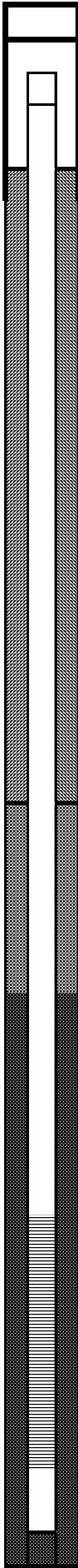
PROJECT Monitoring Wells
LOCATION Plant Bowen

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
90		dolomite (con't)						
			629.0					
		Bottom of borehole at 92.0 feet.		Bottom of hole.				
95								
100								
105								
110								
115								
120								
125								
130								

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL NAME			
		DRILLER: Boart					
LOCATION: Bowen		RIG TYPE: RotoSonic		GWA-43R			
LOGGER: D. Brooks		DRILLING METHODS: RotoSonic					
DATE CONSTRUCTED: 5/24/2011							
<div><div><div>NOT APPLICABLE:</div><div>Locking Hinged Top</div><div>1/4-inch Vent</div><div>1/4-inch Weep Hole</div><div>2-ft x 2-ft concrete pad</div></div><div><div>HOLE DIA: 6"</div></div></div>				DEPTH FEET	ELEVATION FT, MSL		
				TOP OF RISER		0.00	721.00
				2" Threaded Riser Cap			
				GROUND SURFACE		2.80	718.20
				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		65.00	653.20
				ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall			
				TOP OF FILTER PACK		114.50	603.70
				FILTER PACK TYPE: DSI Sand - 2A (20/30) AMOUNT: 7 bags PLACEMENT Tremie; wash with water			
				BOTTOM OF RISER / TOP OF SCREEN		116.50	601.70
				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		126.50	591.70
Flush-threaded end cap							
BOTTOM OF CASING		127.00	591.20				



LOG OF TEST BORING

BORING GWA-43R
PAGE 1 OF 3

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.** 708.36' **COORDINATES:** N:1504117.863 E:2070972.781

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	719.5					
		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	713.0					
15		Silt (ML) - reddish yellow, damp, saprolite; highly weathered carbonate	708.0 706.0					
20		Lean Clay (CL) - mottled red and reddish yellow, damp, red sandy clay with lenses of reddish yellow silt	702.0					
25		Clayey Sand (SC) - red, damp, fine to medium grain, with quartz and chert fragments	699.0					
30		Lean Clay (CL) - mottled orange and red, moist, contains pieces of highly weathered carbonate; becoming more yellow-orange with depth						
35		- CL: mottled yellow-orange and white and red, moist, very fine grain, with sand; lenses of weathered carbonate						
		- SAA with lenses of carbonate increasing in prominence						
40		Silt (ML) - mottled yellow-orange and reddish orange, with sand and weathered chert	684.0 681.0					

(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	677.0					
50		Lean Clay (CL) - yellow-orange, damp, low plasticity	670.0					
55		Clayey Sand (SC) - mottled orange and yellow, red and black, moist, fine to medium grain, with chert	667.0					
60		Lean Clay (CL) - reddish yellow, moist, no to low plasticity, with sand - black, tan and reddish yellow	657.0					
65		Clayey Sand (SC) - black, red, and brown, damp, fine to medium grain, with chert	655.0					
70		- Dolostone	654.0					
75		- Cavity						
80								
85								

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-43R
PAGE 3 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)						
90								
95								
100								
			619.0					
		- Dolostone						
105			616.0					
		- Cavity						
			614.0					
		- Dolostone						
110								
115								
120								
125								
			595.0					
		Bottom of borehole at 127.0 feet.						Bottom of Hole.
130								

Southern Company Generation

HOLE DIA: 6"



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWA-44**
Sheet 1 of 2

SITE Plant Bowen		HOLE DEPTH 86	SURFELEV 725.15
LOCATION Landfill Cells 9 & 10		COORDINATES 34.1300195	-84.9111336
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. 654.66	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	N			
0	725.15								
1	724.15	SILTY SAND (0 - 8 FT) Red to reddish-brown, moderately-cemented silty sand with minor angular gravels; damp.							
2	723.15								
3	722.15								
4	721.15								
5	720.15								
6	719.15								
7	718.15								
8	717.15								
9	716.15								
10	715.15								
11	714.15								
12	713.15								
13	712.15								
14	711.15								
15	710.15								
16	709.15								
17	708.15	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	707.15								
19	706.15								
20	705.15								
21	704.15								
22	703.15								
23	702.15	CLAYEY SILT (18 - 24 FT) Tan-yellow to white clayey silt with rare gravels; predominanty silty hardened soil with no structure; slightly damp.							
24	701.15								

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. **GWA-44**

Sheet 2 of 2

SITE **Plant Bowen** TOTAL DEPTH **86** SURF.ELEV. **725.15**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	700.15								
26	699.15								
27	698.15								
28	697.15								
29	696.15								
30	695.15								
31	694.15								
32	693.15								
33	692.15								
34	691.15								
35	690.15								
36	689.15								
37	688.15								
38	687.15								
39	686.15								
40	685.15								
41	684.15								
42	683.15								
43	682.15								
44	681.15								
45	680.15								
46	679.15								
47	678.15								
48	677.15								
49	676.15								
50	675.15								
51	674.15								
52	673.15								
53	672.15								
54	671.15	CLAYEY SILT (24 - 56 FT)							
		Tan-yellow to white, silty clay to clayey silt; clay varies from 15 to 30%; minor gravel.							
55	670.15								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-44**

Sheet 2 of 2

SITE **Plant Bowen** TOTAL DEPTH **86** SURF.ELEV. **725.15**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
56	669.15								
57	668.15								
58	667.15								
59	666.15								
60	665.15								
61	664.15								
62	663.15								
63	662.15								
64	661.15								
65	660.15								
66	659.15								
67	658.15	SILTY CLAY (56 - 67 FT)							
68	657.15	Tan silty clay to low-plasticity clay; few dolomitic fragments; very damp.							
69	656.15								
70	655.15								
71	654.15								
72	653.15								
73	652.15								
74	651.15	SILT (67 - 74 FT)							
75	650.15	Tan to light yellow silt with minor sand; gravel absent; moist to wet.							
76	649.15	SANDY GRAVEL							
77	648.15	Tan yellow, low plasticity, sandy gravel with some clay; moist to wet.							
78	647.15								
79	646.15								



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-44**

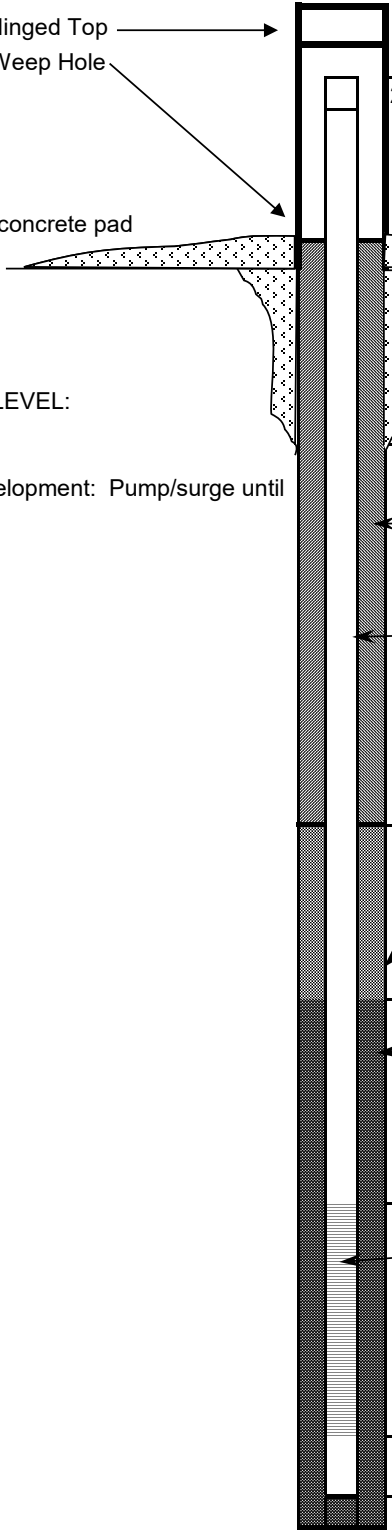
Sheet 2 of 2

SITE **Plant Bowen** TOTAL DEPTH **86** SURF.ELEV. **725.15**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
80	645.15	SANDY GRAVEL (74 - 86 FT) Tan yellow, low plasticity, sandy gravel with some clay; wet. BOTTOM AT 86-FT							
81	644.15								
82	643.15								
83	642.15								
84	641.15								
85	640.15								
86	639.15								

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
 <p>Locking Hinged Top</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL:</p> <p>Well Development: Pump/surge until clear.</p> <p>HOLE DIA: 8"</p>	TOP OF RISER	2.69	701.45
	2" Threaded Riser Cap		
	GROUND SURFACE	0.00	698.76
	PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum		
	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	649.36
	ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1.75 buckets PLACEMENT: Tremie		
	TOP OF FILTER PACK	51.40	647.36
	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	644.33
	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	634.33
	BOTTOM OF CASING	64.73	634.03

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. **698.76**

LOCATION **Cells 1 & 2** COORDINATES N **2071958.16** E **1504537.5**

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	698.76								
1	697.76	Red silty CLAY, dry, firm, occasional pebbles	S-1	4.5-6	3-5-7	12		75	
2	696.76								
3	695.76								
4	694.76								
5	693.76								
6	692.76	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	
7	691.76								
8	690.76								
9	689.76								
10	688.76								
11	687.76	Same as above	S-3	14.5-16.0	11-16-20	36		100	
12	686.76								
13	685.76								
14	684.76								
15	683.76								
16	682.76	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	
17	681.76								
18	680.76								
19	679.76								
20	678.76								
21	677.76								
22	676.76								
23	675.76								
24	674.76								

**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.		698.76	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD				
				From To	Blows	N							
		Red & yellow orange CLAY, dry to damp, firm, carbonate pebbles and sand	S-5	24.5-26.0	3-4-4	8		90					
25	673.76												
26	672.76												
27	671.76												
28	670.76												
29	669.76	Tan orange & dark red CLAY, dry, mottled firm, small carbonate pebbles	S-6	29.5-31.0	2-3-6	9		95					
30	668.76												
31	667.76												
32	666.76												
33	665.76												
34	664.76	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					
35	663.76												
36	662.76												
37	661.76												
38	660.76												
39	659.76	Orange & light tan CLAY, dry, slightly plastic, small carbonate pebbles, coarse sand	S-8	39.5-41.0	2-3-5	8		100					
40	658.76												
41	657.76												
42	656.76												
43	655.76												
44	654.76	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					
45	653.76												
46	652.76												
47	651.76												
48	650.76												
49	649.76	Tan silty CLAY, moist, moderately soft, dark red and black mottles, pebbles and gravel	S-10	49.5-51	5-2-5	7		80					
50	648.76												
51	647.76												
52	646.76												
53	645.76												
54	644.76	Tan silty CLAY, saturated, soft, many chert pebbles, carbonate sand	S-11	54.5-56	11-19-19	38		50					
55	643.76												
56	642.76												

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWC-45

Sheet 3 of 3

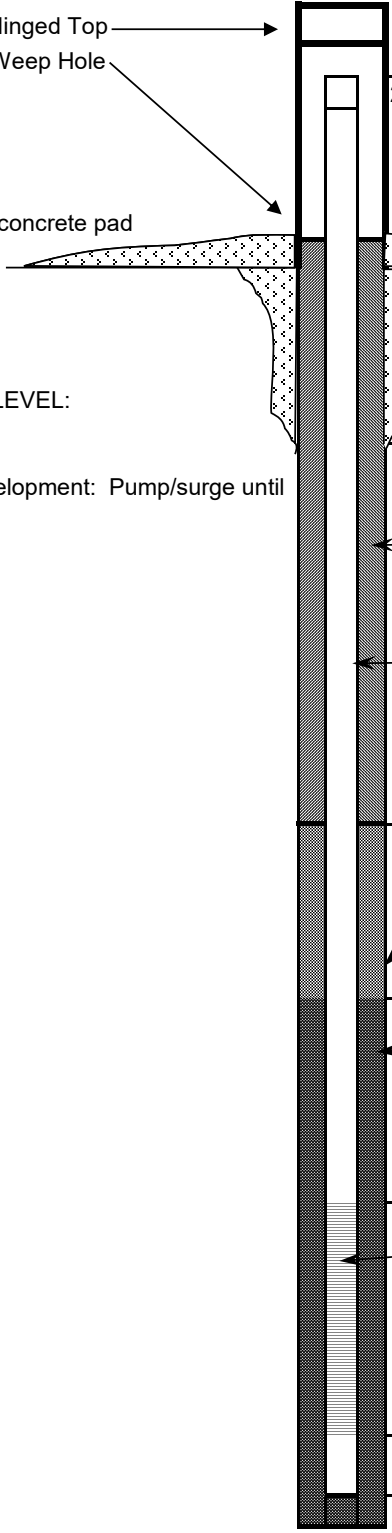
SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **64.3** SURF.ELEV. **698.76**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	641.76	Tan clayey SILT, moist, moderately soft, sand pockets	S-12	59.5-61	4-5-7	12		100	
58	640.76								
59	639.76								
60	638.76								
61	637.76								
62	636.76								
63	635.76								
64	634.76								
65	633.76	Top of rock 64.3: Bottom of boring							
66	632.76								
67	631.76								
68	630.76								
69	629.76								
70	628.76								
71	627.76								
72	626.76								
73	625.76								
74	624.76								
75	623.76								
76	622.76								
77	621.76								
78	620.76								
79	619.76								
80	618.76								
81	617.76								
82	616.76								
83	615.76								
84	614.76								
85	613.76								
86	612.76								
87	611.76								
88	610.76								

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, MSL
 <p>Locking Hinged Top</p> <p>1/4-inch Weep Hole</p> <p>4-ft x 4-ft concrete pad</p> <p>WATER LEVEL:</p> <p>Well Development: Pump/surge until clear.</p> <p>2" Threaded Riser Cap</p> <p>PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum</p> <p>BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 33 bags</p> <p>RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded</p> <p>ANNULAR SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets AMOUNT: 0.25 bucket PLACEMENT: Tremie</p> <p>FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water</p> <p>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</p> <p>HOLE DIA: 8"</p>	<p>TOP OF RISER</p> <p>GROUND SURFACE</p> <p>BOTTOM OF PROTECTIVE CASING</p> <p>TOP OF SEAL</p> <p>TOP OF FILTER PACK</p> <p>BOTTOM OF RISER / TOP OF SCREEN</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF CASING</p>	<p>2.47</p> <p>0.00</p> <p>589.06</p> <p>587.06</p> <p>584.02</p> <p>574.02</p> <p>573.72</p>

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. **699.46**

LOCATION **Cells 1 & 2** COORDINATES N **2071946.84** E **1504536.69**

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	699.46								
1	698.46	Red silty CLAY, dry, firm, tan mottling, small pebbles and occasional roots	S-1	4.5-6	3-3-4	7		100	
2	697.46								
3	696.46								
4	695.46								
5	694.46								
6	693.46								
7	692.46								
8	691.46	Red silty CLAY, dry, firm, some coarse sand grains	S-2	9.5-11.0	4-4-6	10		100	
9	690.46								
10	689.46								
11	688.46								
12	687.46								
13	686.46	Red silty CLAY, dry, firm, small to medium chert & carbonate pebbles	S-3	14.5-16.0	5-6-9	15		100	
14	685.46								
15	684.46								
16	683.46								
17	682.46								
18	681.46	Red CLAY, dry, hard, some silt, occasional carbonate pebbles	S-4	19.5-21.0	6-11-17	28		100	
19	680.46								
20	679.46								
21	678.46								
22	677.46								
23	676.46								
24	675.46								

**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. **699.46**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	674.46	Dark red & tan silty CLAY, dry, firm, occasional chert pebbles	S-5	24.5-26.0	5-7-11	18		100	
26	673.46								
27	672.46								
28	671.46								
29	670.46	Brown and orange silty CLAY, dry, firm, degraded carbonated pebbles and cobbles	S-6	29.5-31.0	5-7-12	19		100	
30	669.46								
31	668.46								
32	667.46								
33	666.46	Tan silty CLAY, moist, firm, small degraded carbonate pebbles and coarse sand	S-7	34.5-36.0	3-4-5	9		100	
34	665.46								
35	664.46								
36	663.46								
37	662.46	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	
38	661.46								
39	660.46								
40	659.46								
41	658.46	Orange and light tan CLAY, dry, firm, black mottling, occasional carbonate pebbles, some silt.	S-9	44.5-46	5-7-9	16		100	
42	657.46								
43	656.46								
44	655.46								
45	654.46	Tan clayey SILT, moist, moderately firm to moderately soft, black and dark red mottling	S-10	49.5-51	2-3-4	7		100	
46	653.46								
47	652.46								
48	651.46								
49	650.46	Tan clayey SILT, moist, moderately soft, degraded carbonate cobbles, black mottling, some sand	S-11	54.5-56	8-7-8	15		100	
50	649.46								
51	648.46								
52	647.46								
53	646.46								
54	645.46								
55	644.46								
56	643.46								

**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	642.46	Tan clayey SILT, w/ sand, saturated, soft, carbonate cobble in bottom of spoon 60.8: Core through 8" boulder	S-12	59.5-61	8-50-1	R		50	
58	641.46								
59	640.46								
60	639.46								
61	638.46								
62	637.46	Tan silty SAND, saturated, loose, medium-coarse grained w/ pebbles and gravel	S-13	64.5-66	3-1-4	5		50	
63	636.46								
64	635.46								
65	634.46								
66	633.46								
67	632.46	Tan clayey SILT, saturated, soft, some black & orange mottling	S-14	69.5-71	2-3-4	7		10	
68	631.46								
69	630.46								
70	629.46								
71	628.46								
72	627.46	No recovery	S-15	74.5-76	3-3-4	7		0	
73	626.46								
74	625.46								
75	624.46								
76	623.46								
77	622.46	Tan silty CLAY, soft, saturated	S-16	79.5-81	3-3-4	7		30	
78	621.46								
79	620.46								
80	619.46								
81	618.46								
82	617.46	Same as above	S-17	84.5-86	9-11-12	23		5	
83	616.46								
84	615.46								
85	614.46								
86	613.46								
87	612.46								
88	611.46								

**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.		699.46	
Depth	Elev.	Material Description, Classification and Remarks			Sample No.	Standard Penetration Test			Comments	% Rec	RQD	
						From To	Blows	N				
89	610.46											
90	609.46											
91	608.46											
92	607.46											
93	606.46											
94	605.46											
95	604.46											95.1: Start coring
96	603.46	Grey DOLOSTONE, some banding. Some fine fractures filled w/ white mineralization.										
97	602.46	96.7-102.2: Cavity										
98	601.46											
99	600.46											
100	599.46											
101	598.46											
102	597.46											
103	596.46	102.5-105.1: Cavity										
104	595.46											
105	594.46											
106	593.46											
107	592.46	Same as above										
108	591.46											
109	590.46											
110	589.46											
111	588.46											
112	587.46											
113	586.46											
114	585.46											
115	584.46											
116	583.46											
117	582.46											
118	581.46											
119	580.46											
120	579.46				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	578.46	124.1-129.2: Cavity							
122	577.46								
123	576.46								
124	575.46								
125	574.46								
126	573.46								
127	572.46								
128	571.46								
129	570.46								
130	569.46	129.2: Bottom of boring							
131	568.46								
132	567.46								
133	566.46								
134	565.46								
135	564.46								
136	563.46								
137	562.46								
138	561.46								
140	559.46								
141	558.46								
142	557.46								
143	556.46								
144	555.46								
145	554.46								
146	553.46								
147	552.46								
148	551.46								
149	550.46								
150	549.46								
151	548.46								
152	547.46								
153	546.46								



LOG OF TEST BORING

BORING GWC-46 R

PAGE 1 OF 1

GPC353387

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells, Cell No. 9

LOCATION Plant Bowen

DATE STARTED 8/14/2014 COMPLETED 8/15/2014 SURF. ELEV. 688.37 COORDINATES:

CONTRACTOR Cascade EQUIPMENT METHOD Rotasonic

DRILLED BY D. Wilcox LOGGED BY W. Shaughnessy CHECKED BY ANGLE BEARING

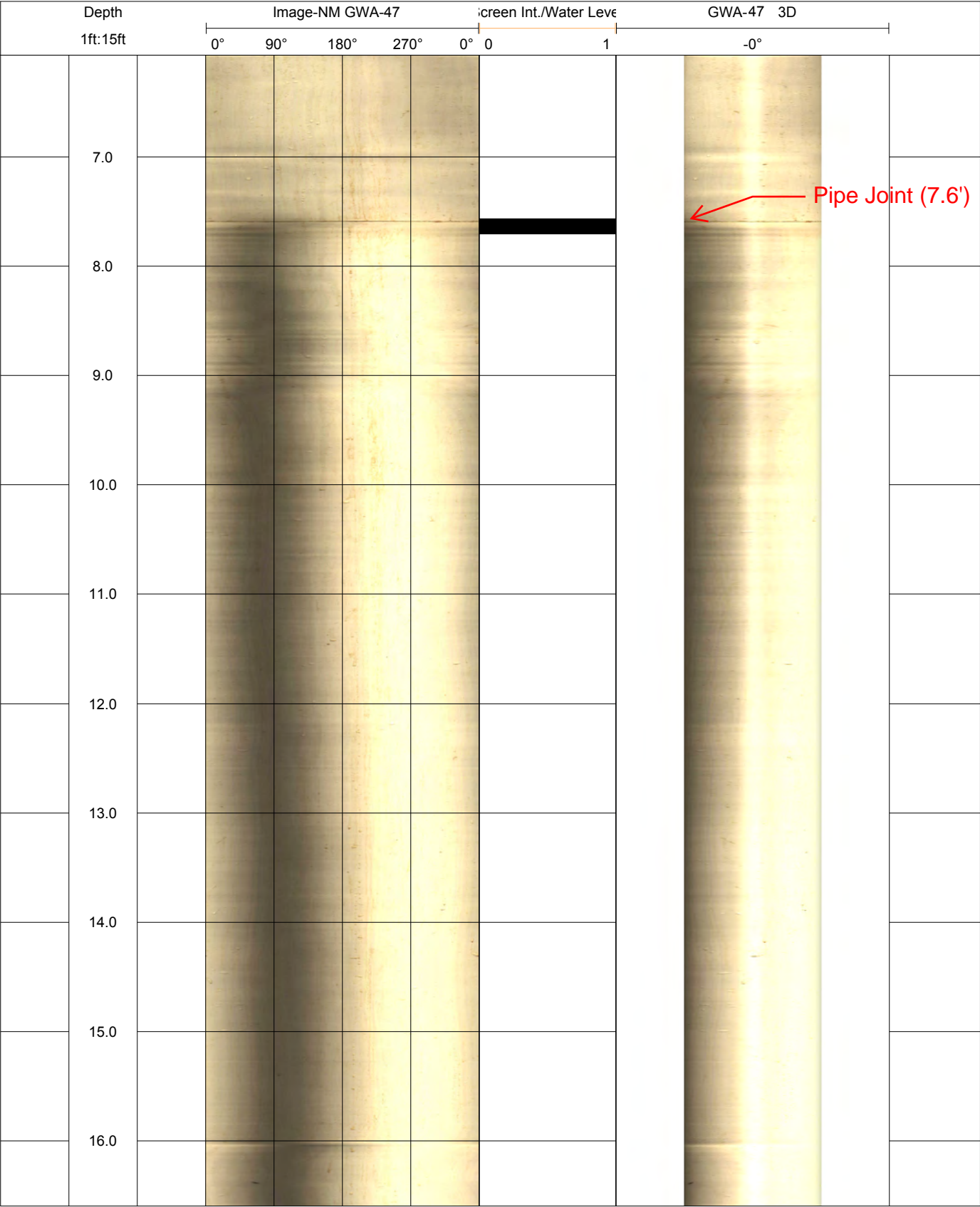
BORING DEPTH 56.5 ft. GROUND WATER DEPTH: DURING COMP. DELAYED 32 ft. after 24 hrs.

NOTES

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 8/22/14 08:30 - \\VALTRCFP01\X2\WSHAUGS\DESKTOP\BOWENBOWEN RPLACEMENT WELL GWC 46R.GPJ

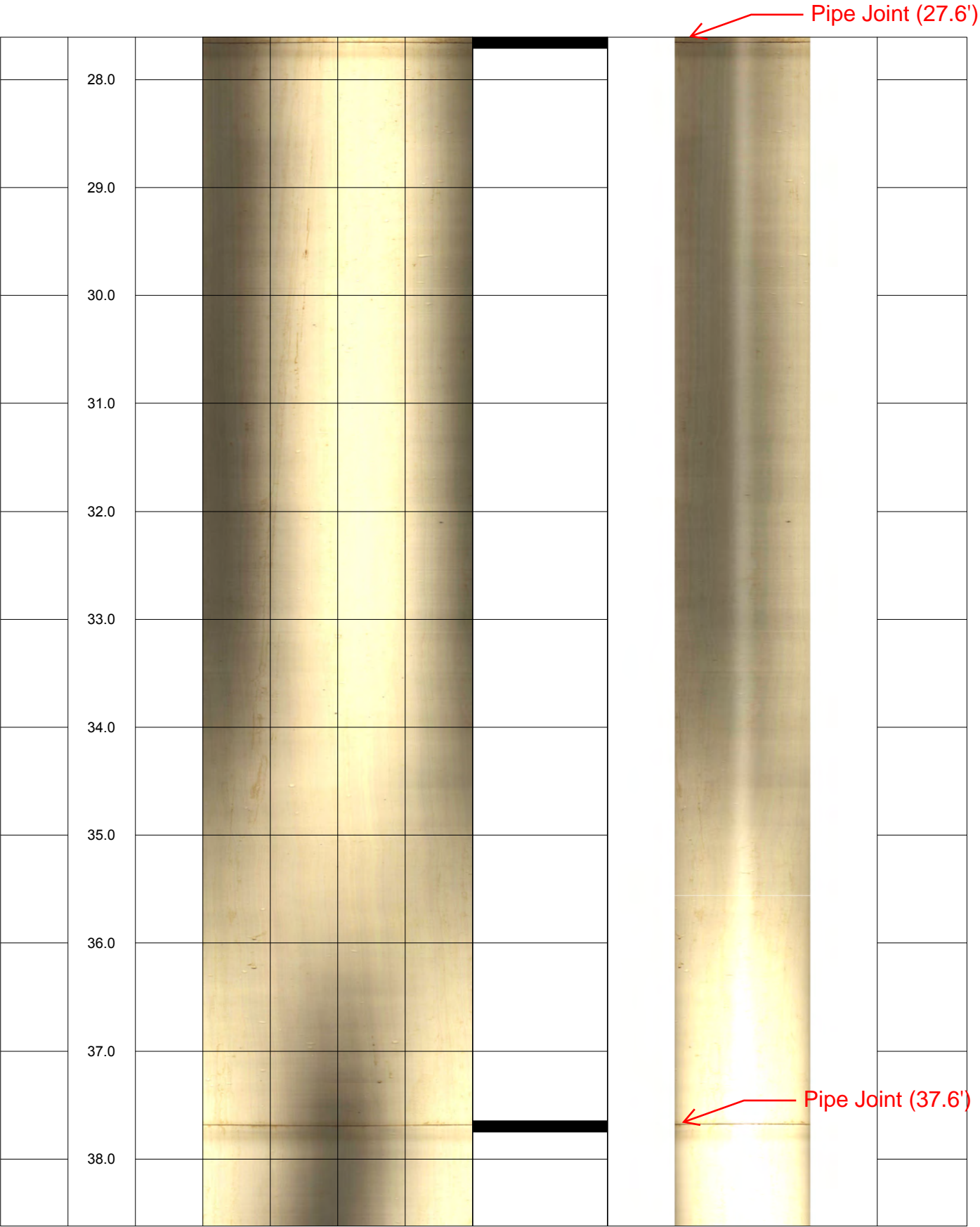
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
		(CL) - CLAY (CL), wet, red-yellow to yellow			Completion: protective aluminum cover with bollards; 2-foot square concrete pad Surface Seal: concrete
10		(CH) - CLAY (CH), yellow with red mottles - gravelly CLAY (CH), wet, yellow with red and black mottling			
20		- gravelly CLAY (CH), wet, brown-yellow with black mottling, cobbles, lesser gravel downward - ----some gravel			Annular Fill: cement-bentonite grout
30		- gravelly CLAY (CH), wet, yellow-red, cobbles (COBBLES AND BOULDERS) - DOLOSTONE boulder, cobbles, pulverized rock, dry, white			
		▼ (CH) - gravelly CLAY (CH), wet, red-yellow and gray, cobbles			
40		(COBBLES AND BOULDERS) - DOLOSTONE, cobbles, pulverized rock, dry, white and light gray - DOLOSTONE, light gray and dark gray, some iron staining, no HCl reaction, thin calcite veins			Annular Seal: bentonite pellets Filter: silica filter sand
50		- DOLOSTONE, light gray and gray, iron staining, no to low HCl reaction, calcite veins			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
		Bottom of borehole at 56.5 feet.			Sump:0.3999999999999999 ft.
60					

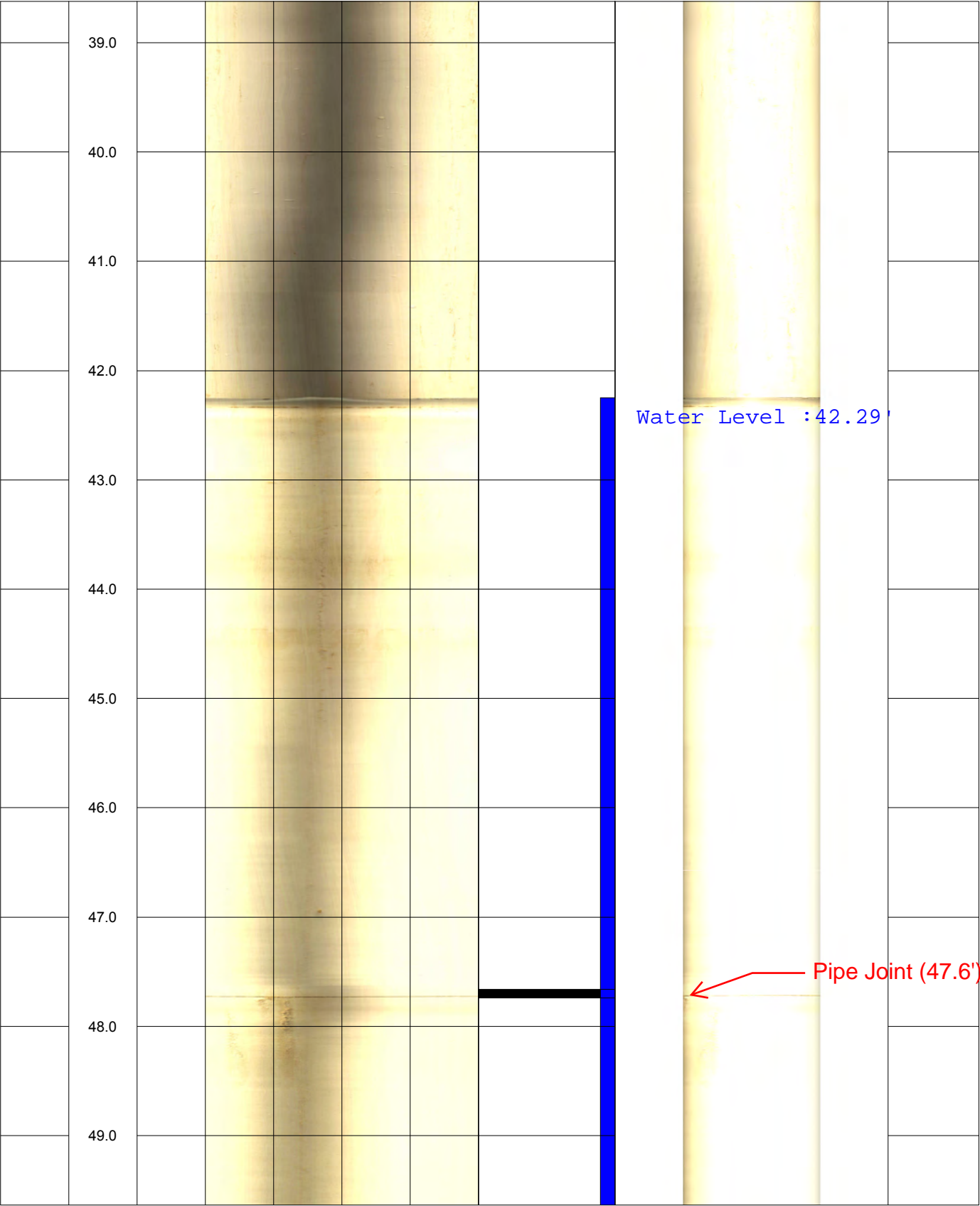
PLANT BOWEN
Optical Teleview
Magnetic North and 3D Image
GWA-47

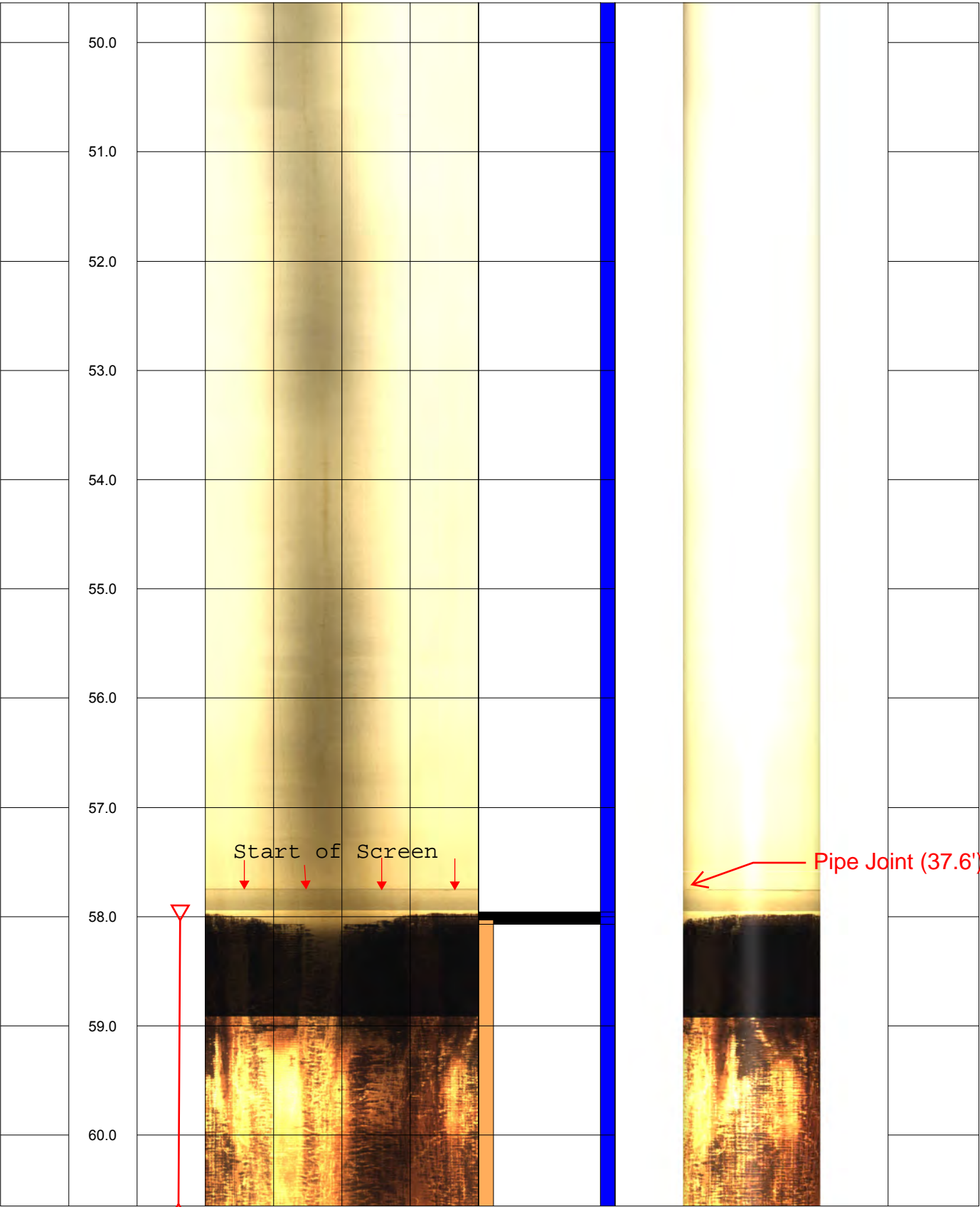


	17.0								
	18.0								
	19.0								
	20.0								
	21.0								
	22.0								
	23.0								
	24.0								
	25.0								
	26.0								
	27.0								

← Pipe Joint (17.6')

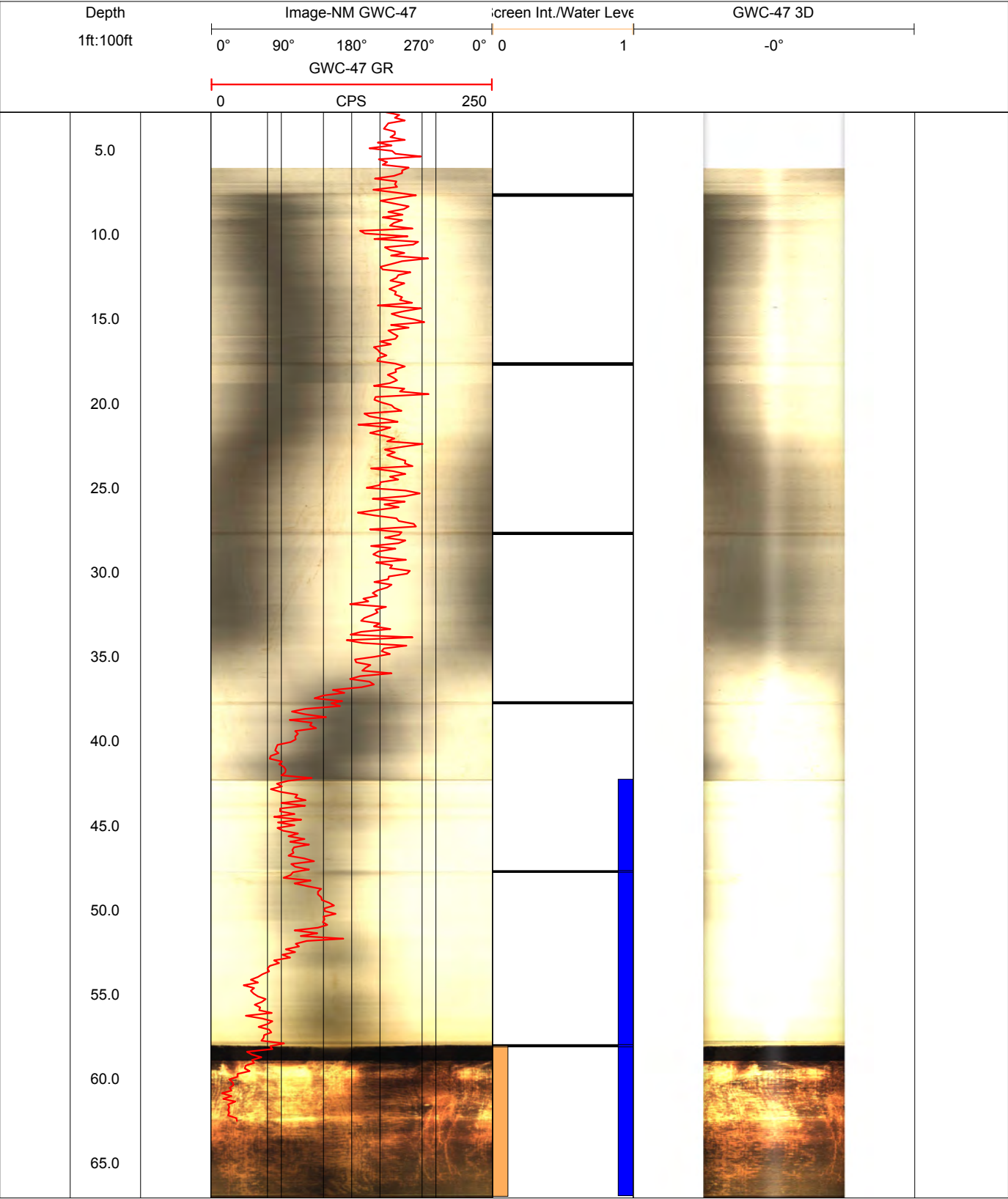


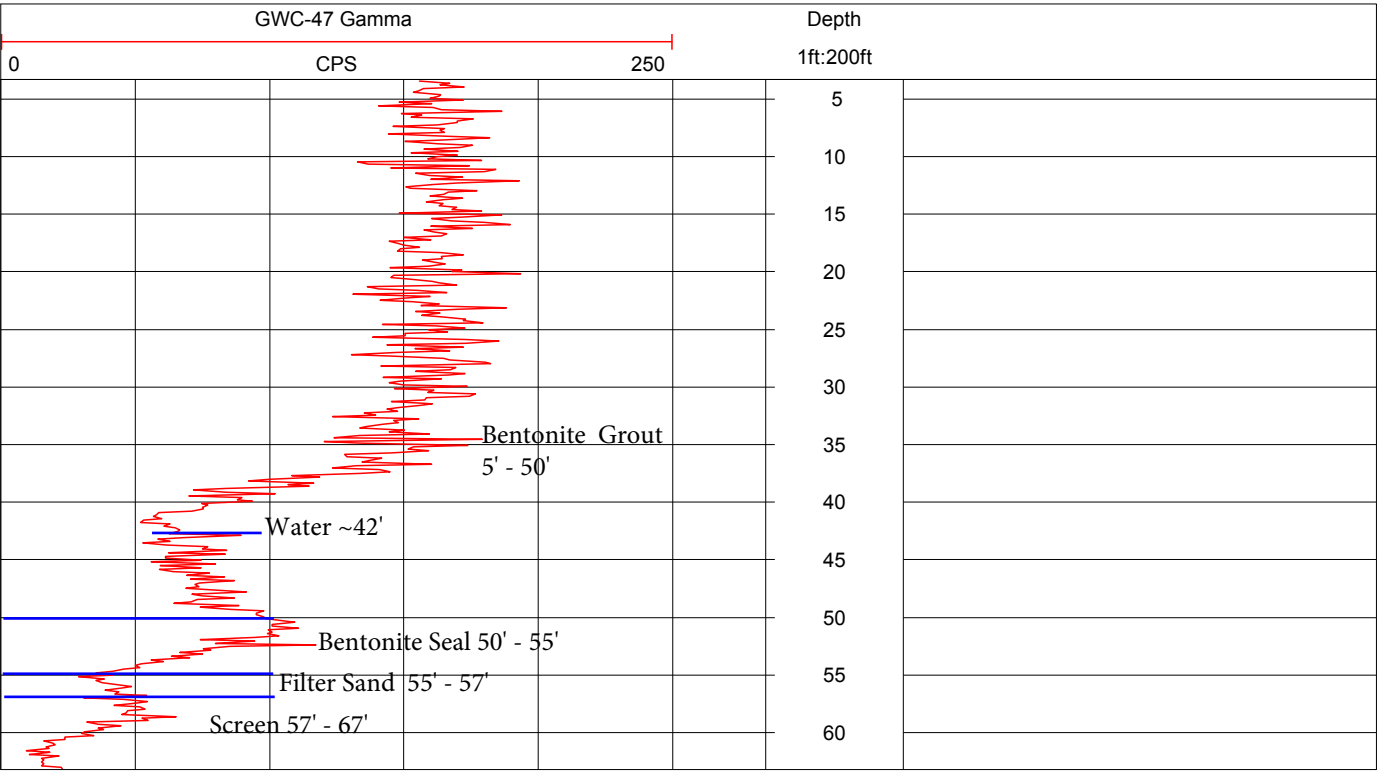




Borehole inundated
with dark material
growing on sidewalls.
In order to view better
exposure and light
were turned up.

BOH:
67.33'







LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-47R

PAGE 1 OF 2

ECS18611

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. 687.8 COORDINATES: N:1,504,538.35 E:2,072,467.98

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

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA
			Protective steel cover 4-foot square concrete pad Top of casing Elev. = 691.00
			ELEV. (DEPTH)
5		Silty Clay (CL-ML) - orange, moist, medium stiff, <i>residuum</i> , silty, dark red mottling, partially weathered rock fragments	← Surface Seal: concrete 685.8 (2.0)
10		Silty Clay (CL-ML) - orange, moist, medium stiff, <i>residuum</i> , silty, red and yellow mottling, partially weathered rock fragments	682.8
15		Silt (ML) - orange, moist, medium stiff, <i>residuum</i> , clayey, red and brown mottling	677.8
20		Silt (ML) - yellow, damp, medium stiff, <i>residuum</i> , clayey, orange and brown mottling, partially weathered rock fragments	672.8
25		Silt (ML) - yellow, damp, stiff, <i>residuum</i> , clayey, orange and yellow mottling, partially weathered rock fragments, trace sand	667.8
30		Silt (ML) - yellow, damp, medium stiff, <i>residuum</i> , clayey, brown and orange mottling, trace sand	662.8
35		Silt (ML) - yellow, damp, stiff, <i>residuum</i> , clayey, brown and orange mottling, trace sand	657.8
40		Lean to Fat Clay (CL-ML) - orange, wet, stiff, <i>residuum</i> , silty, red and yellow mottling, sandy in places	← Annular Fill: Portland Cement Grout 652.8
			647.8

(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

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA	
			ELEV. (CONTINUED)	ELEV. (DEPTH)
45		Silt (ML) - orange, very moist, soft, <i>residuum</i> , clayey, yellow and brown mottling, thin sand lenses	642.8	
50		Silt (ML) - orange, very moist, very soft, <i>residuum</i> , clayey, red and yellow mottling, partially weathered rock fragments, few thin sand lenses	637.8	
55		Silt (ML) - orange, very moist, very hard, <i>residuum</i> , clayey, yellow and light gray mottling, partially weathered rock fragments, trace sand	632.8	
60		(ML) - cored through sample interval - no recovery Chert - gray, not weathered, chert boulder	631.5	
65		Lean to Fat Clay (CH) - orange, very moist, very soft, <i>residuum</i> , sandy, red mottling, thin silt lenses	627.8	
70		Dolomite - gray, hard, slightly weathered, slightly decomposed, slightly fractured	620.8	622.8 (65.0)
75		Dolomite - gray, hard, slightly weathered, slightly decomposed, slightly fractured	618.0	
80		Dolomite - gray, hard, slightly to moderately weathered, slightly decomposed, slightly fractured	613.0	618.6 (69.2)
		Dolomite - gray, hard, slightly weathered, slightly decomposed, slightly fractured	608.0	617.0 (70.8)
		Dolomite - gray, hard, slightly weathered, moderately decomposed, slightly fractured	606.6	
Bottom of borehole at 81.2 feet.				607.0

Well: 2" OD PVC (SCH 40)
Screen: 10 ft. pre-pack
Sump: 0.40 ft.

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: CCB Disposal		DRILLING Boart Longyear		WELL NAME	
		DRILLER: Boart			
LOCATION:	Bowen	RIG TYPE: RotoSonic		GWA-48	
LOGGER:	G.Dyer	DRILLING METHODS: RotoSonic			
DATE CONSTRUCTED: 6/8/2011					
NOT APPLICABLE: Locking Hinged Top		TOP OF RISER		DEPTH FEET	ELEVATION FT, MSL
1/4-inch Vent		2" Threaded Riser Cap		0.00	688.49
1/4-inch Weep Hole					
2-ft x 2-ft concrete pad		GROUND SURFACE		2.00	686.49
		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		40.00	646.49
		ANNULAR SEAL TYPE: Hole Plug 3/8" Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall			
		TOP OF FILTER PACK		43.50	642.99
		FILTER PACK TYPE: DSI Sand - 2A (20/30) AMOUNT: 7 bags PLACEMENT Tremie; wash with water			
		BOTTOM OF RISER / TOP OF SCREEN		45.50	640.99
		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		55.50	630.99
Flush-threaded end cap		BOTTOM OF CASING		56.00	630.49
HOLE DIA: 6"					



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **GWC-48**

Sheet 1 of 2

SITE Plant Bowen		HOLE DEPTH 57'	SURFELEV 686.49 FT
LOCATION Landfill Cells 9 & 10		COORDINATES 34.1336098	-84.9060434
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	N			
0	686.49								
1	685.50	CLAYEY SILT (0 - 3 FT) White to tan and orange, weakly-cemented, clayey silt; few dolomitic fragments; dry.							
2	684.49								
3	683.49								
4	682.49	SILTY SAND (3 - 8 FT) Orange to red-brown silty sand with minor angular to sub-angular gravels; dry.							
5	681.49								
6	680.49								
7	679.49								
8	678.49	CLAYEY SILT (8 - 16 FT) Tan to white clayey silt with few gravels; dark colored banding - likely manganese bands with contorted bedding; moist.							
9	677.49								
10	676.49								
11	675.49								
12	674.49								
13	673.49								
14	672.49								
15	671.49	GRAVELLY SAND (16 - 22 FT) Brownish gravelly sand with wet clay layers; Low plastic clay.							
16	670.49								
17	669.49								
18	668.49								
19	667.49								
20	666.49								
21	665.49								
22	664.49								
23	663.49								
24	662.49								

<div> <div> DRILLING LOG GEOLOGICAL SERVICES </div> <div> Hole No. GWC-48 Sheet 2 of 2 </div> </div>								
SITE Plant Bowen			TOTAL DEPTH 57'		SURF.ELEV. 686.49 FT			
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test		Comments	% Rec	RQD
				From To	Blows	N		
25	661.49							
26	660.49							
27	659.49							
28	658.49							
29	657.49							
30	656.49	SILT						
31	655.49	Tan to orange silt (70%) with clay (15%) and sandy gravel (15%); low plastic clay; lacks structure; wet.						
32	654.49							
33	653.49							
34	652.49							
35	651.49							
36	650.49							
37	649.49							
38	648.49							
39	647.49							
40	646.49							
41	645.49							
42	644.49							
43	643.49							
44	642.49							
45	641.49							
46	640.49	SILT (46 - 50 FT) Tan to orange silt (70%) with clay (15%) and sandy gravel (15%); low plastic clay; lacks structure; wet.						
47	639.49							
48	638.49							
49	637.49							
50	636.49	CLAYEY SILT (50 - 56 FT) Tan to orange silt (65%) with clay (20%) and sandy gravel (15%); low plastic clay; lacks structure; wet.						
51	635.49							
52	634.49							
53	633.49							
54	632.49							
55	631.49							
56	630.49	END OF BORING, 57 FT						

SAMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 5/5/16 16:54 - S:\WORKGROUP\SPAC 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

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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 <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
		Elastic Silt (MH) (Con't)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
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)

SAMPLE 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
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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 <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
90		Sandy Lean Clay (CL)(Con't)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
95		- and dark yellowish brown (10YR 4/6) saturated, very soft, high plasticity, with gravel				(CONTINUED) Sump:0.299999999999997 ft.
100						Backfill:Filter Media 20/40 Silica Sand (0.25 - 50 lbs bags (90.0'-89.5')) and Baroid Hole Plug 3/8 Chips (5 - 50lbs bags (107.0'-92.0'))
105						Cave-in to 107 ft.
110		Bottom of borehole at 107.0 feet.				
115						
120						
125						
130						
135						

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/5/16 16:52 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT



LOG OF TEST BORING

BORING GWC-49 Z

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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		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.)	
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			(Recovery=65% between 57 and 67ft.)	
65						
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.)	
75						
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)

GEOTECHNOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 5/5/16 16:52 - S:\WORK\GROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT



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

DATE STARTED 4/16/2014 COMPLETED 4/17/2014 SURF. ELEV. 706.4 COORDINATES: N:1,504,244.54 E:2,072,917.59

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

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA
			Protective steel cover 4-foot square concrete pad Top of casing Elev. = 709.57
			ELEV. (DEPTH)
5		Lean Clay (CL-ML) - orange, very moist, medium stiff, yellow mottling, partially weathered rock fragments	704.4 (2.0)
10		Silt (ML) - brown, damp, very stiff, clayey, orange and dark red mottling, trace sand, partially weathered rock fragments	701.4
15		Well-graded Sand (SW) - gray, dry, medium dense, fine to coarse grain, yellow and red mottling, clay lenses, chert fragments	696.4
20		Lean Clay (CL-ML) - orange, damp, soft, yellow and red mottling, occasional partially weathered rock fragments, trace sand	691.4
25		Silt (ML) - orange, damp, very stiff, clayey, red and yellow mottling, partially weathered rock fragments, trace sand	686.4
30		Silt (ML) - orange, damp, very stiff, clayey, red and yellow mottling, partially weathered rock fragments, trace sand	681.4
35		Silt (ML) - orange, damp, very stiff, clayey, red, yellow, and light gray mottling, occasional partially weathered rock fragments, sandy lenses throughout	676.4
40		Silt (ML) - orange, damp, stiff, clayey, red and yellow mottling, partially weathered rock fragments	671.4
			666.4

(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

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA	
			Protective steel cover 4-foot square concrete pad Top of casing Elev. = 709.57	ELEV. (DEPTH)
45		Lean to Fat Clay (CH) - red, damp, stiff, low to medium plasticity, yellow mottling, silty, trace sand		
50		Silt (ML) - orange, damp, medium stiff, clayey, yellow and light yellow mottling, clayey lenses		
55		Silt (ML) - yellow, very moist, stiff, clayey, light yellow mottling, few sand lenses		
60		Silt (ML) - yellow, wet, medium stiff, clayey, brown mottling, few thin sand lenses, trace clay		
65		Clayey Sand (SC) - brown, wet, medium dense, medium to coarse grain		
70		Elastic Silt (MH) - yellow, wet, hard, medium plasticity, clayey, orange and black mottling, partially weathered rock fragments		
75		Silt (MH) - yellow, wet, soft, medium plasticity, clayey, orange and black mottling, trace sand		
80		Elastic Silt (ML) - yellow, wet, stiff, clayey, orange and dark brown mottling, clay lenses, partially weathered rock fragments		
85		(MH) - yellow, wet, very hard, medium plasticity, clayey, brown mottling, sand lenses, partially weathered rock fragments		

← Annular Fill: Portland Cement Grout

(Continued Next Page)

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



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

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	WELL DATA	
			ELEV. (CONTINUED)	ELEV. (DEPTH)
90		(MH)(Cont)	616.4	
		- hard, No recovery		
95		Elastic Silt (MH) - brown, wet, very stiff, medium plasticity, clayey, orange mottling, sandy lenses, partially weathered rock fragments	611.4	
100		Elastic Silt (MH) - orange, wet, very stiff, medium plasticity, clayey, gray mottlin, partially weathered rock fragments, clay lenses, trace sand	606.4	
105		Silt (MH) - orange, wet, very soft, clayey, light orange mottling, heavily and partially weathered rock fragments, trace sand	601.4	
110		Clayey Sand (ML) - gray, wet, very hard, clayey, yellow mottling, partially weathered rock fragments	596.4	
115		Dolomite (SC) - yellow, wet, very hard, fine to coarse grain, partially weathered rock fragments	591.4	593.4 (113.0)
120		Dolomite - gray, hard, slightly weathered, slightly disintegrated, slightly fractured	586.4	586.8 (119.6) 585.7 (120.7)
125		Dolomite - gray, hard, moderately weathered, slightly disintegrated, moderately to intensely fractured	581.4	
130		Dolomite - gray, hard, slightly weathered, slightly disintegrated, moderately to intensely fractured	576.4 575.3	575.7
Bottom of borehole at 131.1 feet.				

Protective steel cover
4-foot square concrete pad
Top of casing Elev. = 709.57

Annular Seal: bentonite pellets

Filter: silica filter sand

Well: 2" OD PVC (SCH 40)

Well: 2" OD PVC (SCH 40)
Screen: 9.999999999999999 ft. pre-pack

Sump: 0.40 ft.

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, MSL
	TOP OF RISER -2.40	722.98
GROUND SURFACE	0.00	720.58
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	642.58
ANNULAR SEAL TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK	81.50	639.08
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	636.55
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	626.55
BOTTOM OF CASING	94.33	626.25
HOLE DIA: 10.5"		

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50

Sheet 1 of 4

SITE Plant Bowen Dry Gypsum Storage Facility		HOLE DEPTH 93.5	SURF. ELEV. 720.58
LOCATION Cells 1 & 2	COORDINATES N 1502156.81	E 2072442.89	
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. _____	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	720.58								
1	719.58								
2	718.58								
3	717.58								
4	716.58								
5	715.58	Dark red CLAY, dry, stiff, with light gray mottling	S-1	4.5-6	4-7-10	17			
6	714.58								
7	713.58								
8	712.58								
9	711.58								
10	710.58	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	709.58								
12	708.58								
13	707.58								
14	706.58								
15	705.58	Dark red CLAY, dry, stiff, with orange and white pebbles	S-3	14.5-16	6-8-8	16			
16	704.58								
17	703.58								
18	702.58								
19	701.58								
20	700.58	Orange and dark red silty CLAY, dry, stiff, occassional pebbles	S-4	19.5-21	7-8-11	19			
21	699.58								
22	698.58								
23	697.58								
24	696.58								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50

Sheet 2 of 4

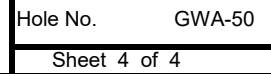
SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	93.5	SURF.ELEV.	720.58
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	695.58	Light tan and white silty CLAY, dry, stiff, with occasional pebbles	S-5	24.5-26	6-8-9	17			
26	694.58								
27	693.58								
28	692.58								
29	691.58								
30	690.58	Dark red and white silty CLAY, dry, crumbly, occasional tan mottling	S-6	29.5-31	6-12-13	25			
31	689.58								
32	688.58								
33	687.58								
34	686.58								
35	685.58	Light tan and orange silty CLAY, moist, with occasional pebbles	S-7	34.5-36	7-7-11	18			
36	684.58								
37	683.58								
38	682.58								
39	681.58								
40	680.58	Same as above	S-8	39.5-41	4-4-4	8			
41	679.58								
42	678.58								
43	677.58								
44	676.58								
45	675.58	Tan and light brown clayey SILT, moist, some white mottling, occasional coarse sand grains	S-9	44.5-46	5-10-10	20			
46	674.58								
47	673.58								
48	672.58								
49	671.58								
50	670.58	Orange and brown clayey SILT, moist, firm, occasional dark brown mottling, degraded white cobbles	S-10	49.5-51	3-4-5	9			
51	669.58								
52	668.58								
53	667.58								
54	666.58								
55	665.58	Orange SILT, moist, softer, degraded and intact gravel and cobbles	S-11	54.5-56	6-9-10	19			
56	664.58								

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GWA-50

Sheet 3 of 4

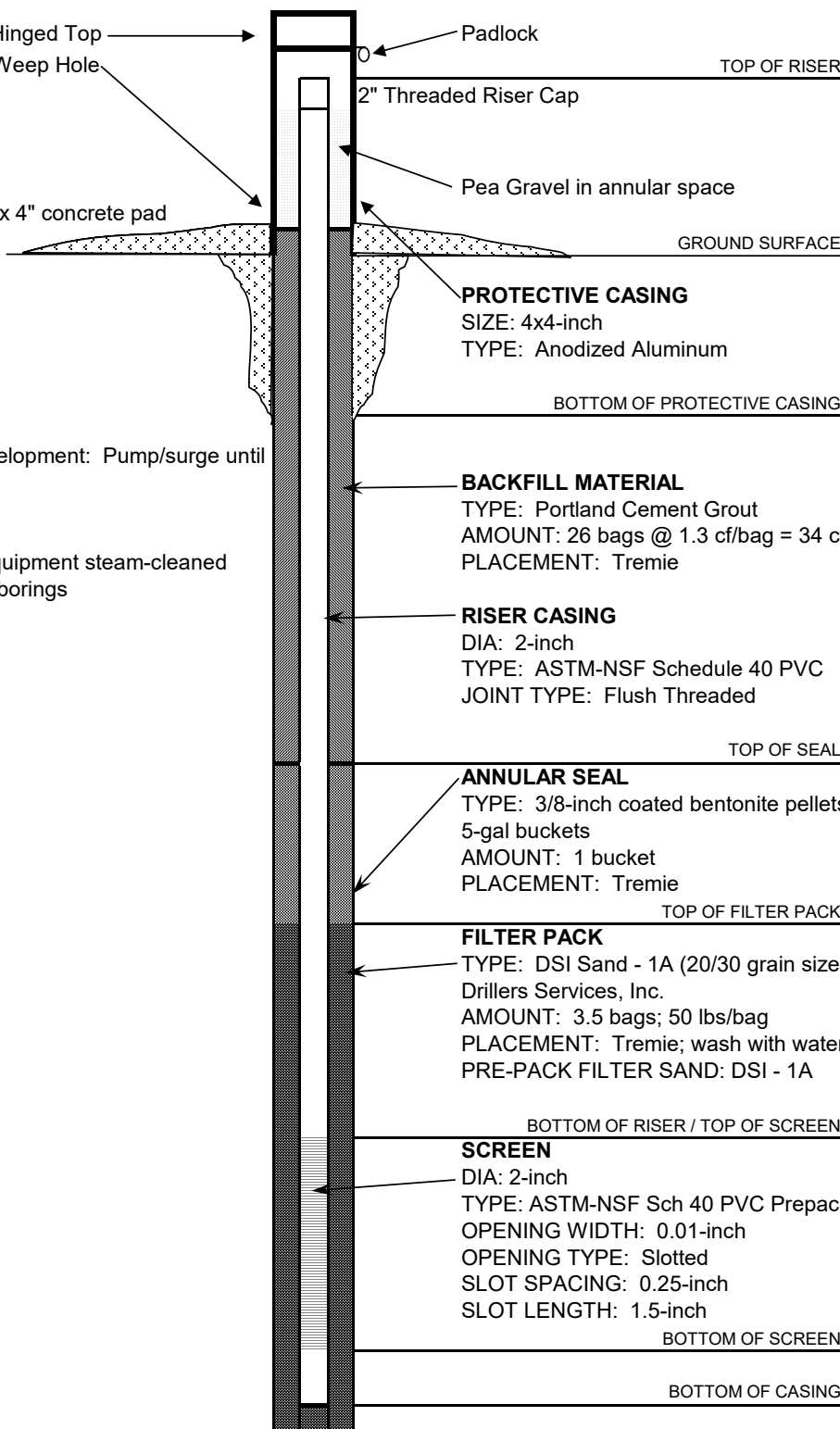
SITE		Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	93.5	SURF.ELEV.	720.58
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	663.58	Same as above, with chert	S-12	59.5-61	3-4-5	9			
58	662.58								
59	661.58								
60	660.58								
61	659.58								
62	658.58	Same as above	S-13	64.5-66	5-8-12	20			
63	657.58								
64	656.58								
65	655.58								
66	654.58								
67	653.58	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			
68	652.58								
69	651.58								
70	650.58								
71	649.58								
72	648.58	Chert cobble in bottom of spoon	S-15	74.5-76	50/1	R			
73	647.58								
74	646.58								
75	645.58								
76	644.58								
77	643.58	Auger refusal - 78.2							
78	642.58								
79	641.58								
80	640.58								
81	639.58								
82	638.58	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		
83	637.58								
84	636.58								
85	635.58								
86	634.58								
87	633.58								
88	632.58								



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, MSL
	Locking Hinged Top		
	1/4-inch Weep Hole		
	Padlock		
	TOP OF RISER	-2.30	721.30
	2" Threaded Riser Cap		
	Pea Gravel in annular space		
	4-ft x 4-ft x 4" concrete pad		
	GROUND SURFACE	0.00	719.00
	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: 26 bags @ 1.3 cf/bag = 34 cf PLACEMENT: Tremie			
RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded			
TOP OF SEAL	128.00	591.00	
ANNULAR SEAL TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie			
TOP OF FILTER PACK	130.00	589.00	
FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Drillers Services, Inc. AMOUNT: 3.5 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water PRE-PACK FILTER SAND: DSI - 1A			
BOTTOM OF RISER / TOP OF SCREEN	128.18	590.82	
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	138.18	580.82	
BOTTOM OF CASING	138.48	580.52	
HOLE DIA: 7.5"			

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. 719.00
LOCATION Cells 1 & 2	COORDINATES N 1502153.94	E 2072448.71	
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	719.00								
1	718.00	Red silty CLAY, dry, hard, with gravel, occasional tan mottling	S-1	4.5-6	10-14-22	36			
2	717.00								
3	716.00								
4	715.00								
5	714.00								
6	713.00								
7	712.00								
8	711.00	Dark red silty CLAY, dry, hard, with gravel, orange and tan mottling	S-2	9.5-11	8-14-20	34			
9	710.00								
10	709.00								
11	708.00								
12	707.00								
13	706.00								
14	705.00								
15	704.00	Dark red clayey SILT, dry, hard, with gravel carbonate pebbles	S-3	14.5-16	8-13-16	29			
16	703.00								
17	702.00								
18	701.00								
19	700.00	Dark red silty CLAY, dry, hard, with gravel and brown mottling	S-4	19.5-21	7-12-16	28			
20	699.00								
21	698.00								
22	697.00								
23	696.00								
24	695.00								

**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.	719.00
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
25	694.00	Orange and white silty CLAY, moist, hard, with sand and gravel	S-5	From To	Blows	N			
26	693.00			24.5-26	10-8-10	18			
27	692.00								
28	691.00								
29	690.00								
30	689.00	Pink and white silty CLAY, moist, firm, with degraded carbonate pebbles	S-6	29.5-31	15-16-13	29			
31	688.00								
32	687.00								
33	686.00								
34	685.00								
35	684.00	Pink and tan clayey SILT, dry, with trace sand, degraded carbonate cobbles	S-7	34.5-36	6-21-21	42			
36	683.00								
37	682.00								
38	681.00								
39	680.00								
40	679.00	Orange and white silty CLAY, dry, firm, with pebbles and gravel	S-8	39.5-41	6-25-14	39			
41	678.00								
42	677.00								
43	676.00								
44	675.00								
45	674.00	Tan and white silty CLAY, moist, plastic, some dark orange mottling	S-9	44.5-46	5-5-3	8			
46	673.00								
47	672.00								
48	671.00								
49	670.00								
50	669.00	Same as above	S-10	49.5-51	4-5-11	16			
51	668.00								
52	667.00								
53	666.00								
54	665.00								
55	664.00	Tan and orange silty CLAY, moist, plastic, occasional white mottling, cobbles	S-11	54.5-56	7-8-3	11			
56	663.00								

**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.	719.00
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
57	662.00	Light orange and tan silty CLAY, moist, plastic, occassional white mottling, gravel	S-12	59.5-61	6-9-7	16			
58	661.00								
59	660.00								
60	659.00								
61	658.00								
62	657.00	Tan and orange clayey SILT, moist, plastic, with chert sand and pebbles	S-13	64.5-66	3-7-9	16			
63	656.00								
64	655.00								
65	654.00								
66	653.00								
67	652.00	Orange clayey SILT, moist, firm, occassional black mottling	S-14	69.5-71	3-5-8	13			
68	651.00								
69	650.00								
70	649.00								
71	648.00								
72	647.00	Orange clayey SILT, moist, firm, with chert and carbonate pebbles, saturated last 3"	S-15	74.5-76	4-7-16	23			
73	646.00								
74	645.00								
75	644.00								
76	643.00								
77	642.00	White and light tan clayey SILT, moist, firm, orange and brown mottling	S-16	79.5-81	4-6-7	13			
78	641.00								
79	640.00								
80	639.00								
81	638.00								
82	637.00	Light tan silty CLAY, moist, firm, with chert and carbonate gravel	S-17	84.5-86	7-7-24	31			
83	636.00								
84	635.00								
85	634.00								
86	633.00								
87	632.00								
88	631.00								

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. **719.00**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD		
				From To	Blows	N					
89	630.00	Tan clayey SILT, moist, firm, with chert gravel	S-18	89.5-91	4-4-10	14					
90	629.00										
91	628.00										
92	627.00										
92	627.00	Auger refusal - 92.0									
93	626.00										
94	625.00	No recovery								92-97	0.0/5.0
95	624.00	White fossiliferous carbonate gravel and cobbles, gray chert with pink veining and non-directional fractures								97-107	0.2/10.0
96	623.00										
97	622.00										
98	621.00										
99	620.00										
100	619.00										
101	618.00										
102	617.00										
103	616.00										
104	615.00										
105	614.00	Tan carbonate as above								107-117	1.5/10.0
106	613.00										
107	612.00										
108	611.00										
109	610.00										
110	609.00										
111	608.00										
112	607.00										
113	606.00										
114	605.00										
115	604.00										
116	603.00										
117	602.00										
118	601.00										
119	600.00										
120	599.00										

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. GWC-45R

Sheet 5 of 5

SITE **Plant Bowen Dry Gypsum Storage Facility** TOTAL DEPTH **142.9** SURF.ELEV. **719.00**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
121	598.00	Same as above		127-137			1.4/10.0		
122	597.00								
123	596.00								
124	595.00								
125	594.00								
126	593.00								
127	592.00								
128	591.00								
129	590.00								
130	589.00								
131	588.00	Same as above		137-142.9			1.5/6.7		
132	587.00								
133	586.00								
134	585.00								
135	584.00								
136	583.00								
137	582.00								
138	581.00								
140	579.00								
141	578.00								
142	577.00	142.9 - Bottom of boring							
143	576.00								
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 5/5/16 16:54 - S:\WORKGROUP\SPC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLACEMENT



LOG OF TEST BORING

BORING GWA-51R Z

PAGE 2 OF 2

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
		Elastic Silt (MH) (Con't)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
50		Clayey Gravel (GC) - reddish yellow (7.5YR 6/6) wet - some cobbles, pulverized rock				
55		Dolostone - grayish brown (2.5Y 5/2) and gray (10YR 5/1) hard - medium dark gray (N4) and dark greenish gray (5GY 4/1) fine grain, hard, not to slightly weathered on fractures weathered, slightly fractured, carbonate, thin fractures healed with calcite				
60						
65						Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (0.5 - 5gal buckets (78.5'-75.0')) and Baroid Hole Plug 3/8 Chips (15 - 50lbs bags (75.0'-22.0'))
70		- dark gray (N3) fine grain, hard, not to slightly weathered, medium to thick bedded, slight to moderately fractured, vertical and cross-cutting thin fractures, calcite healed fractures				
75						
80		- dark gray (N3) and black (N1) fine grain, hard, not to slightly weathered, medium to thick bedded, slight to moderately fractured, low carbonate reaction, fractures healed with calcite, fractures up to 2 inch, cross-cutting, brown-yellow water staining on fractures				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
90		- thick to massive bedded				Sump: 0.299999999999997 ft. Backfill: Filter Media 20/40 Silica Sand (0.25 - 50 lbs bags (92.0'-91.0')) Cave-in to 92 ft.
95		Bottom of borehole at 92.0 feet.				

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

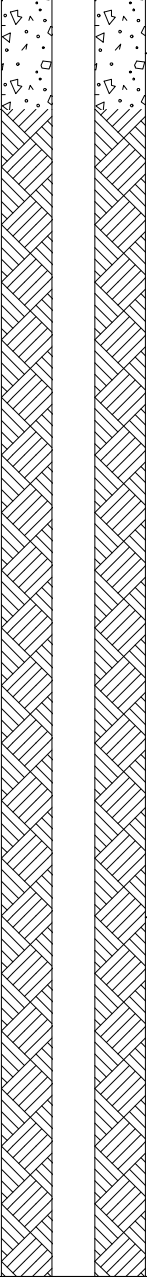


LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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

DATE STARTED 4/7/2015 COMPLETED 4/21/2015 SURF. ELEV. 707.1 COORDINATES: N:34.136295 E:84.902680
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 710.12, 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	
5		707.1	 <p>Surface Seal: Concrete</p> <p>Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water)</p>	
10		703.6		
15				
20				
25				
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\COB 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					
50					
55		653.1			Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water)
60					
65					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'))
70		638.3 636.5			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		626.5 626.2			Sump: 0.30 ft. Cave-in to 80.96 ft.
85					

Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water)

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'))

Filter: Filter Media 1A Silica Sand (7 - 50 lbs bags)

Standpipe: 2" OD PVC (SCH 40)
Screen: 10 ft; 0.010" Slot Prepack

Sump: 0.30 ft.
Cave-in to 80.96 ft.



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. 707.1 COORDINATES: N:34.136295 E:84.902680

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 710.12, 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				
15						
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				
25						
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						

(Continued Next Page)

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



LOG OF TEST BORING

BORING GWA-52
PAGE 2 OF 2
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:\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 <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma <small>55 110 165</small>
45		Lean Clay (CL) (Con't) - 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				
50						
55		Silt (ML) - 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 ▼ ▼				
60						
65		- 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 ▽ - 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'				
70						
75		Lean Clay (CL) - red (10R 4/8) residuum wet, soft, low to medium plastic, some interbedded CH, trace zones of light gray angular dolomite fragments				
80		Dolomite with Chert fragments				
		Bottom of borehole at 81.0 feet.				
85						

WELL CONSTRUCTION LOG - ES&E DATABASE GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB 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

DATE STARTED 3/26/2015 COMPLETED 4/10/2015 SURF. ELEV. 708.3 COORDINATES: N:34.136946 E:84.902146

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 711.38, 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	
5		708.3	Surface Seal: Concrete	
		705.3		
10				
15				
20			Annular Fill: Portland Cement-Bentonite Grout (39 - 47lbs bags PC, 3 - 50lbs bags Gel, 255 gal. Water)	
25				
30				

(Continued Next Page)

WELL CONSTRUCTION LOG - ES&E DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB 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)					
35					
40					
45					
50					
55		653.3			
60					
65					

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

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'))

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



LOG OF WELL CONSTRUCTION

WELL: GWA-53
PAGE 3 OF 4
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
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad		
			(CONTINUED)		
70					
75					
80					
85					
90					
95					
100					
105		603.3			

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'))

Filter: Filter Media 1A Silica Sand (4.5 - 50 lbs bags)

(Continued Next Page)

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'))

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



LOG OF WELL CONSTRUCTION

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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)	
110		600.8	Filter: Filter Media 1A Silica Sand (4.5 - 50 lbs bags)	
115			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
		590.8 590.5	Sump: 0.30 ft. Cave-in to 117.85 ft.	
120				
125				
130				
135				
140				



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

DATE STARTED 3/26/2015 COMPLETED 4/10/2015 SURF. ELEV. 708.3 COORDINATES: N:34.136946 E:84.902146

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 711.38, 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 Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
5		Silt (ML) - mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, some light gray to white/angular to subangular dolomite fragments			SPT N=42bpf(@3ft.) 12/18/24			
10		- mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, trace white/medium to coarse/angular dolomite fragments			SPT N=32bpf(@8ft.) 7/15/17			
15		- 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			SPT N=21bpf(@13ft.) 8/9/12			
20		Elastic Silt (MH) - 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			SPT N=19bpf(@18ft.) 6/9/10			
25		- 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			SPT N=20bpf(@23ft.) 6/6/14			
30		Silt (ML) - 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			SPT N=11bpf(@28ft.) 3/5/6			

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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



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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 <small>Weak Moderate Strong</small>	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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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



LOG OF TEST BORING

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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)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	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\COB 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

DATE STARTED 3/30/2015 COMPLETED 4/10/2015 SURF. ELEV. 708.8 COORDINATES: N:34.136928 E:84.902169

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 711.93, 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	
5		708.8	Surface Seal: Concrete	
10		705.8		
15				
20			Annular Fill: Portland Cement-Bentonite Grout (28 - 47lbs bags PC, 2 - 50lbs bags Gel, 120 gal. Water)	
25				
30				

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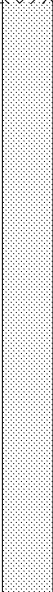

LOG OF WELL CONSTRUCTION

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					Annular Fill: Portland Cement-Bentonite Grout (28 - 47lbs bags PC, 2 - 50lbs bags Gel, 120 gal. Water)
40					
45					
50					
55		656.8			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'))
60					
65					

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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)		
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\COB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4 WEL



LOG OF WELL CONSTRUCTION

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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)	
140				
145				
150				
		555.8		
		554.7	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'))	
155			Filter: Filter Media 1A Silica Sand (5 - 50 lbs bags)	
160			Standpipe: 2" OD PVC (SCH 40) Screen: 11 ft; 0.010" Slot Prepack	
165		543.7 543.4	Sump: 0.30 ft. Cave-in to 165.44 ft.	
170				



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

DATE STARTED 3/30/2015 COMPLETED 4/10/2015 SURF. ELEV. 708.8 COORDINATES: N:34.136928 E:84.902169

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 711.93, 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 Weak Moderate Strong	COMMENTS	Natural Gamma 55 110 165
		Elastic Silt (MH) - dusky red (10R 3/3) fill dry, very stiff, trace organics and medium to coarse/subangular to subrounded rock fragments			Soil density gauged by thumb penetration	
5		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 - 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				
10		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 - 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				
15						
20						
25						
30		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'				

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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

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



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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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <div>Weak Moderate Strong</div>	COMMENTS	Natural Gamma		
						55	110	165
35		Silt (ML) (Con't) - 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 - 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						
40								
45								
50								
55		Lean Clay (CL) ▽ - 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						
60		▽						
65		▽						

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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



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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)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <div>Weak Moderate Strong</div>	COMMENTS	Natural Gamma <div>55110165</div>
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						
95		Dolostone			Limited Recovery	
		VOID - possible solution cavity (91-95')				
100		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	
		VOID - possible solution cavity (100-104')				

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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



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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)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	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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GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUP\SPAC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB WELLS 2015\CELLS 3-4 WELLS\BORING LOGS\PLANT BOWEN CELLS 3 & 4



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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)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <div>Weak Moderate Strong</div>	COMMENTS	Natural Gamma <div>55110165</div>
140		VOID - possible solution cavity (130-143') (Con't)				
145		Dolostone - light gray (N7) and light bluish gray (10B 7/1) very fine to fine grain, medium hard, slightly to moderately weathered, massive, apparent low-angle to horizontal fractures with no to partial healing, trace vertical to high-angle fractures that show apparent moderate to full healing, trace brown staining within some partially healed fractures			No intact recovery	
150		VOID - possible solution cavity (147-153') - no recovery				
155		Dolostone with trace interbedded Chert nodules - light gray (N7) and bluish gray (10B 5/1) very fine to medium grain, massive, mostly small pieces and fragments recovered, trace samples show fracture orientation, low- to high-angle fractures, no to moderate healing, trace fully healed fractures, calcite fracture fill visible, dark brown to red staining visible within some fractures, small 1-2mm thick fill, zone of thick 6-8mm thick moderately to fully healed fractures with large calcite crystals visible @ approx. 164'			No intact recovery	
160						
165						
		Bottom of borehole at 165.4 feet.				
170						

WELL CONSTRUCTION LOG - ES&E DATABASE GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB 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










DATE STARTED 3/25/2015 COMPLETED 4/14/2015 SURF. ELEV. 701.7 COORDINATES: N:34.137385 E:84.901333

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 704.63, 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 Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	NOTES
.....		701.7		
.....		698.7		
5				
.....				
10				
.....				
15				
.....				
20				
.....				
25				
.....				
30				
.....				
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\COB 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		647.7			Annular Fill: Portland Cement-Bentonite Grout (20 - 47lbs bags PC, 2.25 - 50lbs bags Gel, 120 gal. Water)
60		640.8			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (2 - 5gal buckets (60.9'-54.0'))
		638.8			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
		628.8 628.5			Sump: 0.30 ft. Cave-in to 73.17 ft.
75					
80					



LOG OF TEST BORING

BORING GWA-54
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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. 701.7 COORDINATES: N:34.137385 E:84.901333

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 704.63, 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 Weak Moderate Strong	COMMENTS	Natural Gamma		
						55	110	165
5		Silt (ML) - red / moderate reddish brown (10R 4/6) fill moist, hard, trace organics and interbedded clay lenses - 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			Soil density gauged by thumb penetration			
10		- 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						
15								
20		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						
25								
30		- 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						
35								

(Continued Next Page)

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



LOG OF TEST BORING

BORING GWA-54
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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:\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 <small>Weak Moderate Strong</small>	COMMENTS	Natural Gamma 55 110 165
40		Elastic Silt (MH) (Con't) - strong brown (7.5YR 5/6) residuum moist, very stiff, low plastic, interbedded CL, light gray/cobble/angular to subangular dolomite and chert fragments				
45						
50		Sandy Lean Clay (CL) - trace mottling red (2.5YR 5/8), red (10R 4/8) and light brown (7.5YR 6/4) residuum moist to wet, stiff, medium to high plastic, interbedded pockets of very fine grained non plastic silt (7.5YR 6/4) and trace interbedded CH, coarse to cobble/angular to rounded abundant dolomite and trace chert fragments				
55						
60		- yellowish red (5YR 4/6) residuum wet, stiff, medium plastic, abundant medium to coarse/angular dolomite and chert fragments, soft zone with slight decrease in clay @ approx. 61-62', trace interbedded CH				
65						
70		- yellowish red (5YR 4/6) residuum wet, soft to very soft, medium plastic, coarse to cobble size chert fragments, thin zone of light gray to medium gray silty sand (>1' thick) @ approx. 72.5'				
75		Bottom of borehole at 73.2 feet.				
80						

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



LOG OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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

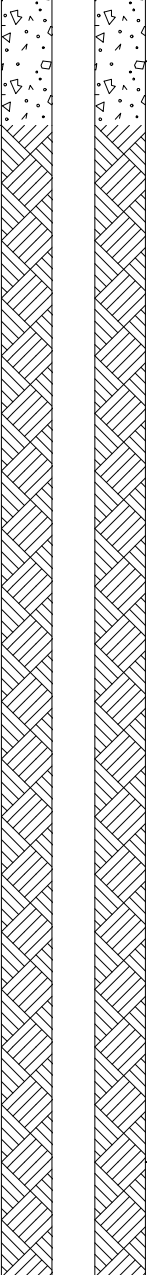
DATE STARTED 3/18/2015 COMPLETED 4/15/2015 SURF. ELEV. 694.2 COORDINATES: N:34.137888 E:84.900608

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 697.01, 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	
		694.2	 <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>	
		691.7		
5				
10				
15				
20				
25				

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB 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		651.2			
50		643.8		Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (4 - 5gal buckets (50.4'-43.0'))	
		642.1		Filter: Filter Media 1A Silica Sand (5 - 50 lbs bags)	
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\COB 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)	
60			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
		632.1 631.8	Sump: 0.30 ft. Cave-in to 62.42 ft.	
65				
70				
75				
80				
85				



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

DATE STARTED 3/18/2015 COMPLETED 4/15/2015 SURF. ELEV. 694.2 COORDINATES: N:34.137888 E:84.900608

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 697.01, 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) - 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 - 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 - increase in size of rock fragments, very coarse to cobble size - 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						
10								
15								
20		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						
25								

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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



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\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
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			Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered	
50		VOID - possible solution cavity (48'-52')				
55		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				

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



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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION	COMMENTS	Natural Gamma		
				Weak Moderate Strong		55	110	165
60		noted a thin open section @ 58-58.5' Dolostone (Con't)						
65								
70								
75								
80								
85								

Bottom of borehole at 62.4 feet.

WELL CONSTRUCTION LOG - ES&E DATABASE GDT - 5/20/15 13:17 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\COB 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




DATE STARTED 3/11/2015 COMPLETED 4/15/2015 SURF. ELEV. 694.0 COORDINATES: N:34.137906 E:84.900573

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 696.84, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet.

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	NOTES
.....		694.0		← Surface Seal: Concrete
.....		691.5		
5				Annular Fill: Portland Cement-Bentonite Grout (40 - 47lbs bags PC, 4.5 - 50lbs bags Gel, 205 gal. Water) ←
.....				
10				
.....				
15				
.....				
20				
.....				
25				
.....				
30				
.....				
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\COB 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	ELEVATION	WELL DATA	NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	
			(CONTINUED)	
40				
45				
		647.5		
50				
55				
60				
65				
70				
75				
80				

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

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'))



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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\COB 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	ELEVATION	WELL DATA		NOTES
			Completion: Protective aluminum cover with bollards; 4-foot square concrete pad		
			(CONTINUED)		
85					
90					
		602.3			
		601.5			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					
		591.5			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack
		591.2			Sump: 0.30 ft. Cave-in to 102.83 ft.
105					
110					
115					
120					
125					



LOG OF TEST BORING

BORING 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

DATE STARTED 3/11/2015 COMPLETED 4/15/2015 SURF. ELEV. 694.0 COORDINATES: N:34.137906 E:84.900573

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 696.84, 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
		Silt (ML)						
5		- 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			

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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



LOG OF TEST BORING

BORING 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

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 <small>55 110 165</small>
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				

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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\COB 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)		
					Annular Fill: Portland Cement-Bentonite Grout (12 - 47lbs bags PC, 1 - 50lbs bags Gel, 65 gal. Water)
35		654.5			
40					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'))
45					
50					
55					
60					
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\COB 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)	
70		618.7	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'))	
		616.9	Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)	
75				
			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
80				
		606.9 606.6	Sump: 0.30 ft. Cave-in to 82.96 ft.	
85				
90				
95				
100				



LOG OF TEST BORING

BORING GWA-56

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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. 689.5 COORDINATES: N:34.138148 E:84.900193

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 692.45, 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 Weak Moderate Strong	COMMENTS	Natural Gamma 55 110 165
		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		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				
10		- 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				
15						
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				
25						
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				

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



LOG OF TEST BORING

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <div>Weak Moderate Strong</div>	COMMENTS	Natural Gamma <div>55110165</div>
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				
50		Chert (ledge)			Limited Recovery	
55		VOID - possible solution cavity (48'-68') - mud filled void, no recovery				
60						
65						

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GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:25 - 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



LOG OF TEST BORING

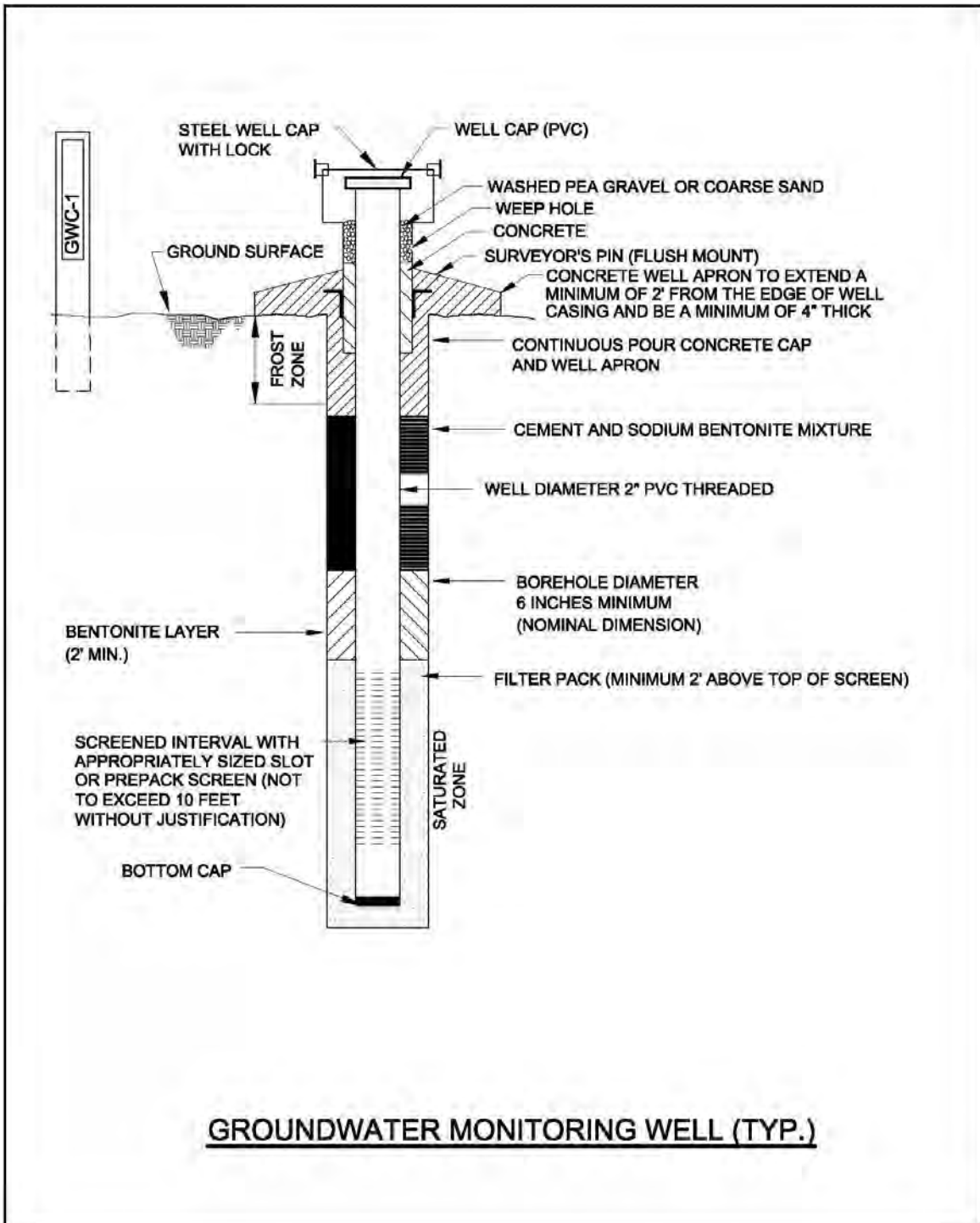
BORING GWA-56
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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <div>Weak Moderate Strong</div>	COMMENTS	Natural Gamma		
						55	110	165
		VOID - possible solution cavity (48'-68') (Con't)						
70		Dolostone with abundant interbedded Chert - light gray (N7), light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fine to fine grain, hard to medium hard, moderately to slightly weathered, massive, moderate- to high-angle fractures visible with trace low-angle fractures, partial to full healing with calcite fracture fill, trace reddish-brown to brown staining within some fractures, calcite fracture fill ranges from <1mm to few 5-6mm thick, zone of dark gray to dark brown chert @ approx. 73-74' , 3 core pieces >6" recovered			Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered, limited recovery			
75								
80		- Dolostone: light gray (N7) and light bluish gray (10B 7/1) very fine to fine grain, hard, moderately to slightly weathered, massive, low- to high-angle fractures visible, partial to full healing with calcite fracture fill, approx. 1-2 mm thick fracture fill, some high-angle and trace vertical fractures with no visible calcite fill, trace reddish-brown staining within some fractures, trace chert @ approx. 82', one 1' core piece recovered						
		Bottom of borehole at 83.0 feet.						
85								
90								
95								
100								

B. GROUNDWATER MONITORING WELL DETAIL



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.

GPC 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 GPC 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.
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 Science and Ecosystem Support Division (SESD) Operating Procedure for Field Equipment Cleaning and Decontamination 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, ORP, and DO) approximately every three to five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings at a minimum:

±0.1 S.U. for pH

±10% for specific conductance (conductivity)

±10% for DO where DO>0.5mg/L. If DO<0.5mg/L no stabilization criteria apply

≤10 NTUs for turbidity

Temperature – Record only, not used for stabilization criteria

ORP – Record only, not used for stabilization criteria.

7. Collect samples at a flow rate between 50 and 250 ml/min 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.

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 Science and Ecosystem Support Division (SESD) Operating Procedure for Surface Water Sampling (SESDPROC-201-R4) and updates. (<https://www.epa.gov/quality/quality-system-and-technical-procedures-sesd-field-branches>).

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 Table 2 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 to, at a minimum, 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.