GROUNDWATER MONITORING PLAN

PLANT BOWEN COAL COMBUSTION RESIDUALS (CCR) LANDFILL

BARTOW COUNTY, GEORGIA

FOR



wood.

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TABLE OF CONTENTS

TABLE OF CONTENTS

I.	CERTIFICATION	. 1
1.	INTRODUCTION	. 2
2.	GEOLOGIC AND HYDROGEOLOGIC CONDITIONS	. 3
2.1	REGIONAL GEOLOGY	. 3
2.2	SITE GEOLOGY	
2.3	SITE HYDROGEOLOGY	
3.	SELECTION OF WELL LOCATIONS	
4.	MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT & REPORTING	. 6
4.1	DRILLING	
4.2	DESIGN AND CONSTRUCTION	
4.3	ABANDONMENT	
4.4	DOCUMENTATION	
5.	GROUNDWATER MONITORING PARAMETERS AND FREQUENCY	
6.	SAMPLE COLLECTION	
7.	CHAIN-OF-CUSTODY	
8.	FIELD AND LABORATORY QUALITY ASSURANCE / QUALITY CONTROL	
9.	REPORTING RESULTS	
10.	STATISTICAL ANALYSIS	
11.	REFERENCES	_
	NDICES	
A.	MONITORING SYSTEM DETAILSA	
B.	GROUNDWATER MONITORING WELL DETAILB	
C.	GROUNDWATER SAMPLING PROCEDURESC	
D.	SURFACE WATER SAMPLING AND ANALYSIS PROCEDURES	1

LIST OF TABLES

Table 1 Groundwater Monitoring Parameters & Frequency

Table 2 Analytical Methods

LIST OF FIGURES

Figure 1 Statistical Analysis Plan Overview

Figure 2 Decision Logic for Determining Appropriate Statistical Method

Figure 3 Decision Logic for Computing Prediction Limits

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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Professional Engineer No. 025565

Date:

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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 Precambrianaged 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.

Two main Hydrostratigraphic (wate

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 to391-3-4-.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 rotosonic techniques. The drilling method shall minimize the disturbance of subsurface materials and shall not cause impact to the groundwater. Borings will be advanced using an appropriate drilling technology capable of drilling and installing a well in site-specific geology. 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 fl.)
- 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

MONUTOR		GROUNI	DWATER MONITORING
MONITOR	ING PARAMETER	Background	Semi-Annual Events
	Temperature	X	Х
	pН	X	X
Field	Specific Conductance	X	X
Parameters	ORP	X	X
	Turbidity	X	X
	Dissolved Oxygen	X	X
	Boron	X	X
	Calcium	X	X
Appendix III	Chloride	X	X
(Detection)	Fluoride	X	X
(Detection)	pH (field)	X	X
	Sulfate	X	X
	Total Dissolved Solids	X	X
	Antimony	X	
	Arsenic	X	
	Barium	X	
	Beryllium	X	
	Cadmium	X	
	Chromium	X	Assessment sampling
Appendix IV	Cobalt	X	frequency and parameter list
(Assessment)	Fluoride	X	determined in accordance
	Lead	X	with Georgia Chapter 391-3- 4.10(6).
	Lithium	X	4.10(0).
	Mercury	X	
	Molybdenum	X	
	Selenium	Χ	
	Thallium	Χ	
	Radium 226 & 228	Χ	

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
рН	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.
- 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).
- 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

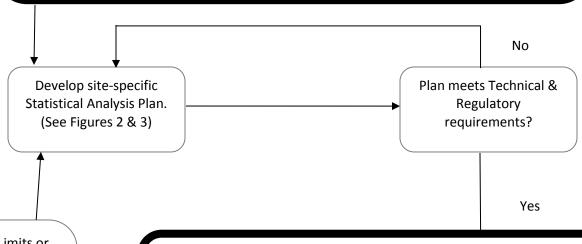
- Croft, M.G., 1963. Geology and ground-water resources of Bartow County, Georgia. U.S. Geological Survey Water-Supply Paper 1619-FF, 37 p.
- Southern Company Services, Inc. 2002. Plant Bowen Coal Combustion By-Products Storage Facility Site Acceptability Report.
- Southern Company Services, Inc. 2004. 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

Groundwater Monitoring Plan
Georgia Power ■ Plant Bowen ■ November 20, 2018

SITE PERMIT

Overview of regulatory requirements. Statistical Analysis Plan must meet requirements per the Georgia Department of Natural Resources Environmental Protection Division Chapter 391-3-4 Solid Waste Management and the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule, 2015).



Update Statistical Limits or Methods

Periodically evaluate Statistical Analysis Plan (after a minimum of 4 new observations)

OPERATING RECORD

Includes a detailed site-specific Statistical Analysis Plan that meets regulatory requirements. Specifies statistical method, wells, background periods, verification plan and statistical limits.

FIGURE 2. DECISION LOGIC FOR DETERMINING APPROPRIATE STATISTICAL METHOD

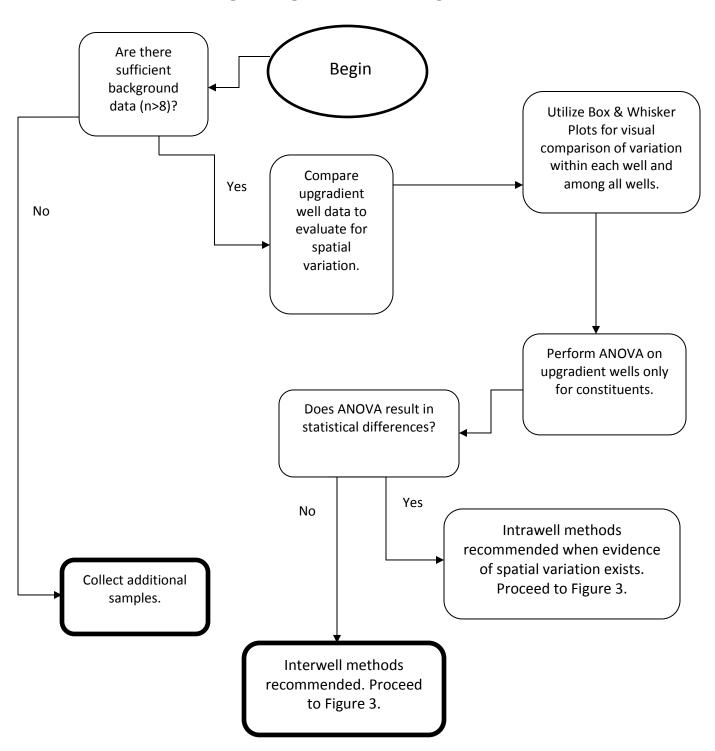
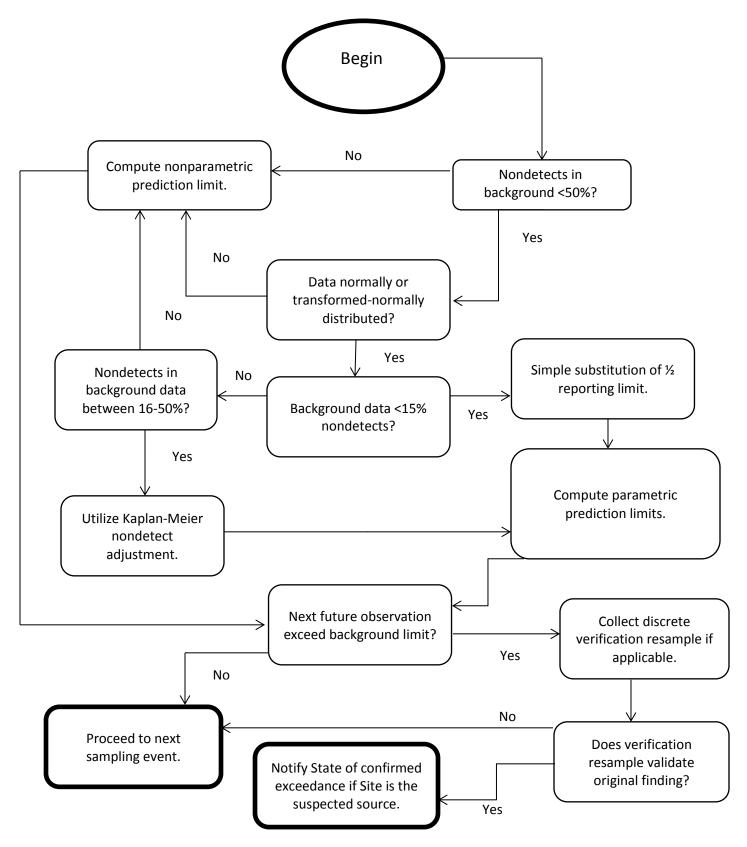


FIGURE 3. DECISION LOGIC FOR COMPUTING PREDICTION LIMITS



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

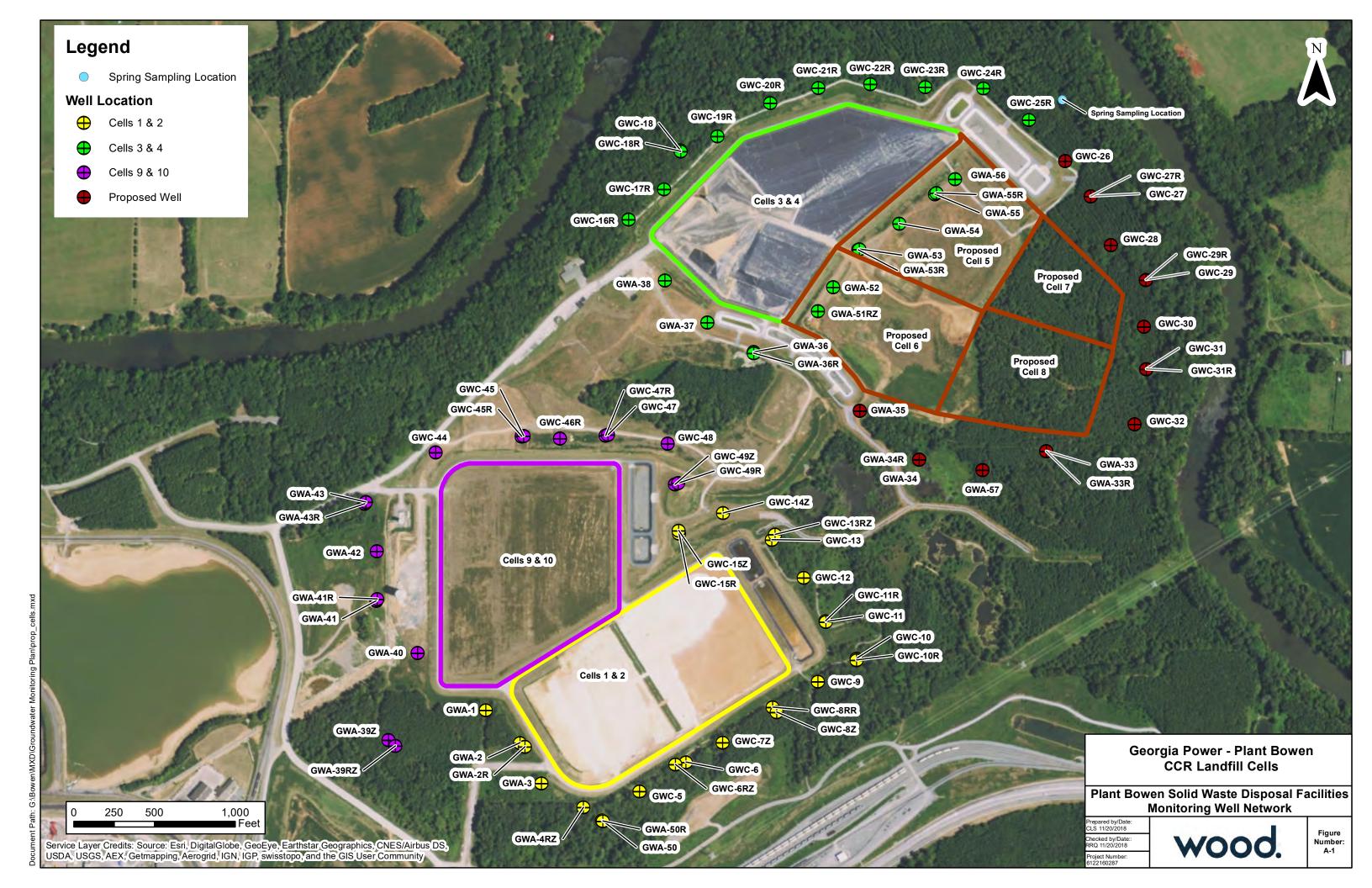
Attachment A1: Well Construction and Boring Logs

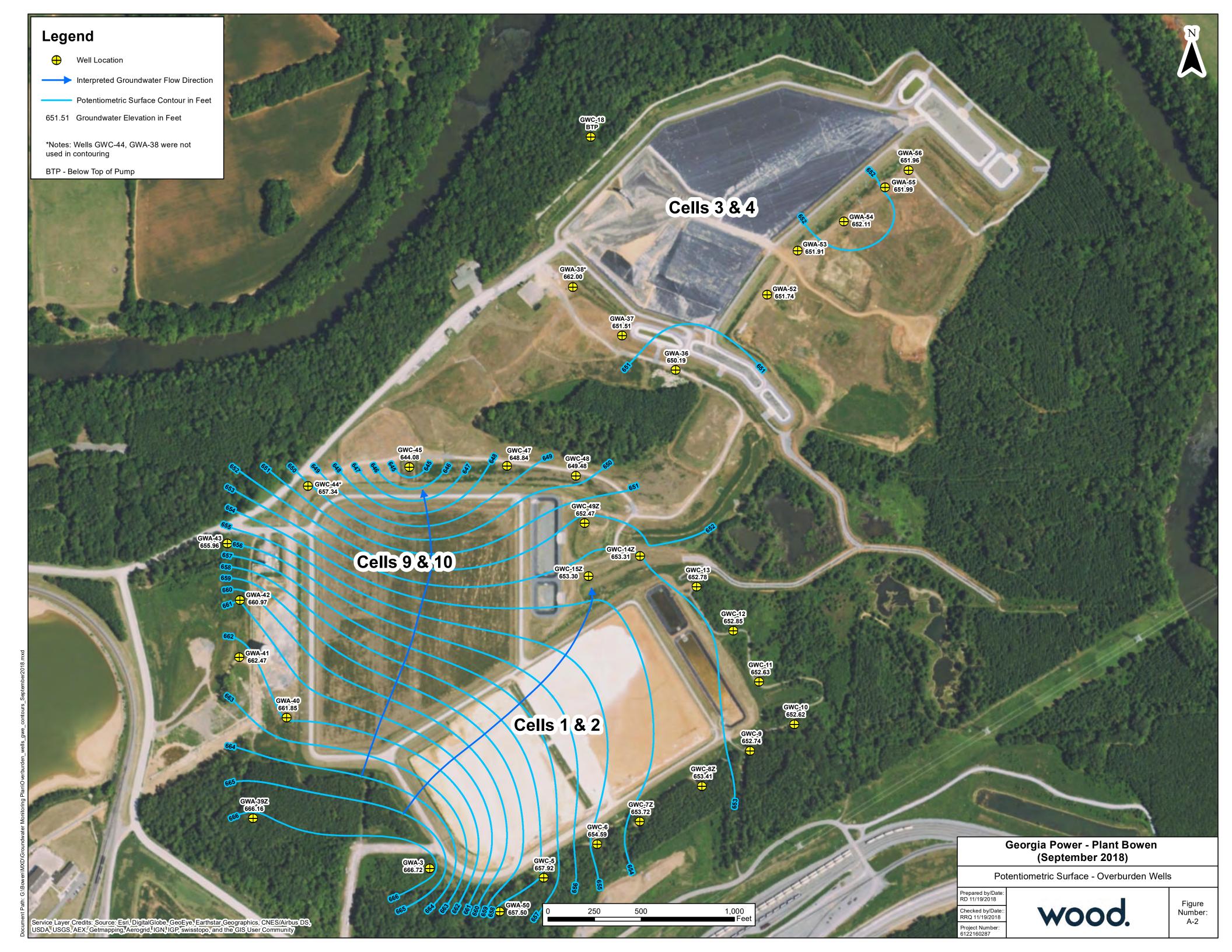
TABLE A-1: SUMMARY of WELL INSTALLATION DATES, COORDINATES, ELEVATION SCREEN INTERVAL, and PURPOSE

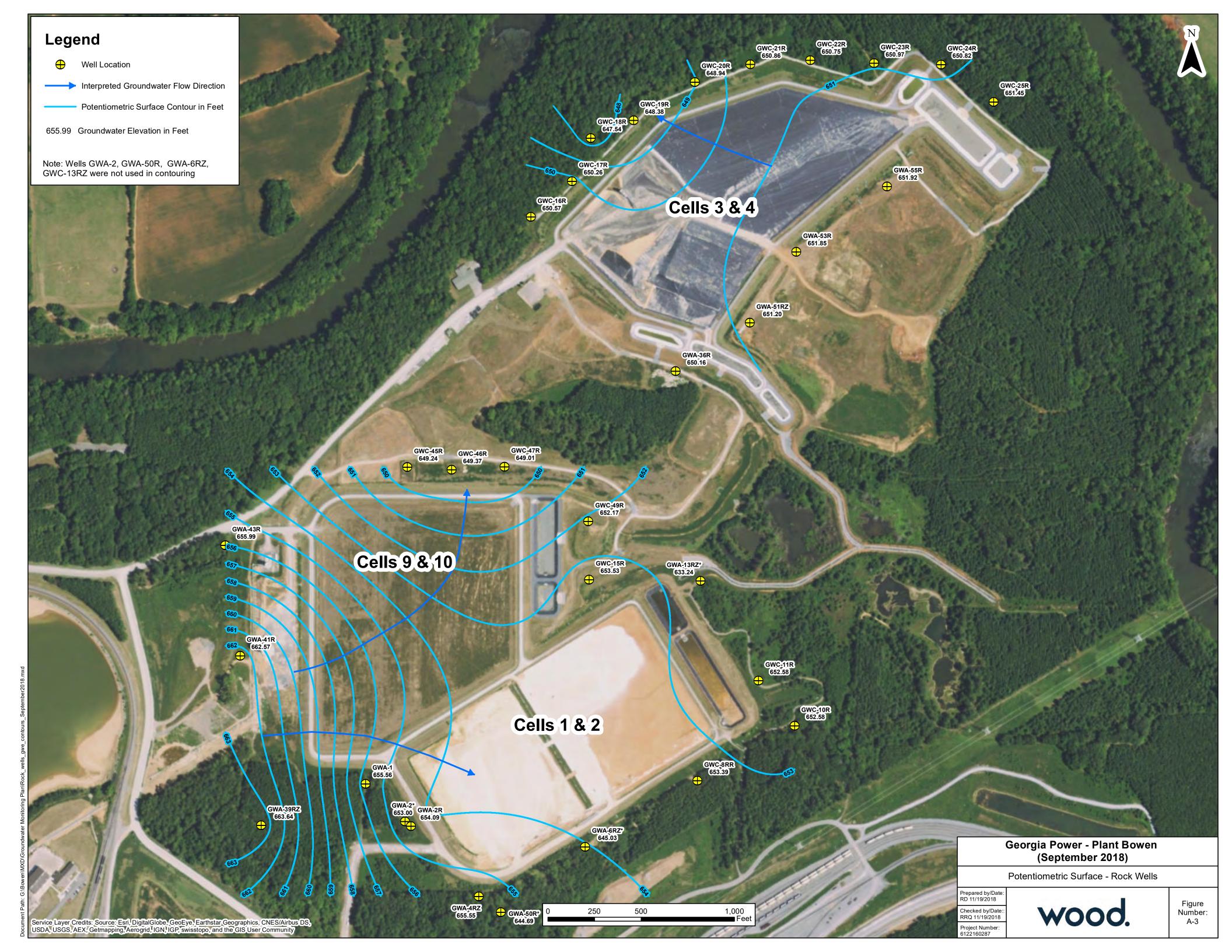
Well Name	Installation Date	Northing (ft NAD83)	Easting (ft NAD83)	Ground Surface Elevation	Top of Casing Elevation (ft NAVD88)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Total Well Depth measured in the field September 2017 (feet below top of casing)	Total Well Depth 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

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

- 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.







ATTACHMENT A1 WELL CONSTRUCTION AND BORING LOGS

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen Dry Gypsum DRILLING CO: SCS Storage Facility DRILLER: B. Flipovich NAME LOCATION: Cells 182 RIG TYPE: CME 550 DATE CONSTRUCTED: 4/12/2007 - 9:00 am Locking Hingad Top 1/4-inch Weep Hole 1-4-ft x 4-ft concrete pad 4-ft x 4-ft concrete pad 4-ft x 4-ft concrete pad PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum PROTECTIVE CASING SIZE: 4x4-inch TYPE: Portland Gement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF FLIER PACK 17-PE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Trenie. wash with water BOTTOM OF RISER 17-PO F SCREEN 137.73 601.70 SCREEN IND OF FLIER PACK 17-PE: Schedule 40 PVC Prepack OPENING PROTECTIVE CASING 187.2-1-Chip and 187.2-1-Chip and 187.73 601.70 SCREEN BOTTOM OF RISER 17-PO F SCREEN 137.73 601.70 BOTTOM OF CASING 148.03 591.40 HOLE DIA: 6-5/8*	WELL CONSTRUCTION LOG	Southern Company Gen	eration	
LOCATION: Cells 182 RIG TYPE: CME 550 LOGGER J. Lippert DRILLING METHODS: HSA GWA-1 DATE CONSTRUCTED: 4/12/2007 - 9:00 am Cocking Hinged Top		DRILLING CO.: SCS		WELL
DRILLING METHODS: HSA DATE CONSTRUCTED: 4/12/2007 - 9:00 am DEPTH ELEVATION FT. MSL.		DRILLER: B. Filipovich		NAME
DATE CONSTRUCTED: 4/12/2007 - 9:00 am DEPTH ELEVATION FIRST FT, MS, TOP OF RISER 2.77 742.20	LOCATION: Cells 1&2	RIG TYPE: CME 550		
DATE CONSTRUCTED: 4/12/2007 - 9:00 am DEPTH ELEVATION FIRST FT, MS, TOP OF RISER 2.77 742.20	LOGGER: J. Lippert	DRILLING METHODS: HSA		GWA-1
Locking Hinged Top 1/4-Inch Weep Hole 1/4-Inch Weep Hole 1/4-Inch Weep Hole 1/4-Inch Weep Hole 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-Inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING PROTECTIVE CASING SIZE: 4x4-Inch TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 24-Inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 134.50 604.93 ANNULAR SEAL TYPE: Ith-Inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie; wash with water PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-Inch TYPE: Schedule 40 PVC JOINT TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 9 bags; 50 bs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-Inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0,25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40				
Locking Hinged Top 1/4-Inch Weep Hole 1/4-Inch Weep Hole 1/4-Inch Weep Hole 1/4-Inch Weep Hole 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-Inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING PROTECTIVE CASING SIZE: 4x4-Inch TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 24-Inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 134.50 604.93 ANNULAR SEAL TYPE: Ith-Inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie; wash with water PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-Inch TYPE: Schedule 40 PVC JOINT TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 9 bags; 50 bs/bag PLACEMENT: Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-Inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0,25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40			DEPTH	FI EVATION
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.77 742.20 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 44-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Sheddule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 134.50 604.93 ANNULAR SEAL TYPE: Vi-linch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremile Top OF FILTER PACK TYPE: DIS Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 9 bags; 50 lbs/bag PLACEMENT: Tremile; wash with water BOTTOM OF RISER/TOP OF SCREEN 137.73 601.70 SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40				
1/4-inch Weep Hole TOP OF RISER 2.77 742.20 2" Threaded Riser Cap REQUENT SUBJECTIVE CASING SIZE: 4X4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 10		7	FEET	FI, MSL
4-ft x 4-ft concrete pad PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie FILTER PACK TYPE: 105I Sand - 14 (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 CASING 148.03 591.40	Locking Hinged Top ———▶	_		
A-ft x 4-ft concrete pad PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 134.50 604.93 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 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: 0.0-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40	1/4-inch Weep Hole \	TOP OF RISER	2.77	742.20
A-ft x 4-ft concrete pad PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 134.50 604.93 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 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: 0.0-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40		2" Threaded Riser Cap		
WATER LEVEL: 108.3 @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: If Ish not coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Bols Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40	\	i '		
WATER LEVEL: 108.3 @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: If Ish not coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Bols Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40				
WATER LEVEL: 108.3 @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: If Ish not coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Bols Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40		×		
WATER LEVEL: 108.3 @ 24 hrs Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: If Ish not coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Bols Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1 bush with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40	4-ft x 4-ft concrete pad			
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags PISER CASING DIA: 24-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING 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 CASING 148.03 591.40		GROUND SURFACE	0.00	739 43
SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING WIDTH: 1.5-inch BOTTOM OF SCREEN 147.73 591.70 BOTTOM OF CASING 148.03 591.40		GROOMS CONTINGE	0.00	700.10
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Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 21 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets, 5-gal buckets; bentonite chips, 10 bags AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 148.03 591.40	WATER LEVEL: 400 2 @ 24 bra	TYPE. Anodized Aluminum		
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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				
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				
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		. E. CEMENT. Home, 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 BOTTOM OF SCREEN 147.73 591.70		ROTTOM OF RISER / TOD OF SODEEN	137 73	601.70
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			107.70	001.70
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				
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				
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				
SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN 147.73 591.70 BOTTOM OF CASING 148.03 591.40				
SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN 147.73 591.70 BOTTOM OF CASING 148.03 591.40				
BOTTOM OF SCREEN 147.73 591.70 BOTTOM OF CASING 148.03 591.40				
BOTTOM OF CASING 148.03 591.40			147 70	E04 70
		BOTTOM OF SCREEN	147./3	591.70
			140.00	E04.40
HOLE DIA: 6-5/8"		BOTTOM OF CASING	148.03	591.40
HOLE DIA: 6-5/8"				
HOLE DIA: 6-5/8"				
	HOLE DIA:	6-5/8"		

SOU.	THERN	DRILLI	NG L	.OG			Hole No.	GWA-1	
Energy :	to Serve You						Sheet 1		
SITE _		Plant Bowen Dry Gypsum Storage Facil	lity		HOLE DEPTH	149'	SURF.EL		
		Cells 1 & 2	COORE	DINATES N	207172			502840.52	
ANGLE		0 BEARING 0	CONTR	ACTOR	SCS	r	DRILL NO.		
	NG METHOD	LICA	s	30	NO. U	.D. SAMPI		0	
CASING		LENGTH							
WATER	R TABLE DEF	PTH105.5ELEV633.93 TI						4/11/2007	
TYPE G		QUANTITY						4/4/2007	
DRILLE	R	B. Filipovich RECORDER J. Lippert APPRO			DRI dard Penetration Test		MP. DATE	4/11/2007	_
Depth	Elev.	Material Description, Classification and Remarks	No.		Blows	N	Comments	% Rec	RQD
0	739.43								
1	738.43								
2	736.43								
3	733.43								
4		Stiff, light brown, silty CLAY with trace organics	S-1	3.5-5	4-5-6	11		90	
5	724.43	and limestone pebbles, dry							
6	718.43								
7	711.43								
8	703.43								
9		Very stiff, reddish brown and gray mottled CLAY, low	S-2	8.5-10	6-8-11	19		100	
10		plasticity, with limestone pebbles and chert fragments, slightly moist							
11	673.43								
12	661.43								
13	648.43								
14	634.43	Very stiff, reddish brown, sandy SILT with chert	S-3	13.5-15	7-10-13	23		100	
15	619.43	fragments, slightly moist							
16	603.43								
17	586.43								
18	568.43								
19	549.43	Same as above	S-4	18.5-20	9-11-16	27		90	
20	529.43								
21	508.43								
22	486.43								
23	463.43								

24 439.43 Form GS9901 7-26-2004 SOUTHERN AS COMPANY Energy to Serve Your World

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

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	14	SURF.ELEV.	739	.43
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25		Very stiff, red with light brown and gray CLAY, high	S-5	23.5-25	8-10-14	24	Confinents	100	עט
26	713.43	plasticity, some chert fragments, moist							
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	oana, ana oman pobbloo, molet							
47	692.43								
48	691.43								
49	690.43								
50		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 55	685.43	Same as above with mottled gray	S-11	53.5-55	11-13-11	24		90	
56	683.43	Came as above with motieu gray	5-11	00.0-00	11-10-11	4 4		90	
	9901 7-26-2	1	H .		i .			1	

SOUTHERN AS COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-1

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

SIIE _			Sample		dard Penetration Test		SURF.ELEV.		
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
57	682.43								
58	681.43								
59	680.43								
60	679.43	Stiff, light brown and reddish brown CLAY, high	S-12	58.5-60	4-5-7	12		90	
61	678.43	plasticity with quartz pebbles, moist							
62	677.43								
63	676.43								
64	675.43								
65	674.43	Same as above, very moist	S-13	63.5-65	4-5-7	12		100	
66	673.43								
67	672.43								
68	671.43								
69	670.43								
70		Same as above	S-14	68.5-70	4-6-8	14		100	
71	668.43								
72	667.43								
73	666.43								
74	665.43								
75		Very stiff, light brown, sandy CLAY with chert	S-15	73.5-75	4-7-10	17		100	
76	663.43	fragments, moist	0 .0	7 0.0 7 0				100	
77	662.43								
78	661.43								
79	660.43								
80		Same as above, stiff	S-16	78.5-80	5-6-8	14		100	
81	658.43	Jame as above, sun	J- 10	70.5-60	J-U-0	14		100	
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 9901 7-26-2								

SOUTHERN ANY COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-1

Sheet 4 of 5 Plant Bowen Dry Gypsum Storage Facility 149'

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	14	SURF.ELEV.	739	.43
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	650.43								
90	649.43	Same as above, very stiff	S-18	88.5-90	6-8-10	18		100	
91	648.43								
92	647.43								
93	646.43								
94	645.43								
95	644.43		S-19	93.5-95	4-5-7	12		100	
96	643.43	pebbles, very moist							
97	642.43								
98	641.43								
99	640.43								
100	639.43	Same as above	S-20	98.5-100	4-4-6	10		100	
101	638.43								
102	637.43								
103	636.43								
104	635.43								
105	634.43	Same as above, with very highly weathered dolomite gravel	S-21	103.5-105	4-5-7	12		100	
106	633.43	g. 1							
107	632.43								
108	631.43								
109	630.43								
110	629.43	Same as above	S-22	108.5-110	6-4-6	10		100	
111	628.43								
112	627.43								
113	626.43								
114	625.43		0.00	440 5 445				, .	
115		Same as above	5-23	113.5-115	2-4-5	9		100	
116	623.43 622.43								
117	621.43								
119	620.43								
120		Same as above, firm	S-24	118.5-120	2-2-4	6		90	

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-1

Sheet 5 of 5

Energy 1	o Serve You		IL OL	INVICES			Sneet 5 of	J	
SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	149	9' SURF.ELEV.	739	9.43
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
121	618.43								
122	617.43								
123	616.43								
124	615.43								
125	614.43	Firm, light brown, sandy CLAY with yellowish	S-25	123.5-125	2-3-5	8		100	
126	613.43	brown SILT and chert gravel, wet							
127	612.43								
128	611.43								
129	610.43								
130	609.43	Hard, light brown sandy CLAY and abundant	S-26	128.5-130	8-27-4	31		90	
131	608.43	highly weathered dolomite, wet, parent rock structure visible in soil							
132	607.43								
133	606.43								
134	605.43								
135	604.43	Same as above, very soft, few chert fragments,	S-27	133.5-135	WOH	0		100	
136	603.43	less structured							
137	602.43								
138	601.43								
139	600.43								
140	599.43	Same as above, firm, some chert gravel	S-28	138.5-140	2-3-3	6		100	
141	598.43								
142	597.43								
143	596.43								
144	595.43								
145	594.43	Same as above, stiff	S-29	143.5-145	2-2-12	14		100	
146	593.43								
147	592.43								
148	591.43								
149	590.43	Very hard, weathered DOLOMITE, highly fractured Bottom of boring	S-30	148.5-150	50/2-x-x	>50		90	
150									
151									
152									

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	1
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Denty		NAME
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	ELEVATION
<u></u>	•	FEET	FT, MSL
Locking Hinged Top ———			
1/4-inch Weep Hole \	TOP OF RISER	2.55	734.81
· \ □	2" Threaded Riser Cap		
	2 Throaded Nicor Cup		
	▶		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	732.26
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 77.8 ft.	* : ; /		
	BOTTOM OF PROTECTIVE CASING		
	2311311311131112311231123113		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
ologi.	TYPE: Portland Cement Grout		
	AMOUNT: 94 bags		
	AMOUNT: 34 bags		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
		40= 00	500.40
	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
HOLE DIA	: 8"		
1.522 5"	-		
		1	1

sou [.]	THERN	<u> </u>	DRILLIN	IG L	OG			Hole No.	GWA-2	
Energy :	COMP to Serve You	ANY rWorld"	GEOLOGICA	L SE	RVICES			Sheet 1 d	of 5	
		Plant Bowen Dry Gypsum								
LOCAT	ION	Cells 1 & 2		COORD	NOTES N	207193	5.81	E	1502638.77	
ANGLE		0 BEARING	0	CONTR	ACTOR	SCS		DRILL NO.	CME-75	
DRILLIN	NG METHOD	HSA	NO. SAMPLES		13	NO. U	.D. SAMP	PLES	0	
	3 SIZE	LENGTH								
		PTH ELEV								
	ROUT	QUANTITY		M	IX	DRI	LLING ST		3/29/2007	
DRILLE	R	S. Denty RECORDER K. Hob	DDS APPROV	/ED Sample		dard Penetration Test		OMP. DATE	1	ī
Depth	Elev.	Material Description, Classification and	Remarks	No.		Blows	N	Comments	% Rec	RQD
0	732.26									
1	731.26									
2	729.26									
3	726.26									
4	722.26									
5	717.26	Stiff, dark brown/red SILT with some sand	d, slightly moist	S-1	4.5-6	3-6-8	14		100	
6	711.26	,	,							
7	704.26									
8	696.26									
9	687.26									
10	677.26	Dark brown/red sandy SILT with pebbles	up to 4 cm, most	S-2	9.5-11	9-10-14	24		100	
11	666.26	pebbles 3-4 mm, areas of tan sand								
12	654.26									
12	641.26									
14	627.26									
15	612.26	Same as above		S-3	14.5-16	5-8-13	21		90	
16	596.26									
17	579.26									
18	561.26									
19	542.26									
20	522.26	Stiff, dark reddish brown sandy SILT with grains up to 2 mm	quartz sand	S-4	19.5-21	4-9-11	20		90	
21	501.26									
22	479.26									
23	456.26									
	1 2.2.2	1								

24 432.26 Form GS9901 7-26-2004

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

SITE _		Flant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH		SURF.ELEV.	732	.20
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Star From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	707.26	Stiff, dark reddish brown SILT with sand and pebbles up to	S-5	24.5-25	3-5-8	13		100	
26	706.26	20 mm in diameter, dry							
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	pennies, siigiiliy iiioisi, nul sliii Glulliniy							
37	695.26								
38	694.26								
39	693.26								
40	692.26	Dark reddish brown sandy SILT with pebbles up to 30 mm	S-8	39.5-41	4-6-10	16		80	
41	691.26	in diameter, approximately 20% pebbles, slightly moist							
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	a. 335 5. Agric 515111 only possible up to 20 mm in didiliotor							
47	685.26								
48	684.26								
49	683.26								
50		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 53	680.26 679.26								
54	678.26								
55		Highly weathered white, tan, and brown SAPROLITE,	S-11	54.5-56	9-11-37	48		50	
56		some bedding features still visible, uniform silt grain size, slightly moist		0 00	0 11-01	70		30	
	9901 7-26-2				•				

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

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	1:	SURF.ELEV.	732	2.26
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	675.26								
58	674.26								
59	673.26								
60		Firm, light brown, tan, and white silty SAPROLITE,	S-12	59.5-61	6-7-9	16			
61	671.26	mottled, moist							
62	670.26								
63	669.26								
64	668.26								
65		Same as above, wet	S-13	64.5-66	5-6-7	13			
66	666.26								
67	665.26								
68	664.26								
69	663.26								
70	662.26	Same as above	S-14	69.5-71	3-4-7	11			
71	661.26								
72	660.26								
73	659.26								
74	658.26								
75	657.26	Same as above	S-15	74.5-76	5-6-12	18			
76	656.26								
77	655.26								
78	654.26								
79	653.26								
80	652.26	White decomposed boulder	S-16	79.5-81	2-21-45	66			
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 Form GS	644.26 9901 7-26-2	2004							

SOUTHERN COMPANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-2
Sheet 4 of 5

Plant Bowen Dry Gypsum Storage Facility

TOTAL DEPTH

151

JRF.ELEV. 732.26

		, , , , , , , , , , , , , , , , , , , ,							
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	From To	Standard Penetration Test Blows	N	Comments	% Red	RQD
00	040.55	material Description, Diassilication and Retilates					Comments	, o 1100	ועעט
89	643.26								
90	642.26	Same as above	S-18	89.5-91	2-7-8	15			
91	641.26								
92	640.26								
93	639.26								
94	638.26								
95	637.26	Same as above	S-19	94.5-96	29-15-8	23			
96	636.26								
97	635.26								
98	634.26								
99	633.26	-							
100	632.26	Firm, brown to white CLAY with sand and silt	S-20	99.5-101	2-5-8	13			
101	631.26								
102	630.26								
103	629.26								
104	628.26								
105	627.26	Same as above	S-21	104.5-106	1-3-5	8			
106	626.26								
107	625.26								
108	624.26								
109	623.26								
110		Same as above	S-22	109.5-111	2-3-8	11			
			S-22	108.5-111	2-0-0	''			
111	621.26								
112									
113	619.26								
114	618.26								
115	617.26	Same as above	S-23	114.5-116	2-3-5	8			
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			
Form GS	9901 7-26-2	2004							

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

151

Top of Rock 581.26 Bottom of boring

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
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/Wate	r	GWA-2R
DATE CONSTRUCTED: 8/3/2007 - 9:00 am			
		DEPTH	ELEVATION
		FEET	FT, MSL
	1		1 1, 11102
Locking Hinged Top ————			
1/4-inch Weep Hole	TOP OF RISER	2.77	735.78
	2" Threaded Riser Cap		
I			
4 ft v 4 ft concrete pad			
4-ft x 4-ft concrete pad	and the superior	0.00	700.04
<u> </u>	GROUND SURFACE	0.00	733.01
\;\;\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 78.0 ft.	$ \cdot $		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 32 bags		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	81.50	651.51
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 0.5 bucket		
	✓ PLACEMENT: Tremie		
	TOP OF FILTER PACK	88.50	644.51
	FILTER PACK		
	TYPE: DSI Sand - 1A (20/30)		
	Drillers Services, Inc.		
	AMOUNT: 4 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	95.13	637.88
	SCREEN		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	OPENING WIDTH: 0.01-inch		
	OPENING TYPE: Slotted		
	SLOT SPACING: 0.25-inch		
	SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	105.13	627.88
	DOTTOM OF GORLER		0200
	BOTTOM OF CASING	105.43	627.58
	233 376110		
HOLE DIA:	7.5"		
HOLL DIA.			

sou [.]	THERN	DRILL	ING L	.OG			Hole No.	GWA-2F	3
	to Serve You						Sheet		
SITE _		Plant Bowen Dry Gypsum Storage Fac							
LOCAT	ION	Cells 1 & 2						1502613.68	
		0 BEARING 0	CONTR	RACTOR	SCS	DF	RILL NO.	0 CME-550	
	NG METHOD								
CASINO	3 SIZE R TABLE DE	LENGTH 78 PTH 78 ELEV. 655.01							
TYPE G		QUANTITY	IIVIE AFTE	IIX	DRII	— DATE	RT DATE	7/31/2007	
		S. Milam RECORDER J. Lippert APPR	OVED		DRII		P. DATE		
Depth	Elev.		Sample		dard Penetration Test Blows	N	0		RQD
Depth		Material Description, Classification and Remarks	110.	PIOIII 10	DIOWS	IN I	Comments	% Rec	RQD
0	733.01		+						
1	732.01								
2	731.01								
3	730.01								
4	729.01								
5	728.01	Stiff brownish red sandy CLAY with silt, moist, residuum	S-1	4.5-6	2 - 4 - 5	9			
6	727.01	·							
7	726.01								
8	725.01								
9	724.01								
10	723.01	Same as above, very stiff with micaceous subrounded	S-2	9.5-11	5 - 9 - 11	20			
11	722.01	gravel							
12	721.01								
13	720.01								
14	719.01								
15	718.01	Same as above	S-3	14.5-16	4 - 10 - 10	20			
16	717.01								
17	716.01								
18	715.01								
19	714.01								
20	713.01	Same as above	S-4	19.5-21	4 - 9 - 10	19			
21	712.01								
22	711.01								
23	710.01								
24	709.01								
Form GS	9901 7-26-2	2004							

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

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	10	SURF.ELEV.	733	.01
Danth	Elay	Material Description Classification and Demarks	Sample No.		dard Penetration Test	N	Commonte	0/ 5	POD
Depth 25	708.01	Material Description, Classification and Remarks Very stiff brownish yellow with yellowish white SILT, moist,		From To 24.5-26	8 - 8 - 12	20	Comments	% Rec	RQD
26	707.01	some cementation in yellowish white silt inclusions		2 20	0 0 12	20			
27	706.01								
28	705.01								
29	704.01								
30		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		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		Hard brownish yellow and white SILT with highly	S-8	39.5-41	5 - 14 - 21	35			
41	692.01	weathered and friable chert gravel, wet							
42	691.01								
43	690.01								
44	689.01								
45	688.01	Firm brownish yellow, yellowish white, and dark brown	S-9	45.5-46	3 - 3 - 3	6			
46	687.01	SILT, moist, elastic in dark brown inclusions							
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		Same as above, very hard with abundant chert gravel	S-11	54.5-56	50/4	R			
56	677.01 9901 7-26-2	2004							

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

			Sample		dard Penetration Test				
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
57	676.01								
F0									
58	675.01								
59	674.01								
60		Stiff brownish yellow, yellowish white, and dark brown SILT,	S-12	59.5-61	3 - 4 -5	9			
61	672.01	moist, elastic where dark brown							
62	671.01								
63	670.01								
64	669.01								
65	668.01	Same as above, very stiff with rounded gravel, some black	S-13	64.5-66	4 - 14 - 15	29			
		stained inclusions							
66	667.01								
67	666.01								
68	665.01								
69	664.01								
			0.44	00.5.74		l			
70	663.01	Hard yellowish brown sandy SILT, wet	S-14	69.5-71	8 - 14 - 16	30			
71	662.01								
72	661.01								
73	660.01								
74	659.01								
75	658.01	Same as above, very hard	S-15	74.5-76	50/4 - X - X	R			
76	657.01								
77	656.01								
77									
78		Auger refusal at 78.0 DOLOMITE, slightly to moderately weathered, hard,		78-83			5.0/2.3	46	
79		aphanitic, slightly fractured					-		
80	653.01	79.2-80.7: Cavity, mud-filled							
81	652.01	. o. zo oarny, maa imoa							
		81.0-81.5: Cavity, mud-filled							
82	651.01	Partial void 81.7 - 82.2					Lost Circulation		
83	650.01			83-88			5.0/4.3	86	
84	649.01			30-00			0.0/4.0	00	
85	648.01								
86	647.01								
87	646.01								
88	645.01 9901 7-26-2								

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-2R

Sheet 4 of Plant Bowen Dry Gypsum Storage Facility 103' SITE TOTAL DEPTH SURF.ELEV. 733.01 Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. From To Blows Ν Comments RQD % Rec 5.0/4.8 Unweathered, moderately to slightly fractured 88-93 96 89 644.01 90 643.01 642.01 High angle (~70° - 75°) healed fractures 91 641.01 92 93 640.01 93-98 5.0/5.2 104 639.01 94 638.01 95 96 637.01 636.01 Split along high angle joint 97 98 635.01 98-103 5.0/5.2 104 99 634.01 100 633.01 101 632.01 102 631.01 103 630.01 Thin cherty seam at 102.5 Bottom of boring 104 629.01 628.01 105 106 627.01 107 626.01 108 625.01 109 624.01 110 623.01 622.01 111 112 621.01 113 620.01 114 619.01 115 618.01 116 617.01 117 616.01 118 615.01 119 614.01 613.01

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	า WELL					
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS							
Storage Facility	DRILLER: S. Denty	NAME						
LOCATION: Cells 1&2	RIG TYPE: CME 75							
LOGGER: J. Lippert	DRILLING METHODS: HSA		GWA-3					
DATE CONSTRUCTED: 4/11/2007 - 16:00								
		DEPTH	ELEVATION					
<u></u>	•	FEET	FT, MSL					
Locking Hinged Top ———								
1/4-inch Weep Hole \	TOP OF RISER	2.55	732.47					
	2" Threaded Riser Cap		-					
\	2 Throaded Nicor Cap							
4-ft x 4-ft concrete pad								
	GROUND SURFACE	0.00	729.92					
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING							
	SIZE: 4x4-inch							
	TYPE: Anodized Aluminum							
WATER LEVEL: 47.4 ft.	*							
	BOTTOM OF PROTECTIVE CASING							
Well Development: Pump/surge until								
clear.	BACKFILL MATERIAL							
	TYPE: Portland Cement Grout							
	AMOUNT: 50 bags							
	7 IIVIO OIVI : 00 bags							
	RISER CASING							
	DIA: 2-inch							
	TYPE: Schedule 40 PVC							
	JOINT TYPE: Flush Threaded							
	JOINT TYPE: Flush Threaded							
		00.00	040.00					
	TOP OF SEAL	80.30	649.62					
	ANNULAR SEAL							
	TYPE: 1/4-inch coated bentonite pellets							
	5-gal buckets							
	AMOUNT: 0.5 bucket							
	PLACEMENT: Tremie							
	TOP OF FILTER PACK	83.30	646.62					
	FILTER PACK							
	TYPE: DSI Sand - 1A (20/30)							
	Drillers Services, Inc.							
	AMOUNT: 3.2 bags; 50 lbs/bag							
	PLACEMENT: Tremie; wash with water							
	BOTTOM OF RISER / TOP OF SCREEN	85.06	644.86					
	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	95.06	634.86					
	BOTTOM OF CASING	95.36	634.56					
HOLE DIA	.: 8"							
<u> </u>			1					

SOU'	THERN		DRILLIN	IG L	OG			Hole No.	GWA-3	
Energy	COMP to Serve You	ANY rWorld* GEO	DLOGICA	L SEF	RVICES			Sheet 1	of 4	
SITE _		Plant Bowen Dry Gypsum Storag	ge Facili	ty		HOLE DEPTH	95.7	SURF.	ELEV. 729	9.92
		Cells 1 & 2		COORD	NATES N	207206	57.9	E	E1502387.58	
ANGLE		0 BEARING 0		CONTR	ACTOR	SCS		DRILL NO.	CME-75	
	NG METHOD	LICA	O. SAMPLES		19	NO. U	I.D. SAMP	PLES	0	
	3 SIZE	LENGTH								
WATER	R TABLE DE	PTH 47.4 ELEV. 682.52								
TYPE G	SROUT	QUANTITY		M	IX	DRI	LLING ST	ART DATE	4/9/2007	
DRILLE	R	S. Denty RECORDER J. Lippert	_					DMP. DATE	4/11/2007	
Depth	Elev.	Material Description, Classification and Remarks		Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
0	729.92									
1	728.92									
2	727.92									
3	726.92									
4	725.92									
5	724.92	Hard, dark brownish red sandy CLAY with chert		S-1	4.5-6	4-16-23	39		100	
6	723.92	pebbles and gravel, slightly moist								
7	722.92									
8	721.92									
9	720.92									
10	719.92	Same as above, very stiff, light brown and dark bro	ownish red	S-2	9.5-11	4-8-12	20		75	
11	718.92									
12	717.92									
13	716.92									
14	715.92									
15	714.92	Stiff, brownish red, light brown, and grayish white		S-3	14.5-16	3-5-8	13		90	
16	713.92	mottled CLAY, high plasticity, moist								
17	712.92									
18	711.92									
19	710.92									
20	709.92	Stiff, white kaolinitic CLAY, moist, some reddish bi	rown	S-4	19.5-21	3-4-5	9		100	
21	708.92	banding								
22	707.92									
23	706.92									

24 705.92 Form GS9901 7-26-2004

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-3

Sheet 2 of 4

Plant Bowen Dry Gypsum Storage Facility 95.7 TOTAL DEPTH SURF.ELEV. 729.92 No. Depth Elev. Material Description, Classification and Remarks Comments RQD From To % Rec S-5 16 25 704.92 24.5-26 2-5-11 100 Same as above, very stiff, brownish yellow, white, and light red mottled 26 703.92 702.92 27 701.92 28 29 700.92 699.92 Same as above, white and brownish yellow S-6 29.5-31 4-8-18 26 100 30 698.92 31 32 697.92 33 696.92 695.92 34 S-7 34.5-36 35 694.92 Very stiff, brown sandy CLAY with abundant chert 4-7-14 21 90 fragments, moist 36 693.92 692.92 37 38 691.92 39 690.92 39.5-41 4-25-19 40 689.92 Same as above, hard S-8 44 100 688.92 41 42 687.92 43 686.92 44 685.92 684.92 Very stiff, light yellowish brown silty CLAY with very highly S-9 44.5-46 6-9-10 19 100 45 weathered chert fragments, very moist 46 683.92 47 682.92 48 681.92 680.92 49 S-10 49.5-51 9-19-39 58 679.92 50 Same as above, very hard, abundant (about 40 to 50%) 100 highly weathered chert fragments, wet 51 678.92 52 677.92 53 676.92 675.92 54 S-11 54.5-56 674.92 Very stiff, yellowish brown silty CLAY, few 8-8-13 21 100 55 chert fragments, wet, some layering visible

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-3

Plant Bowen Dry Gypsum Storage Facility

95.7

Sheet 3 of 4

Dec	SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	95	5.7 SURF.ELEV.	729	.92
ST ST ST ST ST ST ST ST	Depth	Elev.	Material Description. Classification and Remarks				N	Comments	% Rec	RQD
Section Sect									70 1100	
Section Sect										
100 688.92 100 1	58	671.92								
61 668.92 62 667.92 63 666.92 64 666.92 65 664.92 67 662.92 68 661.92 69 660.92 70 659.92 71 658.92 72 657.92 73 656.92 74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 80 649.92 81 649.92 82 Same as above, stiff with highly weathered quartz pebbles 8-14 69.5-71 3-6-9 15 8-15 74.5-76 6-8-9 17 8-15 74.5-76 6-	59	670.92								
66 66 92	60	669.92	Very hard, white DOLOMITE, very highly weathered, wet	S-12	59.5-61	9-32-23	55		100	
66 96 92	61	668.92								
68 66.92 Very stiff, yellowish brown silty CLAY, wet, saprolitic S-13 64.5-66 5-8-12 20 S-8-12 20 S-8-12 30 S-8-12 3	62	667.92								
S5 664.92 Very stiff, yellowish brown silty CLAY, wet, saprolitic structure in parts S-13 64.5-66 S-8-12 20 S-8-12 20 S-8-12	63	666.92								
Structure in parts Structu	64	665.92								
68 66.3.92 structure in parts 4 <td>65</td> <td>664.92</td> <td>Very stiff, yellowish brown silty CLAY, wet, saprolitic</td> <td>S-13</td> <td>64.5-66</td> <td>5-8-12</td> <td>20</td> <td></td> <td>100</td> <td></td>	65	664.92	Very stiff, yellowish brown silty CLAY, wet, saprolitic	S-13	64.5-66	5-8-12	20		100	
682 92 68 661.92 69 660.92 70 669.92 71 658.92 72 667.92 73 656.92 74 655.92 75 664.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 83 646.92 83 646.92 84 645.92 85 644.92 85 644.92 85 644.92 86 643.92 87 642.92 88 644.92 88 644.92 88 644.92 88 643.92 88 643.92 88 643.92 88 643.92 89 644.92										
88 661.92 69 660.92 70 659.92 71 658.92 72 657.92 73 656.92 74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 659.92 80 649.92 80 649.92 81 648.92 82 647.92 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' 8-17 84.5-86 6-9-28 37 87 642.92 82										
69 660.92 70 659.92 71 658.92 72 657.92 73 666.92 74 665.92 76 653.92 77 652.92 78 661.92 79 650.92 79 660.92 79 660.92 79 664.92 79 79 79 79 79 79 79										
The content of the										
71 658.92 72 657.92 73 656.92 74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 83 646.92 84 645.92 85 644.92 86 643.92 86 643.92 87 642.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 89 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 642.92 80 643.92			Company of the winds bringly weather and according to be less	C 11	60 F 74	2.00	45		400	
72 657.92 73 656.92 74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 82 647.92 83 646.92 84 645.92 85 643.92 86 643.92 86 643.92 87 642.92 88 642.92			Same as above, stirr with nightly weathered quartz peobles	5-14	69.5-71	3-6-9	15		100	
73 656.92 74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 83 646.92 84 645.92 85 644.92 86 643.92 86 643.92 87 642.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 88 643.92 89 642.92	71							20 minutes, water		
74 655.92 75 654.92 76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 82 647.92 83 646.92 84 645.92 85 644.92 86 643.92 86 643.92 87 642.92 87 642.92 88 643.92 88 643.92 88 643.92 89 643.92 80 643.92 80 643.92 80 643.92 81 643.92 82 647.92 83 646.92 84 645.92 85 644.92 86 643.92 87 642.92	72	657.92	72.9-74.0: Wet drill through chert boulder					at 57 feet		
75 654.92 Very stiff, yellowish brown sandy clayey SILT with abundant chert fragments, wet S-15 74.5-76 6-8-9 17 76 653.92 77 652.92 651.92 79 650.92 650.92 80 649.92 Same as above, stiff S-16 79.5-81 6-5-5 10 100 100 81 648.92 647.92 83 646.92 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' S-17 84.5-86 6-9-28 37 86 643.92 642.92	73	656.92								
abundant chert fragments, wet 76	74	655.92								
76 653.92 77 652.92 78 651.92 79 650.92 80 649.92 81 648.92 82 647.92 83 646.92 84 645.92 85 644.92 86 643.92 87 642.92	75	654.92		S-15	74.5-76	6-8-9	17		50	
78 651.92 79 650.92 80 649.92 81 648.92 82 647.92 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' S-17 84.5-86 6-9-28 37	76	653.92	abundant chert hagments, wet							
79 650.92 80 649.92 81 648.92 82 647.92 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' S-17 84.5-86 6-9-28 37	77	652.92								
80 649.92 Same as above, stiff 8-16 79.5-81 6-5-5 10 81 648.92 82 647.92 83 646.92 84 645.92 85 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' 87 642.92	78	651.92								
80 649.92 Same as above, stiff 8-16 79.5-81 6-5-5 10 81 648.92 82 647.92 83 646.92 84 645.92 85 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' 87 642.92	79	650.92								
81 648.92 82 647.92 83 646.92 84 645.92 85 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' 87 642.92	80		Same as above, stiff	S-16	79.5-81	6-5-5	10		100	
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' 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' S-17 84.5-86 6-9-28 37	82	647.92								
84 645.92 85 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' 86 643.92 87 642.92	83									
85 644.92 Same as above, hard abundant chert and highly weathered dolomite fragments around 86' 86 643.92 87 642.92	84									
weathered dolomite fragments around 86' 86 643.92 87 642.92				S-17	84.5-86	6-9-28	37			
87 642.92										
	87									

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-3 Sheet 4 of 4

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

Storage Facility LOCATION: Cells 1&2 RIG TYPE: CME 75 LOGGER: L. Millet DRILLING METHODS: HSA/HQ Rock Core w/Water DATE CONSTRUCTED: 3/14/2007 - 16:00 DEPTH FLEVATION FEET 1/4-inch Weep Hole TOP OF RISER 2.51 743.47	WELL CONSTRUCTION LOG	Southern Company Ge	eneration				
LOCATION: Cells 182	PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL			
DEPTH ELEVATION FEET FI. MSL Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BACKFILL MATERIAL TYPE: Portland Gement Grout AMOUNT: 59 bags DIA: 2-inch TYPE: Schedule 40 PVC JOINT TyPE: DIS Sand - 1A (20/30) Dillers Services, Inc. AMOUNT: 2 bags; 50 lbs/bag PLACEMENT: Tremie; wash with water SCHEEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDT: 50.04-inch OPENING WIDT: 50.04-inch OPENING WIDT: 50.04-inch OPENING WIDT: 1.0-1-inch OPENING WIDT: 1.0-1-inch OPENING WIDT: 1.0-1-inch OPENING TYPE: Schedule 40 PVC Prepack OPENING WIDT: 1.0-1-inch OPENING WIDT: 1.0-1-inch OPENING WIDT: 1.0-1-inch SOTTOM OF CASING 69.79 671.17 BOTTOM OF CASING 69.79 671.17		DRILLER: S. Denty		NAME			
DATE CONSTRUCTED: 3/14/2007 - 16:00 DEPTH ELEVATION FIET FI. MSL TOP OF RISER 2.51 743.47							
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.51 743.47 TOP OF RISER 2.51 743.47 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 59 bags PISER CASING DIA: 2-inch TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 1.5 buckets AMOUNT: 0.5 buckets AMOUNT: 0.5 buckets AMOUNT: 0.5 buckets AMOUNT: 7 begs; 50 lbs/bag PLACEMENT: Trenie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 2 bags; 50 lbs/bag PLACEMENT: Trenie, wash with water BOTTOM OF RISER / TOP OF SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 69.79 671.17		DRILLING METHODS: HSA/HQ Rock Core w/Wate	er	GWA-4			
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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 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		TYPE: Schedule 40 PVC					
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	HOLE DIA	Ċδ					

SOU [.]	THERN COMP	AND THE RESERVE TO TH	DRILLI	NG L	OG			Hole No.		GWA-4	
Energy :	to Serve You	ur World"	GEOLOGIC					Shee			
			um Storage Facil	lity							
LOCAT	ION	Cells 1 & 2		COORD	INATES N			E			
ANGLE		0 BEARING HSA/HQ Rock core with w	0	CONTR	ACTOR	SCS		ORILL NO.	CN	/IE-75	
DRILLIN	NG METHO	HSA/HQ Rock core with w	vater NO. SAMPLE	s	9	NO. U	.D. SAMPI)	
CASING		4.25" ID & 8.5" OD LENGTH				HQ					
			674.46 _{TI}							4/2007	
		Portland Cement QUANTIT						ART DATE		4/2007	
DRILLE	R	S. Denty RECORDER L.	MIIIET APPRO	Sample		DRI dard Penetration Test		MP. DATE	3/1-	1,2001	
Depth	Elev.	Material Description, Classification	n and Remarks	No.		Blows	N	Commer	nts	% Rec	RQD
0	740.96										
1	739.96										
2											
2	738.96										
3	737.96										
4	736.96										
5	735.96	Light tan clayey SILT, dry, heavy dark	red mottling	S-1	4.5-6	5-10-16	26			80	
6	734.96										
		1									
7	733.96										
8	732.96										
9	731.96										
10	730.96	Light gray to white silty CLAY, dry, he	avv dark red mottling.	S-2	9.5-11	6-24-50/3	R			60	
		3" limestone lense at bottom, white, c									
11	729.96										
12	728.96										
13	727.96										
14	726.96										
15	725.96	Light tan and light gray clayey SILT, c	dry heavy red	S-3	14.5-16	4-5-8	13			80	
		mottling, limestone pebbles	,,		10	700				00	
16	724.96										
17	723.96										
18	722.96										
19	721.96										
		Light orange and tan ailtry OLAV -t	with limestons	S-4	19.5-21	4-7-9	16				
20		Light orange and tan silty CLAY, dry, pebbles, white	with innestone	3-4	18.5-41	4-7-9	10				
21	719.96	-									
22	718.96										
23	717.96										
	716.96										
24 Form GS	716.96 9901 7-26-2										<u> </u>

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-4
Sheet 2 of 3

Plant Bowen Dry Gypsum Storage Facility 68.6 TOTAL DEPTH SURF.ELEV. 740.96 Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. From To Blows Ν Comments % Rec RQD 40 S-5 24.5-26 6-15-25 25 715.96 Same as above 26 714.96 27 713.96 26.5: encountered rock, approximately 1.5' thick 28 712.96 29 711.96 710.96 Same as above, with chert S-6 29.5-31 13-7-8 15 30 50 709.96 31 32 708.96 33 707.96 706.96 34 34.5-36 S-7 7-12-13 35 705.96 Light orange silty CLAY, moist, with small chert pebbles 25 20 36 704.96 37 703.96 38 702.96 39 701.96 12-17-21 Orange and brown clayey SILT, dry, with sand, chert S-8 39.5-41 38 40 700.96 50 pebbles and cobbles 699.96 41 42 698.96 43 697.96 696.96 44.5-46 45 695.96 Tan and orange silty CLAY, light brown mottling, chert S-9 19-47-25 72 15 pebbles and cobbles 46 694.96 693.96 47 47.5: Top of rock, begin coring 47.5-57.5 10.0/10.0 48 692.96 691.96 Light gray DOLOSTONE, small secondary fractures filled 49 with white mineralization 50 690.96 50: fracture, no obvious water movement 51 689.96 688.96 51.7: fracture with clay rinds, soil buildup 53 687.96 54 686.96 55 685.96 684.96

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-4

Company to Serve Your World**

| Site | Plant Bowen Dry Gypsum Storage Facility | TOTAL DEPTH | 68.6' | SURF.ELEV. | 740.96 |

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	00	SURF.ELEV.	740	.96
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	ndard Penetration Test Blows	N	Comments	% Rec	RQD
		маюна <i>Резин</i> риин, Сивъзшланин ани кентакъ			Diows	, ·		70 KBC	ייעט
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								
64		63.9: fracture with weathering, clay rinds							
65		colo mactaro mar nounto mg, olay mac							
	675.96								
66	674.96	66.1-69.5: cavity with minimum 1.5' soil fill (orange							
67		silty CLAY, plastic, with carbonate, large sand/small pebbles)							
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 9901 7-26-2								

Storage Facility DRILLER: S. Denty LOCATION: Cells 1&2 RIG TYPE: CME 75 LOGGER: L. Millet DRILLING METHODS: HSA/HQ Rock Core w/Water DATE CONSTRUCTED: 3/13/2007 - 16:00 DEPTH FEET TOP OF RISER 2.40 743.84 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum	WELL CONSTRUCTION LOG	Southern Company Ge	eneration	1			
LOCATION: Cells 182 RIG TYPE: CME 75 DRILLING METHODS: HSA/HQ Rock Core w/Water DATE CONSTRUCTED: 3/13/2007 - 16:00 DEPTH ELEVATION FEET F. MSL TOP OF RISER 2.40 743.84 4-ft x 4-ft concrete pad GROUND SURFACE 0.00 741.44 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded AMNULAR SEAL TYPE: 1/4-inch coated bentonite pellets S-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie: TOP OF 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 SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Siched 40 PVC Prepack OPENING TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Schedule 40 PVC Prepack OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch SCOTLENGTH:	PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL			
DRILLING METHODS: HSA/HQ Rock Core w/Water DATE CONSTRUCTED: 3/13/2007 - 16:00 DEPTH FEET TOP OF RISER 2.40 TOP OF RISER 3.44 TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: 14-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.39 BOTTOM OF CASING 93.35 648.09	Storage Facility	DRILLER: S. Denty		NAME			
DATE CONSTRUCTED: 3/13/2007 - 16:00 DEPTH FEET FEET	LOCATION: Cells 1&2	RIG TYPE: CME 75					
DATE CONSTRUCTED: 3/13/2007 - 16:00 DEPTH FEET FEET	LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock Core w/Wate	er	GWA-4R			
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.40 743.84 TOP OF RISER 2.40 743.84 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. Well Development: Pump/surge until clear. Well Development: Pump/surge until clear. TYPE: Porland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TOP OF FILTER PACK ANOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.09	DATE CONSTRUCTED: 3/13/2007 - 16:00						
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.40 743.84 TOP OF RISER 2.40 743.84 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. 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 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 TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.39 BOTTOM OF CASING 93.35 648.09			DEPTH	ELEVATION			
Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap 2" Threaded Riser Cap 2" Threaded Riser Cap 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASINS Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags PISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremile TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 1.5 bucket PLACEMENT: Tremile; wash with water BOTTOM OF RISER / TOP OF SCREEN SCREEN DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Solted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.09							
1/4-inch Weep Hole TOP OF RISER 2.40 743.84 2" Threaded Riser Cap RICE: 4x4-fl concrete pad GROUND SURFACE 0.00 741.44 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. PROTECTIVE CASING SIZE: 4x4-inch 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 TYPE: SIS Sand - 1A (20/30) Drillers Services, Inc. AMOUNT: 3 bags; 50 bis/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 TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 15-inch BOTTOM OF CASING 93.35 648.09	<u></u>	•	FEET	FI, MSL			
4-ft x 4-ft concrete pad SROUND SURFACE 0.00 741.44 PROTECTIVE CASING SIZE: 44x4-inch TYPE: Anadized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Schedule 40 PVC JOINT TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Schedule 40 PVC Prepack OPENING WITPE: Schedule SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.09	Locking Hinged Top ———						
4-ft x 4-ft concrete pad SROUND SURFACE 0.00 741.44 PROTECTIVE CASING SIZE: 44x4-inch TYPE: Anadized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 44 bags RISER CASING DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Schedule 40 PVC JOINT TYPE: 1/4-inch coated bentonite pellets 5-gal buckets AMOUNT: 0.5 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: Schedule 40 PVC Prepack OPENING TYPE: Schedule 40 PVC Prepack OPENING WITPE: Schedule SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.09	1/4-inch Weep Hole	TOP OF RISER	2.40	743.84			
A-ft x 4-ft concrete pad GROUND SURFACE 0.00 741.44 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. 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 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 WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF CASING 93.35 648.09	· \ □	2" Threaded Riser Can					
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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							
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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		ROTTOM OF DISEB / TOD OF SORTEN	83.05	658 30			
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			00.00	000.09			
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							
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							
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		·					
SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN 93.05 648.39 BOTTOM OF CASING 93.35 648.09							
SLOT LENGTH: 1.5-inch BOTTOM OF SCREEN 93.05 648.39 BOTTOM OF CASING 93.35 648.09							
BOTTOM OF SCREEN 93.05 648.39 BOTTOM OF CASING 93.35 648.09							
BOTTOM OF CASING 93.35 648.09			03.05	648 30			
		BOTTOW OF SCREEN	90.00	∪ 1 0.38			
		ROTTOM OF CASINO	03 35	648 NO			
HOLE DIA: 8"		BOTTOW OF CASING	55.55	U-TU.U3			
HOLE DIA: 8"							
NOLE DIA. 6	HOLEDIA	. 0"					
	HOLE DIA	ı. O					

sou	THERN		ORILLING L	OG			Hole No.	GWA-	4R
Energy .	to Serve You	r World GEO	LOGICAL SE				Sheet		
			e Facility		HOLE DEPTH _	92.5'	SUF	RF.ELEV.	741.44
LOCAT	ION	Cells 1 & 2			20723				
ANGLE		0 BEARING 0 HSA/HQ Rock core with water	CONTR	RACTOR	SCS		ORILL NO.	CME-7	5
DRILLII	NG METHOD								
	3 SIZE	LENGTH							
		PTH ELEV							
	ROUT	S. Denty RECORDER L. Millet							
DRILLE		3. Denty RECORDER L. Willet	Sample	Stan	dard Penetration Test		WIF. DATE		
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% R	ec RQD
0	741.44					\perp			
1	740.44								
2	739.44								
3	738.44								
4	737.44								
5	736.44	Orange, red, tan, and light gray clayey SILT, dry	S-1	4.5-6	8-11-13	24		80)
6	735.44								
7	734.44								
8	733.44								
9	732.44								
10	731.44	Red clayey SILT, dry, with 3" limestone lense at bowhite, dry	ttom, S-2	9.5-11	9-32-34	68		85	5
11	730.44								
12	729.44								
13	728.44								
14	727.44								
		<u> </u>							
15	726.44	Light tan and orange silty CLAY, dry, occasional da red mottling	ark S-3	14.5-16	6-11-17	28		85	
16	725.44								
17	724.44								
18	723.44								
19	722.44								
		Light top city CLAV due with and an art with the		10 5 04	7 40 00	25			
20		Light tan silty CLAY, dry, with carbonate rubble, fine dark red mottling	e S-4	19.5-21	7-12-23	35			
21	720.44								
22	719.44								
23	718.44								
24	717.44								
	9901 7-26-2	2004	1						

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-4R
Sheet 2 of 4

Energy i	to Serve You		IL JL	KVICES			Sheet 2 of	7	
SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	92.5	SURF.ELEV.	741	.44
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	716.44	Light orange silty CLAY, dry, occasional dolostone	S-5	24.5-26	3-6-17	23			
26	715.44	pebbles							
27	714.44	26.3': drilled through 6" to 8" of rock							
28	713.44								
29	712.44								
30	711.44	Light orange silty CLAY, moist, occasional light gray	S-6	29.5-31	9-9-9	18		50	
31	710.44	and black mottling, occasional dolostone pebbles							
32	709.44								
33	708.44								
34	707.44								
35		Same as above, large dolostone cobble stuck in bottom	S-7	34.5-36	10-11-9	20		15	
36	705.44	of spoon							
37	704.44								
38	703.44								
39	702.44								
40		Light orange silty CLAY, moist, occasional light gray and	S-8	39.5-41	7-7-9	16		50	
41	700.44	black mottling, small carbonate shards							
42	699.44								
43		41.6' - 44.0': rock ledge, about 2.5' thick							
44	697.44								
45		Light orange silty CLAY, dry, black mottling, degraded	S-9	44.5-46	8-8-8	16		75	
46	695.44	carbonate pebbles							
47	694.44								
48	693.44								
49	692.44								
50	691.44	Brown clayey SILT, moist, occasional black mottling,	S-10	49.5-51	2-4-4	8		20	
51	690.44	carbonate pebbles and sand throughout							
52	689.44								
53	688.44								
54	687.44	Same as above 54.0' Top of rock	S-11	53.5-56	50/2	R		5	
55	686.44	54.0: Light gray DOLOSTONE, some secondary		54-57.5			3.5/2.9	83	
56	685.44	mineralization in minor fractures							

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-4R

Sheet 3 of 4

Plant Bowen Dry Gypsum Storage Facility 92.5' TOTAL DEPTH SURF.ELEV. 741.44 No. Depth Elev. Material Description, Classification and Remarks From To Blows Ν Comments RQD 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 58 683.44 54 682.44 58.6' - 59.4': Top of open cavity 59 60 60.0: Pitted DOLOSTONE, thicker clay rinds with some iron 681.44 staining in fractures 61 680.44 679.44 62 63 678.44 677.44 64 64.2' - 65.7': Cavity, appears to be some soil deposition 65 676.44 at bottom, possible chert about 2" thick 66 675.44 65.7' - 67.2': Gray DOLOMITE, secondary crystalization in 67 674.44 minor fractures 67.5-77.5 10/9.9 68 673.44 99 69 672.44 70 671.44 71 670.44 669.44 72 73 668.44 74 667.44 75 666.44 76 665.44 664.44 77 77.5-87.5 10/8.6 78 663.44 86 78.0' - 79.3': Cavity, bottom of cavity is heavily weathered (2") 662.44 79 DOLOSTONE, tan/orange then gray dolostone as above 80 661.44 81 660.44 659.44 79.3' - 84.4': Gray DOLOSTONE, same as above 82 658.44 83 84 657.44 656.44 85.7': Fracture with iron oxide staining and light clay rind 86 655.44 87 654.44 653.44

SOUTHERN AS

DRILLING LOG

Hole No. GWA-4R

Sheet 4 of

GEOLOGICAL SERVICES Energy to Serve Your World Plant Bowen Dry Gypsum Storage Facility 92.5' SITE TOTAL DEPTH SURF.ELEV. 741.44 No. Depth Elev. Material Description, Classification and Remarks RQD % Rec 87.5-92.5 5.0/5.0 100 652.44 89 90 651.44 85.7' - 92.5': Light gray DOLOSTONE, same as above, no evidence of water in occasional fractures 91 650.44 92 649.44 648.44 92.5: Bottom of boring 93 647.44 94 646.44 95 96 645.44 97 644.44 643.44 98 99 642.44 100 641.44 101 640.44 102 639.44 103 638.44 104 637.44 105 636.44 106 635.44 107 634.44 108 633.44 632.44 109 110 631.44 630.44 111 112 629.44 113 628.44 627.44 114 115 626.44 116 625.44 117 624.44 118 623.44 119 622.44

120



LOG OF TEST BORING

BORING GWA-4RZ PAGE 1 OF 3 6122160287

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

DATE STARTED 10/25/2016 COMPLETED 10/28/2016 SURF. ELEV.740.10 ft msl COORDINATES: N:34.1274100 E:-84.9077109

CONTRACTOR Cascade EQUIPMENT PS T-150 METHOD

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

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

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

NOTE	S Nea	ar GWA-4R, *Sample Logged by geologis	st employed by Amec Foster Wheeler		
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma Vatural Gamma	Weak HCL Moderate REACTION Strong	WELL DATA Completion: Protective casing set in concrete pad; 2-foot square concrete pad
5 10 15 20		- SILT (ML), orange, tan and red (2.5 YR 6/4), loose, dry 725.1 - silty CLAY (CL), orange, tan and red (2.5 YR 6/4)		Model: Model: Strong	Annular Fill: Aquaguard Grout Mixture
35		- same as above, (5 YR 8/2), chert nodules, dry - same as above, (7.5 YR 8/6), without chert nodules, dry 702.1 - clayey SILT (ML), mottled light tan and black, chert nodules, dry		-	



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 Weak Moderate REACTION WELL DATA GRAPHIC LOG MATERIAL DESCRIPTION Natural Gamma Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (DEPTH) 132.75 44.25 88 ELEV. (Cont.) Annular Fill: Aquaguard Grout Mixture 45 SIMPLE GEO W/ WELL AND GAMMA - ESEE2012DATABASE.GDT - 1/6/17 11:12 - C.\USERS\WACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GP. - same as above 50 55 60 - same as above, dolomite gravel 65 70 - same as above, increasing gravel, saturated 75 665.1 (75.0)Annular Seal: 3/8" bentonite chips 80 660.1 - Top of competent dolomitic bedrock, gray, saturated 85 665



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

Annuar Seal: 3/8" bentonite pellets (non-coated) Filter: silica filter sand	EARTH SO	CIENCE AND ENVIRONMENTAL ENGINE	ERING	LOCATION Carter	sville, GA		
Annular Seal: 3/8" bentonite chips - same as above, possible horizontal fractures - same as above as	EPTH (ft) RAPHIC LOG	MATERIAL DESCRIPTION		Natural Gamma		HCL	WELL DATA Completion:
Annular Seal: 3/8" bentonite chips - same as above, possible horizontal fractures - same as above - same	G G			88.5	132.75	Weak Moderate Strong	concrete pad; 2-foot square concrete pad (DEF
- same as above - same as above - same as above - same as above, vertical fractures present - same as above, vertical fractures present - Bottom of borehole at 117.0 feet. - same as above - same as above, vertical fractures - present - Bottom of borehole at 117.0 feet.	90 /		Monnymy			-	Annular Seal:
Filter: silica filter sand Standpipe: 2 'OD PVC (SCH 40) Screen: 10 ft; pre-pack Bottom of borehole at 117.0 feet.		- same as above	JOHN MANNAN			-	3/8" bentonite pellets
Bottom of borehole at 117.0 feet. 120 125						-	silica filter sand 63 Standpipe: 2" OD PVC (SCH 40) Screen:
120 	115 /						
125	120	Bottom of borehole at 117.0 feet.					
	120						
130	125						
130							
	130						
135 ·	135						

WELL CONSTRUCTION LOG	Southern Company Ge	eneration									
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL								
Storage Facility	DRILLER: S. Denty		NAME								
LOCATION: Cells 1&2	RIG TYPE: CME 75										
OGGER: J. Lippert DRILLING METHODS: HSA											
DATE CONSTRUCTED: 4/18/2006 - 9:00 am											
		DEPTH	ELEVATION								
	•	FEET	FT, MSL								
Locking Hinged Top											
1/4-inch Weep Hole	TOP OF RISER	2.33	738.17								
· \ □	2" Threaded Riser Cap										
\	2 Throduod Thoor Oup										
↓	×										
4-ft x 4-ft concrete pad											
	GROUND SURFACE	0.00	735.84								
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING										
	SIZE: 4x4-inch										
	TYPE: Anodized Aluminum										
WATER LEVEL: 74 ft	; ;/										
	BOTTOM OF PROTECTIVE CASING										
Well Development: Pump/surge until											
clear.	BACKFILL MATERIAL										
	TYPE: Portland Cement Grout										
	AMOUNT: 34 bags										
	, iii 3 3 1 1 1 2 ag 3										
	RISER CASING										
	DIA: 2-inch										
	TYPE: Schedule 40 PVC										
	JOINT TYPE: Flush Threaded										
	TOP OF SEAL	98.90	636.94								
	ANNULAR SEAL	90.90	030.94								
	TYPE: 1/4-inch coated bentonite pellets										
	5-gal buckets										
	AMOUNT: 0.5 bucket										
	PLACEMENT: Tremie	404.00	00404								
	TOP OF FILTER PACK	101.00	634.84								
	FILTER PACK										
	TYPE: DSI Sand - 1A (20/30)										
	Drillers Services, Inc.										
	AMOUNT: 3 bags; 50 lbs/bag										
	PLACEMENT: Tremie; wash with water										
		46	05.1								
	BOTTOM OF RISER / TOP OF SCREEN	101.11	634.73								
	SCREEN										
	DIA: 2-inch										
	TYPE: Schedule 40 PVC Prepack										
	OPENING WIDTH: 0.01-inch										
	OPENING TYPE: Slotted										
	SLOT SPACING: 0.25-inch										
	SLOT LENGTH: 1.5-inch										
	BOTTOM OF SCREEN	111.11	624.73								
	BOTTOM OF CASING	111.41	624.43								
	-										
HOLE DIA	: 8"										

sou [.]	THERN	DRILL	ING L	.OG			Hole No). (GWC-5	
-	o Serve You							eet 1 of		
		Plant Bowen Dry Gypsum Storage Fac								
LOCAT	ION					E1502338.19				
		0 BEARING 0	CONTRACTOR			DRILL NO CME 75			ME 75	
DRILLIN	NG METHOD									
CASINO		LENGTH 661.84							9/2007	
	TABLE DE								2/2007	
	ROUT	S. Denty RECORDER J. Lippert APPRO					IP. DATE		3/2007	
DIVILLE	<u> </u>	C. Benty Recorder C. Epper	Sample	Stand	dard Penetration Test	LING CON	IF. DATE _			
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comm	ents	% Rec	RQD
0	735.84									
1	734.84									
2	733.84									
3	732.84									
4	731.84									
5			S-1	4.5-6	6-8-11	19			100	
6	729.84	Very stiff, dark reddish brown sandy CLAY, slightly moist							.00	
7	728.84									
8	727.84									
9	726.84									
10		Same as above	S-2	9.5-11	5-13-15	28			100	
11	724.84	Same as above		0.0	0 10 10				100	
12	723.84									
	722.84									
14	721.84									
15		Same as above with black and light brown mottled	S-3	14.5-16	4-8-12	20			100	
16	719.84	with reddish brown								
17	718.84									
18	717.84									
19	716.84									
20	715.84	Same as above	S-4	19.5-21	4-11-15	26			100	
21	714.84									
22	713.84									
23	712.84									
24	711.84									
Form GS	9901 7-26-2	2004			·			·		_

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-5

Sheet 2 of 4

Plant Bowen Dry Gypsum Storage Facility 114.2 TOTAL DEPTH SURF.ELEV. 735.84 No. Depth Elev. Material Description, Classification and Remarks Comments RQD From To % Rec S-5 3-7-22 29 25 710.84 24.5-26 100 Same as above with chert pebbles in matrix, some chert 26 709.84 27 708.84 707.84 28 706.84 29 Hard, brown, red, light brown and black mottled sandy S-6 29.5-31 8-14-18 32 30 705.84 100 gravelly CLAY with iron stained dolomite fragments 704.84 and chert pebbles, slightly moist 31 32 703.84 33 702.84 701.84 34 S-7 34.5-36 35 700.84 Very stiff, brownish red CLAY, high plasticity, with trace 7-7-11 18 100 dolomite pebbles, moist 36 699.84 698.84 37 38 697.84 696.84 39 S-8 29 40 Very stiff, brown and reddish brown sandy CLAY with 39.5-41 3-8-21 100 abundant chert pebbles, some grayish white silt lenses, 694.84 41 42 693.84 43 692.84 44 691.84 44.5-46 8-9-10 19 45 690.84 Very stiff, brown silty CLAY with some sandy lenses, moist 100 46 689.84 47 688.84 48 687.84 686.84 49 685.84 S-10 49.5-51 3-7-5 12 50 Same as above, brown and reddish brown, wet 100 51 684.84 52 683.84 53 682.84 54 681.84 54.5-56 55 680.84 Chert lense 50/5 R 75

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-5

Sheet 3 of 4

Plant Bowen Dry Gypsum Storage Facility 114.2 SITE TOTAL DEPTH SURF.ELEV. 735.84 Standard Penetration Test No. RQD Comments Depth Elev. Material Description, Classification and Remarks From To Blows Ν % Rec 57 678.84 58 677.84 59 676.84 7 S-12 59.5-61 5-4-3 60 675.84 0 674.84 61 62 673.84 672.84 63 64 671.84 S-13 64.5-66 12-13-22 35 100 65 670.84 Hard, light brown and white clayey SILT, clay content in light brown matrix, very moist 66 669.84 668.84 67 68 667.84 69 666.84 S-14 69.5-71 16-25-17 42 100 70 665.84 Same as above, white silt more abundant 664.84 71 72 663.84 73 662.84 74 661.84 75 660.84 Hard, highly weathered and fractured DOLOMITE, wet S-15 74.5-76 18-33-14 47 100 659.84 76 77 658.84 77.6: Rock seam 657.84 78 79 656.84 30-13-23 S-16 79.5-81 36 655.84 Hard, brown interbedded coarse SAND and silty 75 80 CLAY, wet 81 654.84 82 653.84 83 652.84 84 651.84 650.84 Very stiff, brown sandy CLAY with chert fragments S-17 84.5-86 19-13-12 25 85 ranging from coarse sand to gravel, wet 86 649.84 87 648.84

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

Sheet 4 of 4

GWC-5

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 114.2' SURF.ELEV. 735.84

			Sample		dard Penetration Test				
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
89	646.84								
90	645.84	Same as above, hard with highly weathered dolomitic sand	S-18	89.5-91	14-25-19	44		50	
91	644.84	Sailu							
92	643.84								
93	642.84								
94	641.84								
95	640.84	Hard, highly weathered DOLOMITE, highly fractured,	S-19	94.5-96	21-13-21	34		25	
96	639.84	grain size ranging from coarse sand to large gravel, some clay seams, wet							
97	638.84								
98	637.84								
99	636.84								
100	635.84		S-20	99.5-101	17-5-7	12		0	
101	634.84								
102	633.84								
103	632.84								
104	631.84								
105	630.84	Very stiff, light brown silty CLAY with white silt	S-21	104.5-106	10-7-10	17		90	
106	629.84	lenses, wet							
107	628.84								
108	627.84								
109	626.84								
110	625.84	Hard, white silty SAND, dolomitic, very fine to medium grained, wet	S-22	109.5-111	10-14-16	30		75	
111	624.84	graniou, wet							
112	623.84								
113	622.84								
114	621.84	Top of rock Bottom of boring							
115	620.84								
116	619.84								
117	618.84								
118	617.84								
119	616.84								
120	615.84 9901 7-26-2	2004							

WELL CONSTRUCTION LOG Southern Company Generation						
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL			
Storage Facility						
LOCATION: Cells 1&2 RIG TYPE: CME 75						
LOGGER: K. Hobbs DRILLING METHODS: HSA						
DATE CONSTRUCTED: 5/1/2007 - 16:00						
		DEPTH	ELEVATION			
<u> </u>		FEET	FT, MSL			
Locking Hinged Top ———						
1/4-inch Weep Hole \	TOP OF RISER	2.28	729.02			
' \ I □	2" Threaded Riser Cap					
\	2 Thiodadd Moor Cap					
4-ft x 4-ft concrete pad						
	GROUND SURFACE	0.00	726.74			
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	/ PROTECTIVE CASING					
	SIZE: 4x4-inch					
	TYPE: Anodized Aluminum					
WATER LEVEL:	: //					
	BOTTOM OF PROTECTIVE CASING					
Well Development: Pump/surge until						
clear.	BACKFILL MATERIAL					
	TYPE: Portland Cement Grout					
	AMOUNT: 40 bags					
	, o oge					
	RISER CASING					
	DIA: 2-inch					
	TYPE: Schedule 40 PVC					
	JOINT TYPE: Flush Threaded					
	CONTITUE NACHTINGGOG					
	TOP OF SEAL	88.80	637.94			
	ANNULAR SEAL	00.00	007.54			
	TYPE: 1/4-inch coated bentonite pellets					
	5-gal buckets AMOUNT: 0.75 bucket					
	PLACEMENT: Tremie					
	-	04.20	622.44			
	TOP OF FILTER PACK	94.30	632.44			
	FILTER PACK TYPE: DSI Sand 14 (20/20)					
	TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc.					
	AMOUNT: 12 bags; 50 lbs/bag					
	PLACEMENT: Tremie; wash with water					
	DOTTON	07.00	600.40			
	BOTTOM OF RISER / TOP OF SCREEN	97.62	629.12			
	SCREEN DIA 3 in ab					
	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	40=	040 15			
	BOTTOM OF SCREEN	107.62	619.12			
		40=	040.55			
	BOTTOM OF CASING	107.92	618.82			
HOLE DIA	: 8"					

sou	THERN		ING L	.OG			Hole N	lo.	GWC-6	
COMPA Energy to Serve Your		OFOLOGICAL OFFINIOFO					Sheet 1 of 4			
SITE _		Plant Bowen Dry Gypsum Storage Fac	ility		HOLE DEPTH	109.3		SURF.ELEV	. 726	3.74
LOCAT	ION	Cells 1 & 2	COORE	DINATES N	207296	64.1	E	150	2517.79	
ANGLE		0 BEARING 0	CONTR	RACTOR	SCS	[RILL NO.			
DRILLII	NG METHO	D HSA NO. SAMPLE	s	21	NO. U	.D. SAMPL	_ES			
CASING	G SIZE	LENGTH	co	RE SIZE		TOTAL	% REC.			
WATER	R TABLE DE									
TYPE (GROUT	QUANTITY		IIX	DRII	LLING STA	RT DATE		1/2007	
DRILLE	R	S. Denty RECORDER K. Hobbs APPRO	_	Ctor		LLING CO	MP. DATE	5/	1/2007	_
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	From To	dard Penetration Test Blows	N	Con	nments	% Rec	RQ
0	726.74									
1	725.74									
2	723.74									
3	720.74									
4	716.74									
5	711.74	very still, red salidy SILT, Gruffibly, soffie qualiz	S-1	4.5-6	5-8-12	20				
6	705.74	pebbles								
7	698.74									
8	690.74									
9	681.74									
10	671.74	Very stiff, red silty gravelly CLAY, dry, crumbly, with	S-2	9.5-11	4-6-15	21				
11	660.74	dolomite fragments								
12	648.74									
13	635.74									
14	621.74									
15		Stiff, red-brown to light brown sandy SILT, dry,	S-3	14.5-16	3-5-7	12				
16		crumbly, with clay seams & some weathered dolomite fragments			-					
17	573.74									
18	555.74									
10	536 74				1	1 1			1	

S-4 19.5-21

24 426.74 Form GS9901 7-26-2004

495.74 473.74

450.74

lense

516.74 Stiff, light brown SILT, moist, 1.5" thick white dolomite

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-6

GEOLOGICAL SERVICES
Sheet 2 of 4

Plant Bowen Dry Gypsum Storage Facility
TOTAL DEPTH
109.3
SURF.ELEV. 726.74

SITE _				TOTAL DEPTH	109	9.3 SURF.ELEV.	726	.74	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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,	S-6	29.5-31.0	3-8-11	19			
31	695.74	brown, and red brown							
32	694.74								
33	693.74								
34	692.74								
35	691.74	Very stiff, light brown sandy SILT, moist, some white	S-7	34.5-36	6-7-13	20			
36	690.74	dolomite fragments							
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	weathered dolonite							
47	679.74								
48	678.74								
49	677.74								
50		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	Chiff light heavy pandy gravelly Old Tours for your	C 44	E4 E 50	6.00	4.4			
55		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 9901 7-26-2	2004							

SOUTHERN COMPANY Energy to Serve Your World*

Form GS9901 7-26-2004

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-6

Sheet 3 of 4

Plant Bowen Dry Gypsum Storage Facility 109.3 726.74 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. Blows Ν Comments RQD 669.74 57 668.74 58 667.74 59 666.74 Stiff, light brown sandy SILT, wet, some dolomite S-12 8-7-8 15 60 59.5-61 fragments 665.74 61 664.74 62 63 663.74 662.74 64 661.74 Stiff, light brown SILT, wet, with gravel S-13 64.5-66 4-6-8 14 65 660.74 66 67 659.74 658.74 68 69 657.74 656.74 S-14 69.5-71 70 Stiff, light brown gravelly SILT, one band of quartz 7-5-7 12 655.74 71 654.74 72 653.74 73 652.74 74 651.74 S-15 74.5-76 75 Stiff, light brown SILT, wet, some banding and quartz 6-10-10 20 fragments 76 650.74 649.74 77 78 648.74 647.74 79 80 646.74 Stiff, light brown SILT, wet, with black/gray chert, S-16 79.5-81 5-6-9 15 banding, chert and quartz fragments 81 645.74 82 644.74 643.74 83 642.74 84 85 Very stiff, light brown to reddish brown sandy SILT, S-17 84.5-86 8-3-24 27 wet, with chert fragments 640.74 86 639.74 87 638.74

SOUTHERN COMPANY Energy to Serve Your World

Form GS9901 7-26-2004

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-6

Sheet 4 of 4

109.3 Plant Bowen Dry Gypsum Storage Facility 726.74 SURF.ELEV. SITE TOTAL DEPTH Elev. RQD Depth Material Description, Classification and Remarks Blows Comments From To % Rec 637.74 89 Medium stiff, light brown clayey SILT, wet, red S-18 89.5-91 2-3-3 6 90 mottling, some chert fragments 635.74 91 634.74 92 633.74 93 94 632.74 631.74 S-19 94.5-96 2-2-2 95 Soft, light brown silty CLAY, saturated, with some 4 sandy bands 630.74 96 629.74 97 628.74 98 99 627.74 626.74 S-20 99.5-101 100 Soft, light brown silty CLAY, saturated, with few 0-1-2 3 rock fragments 101 625.74 624.74 102 623.74 103 <u>10</u>4 622.74 S-21 104.5-106 105 621.74 Light brown clayey sandy SILT, with rock fragments 1-1-15 16 chert, and dolomite 620.74 106 107 619.74 108 618.74 617.74 109 Top of rock Bottom of boring 616.74 110 615.74 111 614.74 112 613.74 113 612.74 114 611.74 115 610.74 116 609.74 117 608.74 118 607.74 119 606.74



WELLS 2015/CELLS 1-2 WELLS/BORING LOGS/PLANT BOWEN CEL

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 7/2/15 09:24 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTUDRILLING/PROJECTS/GA-BOWENICCB

WELL: GWC-6RZ PAGE 1 OF 3

RECORD OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 1 & 2 Replacement Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 **BOREHOLE COMMENTS WELL DATA DATA** DEPTH Surface: protective aluminum cover with bollards; 4-foot square concrete pad ELEV (DEPTH ELEV. Strata · B ^ -Surface Seal: Concrete 725.8 (3.5)721.3 716.3 Well: 2" OD PVC (SCH 40) Annular Fill: Portland Cement-Bentonite Grout (24 - 47lbs bags PC, 2.5 -50lbs bags Gel, 135 gal. Water) 702.3 696.3

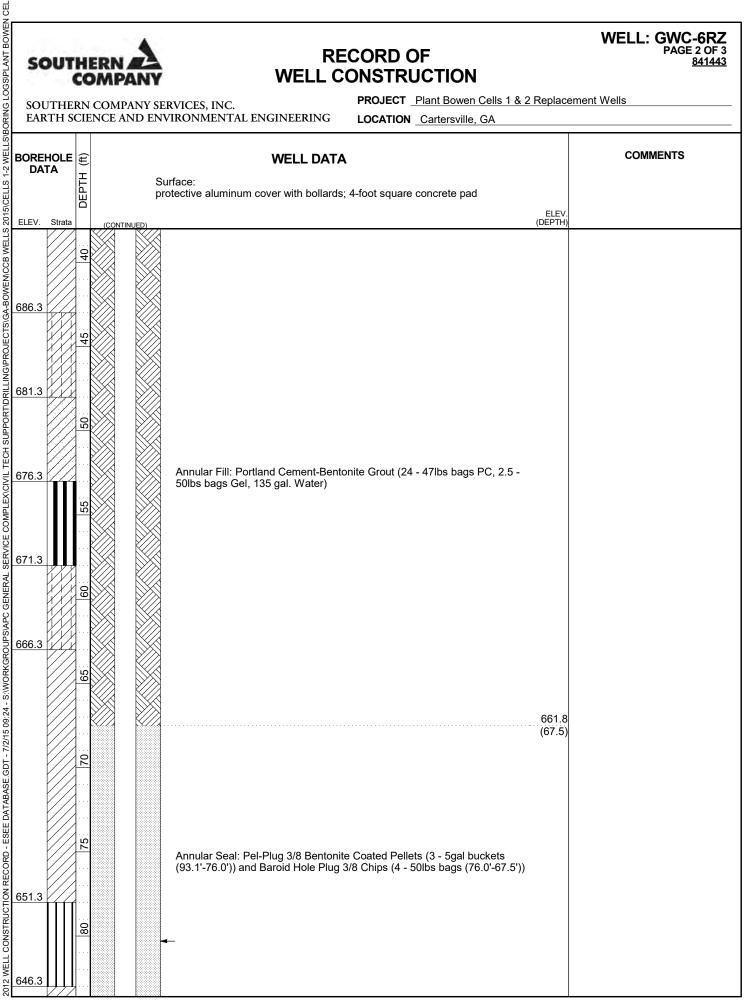


RECORD OF WELL CONSTRUCTION

WELL: GWC-6RZ PAGE 2 OF 3 841443

SOUTHERN COMPANY SERVICES, INC.

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells



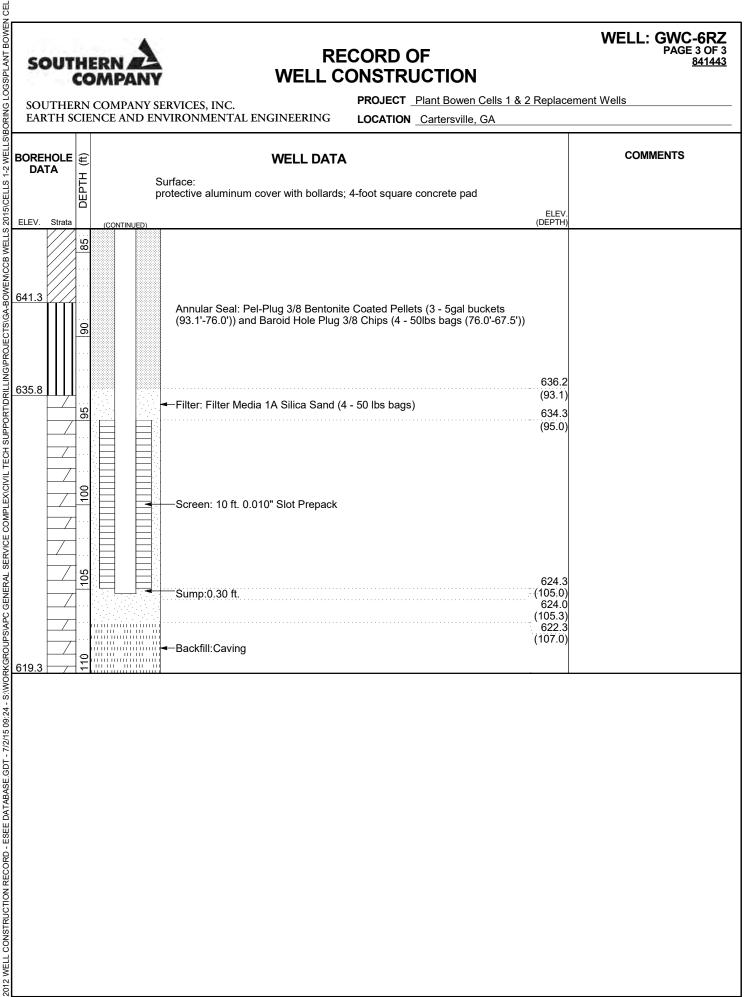


RECORD OF WELL CONSTRUCTION

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



2 REPLAC					BORING GWC-6RZ
CE COMPLEXCIVIL TECH SUPPORTUBEILING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 12 WELLS/BORING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEXCIVIL TECH SUPPORTUBING LOGS/PLANT BOWEN CELLS 1 & 2 REPLACE COMPLEX COMP		HERN LOG OF	TEST BOR	ING	PAGE 1 OF 3
MEN MEN			PRO IECT Plant	Rower	n Cells 1 & 2 Replacement Wells
SO E EA		RN COMPANY SERVICES, INC. CIENCE AND ENVIRONMENTAL ENGINEERING	LOCATION Carte		•
S/PLA					
DATI		TED _4/22/2015 COMPLETED _4/28/2015 SURI DR _Cascade Drilling EQUIPMENT _78	F. ELEV. <u>729.3</u>		
DRIL	LED BY	J. Sigler LOGGED BY B. Smelser	CHECKED BY		ANGLE BEARING
∰ BOR	ING DEI	PTH 110 ft. GROUND WATER DEPTH: DURING	_48.5 ft. COMP	P. <u>71.</u>	7 ft. DELAYED 73.9 ft. after 100 hrs.
TON $\frac{17}{2}$	ES TO	C Elevation 732.10, Sonic Drilling - 7"OD Casing in Overb	ourden, 6"OD Casin	g in Ro	ock, 4"OD Core
				Z	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION	COMMENTS
EN/CCB W	GR/ L		ELEV	Weak Moderate Strong	
 Q		Elastic Silt (MH)		≶≥ળ	
7 2 8					
	[] [SPT N=28bpf(@3ft.)
5 5		 dark red (10R 3/6) fill dry, very stiff, low plastic, clay light gray brittle/friable dolomite fragments 	ey, some white to		10/12/16
		.gg,			
HSI		Lean Clay (CL)			SPT N=27bpf(@8ft.)
10		 trace mottling dark red (10R 3/6) and dark brown (7 residuum dry, very stiff, low to medium plastic, trace of 			8/13/14
Ö 		fragments	3		
(APC)					
 Ш		Elastic Silt (MH)			SPT N=26bpf(@13ft.)
15		 mottled red / moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6) residuum dry, very s 	stiff, clayey silt,		7/12/14
≱l 	. [] [abundant light gray to white, angular to subangular, m coarse dolomite fragments, trace interbedded clay lay			
A		- mottled red / moderate reddish brown (10R 4/6), stro	ong brown (7 5YR		SPT N=11bpf(@18ft.)
20	_	4/6) and yellow (10YR 7/6) residuum moist, stiff, low decrease in rock fragments			3/5/6
XGX 	[] [decrease in rock nagments			
₩ 					
χ, Σ		- mottled yellow (10YR 7/8) and red (2.5YR 4/6) resid	duum moist, very		SPT N=16bpf(@23ft.)
25	-	stiff, low plastic, clayey silt with interbedded zones of abundant medium to coarse, angular light gray dolom		: :	3/7/9
- 574/15 14:38 - S:WORKGROUPS/APC GENERAL SERVI	. []	light gray clay streaks	3 ,		
- - -		Lean Clay (CL)			
34SE		- mottled yellow (10YR 7/8) and red (2.5YR 4/6) resid			SPT N=9bpf(@28ft.)
30	1///	low to medium plastic, trace angular to subangular, co coarse dolomite and chert fragments	arse to very		3/4/5
SE					
- 50		Electic Silt (MILI)			SDT N=10hnf/@22# \
35		Elastic Silt (MH) - mottled yellowish red (5YR 5/8) and yellow (10YR 8			SPT N=10bpf(@33ft.) 3/5/5
SIMPLE GEOLOGY LOG - ESEE DATABASE GDT	 [] []	moist, stiff, low plastic, interbedded zones of red CL a	na yellow ML		0,0,0
<u>≥</u>					

S		HERN A	LOG OF	TEST BOR	ING	BORING GWC-6RZ PAGE 2 OF 3 841443			
SO		RN COMPANY SI	FRVICES INC	PROJECT Plant	n Cells 1 & 2 Replacement Wells				
EAI			VIRONMENTAL ENGINEERING	LOCATION Cartersville, GA					
SO EAI HLd (#) 40 45 50 55	GRAPHIC LOG		MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS			
40		4/4) residuum) (2.5YR 4/6) and reddish brown / mode moist, stiff, low to medium plastic, trac plomite fragments			SPT N=13bpf(@38ft.) 3/6/7			
45		brown (10R 4/0 stiff, non to me silt, low to med	ML) g white / pinkish gray (5YR 8/1), red / m 6) and reddish yellow (7.5YR 7/8) resi edium plastic, silt grading to silty clay, r dium plastic red clay, trace light gray ar ittle/friable, medium to coarse dolomite	duum moist, very non plastic light gray nd angular to	-	SPT N=19bpf(@43ft.) 12/12/7			
50			R 7/8) residuum wet, medium stiff, low to ones of fine silty sand, cohesive, can ro			SPT N=7bpf(@48ft.) 1/2/5			
55		light gray (N8)	H) dark brown / dusky yellowish brown (10 residuum wet, very stiff, low plastic, ab edium to very coarse angular chert frag	oundant light gray to		SPT N=28bpf(@53ft.) 28/14/14			
60		Silty Clay (CL- - mottled yellow yellow (10YR 7 medium rock f	wish brown / moderate yellowish brown 7/8) residuum wet, stiff, low to medium	(10YR 5/4) and plastic, trace		SPT N=9bpf(@58ft.) 2/3/6			
65		(10YR 8/6) and plastic, silty, tr) sh yellow (7.5YR 6/8), yellow / pale yed red (2.5YR 5/6) residuum wet, very ace light gray to white, medium to coar lomite fragments	stiff, low to medium		SPT N=17bpf(@63ft.) 4/8/9			
70		5/8) residuum	nish yellow (10YR 6/8), white (10YR 8 wet, very stiff, low to medium plastic, t nedium to coarse dolomite fragments a ments	trace subangular to		SPT N=25bpf(@68ft.) 4/10/15			
70 75		(2.5YR 5/8) re	ish yellow (7.5YR 6/6), reddish yellow obsiduum wet, medium stiff, low to mediun to subangular chert fragments and do	ùm plastic, trace		SPT N=8bpf(@73ft.) 1/4/4			
80	-		wish red (5YR 5/8) and yellow (10YR e interbedded clay and rock fragments	7/8) residuum wet,		SPT N=25bpf(@78ft.) 4/15/10			
	ЩЦ				4 : : l	SPT N=23bpf(@83ft.)			

BORING GWC-6RZ PAGE 3 OF 3 841443

PECHOGY LOG - ESEE DATABASE. GDT - 5/14/15 14:38 - S:WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICCB WELLS 2015/CELLS 1-2 WELLS/BORING LOGS/PLANT BOWEN CELLS 1 & 2 REPLAC PROJECT Plant Bowen Cells 1 & 2 Replacement Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Moderate - trace mottling strong brown (7.5YR 5/6) and pale yellow (2.5Y 7/4) 10/10/13 85 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) Silt (MH) SPT N=28bpf(@88ft.) - brownish yellow / dark yellowish orange (10YR 6/6) and yellow (10YR 10/12/16 90 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 Dolostone 95 - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, hard, NOTE: degree of fracture unknown due to sonic slightly to moderately weathered, massive, trace medium grains visible, drilling method, no intact core pieces recovered limited 1-2" core pieces recovered, mostly fragments recovered, trace making fracture orientation difficult to determine. 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 100 angled fractures, trace low angled fractures visible, trace orangish mud staining near bottom of recovered section, calcite fracture fill visible, no identifiable healing 105 driller noted a very weak zone (possible void or heavily fractured zone) @ approx. 107-110', no recovery, hole caved from 110-107', filter sand was placed on bottom above the caved zone from . 105-107'. 110 Bottom of borehole at 110.0 feet. 115 120 125



GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 9/8/16 08:34 - S:WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/GA-BOWEN/LANDFILL REPLACEMENT WELLS 2016/GWC-07/BOWEN LANDFILL REPLACEMEN

LOG OF TEST BORING

BORING GWC-07 Z PAGE 1 OF 3 GPC633179

SOUTHERN COMPANY SERVICES, INC.

EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

		DR Cascade EQUIPMENT Tracked METHO J. Asua LOGGED BY _W. Shaughnessy CHECKED BY _B.			BEARING _
		PTH 127.5 ft. GROUND WATER DEPTHDURING 75 ft. COM			
NOTE	s				
			Z		
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak Moderate Strong REACTION	COMMENTS	Natural Gamma
			Wea Mode Stror		55 110 165
		Sandy Silt (ML) - dark yellowish brown (10YR 4/6) dry - dark grayish brown / dark yellowish brown (10YR 4/2)			
5		- light brownish gray / pale yellowish brown (10YR 6/2)			-
		- mottled strong brown (7.5YR 4/6) and light gray (2.5Y 7/2) dry			\ \{\ \}
15 20 25		- mottled strong brown (7.5YR 5/6) and red (2.5YR 4/6) dry to damp increased sand content than above	,		
30		Sandy Lean Clay (CL) - dark red (2.5YR 3/6) damp, with fine angular gravel - medium			
35		- mottled red (2.5YR 4/6), pale brown (10YR 6/3) and white (2.5YR 8/1) hard			-



SOUTH			NG GWC-07 Z PAGE 2 OF 3 GPC633179
SOUTHERN	OMPANY N COMPANY SERVICES, INC. PROJECT Land	fill Replacement Monitoring Wells	
EARTH SCI	ENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plan		
OEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak HCL Moderate REACTION Strong DO ALAN	Natural Gamma
SOUTHERN EARTH SCI #### 150 ##### 150 ##### 150 ##### 150 ##### 150 ##### 150 ###### 150 ###################################	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	5 2 0)	
55 60	- increased gravel content than above, weathered chert Well-graded Sandy Gravel (GW) - light gray (5YR 7/1) coarse chert gravel 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)		
65 70	- mottled brownish yellow / dark yellowish orange (10YR 6/6), white (10YR 8/1) and red (2.5YR 5/8) fine to coarse chert gravel (subrounded and angular)		
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		
85	- increased sand content than above		



sc	DUTH	LOG OF TEST B	ORING	BOR	ING GWC-07 Z PAGE 3 OF 3 GPC633175
SOU FAR	JTHERN			nent Monitoring Wells	
2211		ECOATION _			
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION Weak HCL Moderate REACTION Strong	COMMENTS	Natural Gamm
90		Sandy Fat Clay (CH)(Con't)	2 0)		5
		Elastic Silt (MH) - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/6) wet, hi			
95		- red (2.5YR 4/6) medium stiff, medium, with dark gray chert cobb			
		 mottled brownish yellow (10YR 6/8) and red (2.5YR 4/6) high, v sand and fine gravel 	vith		
100		- mottled red (2.5YR 4/6), white (2.5YR 8/1) and pale brown (10\6/3)	r		
105		- yellowish brown (10YR 5/8) soft			
110		Clayey Sand (SC) - dark yellowish brown (10YR 4/6) with fine to coarse chert grave			
115					
120					
		- chert gravel and sand			
125					
		Bottom of borehole at 127.5 feet.			
130					



2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 9/8/16 08:36 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/GA-BOWENLANDFILL

RECORD OF

WELL: GWC-07 Z

PAGE 1 OF 3

REPLACEMENT WELLS 2016/GWC-07/BOWEN LANDFILL REPLAC **WELL CONSTRUCTION** PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen **DATE STARTED** 5/12/2016 **COMPLETED** 5/19/2016 **SURF. ELEV.** 710.1 **COORDINATES:** N:34.128532 E:-84.904870 CONTRACTOR Cascade EQUIPMENT Tracked METHOD Rotosonic DRILLED BY J. Asua LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING BORING DEPTH 127.5 ft. GROUND WATER DEPTHDURING 75 ft. COMP. 55 ft. DELAYED 55 ft. after 24 hrs. BOREHOLE E **WELL DATA COMMENTS DATA** DEPTH Surface: protective aluminum cover with bollards; 4-foot square concrete pad ELEV. Strata -Surface Seal: Concrete 708.1 (2.0)Well: 2" OD PVC (SCH 40) Annular Fill: Bentonite Grout (3 - 50lbs bags Aquagaurd, 80 gal. water) 684.1

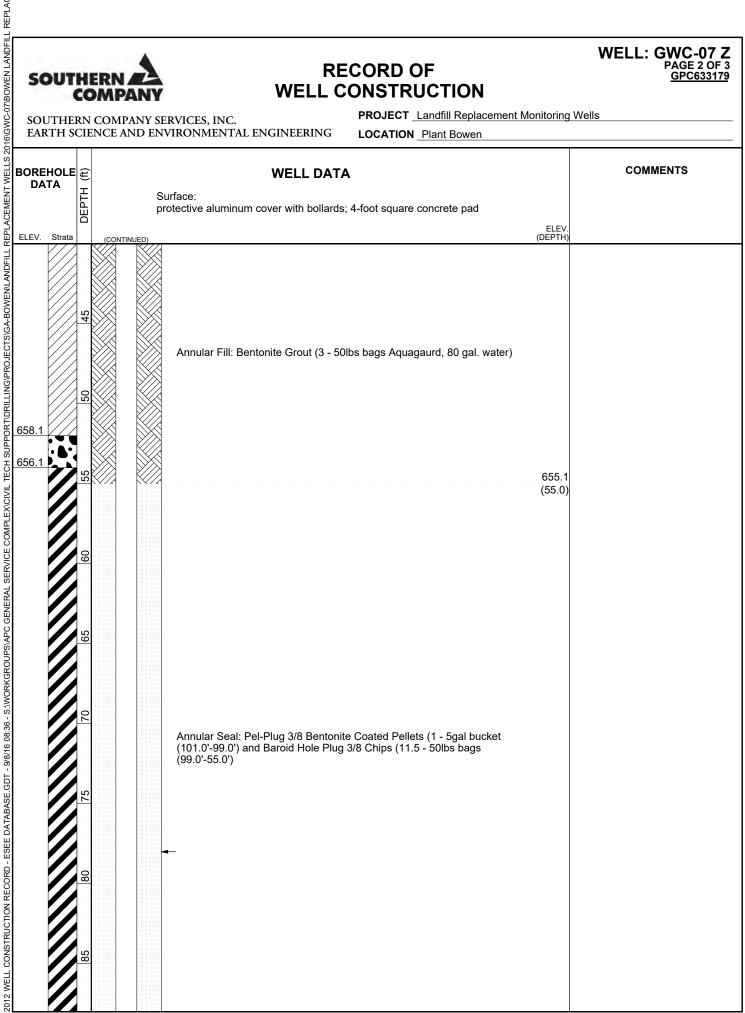


RECORD OF WELL CONSTRUCTION

WELL: GWC-07 Z PAGE 2 OF 3 GPC633179

SOUTHERN COMPANY SERVICES, INC.

PROJECT Landfill Replacement Monitoring Wells



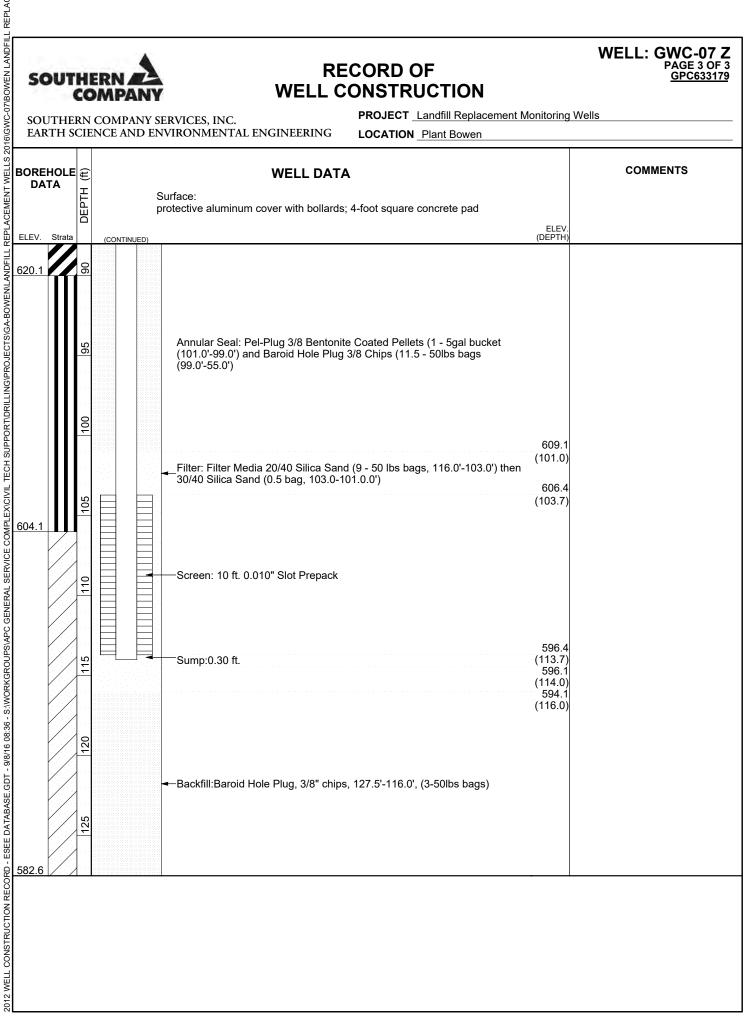


RECORD OF WELL CONSTRUCTION

WELL: GWC-07 Z PAGE 3 OF 3 GPC633179

SOUTHERN COMPANY SERVICES, INC.

PROJECT Landfill Replacement Monitoring Wells





WELLS 2015/CELLS 1-2 WELLS/BORING LOGS/PLANT BOWEN CEL

2012 WELL CONSTRUCTION RECORD - ESEE DATABASE GDT - 7/2/15 09:24 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTUDRILLING/PROJECTS/GA-BOWENICCB

WELL: GWC-8Z

PAGE 1 OF 2 **RECORD OF** WELL CONSTRUCTION PROJECT Plant Bowen Cells 1 & 2 Replacement Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 **BOREHOLE COMMENTS WELL DATA** Œ DATA DEPTH Surface: protective aluminum cover with bollards; 4-foot square concrete pad ELEV. Strata Surface Seal: Concrete 696.8 (2.5)691.3 686.3 Well: 2" OD PVC (SCH 40) Annular Fill: Portland Cement-Bentonite Grout (8 - 47lbs bags PC, 0.5 -50lbs bags Gel, 45 gal. Water) 676.3 671.3 666.3

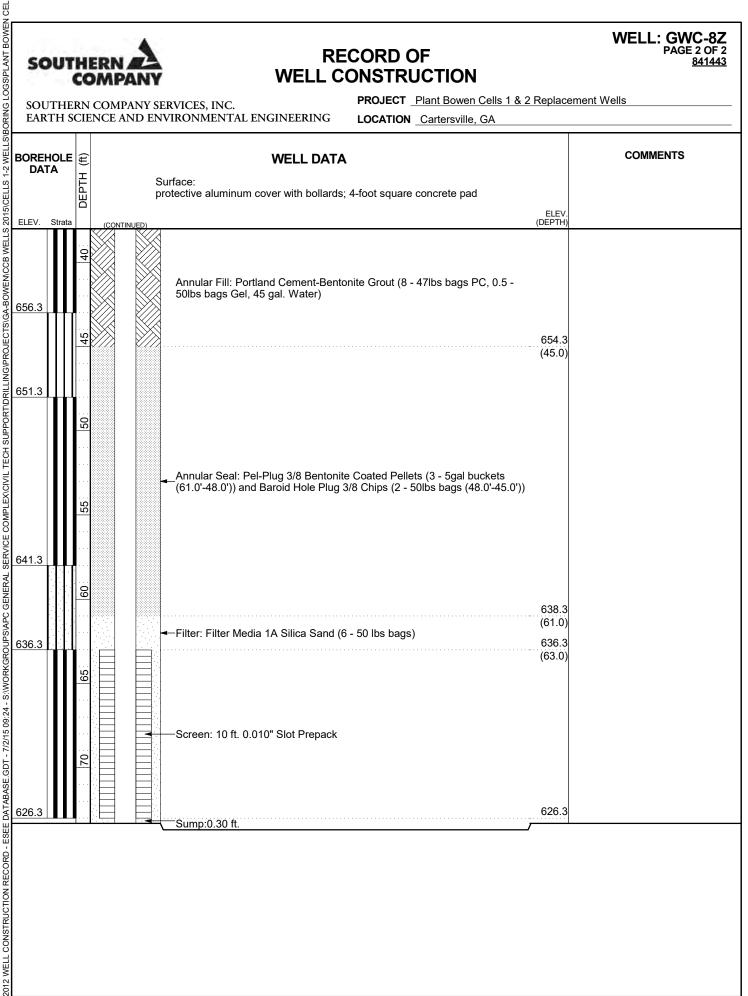


RECORD OF WELL CONSTRUCTION

WELL: GWC-8Z PAGE 2 OF 2

SOUTHERN COMPANY SERVICES, INC.

PROJECT Plant Bowen Cells 1 & 2 Replacement Wells



2 REPLAC					BORING GWC-8Z
CE COMPLEXICIVIL TECH SUPPORTIDRILLING IPROJECTS/BOWEN/CCB WELLS 2015/CELLS 1-2 WELLS/BORING LOGS/PLANT BOWEN CELLS 1 & 2 REPLAC DEPTH DEPTH		HERN LOG OF T	TEST BOR	RING	PAGE 1 OF 2
WEN			DPO IECT Diant	Rowen	Cells 1 & 2 Replacement Wells
SC EA		AN COMPANT SERVICES, INC.	LOCATION Cart		•
%PLAN					
DAT DAT CON		RTED 4/17/2015 COMPLETED 4/28/2015 SURF. FOR Cascade Drilling EQUIPMENT 786			
B DRIL	LED B	Y J. Sigler LOGGED BY B. Smelser C	HECKED BY		ANGLE BEARING
∄ BOR	RING DE	PTH _73.31 ft GROUND WATER DEPTH: DURING _	53 ft. COM	P. <u>50.</u>	5 ft. DELAYED 44.12 ft. after 100 hrs.
TON 5	ES TO	OC Elevation 702.32, Sonic Drilling - 7"OD Casing in Overbu	rden, 6"OD Core		
				Z	
2015	ပ		N O	윊	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL	COMMENTS
	GR/		ELE)	rate P	
VEN VEN				Weak Moderate Strong	
		Elastic Silt (MH)			
3/PRC		to a constitue of a delicit college (FVD C/O) and a top on both	(7.5)(D.5(0)		SPT N=34bpf(@3ft.)
5		 trace mottling reddish yellow (5YR 6/8) and strong br residuum dry, hard, clayey, trace medium sized subang 	own (7.5YR 5/8) ular to		9/14/20
F		subrounded rock fragments			
PPOR					
S	┈╁╃╄┧	Silt (ML)		1 : :	SPT N=25bpf(@8ft.)
10		 trace mottling strong brown (7.5YR 5/8) and light yell (10YR 6/4) residuum dry, very stiff, trace clay and medi 			4/10/15
		angular to subangular rock fragments			
MPLE					
S		Elastic Silt (MH)		1	SPT N=31bpf(@13ft.)
15	_	 mottled red (2.5YR 5/8), reddish yellow (7.5YR 6/8) at (7.5YR 7/1) residuum dry, hard, clayey, trace medium t 			11/12/19
SAL SAL SI		brittle, angular to subangular rock fragments			
APC		- mottled light red (2.5YR 6/8), reddish yellow (7.5YR 6	/8) and light grav		SPT N=19bpf(@18ft.)
<u>S</u> 20		(10YR 7/1) residuum moist, very stiff, non to low plastic interbedded layers of gray CL lean clay, trace subround	c, clayey with		5/9/10
KGRC		fragments	ed coarse criert		
- S:WORKGROUPSIAPC GENERAL SERVI					
		Silty Clay (CL-ML) - mottled reddish yellow (7.5YR 6/6), light gray (7.5YR	7/1) and red	1	SPT N=17bpf(@23ft.) 4/6/11
25	-1//	(10R 4/8) residuum moist, very stiff, low plastic, interbe	dded layers of		4/0/11
- 5/14/15 14:38		CL, medium to coarse hard to brittle angular to subangu fragments, trace very coarse angular chert fragments	nar dolomite		
<u>-</u>					
ASE.(Lean Clay (CL) - mottled red (2.5YR 5/8), light red (2.5YR 6/6) and ligh	t reddish arav	7 : :	SPT N=28bpf(@28ft.) 9/14/14
30 30	-\//	(2.5YR 7/1) residuum moist, very stiff, low to medium p coarse to very coarse, rounded to subrounded white ch	olastic, trace		V. 1 11 17
SEC	- 1///	Coarse to very coarse, rounded to subrounded write the	on nayments		
<u>б</u>					
37 LC		Elastic Silt (MH) - mottled reddish yellow (7.5YR 6/8), red (2.5YR 5/8) ar	nd light reddish		SPT N=35bpf(@33ft.) 15/16/19
SIMPLE GEOLOGY LOG - ESEE DATABASE GDT 22 C C C C C C C C C C C C C C C C C C	_	gray (2.5YR 7/1) residuum moist, hard, non to low plas coarse to very coarse, angular to rounded chert fragme	tic, clayey,		** **
უ ლ	┈╽▋┃│	states to very sociese, angular to rounded orient flagmen			
MM 					

BORING GWC-8Z PAGE 2 OF 2 841443

SIMPLE GEOLOGY LOG - ESEE DATABASE. GDT - 5/14/15 14:38 - S.WORKGROUPS\APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING\PROJECTS\BOWENICCB WELLS 2015\CELLS 1-2 WELLS\BORING LOGS\PLANT BOWEN CELLS 1 & 2 REPLAC PROJECT Plant Bowen Cells 1 & 2 Replacement Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Moderate Elastic Silt (MH) (Con't) SPT N=16bpf(@38ft.) - mottled yellow / pale yellowish orange (10YR 8/6) and reddish yellow 6/7/9 40 (7.5YR 6/6) residuum moist, very stiff, non to low plastic, coarse to very coarse, subangular to subrounded chert fragments SPT N=17bpf(@43ft.) - yellow (10YR 7/8) residuum moist, very stiff, trace subrounded to 4/7/10 45 subangular, coarse to very coarse dolomite and chert fragments SPT N=12bpf(@48ft.) Elastic Silt (MH) - reddish yellow (7.5YR 6/8) and light red (2.5YR 6/6) residuum moist, 4/5/7 50 stiff, non to low plastic, medium to cobble sized, angular to subangular chert and dolomite fragments SPT N=11bpf(@53ft.) - reddish yellow (7.5YR 6/8) residuum wet, stiff, non to low plastic, 4/6/5 55 abundant medium to coarse dolomite fragments SPT N=0bpf(@58ft.) Sandy Silt (ML) - reddish yellow (7.5YR 6/8) residuum wet, very soft, cannot roll, WOH 60 cohesive, trace clay SPT N=21bpf(@63ft.) 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 5/10/11 65 to subrounded chert and dolomite fragments SPT N=0bpf(@68ft.) - strong brown (7.5YR 5/8) residuum wet, very soft, low plastic, clayey, WOH cohesive, trace medium to coarse rock fragments 70 Bottom of borehole at 73.3 feet. 75 80

GWC- 8RR Gamma	Depth
0 CPS 250	1ft:200ft
Muham	5
	10
N. N	15 20
M) AA	25
What	30
24	35
Water	40
- Tallet	45
	50
N _V	55
	60
WINA.	65
	70
Bentonite Grout 5' - 91'	75
Sentonic Grout 3 71	80
	85
Bentonite Seal 91' - 95'	90
Sand Filter 95' - 97'	95
Screen 97' - 107'	105
2	

SOU	THERN			1	DRILLIN	IG L	OG			Hole N	o. G	WC-8RF	₹
Energy 1	COMF o Serve You	ur Wor ld ™					RVICES			_	eet 1 of		
SITE		Plant	Bowen Dry Gyp	sum Stora	ge Facil	ity		HOLE DEPTH	107		SURF.ELEV.	N	М
LOCAT	ION		Cells 1 & 2			COORE	DINATES N	20735	01.63	E _	150	2857.62	
			BEARING									ИЕ 75	
DRILLI	NG METHO	D	Rotosonic	N	IO. SAMPLES		Continuo	NO.	U.D. SAMPL	.ES)	
CASING	SIZE	8"	LENGTH			_ co	RE SIZE		TOTAL	% REC.			
WATER	R TABLE DE	EPTH	46.02 ELEV.	NM	TIM	E AFTE	R COMP.	24 hour	DAT	E TAKEN .			
	ROUT		QUAN	NTITY		M	IIX	DR	ILLING STA	RT DATE .	6/2	7/2011	
DRILLE	R	Boart	RECORDER	C. Sellers				DR	ILLING CON	IP. DATE	6/2	7/2011	
Depth	Elev.		Material Description, Classifica	ation and Remarks		Sample No.		dard Penetration Test Blows	N	Comr	nents	% Rec	RQE
0	NM												
1													
2													
3		CLAY, Sandy	y; brownish red; fine (grained sand									
4													
5													
6													
7													
8													
9													
10													
11													
12		CLAY, Silty;	yellowish red; traces	of chert gravel									
13													
14													
15													
16		_											
17		_											
18		_											
19													
20		_											
21		_											
22													

SOUTHERN COMPANY
Energy to Serve Your World*

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-8RR

Sheet 2 of 4

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	10	SURF.ELEV.	N	М
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25									
26		CLAY, Silty; yellowish red; traces chert gravel							
27		, ,,,							
28									
29									
30									
31									
32									
33									
34		CLAY, Sandy; yellow; with chert							
35									
36									
37									
38									
39									
40		SAA							
41		5nn							
42									
43									
44									
45									
46									
47									
48									
49		SAA							
50									
51									
52									
53									
54									
55									
56								1 /	1

DRILLING LOG

GEOLOGICAL SERVICES

SITE Plant Bowen Dry Gypsum Storage Facility

Sample S

Hole No. GWC-8RR
Sheet 3 of 4

TOTAL DEPTH SURF.ELEV. NM Standard Penetration Test No. RQD Depth Elev. Material Description, Classification and Remarks From To Comments % Rec Silt; yellow; wet SILT; yellow; sandy with chert gravel SAA with increasing gravel content Top of rock at 84' Dolostone; blue grey; iron stained fractures

SOUTHERN A COMPANY			DRILL					Hole No. G	WC-8RF	₹
Energy t	o Serve Yo		GEOLOGIC	AL SE	RVICES			Sheet 4 of	4	
SITE _			Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	107	SURF.ELEV.	N	М
Depth	Elev.		Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89										
90										
91		SAA								
92										
93										
94										
95		1								
96		1								
97		1								
98		1								
99										
100										
101		1								
102		1								
103										
104		1								
105		1								
106		1								
107		1								
108		BOH @ 1	07'							
109		Ī								
110		1								
111		1								
112		1								
113		1								
114		1								
115										
116										
117]								
118]								
119										1

120

Form GS9901 7-26-2004

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: B. Filipovich		NAME
LOCATION: Cells 1&2	RIG TYPE: CME 550		
LOGGER: K. Hobbs	DRILLING METHODS: HSA		GWC-9
DATE CONSTRUCTED: 8/16/2006 - 16:00			
		DEPTH	ELEVATION
		FEET	FT, MSL
	1	ILLI	I I, WISE
Locking Hinged Top———	4		
1/4-inch Weep Hole	TOP OF RISER	2.67	695.50
	2" Threaded Riser Cap		
I	·		
\ 			
A ft y A ft concrete mad	X		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	692.83
	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL:	* :/		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 20.5 bags		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	56.00	636.83
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 1 bucket		
	PLACEMENT: Tremie		
	TOP OF FILTER PACK	58.00	634.83
	FILTER PACK	20.00	551.50
	TYPE: DSI Sand - 1A (20/30)		
	Drillers Services, Inc.		
	AMOUNT: 7 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	i Li Celvierti. Henne, wash with Water		
	BOTTOM OF RISER / TOP OF SCREEN	60.18	632.65
	SCREEN	00.10	002.00
	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	70.40	600.05
	BOTTOM OF SCREEN	70.18	622.65
	BOTTON OF 610000	70.40	600.05
	BOTTOM OF CASING	70.48	622.35
	0.5"		
HOLE DIA:	8.5°		

sou [.]	THERN	DRILLI	NG L	.OG			Hole N	0.	GWC-9		
Energy to Serve Your Wo								Sheet 1 of 3			
SITE _		Plant Bowen Dry Gypsum Storage Faci	lity		HOLE DEPTH	70'		SURF.ELEV.	692	2.83	
LOCAT	ION	Cells 1 & 2					E _		3017.3		
ANGLE		BEARING	CONTR	ACTOR	SCS	DI	RILL NO.	CM	1E-550		
DRILLII	NG METHOI	ПСУ							0		
CASING	G SIZE	LENGTH	co	RE SIZE		TOTAL 9	% REC.				
WATER	R TABLE DE	PTH ELEV TI	ME AFTE	R COMP.		DATE	TAKEN				
TYPE G	GROUT	QUANTITY	N	IIX			RT DATE		6/2006		
DRILLE	R	B. Filipovich RECORDER A. Grissom APPRO	VED _		DRIL	LING COM	P. DATE	8/1	6/2006		
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comr	ments	% Rec	RQI	
									75.132		
0	692.83										
1	691.83										
2	690.83										
3	689.83										
		Hard dad as diah haram as a da Ol AV day with	C 4	255	40.44.40	00					
4		Hard, dark reddish brown sandy CLAY, dry, with large chert fragments	S-1	3.5-5	10-14-18	32					
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,	S-4	18.5-20	4-4-5	9					
		with few small rock fragments		10.0 20	770						
20	672.83										
21	671.83		I								

670.83

669.83

SOUTHERN COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

2

5

4

1-2-3

1-2-2

Sheet 2 of

GWC-9

Plant Bowen Dry Gypsum Storage Facility 70' TOTAL DEPTH SURF.ELEV. 692.83 No. Depth Elev. Material Description, Classification and Remarks RQD From To Comments % Rec 13 667.83 S-5 23.5-25 4-7-6 25 Same as above, with many large chert fragments 26 666.83 27 665.83 28 664.83 S-6 28.5-30 7 29 663.83 Same as above, with small amount of chert 2-3-4 662.83 30 661.83 31 32 660.83 33 659.83 4-3-5 8 Same as above, with small amount of chert S-7 33.5-35 658.83 34 35 657.83 656.83 36 37 655.83 38 654.83 39 Soft, yellowish orange to light brown slightly sandy S-8 38.5-40 WOH-2-2 4 653.83 silty CLAY, moist, with trace of chert

S-10

48.5-50

53.5-55

649.83 648.83 Same as above S-9 43.5-45 WOH-1-1 647.83

645.83 644.83 Firm, light brown sandy CLAY, fairly dry, with 643.83 a few chert fragments 642.83

639.83 638.83 Soft, yellowish orange slightly sandy CLAY, slightly moist, with trace of chert

637.83 636.83

Form GS9901 7-26-2004

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48

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50 51

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53

54

55

652.83 651.83

650.83

646.83

641.83

640.83

SOUTHERN COMPANY
Energy to Serve Your World*

DRILLING LOG

Hole No.

GWC-9

GEOLOGICAL SERVICES Sheet 3 of Energy to Serve Your World Plant Bowen Dry Gypsum Storage Facility 70' SITE TOTAL DEPTH SURF.ELEV. 692.83 Sampl No. Depth Elev. Material Description, Classification and Remarks From To Comments RQD % Rec 57 635.83 58 634.83 WOR 633.83 Very soft, yellowish orange sandy CLAY, with trace S-12 58.5-60 0 59 of pebbles 60 632.83 61 631.83 62 630.83 629.83 63 64 628.83 Same as above, with many rock fragments S-13 63.5-65 1-1-1 2 65 627.83 626.83 66 67 625.83 68 624.83 69 623.83 Same as above 68.5-70 50/2 R 622.83 Top of rock 70 Bottom of boring 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG Southern Company Generation							
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL				
Storage Facility	DRILLER: B. Filipovich		NAME				
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	ELEVATION				
		FEET	FT, MSL				
l 	¬	1	1 1, WIGE				
Locking Hinged Top ———▶							
1/4-inch Weep Hole \	TOP OF RISER	2.82	688.57				
	2" Threaded Riser Cap						
	·						
\ 							
A thrus A three months mad							
4-ft x 4-ft concrete pad							
	GROUND SURFACE	0.00	685.75				
\`.\	PROTECTIVE CASING						
	SIZE: 4x4-inch						
	TYPE: Anodized Aluminum						
WATER LEVEL:							
	BOTTOM OF PROTECTIVE CASING						
Well Development: Pump/surge until							
clear.	BACKFILL MATERIAL						
	TYPE: Portland Cement Grout						
	AMOUNT: 19.5 bags						
	RISER CASING						
	DIA: 2-inch						
	TYPE: Schedule 40 PVC						
	JOINT TYPE: Flush Threaded						
	TOP OF SEAL	54.00	631.75				
	ANNULAR SEAL						
	TYPE: 1/4-inch coated bentonite pellets						
	5-gal buckets						
	AMOUNT: 1 bucket						
	PLACEMENT: Tremie						
	TOP OF FILTER PACK	56.00	629.75				
	FILTER PACK	55.50	5_5.70				
	TYPE: DSI Sand - 1A (20/30)						
	Drillers Services, Inc.						
	AMOUNT: 4 bags; 50 lbs/bag						
	PLACEMENT: Tremie; wash with water						
	TENGLIVILIVI. Honne, wash with water						
	BOTTOM OF RISER / TOP OF SCREEN	58.19	627.56				
	SCREEN	50.18	027.00				
	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	60.40	647.50				
	BOTTOM OF SCREEN	68.19	617.56				
		00.40	047.00				
	BOTTOM OF CASING	68.49	617.26				
HOLE DIA:	6-5/8"						

SOU	THERN COMP	DRILL	NG L	.OG			Hole No.	GWC-10	
Energy i	o Serve You	r World" GEOLOGIC					Sheet 1 of		
_									
		Cells 1 & 2	COORI	DINATES N	2074020).99	E15	03160.48	
		0 BEARING 0 HSA NO. SAMPLE	CONTR	13	303		ORILL NO.	0	
CASING	NG METHOD	4.25" ID LENGTH							
TYPE G		QUANTITY				_			
DRILLE	R	B. Filipovich RECORDER M. Hughes APPRO	DVED _		DRII	LING COM	MP. DATE 8	/24/2006	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
0	685.75								
1	684.75								
2	682.75								
3	679.75								
4	675.75	Red CLAY, with medium to large quartz pebbles	S-1	4-5.5	5-11-18	29			
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								
14	580.75	Same as above	S-3	14-15.5	5-11-13	24			
15	565.75								
16	549.75								
17	532.75								
18	514.75								
19	495.75	Samo ac abovo		19-20.5	5 1 E 1 A	26]
20	454.75	Same as above	S-4	13-20.5	5-15-11	26]
22	432.75								
23	409.75								
23	400.70								1

24 385.75 Form GS9901 7-26-2004 SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-10

Sheet 2 of 3

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	6	5 SURF.ELEV.	685	.75
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	660.75	Orange and light tan CLAY with chert and rock	S-5	24-25.5	5-6-6	12			
26	659.75	fragments							
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		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	Out and and district to the COLON ST.	0.44	F4 55 5	MOLL C. S				
55		Orange and reddish brown CLAY with rock fragments and trace sand	S-11	54-55.5	WOH-2-0	2			
56	629.75								1

SOUTHERN AS **DRILLING LOG** Hole No. GWC-10 **GEOLOGICAL SERVICES** Sheet 3 of 3 Energy to Serve Your World **Plant Bowen Dry Gypsum Storage Facility** 65 SITE TOTAL DEPTH SURF.ELEV. 685.75 Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. From To Comments % Rec RQD 628.75 57 58 627.75 626.75 59 Brown and orange CLAY with rock fragments, 60 625.75 trace sand S-12 59-60.5 1-2-11 13 624.75 61 62 623.75 622.75 63 621.75 64 620.75 No recovery S-13 64-35.5 WOH 0 65 Bottom of boring 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84

85 86 87

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG	eneration	1	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS	WELL	
Storage Facility	DRILLER: S. Denty	NAME	
LOCATION: Cells 1&2	RIG TYPE: CME 75		
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock Core w/Wate	er	GWC-10R
DATE CONSTRUCTED: 5/15/07 - 9:00 am			
		DEPTH	ELEVATION
	•	FEET	FT, MSL
Locking Hinged Top ──►			
1/4-inch Weep Hole \	TOP OF RISER	2.00	688.61
' \ I □	2" Threaded Riser Cap		
\	2 Throaded Nicor Oup		
	*		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	686.61
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL:	* :		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 28 bags		
	7 tivio orti i 20 bago		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	JOINT TIFE. Hush Hilleaded		
	TOP OF SEAL	80.20	606.41
	TOP OF SEAL	00.20	000.41
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 0.5 bucket		
	PLACEMENT: Tremie	0= 00	224.24
	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		
		0	
	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"		

SOUTHERN AND DRILL				3 LO	og			Hole No.	GWC-10F	₹		
	o Serve You			CAL SERVICES				Sheet 1 of 4				
		Plant Bowen Dry Gypsum Stor										
		Cells 1 & 2	co	OORD	INATES N	2074021	.32	E150	3151.35			
ANGLE		0 BEARING 0	co	ONTRA	ACTOR	SCS	DR	RILL NO. C	ME 75			
DRILLIN	IG METHOD	LICA/LIC Core with water	NO. SAMPLES _		14	NO. U.	D. SAMPLE	s	0			
CASING		LENGTH										
WATER		PTH 34' ELEV							15/2007			
TYPE G		QUANTITY							14/2007			
DRILLE	R	S. Denty RECORDER L. Millet				DRIL dard Penetration Test		P. DATE5/	14/2007			
Depth	Elev.	Material Description, Classification and Remarks			From To	Blows	N	Comments	% Rec	RQD		
0	686.61											
1	685.61											
2	683.61											
3	680.61											
4	676.61											
5	671.61	Dark red silty CLAY, dry, hard, occasional carbo	onate	S-1	4.5-6	6-8-12	20					
6	665.61	sand										
7	658.61											
8	650.61											
9	641.61											
10	631.61	Same as above with carbonate pebbles	5	S-2	9.5-11	8-10-13	23					
11	620.61											
12	608.61											
13	595.61											
14	581.61											
15	566.61	Dark orange silty CLAY, dry, hard, carbonate sa and cobbles	and S	S-3	14.5-16	10-13-42	55					
16	550.61	and copples										
17	533.61											
18	515.61											
19	496.61									I I		
20	476.61	Same as above	S	S-4	19.5-21	9-7-8	15					
21	455.61											
22	433.61											
23	410.61											

24 386.61 Form GS9901 7-26-2004 SOUTHERN AS COMPANY
Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

Sheet 2 of 4

SURF.ELEV.

GWC-10R

686.61

SITE Plant Bowen Dry Gypsum Storage Facility TOTAL DEPTH 97.8

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

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-10R

686.61

GEOLOGICAL SERVICES
Sheet 3 of 4

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

_					_				
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	629.61								
58	628.61								
59	627.61								
60		Orange silty CLAY, moist, firm, light to heavy black	S-12	59.5-61	4-6-7	13			
61	625.61	mottling, carbonate sand and pebbles							
62	624.61								
63	623.61								
64	622.61								
65		Orange and light gray CLAY, saturated, firm (gray)	S-13	64.5-66	10-20-12	32			
66	620.61	and soft (orange), occasional dark brown mottling,							
67	619.61								
68	618.61								
69	617.61								
70	616.61	Light orange and medium brown silty CLAY,	S-14	69.5-71	2-10-6	16			
71	615.61	saturated, soft, carbonate pebbles and sand							
72	614.61								
73	613.61	73.1 - Top of rock							
74	612.61								
75	611.61								
76	610.61								
77	609.61	Dad and DOLOGTONS about		77.0.00.0			5.0/4.7		
78	608.61	Dark gray DOLOSTONE, shaley		77.6-82.6			5.0/4.7		
79	607.61								
80	606.61	80.8- Fracture with iron staining							
81	605.61								
82	604.61								
83		Dark gray DOLOSTONE, shaley		82.6-87.6			5.0/5.0		
84	602.61	OF O Freehors with mistral about the							
85	600.61	85.2- Fracture with minimal clay rind							
86 87	599.61								
88	598.61								
- 55									

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-10R

Sheet	4	of	4	

Energy 1	to Serve You	r World* GEOLOGICA	IL OL	IVVICES			Sheet 4 of 4		
SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	97	SURF.ELEV.	686	.61
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	597.61	88.6- Fracture over shale lense							
90		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								1
94	592.61								1
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	573.61 572.61								
114	572.61 571.61								
116	570.61								
117	569.61								
118	568.61								
119	567.61								
120	566.61	2004							

PROJECT: Plant Bowen Dry Gypsum Storage Facility DRILLER: S. Milam LOCATION: Cells 1&2 RIG TYPE: CME 550 LOGGER: Wayne Wang DATE CONSTRUCTED: 6/1/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum	ACE	DEPTH FEET 2.44	WELL NAME GWC-11 ELEVATION FT, MSL 678.43
LOCATION: Cells 1&2 LOGGER: Wayne Wang DRILLING METHODS: HSA DATE CONSTRUCTED: 6/1/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	GWC-11 ELEVATION FT, MSL 678.43
LOGGER: Wayne Wang DATE CONSTRUCTED: 6/1/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	ELEVATION FT, MSL 678.43
LOGGER: Wayne Wang DATE CONSTRUCTED: 6/1/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	ELEVATION FT, MSL 678.43
Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	ELEVATION FT, MSL 678.43
Locking Hinged Top 1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	FT, MSL 678.43
1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	FT, MSL 678.43
1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE	2.44	678.43
1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE		
1/4-inch Weep Hole TOP OF RI 2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE		
2" Threaded Riser Cap 4-ft x 4-ft concrete pad GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch	ACE		
4-ft x 4-ft concrete pad GROUND SURF PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	675.99
PROTECTIVE CASING SIZE: 4x4-inch		0.00	010.00
SIZE: 4x4-inch			
SIZE: 4x4-inch			
I I I I I I I I I I I I I I I I I I I			
L'.			
WATER LEVEL:			
BOTTOM OF PROTECTIVE CAS	SING		
Well Development: Pump/surge until			
clear. BACKFILL MATERIAL			
TYPE: Portland Cement Grout			
AMOUNT: 17 bags			
RISER CASING			
DIA: 2-inch			
TYPE: Schedule 40 PVC			
JOINT TYPE: Flush Threaded			
TOP OF S	:ΕΛΙ	28.00	647.99
ANNULAR SEAL	LAL	20.00	047.55
	lloto		
TYPE: 1/4-inch coated bentonite pe	liets		
5-gal buckets			
AMOUNT: 1 bucket			
PLACEMENT: Tremie			
TOP OF FILTER P	ACK	31.00	644.99
FILTER PACK			
TYPE: DSI Sand - 1A (20/30)			
Drillers Services, Inc.			
AMOUNT: 4 bags			
PLACEMENT: Tremie; wash with w	ater		
BOTTOM OF RISER / TOP OF SCR	EEN	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 SPACING: 0.23-inch			
	I	11 76	634.23
BOTTOM OF SCR	CEN	41.76	UJ4.ZJ
DOTTOM OF OAK	, INIC	42.06	633.93
BOTTOM OF CAS	DING	42.00	033.93
11015 014 55			
HOLE DIA: 7.5"			

SOU'	THERN	DRIL	LING L	OG			Hole No	. (GWC-11	
Energy	COMP to Serve You		ICAL SE	RVICES			She	eet 1 of	2	-
SITE _		Plant Bowen Dry Gypsum Storage Fa	acility		HOLE DEPTH	46'		SURF.ELEV	675	.99
		Cells 1 & 2								
ANGLE		0 BEARING 0	CONTR	ACTOR	SCS		ORILL NO.	CN	/IE-550	
DRILLI	NG METHOI	D HSA NO. SAMP	PLES	9	NO. U	J.D. SAMPL			0	
CASING	SIZE	LENGTH	CO	RE SIZE		TOTAL	% REC			
WATER	R TABLE DE	PTH ELEV	TIME AFTE	R COMP.		DAT	E TAKEN _			
		QUANTITY					RT DATE _		1/2007	
DRILLE	R	S. Milam RECORDER J. Lippert APP				LLING COM	MP. DATE _	6/	1/2007	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comm	ents	% Rec	RQD
0	675.99									
1	674.99									
2	673.99									
3	672.99									
4	671.99									
5	670.99	Very stiff, light brown, gray, and reddish brown, silty CL	AY S-1	4.5-6.0	5-8-9	17				
6	669.99	with chert fragments, slightly moist								
7	668.99									
8	667.99									
9	666.99									
10	665.99	Same as above.	S-2	9.5-11.0	4-10-15	25				
11	664.99									
12	663.99									
13	662.99									
14	661.99									
15	660.99	Very stiff, light reddish brown, sandy CLAY with chert gravel, slightly moist	S-3	14.5-16.0	7-12-12	24				
16	659.99	With Orient graves, enginery motor								
17	658.99									
18	657.99									
19	656.99									
20	655.99	Stiff, light reddish brown, silty CLAY (CL) with chert gravel, moist	S-4	19.5-21.0	2-4-7	11				
21	654.99									
22	653.99									
23	652.99									1

24 651.99 Form GS9901 7-26-2004

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-11

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

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
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/HQ Rock Core w/Wate	er	GWC-11R
DATE CONSTRUCTED: 5/31/07 - 16:00			
		DEPTH	ELEVATION
<u> </u>	_	FEET	FT, MSL
Locking Hinged Top——▶			
1/4-inch Weep Hole \	TOP OF RISER	2.40	678.32
	2" Threaded Riser Cap		0.0.02
\	Z Till caded Niser Cap		
\ \ 	L		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	675.92
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 24.5 ft	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
	BOTTOM OF PROTECTIVE CASING		
	BOTTOM OF TROTEOTIVE GROWN		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
cieai.	TYPE: Portland Cement Grout		
	AMOUNT: 21 bags		
	DIOED CACING		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	65.20	610.72
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 0.25 bucket		
	✓ PLACEMENT: Tremie		
	TOP OF FILTER PACK	68.20	607.72
	FILTER PACK		
	TYPE: DSI Sand - 1A (20/30)		
	Drillers Services, Inc.		
	AMOUNT: 3 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	, , , , , , , , , , , , , , , , , , , ,		
	BOTTOM OF RISER / TOP OF SCREEN	67.90	608.02
	SCREEN		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	OPENING WIDTH: 0.01-inch		
	OPENING TYPE: Slotted		
	SLOT SPACING: 0.25-inch		
	SLOT SPACING. 0.25-IIICH SLOT LENGTH: 1.5-Inch		
		77 00	598.02
	BOTTOM OF SCREEN	77.90	080.UZ
	DOTTOM OF CACINO	78.20	597.72
	BOTTOM OF CASING	10.20	081.12
1101 5 51	A . O!!		
HOLE DI	Α: ၓ [·]		

sou [.]	THERN	DRILLI	NG L	OG			Hole N	lo. G	WC-11F	₹
	to Serve You							heet 1 of		
		Plant Bowen Dry Gypsum Storage Faci								
LOCAT	ION	Cells 1 & 2	COORE	DINATES N	207382	9.01	E	1503	3393.39	
ANGLE		0 BEARING 0	CONTR	ACTOR	505		DRILL NO.	CN	ME 75 0	
		HSA/HQ rock core with water No. SAMPLE							-	
	SIZE	LENGTH TI								
	ROUT	QUANTITY							0/2007	
		S. Denty RECORDER J. Lippert APPRO						- /-	1/2007	
Depth	Elev.	Material Description, Classification and Remarks		Stand From To	dard Penetration Test Blows	N	Com	nments	% Rec	RQD
0	675.16									
1	674.16									
2	673.16									
3	672.16									
4		Very stiff light brown silty CLAY with chert	S-1	4.5-6	7-12-14	26				
5	670.16	fragments, slightly moist								
6	669.16									
7	668.16									
8	667.16									
9	666.16									
10	665.16	Same as above, hard, light brown & red	S-2	9.5-11.0	8-12-26	36				
11	664.16									
12	663.16									
13	662.16									
14	661.16	Same as above, very stiff, light grey & brownish red, moist moist	S-3	14.5-16.0	8-12-15	27				
15	660.16									
16	659.16									
17	658.16									
18	657.16									
19	656.16	Same as above, light brown	S-4	19.5-21.0	8-8-8	16				
20	655.16									
21	654.16									
22	653.16									
23	652.16									
24 Form GS	651.16 9901 7-26-2	004								

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

311E -	1	, , , , , , , , , , , , , , , , , , ,			deed Breathatian Test		SURF.ELEV.		
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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	Same as above.	S-6	29.5-31.0	3-4-6	10			
30	645.16								
31	644.16								
32	643.16								
33	642.16								
34	641.16	Same as above.	S-7	34.5-36.0	2-3-6	9			
35	640.16								
36	639.16								
37	638.16								
38	637.16								
39	636.16	Dolomite gravel	S-8	39.5-41.0	36-50/1-X	R			
40	635.16	Start coring @ 40.1		40 4 40 4			8 0/2 2	00	00
41	634.16	DOLOMITE, very hard, fresh, some Fe staining		40.1-48.1			8.0/2.2	28	28
42	633.16	41.6-47.1: Mud filled cavity							
43	632.16								
44	631.16								
45	630.16								
46	629.16								
47	628.16	DOLOMITE, highly weathered joints							
48	627.16	48.1-51.4: Cavity		48.1-53.1			5.0/1.3	27	12
49	626.16							_,	
50	625.16								
51	624.16								
52		DOLOMITE, very hard, fresh, grey							
53	622.16			53.1-58.1			5.0/5.0	100	100
54	621.16								
55	620.16								
56 Form GS	619.16 9901 7-26-2	004				L			

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-11R

Sheet 3 of 3

SITE _		Plant Bowen Dry Gypsum Storage Facility			. TOTAL DEPTH	83	SURF.ELEV.	675	.16
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	618.16	56.5: Chemically weathered joint							
58	617.16			50.4.55			5 0/4 0		
59	616.16			58.1-63.1			5.0/4.0	98	98
60	615.16								
61	614.16								
62	613.16								
63	612.16			62.4.60.4			E 0/E 0	400	400
64	611.16			63.1-68.1			5.0/5.0	100	100
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			00.1-73.1			3.0/2.1	42	55
70	605.16	69.4-72.4: Cavity							
71	604.16								
72	603.16								
73	602.16	DOLOMITE 73.1-74.7: Cavity		73.1-78.1			5.0/1.1	22	7
74	601.16						0.0,	22	•
75	600.16	Very highly weathered top of rock							
76	599.16	75.8: Chemically weathered joint							
77	598.16								
78	597.16			78.1-83.1			5.0/4.8	95	92
79	596.16								
80		79.5: Slightly weathered joint							
81	594.16								
82	593.16								
83	592.16	83.1: Bottom of boring							
84 85	591.16 590.16								
86	589.16								
87	588.16								
88	587.16								

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Milam		NAME
LOCATION: Cells 1&2	RIG TYPE: CME 550		
LOGGER: J. Lippert	DRILLING METHODS: HSA		GWC-12
DATE CONSTRUCTED: 6/4/2007 - 16:00			
		DEPTH	ELEVATION
<u> </u>	-	FEET	FT, MSL
Locking Hinged Top———			
1/4-inch Weep Hole、	TOP OF RISER	2.60	677.77
	2" Threaded Riser Cap		
\	2 Throadou Nicor Oup		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	675.17
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 29.8 @ 24 hr.	./		
	BOTTOM OF PROTECTIVE CASING		
	Berremer merelenve entenve		
Well Development: Pump/surge until			
Iclear.	BACKFILL MATERIAL		
clear.			
	TYPE: Portland Cement Grout		
	AMOUNT: 20 bags		
	DIOED CAOMO		
	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		
	i E. Coemerti. Homo, wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	38.10	637.07
	SCREEN	50.10	037.07
	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"		
			1

sou [.]	THERN		RILLIN	G L	OG			Hole N	lo.	GWC-12	2
Energy :	COMP to Serve You		LOGICAI						heet 1 of		
SITE _		Plant Bowen Dry Gypsum Storag	je Facili	ty		HOLE DEPTH	51'		SURF.ELE\	/. <u>675</u>	5.17
LOCAT	ION				DINATES N				150		
ANGLE		0 BEARING 0		CONTR	ACTOR	SCS	DF	RILL NO.	CI	ME-550	
DRILLII	NG METHOI	D HSA NO	. SAMPLES		10	NO. U	.D. SAMPLE	s		0	
CASING	3 SIZE	LENGTH		co	RE SIZE		TOTAL %	6 REC.			
WATER	R TABLE DE	PTH ELEV	TIME	AFTE	R COMP.		DATE	TAKEN			
TYPE C	GROUT	QUANTITY		M	IX		LING STAF			/4/2007	
DRILLE	R	S. Milam RECORDER J. Lippert				<u> </u>	LING COM	P. DATE	6/	/4/2007	
Depth	Elev.	Material Description, Classification and Remarks		Sample No.	Stand From To	dard Penetration Test Blows	N	Com	nments	% Rec	RQI
0	675.17										
1	674.17										
2	673.17										
3	672.17										
4	671.17										
5	670.17	Stiff group and light brown allty CLAV maint		S-1	4.5-6.0	3-6-6	12				
3		Stiff, gray and light brown, silty CLAY, moist		J-1	4.5-0.0	3-0-0	12				
6	669.17										
7	668.17										
8	667.17										
9	666.17										
		<u></u>		0.0	0.5.44.0						
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										

652.17

22 653.17

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-12

SITE Plant Bowen Dry Gypsum Storage Facility

TOTAL DEPTH

51'

Sheet 2 of 2

675.17

Dept. Cov. Makeda Doscopton. Classification and Renames Section Town N Common N Rec. ROD	SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	5	SURF.ELEV.	675	.17
25 850.17 Same as above S-5 24.5-26.0 2-3-4 7 7 2-648.17 2-7 848.1	Depth	Elev.	Material Description, Classification and Remarks	Sample No.			N	Comments	% Rec	RQD
27 648.17 28 647.17 29 646.17 30 645.17 31 644.17 32 643.17 33 642.17 34 641.17 35 640.11 36 639.17 37 638.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 45 630.17 47 629.17 48 627.17 49 626.17 50 625.17 49 626.17 50 625.17 41 Very hard, light brown and gray, sandy Sil.T with abundant organics 10 641.17 51 626.17 52 623.17 53 622.17 53 622.17 53 622.17 54 621.17 55 620.17 51 625.17 53 622.17 53 622.17 54 621.17 55 620.17	25	650.17	Same as above	S-5	24.5-26.0	2-3-4	7			
28 647.17 29 646.17 30 645.17 31 644.17 32 643.17 33 642.17 34 641.17 35 640.17 36 639.17 37 638.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 52 624.77 53 628.17 54 626.17 55 620.17 Very hard, light brown and gray, sandy SILT with abundant orter fragments, wet 10 62.17 55 620.17 Very hard, light brown and gray, sandy SILT with abundant orter fragments, wet 10 62.17 55 620.17 Very hard, light brown and gray, sandy SILT with abundant orter fragments, wet 10 62.17 56 622.17 57 622.17 58 622.17 59 622.17 59 622.17 50 622.17 50 622.17 51 624.17 52 622.17 53 622.17 54 621.17 55 620.17	26	649.17								
29 646.17 30 645.17 31 644.17 32 643.17 33 642.17 34 641.17 35 640.17 36 639.17 37 638.17 39 636.17 40 635.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 45 630.17 46 629.17 47 628.17 48 627.17 49 628.17 49 628.17 40 631.17 50 630.17 51 628.17 51 628.17 52 623.17 53 622.17 55 620.17 Very hard, light brown and gray, sandy SiLT with abundant cert fragments, wel 51 622.17 53 622.17 54 631.17 55 620.17	27	648.17								
30 645.17 Same as above, soft, very moist S-6 29.5-31.0 11-2-2 4 31 644.17 Same as above, soft, very moist S-7 29.5-31.0 11-2-2 4 32 643.17 Same as above S-7 34.5-36.0 11-1-2 3 36 639.17 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 Same as above, dark brown with abundant organics S-8 39.5-41.0 2-2-3 5 43 632.17 Same as above, dark brown with abundant organics S-9 44.5-46.0 2-2-4 6 46 629.17 Same as above, dark brown and gray, sandy SILT with abundant chert fragments, wet S-10 49.5-51.0 2-50/2-X R 51 624.17 Same as above, dark brown and gray, sandy SILT with abundant chert fragments, wet S-10 49.5-51.0 2-50/2-X R 51 622.17 Same as above, brown and gray, sandy SILT with abundant chert fragments, wet S-10 49.5-51.0 2-50/2-X R 55 623.17 Same as above, brown and gray, sandy SILT with abundant chert fra	28	647.17								
31 644.17 32 643.17 33 642.17 34 641.17 35 640.17 36 639.17 37 638.17 38 637.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 46 629.17 47 628.17 48 627.17 49 626.17 50 625.17 50 625.17 51 624.17 53 622.17 53 622.17 54 621.17 55 620.17	29	646.17								
32 643.17 33 642.17 34 641.17 35 640.17 38 639.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 46 629.17 47 628.17 48 627.17 49 626.17 50 625.17 51 624.17 55 620.17 51 63.17 51 63.17 51 63.17 51 63.17 51 63.17 51 63.17 53 632.17 53 632.17	30	645.17	Same as above, soft, very moist	S-6	29.5-31.0	1-2-2	4			
33 642.17 34 641.17 35 640.17 36 639.17 37 638.17 38 637.17 39 636.17 40 635.17 41 633.17 42 633.17 43 632.17 44 631.17 45 630.17 53 827.17 47 628.17 48 627.17 49 626.17 50 625.17 49 626.17 51 624.17 55 620.17 55 620.17	31	644.17								
34 641.17 35 640.17 36 639.17 37 638.17 38 637.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 5ame as above, dark brown with abundant organics S-9 44.5-46.0 2.2-4 6 629.17 47 628.17 48 627.17 49 626.17 50 625.17 50 625.17 51 624.17 53 622.17 54 622.17 55 620.17	32	643.17								
36 640.17 Same as above S-7 34.5-36.0 1-1-2 3 3 3 4.5-36.0 1-1-2 3 3 3 636.17 3 638.17 3 638.17 3 636.17 Same as above, firm, some dark brown mottling and angular chert fragments 4 634.17 4 634.17 4 631.17 4 630.17 Same as above, dark brown with abundant organics S-9 44.5-46.0 2-2-4 6 6 629.17 4 628.17 4 628.17 4 626.17 5 625.17 Very hard, light brown and gray, sandy SILT with abundant chert fragments, wet 5 630.17 5 621.17 5 623.17 5 623.17 5 623.17 5 623.17 5 620.1	33	642.17								
36 639.17 37 638.17 38 637.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 629.17 47 628.17 48 627.17 49 626.17 50 625.17 50 625.17 51 634.17 52 623.17 53 622.17 54 621.17 55 620.17	34	641.17								
37 638.17 38 637.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 46 629.17 47 628.17 49 626.17 50 625.17 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	35	640.17	Same as above	S-7	34.5-36.0	1-1-2	3			
38 637.17 39 636.17 40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 48 627.17 49 626.17 50 625.17 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	36	639.17								
39 636.17 40 635.17 Same as above, firm, some dark brown mottling and angular chert fragments 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 Same as above, dark brown with abundant organics 5-9 44.5-46.0 2-2-4 6 6 629.17 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 51.0: Bottom of boring 51.0: Bottom of boring 51.0: Bottom of boring	37	638.17								
40 635.17 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 47 628.17 49 626.17 50 625.17 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	38	637.17								
angular chert fragments 41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 46 629.17 47 628.17 49 626.17 50 625.17 51 624.17 53 622.17 54 621.17 55 620.17	39	636.17								
41 634.17 42 633.17 43 632.17 44 631.17 45 630.17 Same as above, dark brown with abundant organics 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 51.0: Bottom of boring 51.0: Bottom of boring	40	635.17		S-8	39.5-41.0	2-2-3	5			
43 632.17 44 631.17 45 630.17 A62 629.17 49 626.17 50 625.17 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	41	634.17	langular chert fragments							
44 631.17 45 630.17 Same as above, dark brown with abundant organics S-9 44.5-46.0 2-2-4 6 6 629.17 47 628.17 48 627.17 49 626.17 50 625.17 Same as above, dark brown with abundant organics S-9 44.5-46.0 2-2-4 6 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	42	633.17								
45 630.17 Same as above, dark brown with abundant organics 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 51.0: Bottom of boring 52 623.17 53 622.17 54 621.17 55 620.17	43	632.17								
46 629.17 47 628.17 48 627.17 49 626.17 50 625.17 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	44	631.17								
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 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	45	630.17	Same as above, dark brown with abundant organics	S-9	44.5-46.0	2-2-4	6			
48 627.17 49 626.17 50 625.17 Very hard, light brown and gray, sandy SILT with abundant chert fragments, wet 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	46	629.17								
49 626.17 50 625.17 Very hard, light brown and gray, sandy SILT with abundant chert fragments, wet 51 624.17 52 623.17 53 622.17 54 621.17 55 620.17	47	628.17								
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 51.0: Bottom of boring 53 622.17 621.17 55 620.17	48	627.17								
51 624.17 51.0: Bottom of boring 52 623.17 54 621.17 55 620.17	49									
51 624.17 52 623.17 53 622.17 54 621.17 55 620.17			Very hard, light brown and gray, sandy SILT with abundant chert fragments, wet	S-10	49.5-51.0	2-50/2-X	R			
53 622.17 54 621.17 55 620.17										
54 621.17 55 620.17										
55 620.17										
	56	619.17								

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Milam		NAME
LOCATION: Cells 1&2	RIG TYPE: CME 550		
LOGGER: Wayne Wang	DRILLING METHODS: HSA		GWC-13
DATE CONSTRUCTED: 5/31/07 - 16:00			
		DEPTH	ELEVATION
	•	FEET	FT, MSL
Locking Hinged Top ———▶			
1/4-inch Weep Hole	TOP OF RISER	2.26	687.13
1/4 men weep hele	2" Threaded Riser Cap	2.20	007.10
\	Z Tilleaded Risel Cap		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	684.87
	GROUND SURI ACL	0.00	004.07
	PROTECTIVE CASING		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\$ · · · /		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 33.8 ft @ 24 hrs	`		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 30 bags		
	, und ditti da baga		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	63.60	621.27
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 1/2 buckets		
	PLACEMENT: Tremie		
	TOP OF FILTER PACK	66.60	618.27
	FILTER PACK	50.00	010.21
	TYPE: DSI Sand - 1A (20/30) Drillers Services, Inc.		
	8 · · · · · · · · · · · · · · · · · · ·		
	AMOUNT: 2 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	70.44	614.43
	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		
		80.44	604.43
	BOTTOM OF SCREEN	00.44	004.43
	DOTTOM OF CAOMO	80.74	604.42
	BOTTOM OF CASING	00.74	604.13
	·		
HOLE DIA:	7.5"		

SOU	THERN		ING L	.OG			Hole No.	(3WC-13	3
Energy .	COMP to Serve You	CEOLOGIC	AL SE	RVICES			She	et 1 of	3	
SITE _		Plant Bowen Dry Gypsum Storage Fac	ility		HOLE DEPTH	61'	s	URF.ELEV.	684	1.87
LOCAT	ION	Cells 1 & 2					E		3896.0	
ANGLE		0 BEARING 0	CONTR	RACTOR	SCS	D	RILL NO.	CN	IE-550	
DRILLII	NG METHO	D HSA NO. SAMPLE	s	12	NO. U	.D. SAMPLI	ES	()	
CASING	G SIZE	LENGTH	cc	RE SIZE		TOTAL 9	% REC			
WATER	R TABLE DE	PTH ELEV TI	ME AFTE	R COMP.		DATI	E TAKEN _			
TYPE (GROUT	QUANTITY	N	/IIX			RT DATE _		1/2007	
DRILLE	R	S. Milam RECORDER J. Lippert APPRO	OVED _		DRII	LING COM	IP. DATE	5/3	1/2007	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comme	ents	% Rec	RQI
0	684.87									
0	004.07		1							
1	683.87									
2	682.87									
3	681.87									
4	600.07									
4	680.87									
5	679.87	Very stiff, reddish brown, sandy silty CLAY, slightly moist	S-1	4.5-6.0	8-13-16	29				
6	678.87									
7	677.87									
8	676.87									
9	675.87									
10	674.87	Very stiff, reddish brown, sandy clayey SILT with rounded	S-2	9.5-11.0	8-11-13	24				
11	673.87	chert gravel, slightly moist								
12	672.87									
13	671.87									
14	670.87									
15	660.87	Firm, light reddish brown, SILTY SAND, some clay,	S-3	14.5-16.0	4-9-9	18				
		moist		14.0 10.0	455	"				
16	668.87									
17	667.87									
18	666.87									
19	665.87									
20	664.87	Chert gravel	S-4	19.5-21.0	8-13-16	29				
21	663.87		1							

662.87

661.87

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-13

Sheet 2 of 3

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

Form GS9901 7-26-2004

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-13

Sheet 3 of 3

Plant Bowen Dry Gypsum Storage Facility 61' TOTAL DEPTH SURF.ELEV. 684.87 Sample No. Depth Elev. Material Description, Classification and Remarks Comments % Rec 627.87 57 58 626.87 625.87 59 S-12 59.5-61.0 60 624.87 Same as above, very soft WOR 0 623.87 61 61.0: Bottom of boring 62 622.87 63 621.87 620.87 64 65 619.87 618.87 66 67 617.87 68 616.87 69 615.87 70 614.87 613.87 71 612.87 72 73 611.87 610.87 74 75 609.87 76 608.87 607.87 77 78 606.87 605.87 79 80 604.87 81 603.87 602.87 82 601.87 83 600.87 84 85 599.87 86 598.87 87 597.87 596.87

WELL CONSTRUCTION LOG	Southern Company Ge	neration	
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/HQ Rock Core w/Wate	er	GWC-13R
DATE CONSTRUCTED: 6/5/2007 - 16:00			
		DEPTH	ELEVATION
<u></u>	-	FEET	FT, MSL
Locking Hinged Top ———			
1/4-inch Weep Hole \	TOP OF RISER	2.60	686.53
	2" Threaded Riser Cap		
\	2 Tilleaded Nisel Cap		
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
4-ft x 4-ft concrete pad			
***************************************	GROUND SURFACE	0.0	683.93
	GROUND BORN ACE	0.0	000.00
	PROTECTIVE CASING		
\ \;\!\	N > 3/		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL:	 		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 40 bags		
	, o 22go		
	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		
	FLAGEINENT. Heitile, wash with water		
	BOTTON OF BIGT 1	00.00	E04.00
	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"		
I TOLL DIF	. •		
<u> </u>			

SOUT	THERN	DRILLII	NG L	.OG			Hole No.	GWC-13F	२
Energy t	o Serve You						Sheet 1 of		
SITE _		Plant Bowen Dry Gypsum Storage Facil	ity		HOLE DEPTH	102.1'	SURF.ELE	v. <u>683</u>	3.93
LOCATI	ON	Cells 1 & 2					E15		
		0 BEARING 0						ME-75	
DRILLIN	NG METHOD	HSA/HQ rock core with water NO. SAMPLES		16	NO. U.	D. SAMPLE		0	
CASING	SIZE	LENGTH	_ co	RE SIZE		TOTAL %	% REC		
WATER	TABLE DEI	PTH ELEV TIN	IE AFTE	R COMP.		DATE	TAKEN		
		QUANTITY					RT DATE	<u></u>	
DRILLE	R	S. Denty RECORDER J. Lippert APPROV				LING COM	P. DATE6	/5/2007	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
0	683.93								
1	682.93								
2	681.93								
3	680.93								
4	679.93								
5	678.93	Very stiff, dark red, sandy CLAY, some rounded pebbles,	S-1	4.5-6.0	8-12-14	26			
6	677.93	very moist							
7	676.93								
8	675.93								
9	674.93								
10	673.93	Same as above, brownish red and light brown, slightly	S-2	9.5-11.0	9-12-16	28			
11	672.93	moist							
12	671.93								
13	670.93								
14	669.93								
15	668.93	Very firm, light brown, SILTY SAND with chert	S-3	14.5-16.0	9-10-11	21			
16	667.93	fragments, moist							
17	666.93								
18	665.93								
19	664.93								
20	663.93	Same as above, dense, abundant chert fragments	S-4	19.5-21.0	10-20-19	39			
21	662.93								
22	661.93								
23	660.93								

24 659.93 Form GS9901 7-26-2004

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

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	102	SURF.ELEV.	683	1.93
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25		Same as above, very stiff, light brown and brownish red,	S-5	24.5-26.0	19-17-10	27	Sommonto	70 NEC	
26	657.93	very moist							
27	656.93								
28	655.93								
29	654.93								
30		Stiff, light brown and grayish white, silty CLAY	S-6	29.5-31.0	8-6-5	11			
31	652.93	with rounded chert pebbles, very moist							
32	651.93								
33	650.93								
34	649.93								
35		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		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		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 9901 7-26-2								

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-13R

Plant Bowen Dry Gypsum Storage Facility

TOTAL DEPTH

102.1'

SURF.ELEV.

Sheet 3 of 4

SITE 683.93 No. Depth Elev. Material Description, Classification and Remarks Comments RQD From To % Rec 626.93 57 58 625.93 59 624.93 60 623.93 Same as above, soft S-12 59.5-61.0 2-2-2 4 622.93 61 621.93 62 620.93 63 619.93 64 65 618.93 Same as above S-13 64.5-66.0 1-1-1 2 617.93 66 67 616.93 68 615.93 614.93 69 S-14 69.5-71.0 WOR 0 613.93 No recovery 70 612.93 71 72 611.93 610.93 73 74 609.93 S-15 74.5-76.0 WOR 0 75 608.93 No recovery 76 607.93 77 606.93 78 605.93 79 604.93 S-16 79.5-81.0 80 603.93 No recovery WOR 0 602.93 81 82 601.93 82.1-87.1 5.0/4.8 97 82.1: Top of rock 97 600.93 DOLOMITE, very hard, fresh, gray, excellent rock 83 quality 84 599.93 85 598.93 86 597.93 596.93 lost water 87 87.1-92.1 87.0-87.8: Cavity 5.0/4.5 90 90 595.93

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-13R

GEOLOGICAL SERVICES Sheet 4 of 4

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	10:	2.1' SURF.ELEV.	683	.93
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	594.93	Dolomite							
90	593.93								
91	592.93								
92	591.93	Same as above		92.1-97.1			5.0/5.0	100	100
93	590.93								
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	33 40 400.0		3 102.1			2.0,0.0	100	.00
99	584.93								
100	583.93								
101	582.93								
102	581.93								
103		102.1: Bottom of boring							
104	579.93								
105	578.93								
106	577.93								
107	576.93								
108	575.93								
109	574.93								
110	573.93								
111	572.93								
	571.93								
113									
114	569.93								
115	568.93								
116	567.93								
117	566.93								
118	565.93								
119	564.93								
120 Form GS	563.93								



LOG OF TEST BORING

BORING GWC-13RZ PAGE 1 OF 3 6122160287

BORIN	G DE	TOR Cascade EQUIPMENT PS T-150 Y Tommy and Rodger LOGGED BY D. Morris * CHECKED EPTH 102 ft bgs GROUND WATER DEPTH: DURING ear GWC-13R, *Sample Logged by geologist employed by Amec Fost	BY	P. <u>50 1</u>	t bgs	_ ANGLE _ DELAYE		
DEPTH (ft)	GKAPHIC LOG	MATERIAL DESCRIPTION	ELEV	Weak Moderate Strong	GROUNDWATER	Comple Protect 2-foot s	ive casing set in concrete pad; quare concrete pad	; EL (DEP
10 15 20 25		- same as above, (5 YR 5/6) - same as above, (5 YR 5/6) - CLAY (CH), brown (10 YR 6/8), high plasticity, moist	656.8				Annular Fill: Aquaguard Grout Mixture	65s (26
30							3/8" bentonite chips	



BORING GWC-13RZ PAGE 2 OF 3

LOG OF TEST BORING 6122160287 PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA GROUNDWATER WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (DEPTH) (Cont.) Annular Seal: samé as above, (10 YR 6/8), chert nodules 3/8" bentonite chips same as above, (10 YR 6/8), increasing chert and gravel, moist \blacksquare SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GPJ same as above, hard drilling 80 601.8 - competent DOLOMITE, gray 597.8 (84.0)85 Annular Seal: 3/8" bentonite pellets (non-coated)



LOG OF TEST BORING

BORING GWC-13RZ PAGE 3 OF 3 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION **SROUNDWATER DBSERVATIONS** WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (DEPTH) (Cont.) 592.8 (89.0)90 Filter: - same as above silica filter sand 589.8 (92.0)Standpipe: 2" OD PVC (SCH 40) Screen: 95 10 ft; pre-pack SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GPJ 100 - same as above 579.8 Bottom of borehole at 102.0 feet. 105 110 115 120 125 130 135



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE GDT - 1/6/17 11:11 - C;USERSIMACKENZIE. FIOCAIDESKTOP/PLANT BOWEN SOUTHERN COMPANY GP.

LOG OF TEST BORING

BORING GWC-14Z PAGE 1 OF 2 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES. INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 EQUIPMENT PS T-150 METHOD ___ CONTRACTOR Cascade 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 , HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. - SILT (ML), brown (7.5 YR 4/4), dry Annular Fill Aquaguard Grout Mixture 677.4 - CLAY (CL), red, brown and white (7.5 YR 5/3 - 8/1), tight, low plasticity, dry 10 674.4 - CLAY (CL) with chert lenses, gray (7.5 YR 8/6), tight, medium stiff, low plasticity, dry 15 667.4 - SILT (ML), light gray (7.5 YR 5/0), medium stiff, moist 20 663.4 - SILT (ML), beige (7.5 YR 8/6), medium stiff, moist 25 656.9 (27.5)Annular Seal: 3/8" bentonite chips 30 35 647.4 - SILT (ML), brown (7.5 YR 5/8), medium stiff, white nodules, moist



LOG OF TEST BORING

BORING GWC-14Z PAGE 2 OF 2 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (Cont.) Annular Seal: 3/8" bentonite chips 45 639.4 - CLAY (CL), brown (7.5 YR 5/8), moderate plasticity, moist 50 SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C.\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GPJ 55 - same as above, black and white layering, wet 628.4 (56.0)<u>V</u> Annular Seal: 3/8" bentonite pellets (non-coated) 60 - same as above, wet 623.4 (61.0 Filter: 621.4 silica filter sand (63.0)Standpipe: 2" OD PVC (SCH 40) 65 Screen: 10 ft; pre-pack 70 614.4 - same as above, wet - Top of Rock @ 73.0 feet Bottom of borehole at 73.0 feet. 75 80 85

sou [.]	THERN		DRILL	ING L	.og			Hole N	lo. (GWC-14	†
Energy :	COMP to Serve You		GEOLOGIC	AL SE	RVICES			Sh	eet 1 of 3		
SITE _		Plant Bowen Dry Gypsı	ım Storage Fac	ility		HOLE DEPTH	80.5		SURF.ELEV	683	3.56
LOCAT	ION	Cells 1 & 2		COORE	DINATES N	207321	4.9	E	150	4081.44	
ANGLE		0 BEARING	0	CONTR	ACTOR	Ranger		RILL NO.	CN	/IE 550	
DRILLII	NG METHO	D HSA	NO. SAMPLE	:s	16	NO. U	.D. SAMPL	.ES		0	
CASING	G SIZE	LENGTH		co	RE SIZE		TOTAL	% REC.			
WATER	R TABLE DE	PTH ELEV	Т	IME AFTE	R COMP.						
TYPE 0	GROUT	QUANTIT				DRII	LING STA	RT DATE		2/2007	
DRILLE	R	Ranger RECORDER K.	Hobbs APPR	_			LING CON	ИР. DATE	8/2	2/2007	
Depth	Elev.	Material Description, Classification	and Remarks	Sample No.	From To	dard Penetration Test Blows	N	Con	nments	% Rec	RC
0	683.56										
4											
1	682.56										
2	680.56										
3	677.56										
4	673.56										
5	668.56	Light brown sandy SILT, dry with sor	ne pebbles	S-1	4-5.5	4-4-9	13				
6	662.56										
7	655.56										
8	647.56										
9	638.56										
10	628.56	White, tan, light brown SILT, dry, wit and pockets of sand	h rock flakes	S-2	9-10.5	5-9-14	23				
11	617.56	and pockets of sand									
12	605.56										
13	592.56										
14	578.56										
15	563.56	Dark brown sandy SILT, dry, with do	lomite fragments	S-3	14-15.5	6-14-19	33				
16	547.56										
17	530.56										
18	512.56										
19	493.56										

S-4 19-20.5

24 383.56 Form GS9901 7-26-2004

452.56 430.56

407.56

473.56 White to light brown SILT, moist, with few quartz fragments

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

SITE _		Flain Bowen Dry Gypsum Storage Facility			TOTAL DEPTH		SURF.ELEV.	683	.56
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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	S-7	34-35.5	2-6-8	14			
36	647.56	and dolomite fragments							
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		Light brown SILT, wet, with rock fragments	S-10	49-50.5	4-5-9	14			
51	632.56								
52	631.56 630.56								
53 54	629.56								
55		Same as above	S-11	54-55.5	6-7-11	18			
56	627.56	, a							
	9901 7-26-20	004			-				

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

SITE _		Flant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH		SURF.ELEV.	683	0.36
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	626.56	material ever-plan, addendation and remains			2.5#0	.,	Commonto	/o Kec	
58	625.56								
59	624.56								
60		Light brown SILT, with some weathered rock fragments	S-12	59-60.5	4-5-7	12			
61	622.56								
62	621.56								
63	620.56								
64	619.56								
65	618.56	Same as above	S-13	64-65.5	4-2-2	4			
66	617.56								
67	616.56								
68	615.56								
69	614.56								
70	613.56	Light brown silty CLAY, wet, very soft	S-14	69-70.5	1-2-4	6			
71	612.56								
72	611.56								
73	610.56								
74	609.56								
75		Mottled light/dark brown/gray SILT, wet, with few	S-15	74-75.5	6-7-7	14			
76	607.56	rock fragments	0 10	74 70.0	011				
77	606.56								
78	605.56								
79	604.56								
80		Same as above	S-16	79-80.5	5-7-9	16			
81		80.5: Bottom of boring							
82	601.56								
83	600.56								
84	599.56								
85	598.56								
86	597.56								
87	596.56								
88	595.56 9901 7-26-2	2004							

PROJECT: Plant Bowen Dry Gypsum Storage Facility DRILLER: Ranger LOCATION: Cells 1&2 DRILLING METHODS: HSA DATE CONSTRUCTED: 8/22/2007 - 16:00 DEP FEE Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 50 bags	FT, MSL 686.30
LOCATION: Cells 1&2 LOGGER: Wayne Wang DATE CONSTRUCTED: 8/22/2007 - 16:00 DEP FEE Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	GWC-14 H ELEVATION FT, MSL 686.30
DATE CONSTRUCTED: 8/22/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole 4-ft x 4-ft concrete pad GROUND SURFACE O.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	H ELEVATION FT, MSL 686.30
DATE CONSTRUCTED: 8/22/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	H ELEVATION FT, MSL 686.30
DATE CONSTRUCTED: 8/22/2007 - 16:00 Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	H ELEVATION FT, MSL 686.30
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	FT, MSL 686.30
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	FT, MSL 686.30
Locking Hinged Top 1/4-inch Weep Hole TOP OF RISER 2.7 2" Threaded Riser Cap PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	686.30
4-ft x 4-ft concrete pad GROUND SURFACE O.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
4-ft x 4-ft concrete pad GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
4-ft x 4-ft concrete pad GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
4-ft x 4-ft concrete pad GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
Well Development: Pump/surge until clear. GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
Well Development: Pump/surge until clear. GROUND SURFACE 0.0 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	683.56
PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	003.30
SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
SIZE: 4x4-inch TYPE: Anodized Aluminum WATER LEVEL: 62.3 @ 24 hours Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	ī
WATER LEVEL: 62.3 @ 24 hours TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
WATER LEVEL: 62.3 @ 24 hours BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
clear. BACKFILL MATERIAL TYPE: Portland Cement Grout	
/ two or the bags	
- DISER CASING	
RISER CASING	
DIA: 2-inch	
TYPE: Schedule 40 PVC	
JOINT TYPE: Flush Threaded	
TOP OF SEAL 63.0	0 620.56
ANNULAR SEAL	
TYPE: bentonite chips	
5-gal bags	
AMOUNT: 1 bag	
PLACEMENT: Tremie	
	0 618.56
TOP OF FILTER PACK 65.0	5 010.00
TYPE: DSI Sand - 1A (20/30)	
Drillers Services, Inc.	
AMOUNT: 3 bags; 50 lbs/bag	
PLACEMENT: Tremie; wash with water	
BOTTOM OF RISER / TOP OF SCREEN 67.7	4 615.82
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	
	4 605.82
BOTTOM OF SCREEN 77.7	1 000.02
BOTTOM OF CASING 78.0	4 605.52
BOTTOM OF CASING 78.0	+ 000.02
HOLE DIA: 8"	

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Milam		NAME
LOCATION: Cells 1&2	RIG TYPE: CME 550		
LOGGER: Wayne Wang	DRILLING METHODS: HSA		GWC-15
DATE CONSTRUCTED:6/1/07 - 16:00			
		DEPTH	ELEVATION
<u> </u>		FEET	FT, MSL
Locking Hinged Top →			
1/4-inch Weep Hole \	TOP OF RISER	2.24	695.51
	2" Threaded Riser Cap		
	2 mioddod Moor Cap		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	693.27
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL: 40.8 @ 24 hrs	; <u>`</u>		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 20 bags		
	7 20 2gc		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	CONTINE NACH INICAGO		
	TOP OF SEAL	53.60	639.67
	ANNULAR SEAL	33.00	009.07
	TYPE: 1/4-inch coated bentonite pellets		
	5-gal buckets		
	AMOUNT: 1.75 buckets		
	l /		
	PLACEMENT: Tremie	EC CO	626.67
	TOP OF FILTER PACK	56.60	636.67
	FILTER PACK TYPE: DSI Sond 14 (20/20)		
	TYPE: DSI Sand - 1A (20/30)		
	Drillers Services, Inc.		
	AMOUNT: 7 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	DOTTON	F7 04	606.00
	BOTTOM OF RISER / TOP OF SCREEN	57.01	636.26
	SCREEN DIA 2 in a h		
	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"		
			· · · · · · · · · · · · · · · · · · ·

sou [.]	THERN	DRILLI	NG L	.OG			Hole No	o. (GWC-15	;
Energy :	COMP to Serve You							eet 1 of		
SITE		Plant Bowen Dry Gypsum Storage Faci	lity		HOLE DEPTH	70		SURF.ELEV.	693	3.27
LOCAT	ION	Cells 1 & 2						1503		
ANGLE		0 BEARING 0	CONTR	RACTOR	SCS	D	RILL NO.	CN	1E 550	
DRILLI	NG METHO	LICA)	
CASING	G SIZE	LENGTH								
WATER	R TABLE DE	PTH ELEV TI	ME AFTE	R COMP.		DATI	E TAKEN			
TYPE 0	GROUT	QUANTITY	N	11X	DRII	LING STAF	RT DATE	5/3	0/2007	
DRILLE	R	S. Milam RECORDER J. Lippert APPRO	VED _		DRII	LING COM	IP. DATE	5/3	0/2007	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comn	nents	% Rec	RQI
									76 TCC	
0	693.27									
1	692.27									
2	691.27									
3	690.27									
4	689.27									
5	688.27	Firm, reddish brown, silty sandy CLAY, moist	S-1	4.5-6.0	4-3-3	6				
6	687.27									
7	686.27									
8	685.27									
9	684.27									
10	683.27	Same as above, very stiff, reddish brown and light brown	S-2	9.5-11.0	3-10-8	18				
11	682.27									
12	681.27									
13	680.27									
14	679.27									
15	678.27	Stiff, reddish brown and light yellowish gray banded,	S-3	14.5-16.0	4-6-8	14				
15		clayey SILT, moist	3-3	14.5-10.0	4-0-0	'				
16	677.27									
17	676.27		Ī							
18	675.27		Ī							
19	674.27		Ī							
20	673.27	Same as above, firm, predominantly yellowish gray	S-4	19.5-21.0	4-4-4	8				
21	672.27		1							

671.27

670.27

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-15

Sheet 2 of 3

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

SITE _		Train bowen bry cypsum ctorage racinty			TOTAL DEPTH		SURF.ELEV.	693	.21
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	668.27	Firm, reddish brown and yellowish brown, silty CLAY,	S-5	24.5-26.0	3-3-4	7			
26	667.27	moist							
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		No recovery	S-10	49.5-51.0	3-3-2	5			
51	642.27								
52	641.27 640.27								
53 54	639.27								
55		Firm, brown, sandy SILT, wet	S-11	54.5-56.0	8-5-3	8			
56	637.27	,, s. smi, saray sizi, not		3.12 33.0					
	9901 7-26-	2004	-					•	

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-15

Sheet 3 of 3

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	7	SURF.ELEV.	693	.27
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	636.27								
58	635.27								
59	634.27								
60	633.27	Same as above, light brown and brown	S-12	59.5-61.0	1-3-2	5			
61	632.27								
62	631.27								
63	630.27								
64	629.27								
65	628.27	Same as above	S-13	64.5-66.0	0-0-2	2			
66	627.27								
67	626.27								
68	625.27								
69	624.27								
70	623.27	70.0: Bottom of boring							
71	622.27	70.0. Bottom of boning							
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 87	607.27								
88	605.27								

PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL				
	ROJECT: Plant Bowen Dry Gypsum DRILLING CO.: SCS						
Storage Facility	DRILLER: S. Denty		NAME				
LOCATION: Cells 1&2	RIG TYPE: CME 75						
LOGGER: K. Hobbs	DRILLING METHODS: HSA/HQ Rock Core w/Wate	er	GWC-15R				
DATE CONSTRUCTED: 5/24/2007 - 9:00 am							
		DEPTH	ELEVATION				
<u></u>	-	FEET	FT, MSL				
Locking Hinged Top ———							
1/4-inch Weep Hole \	TOP OF RISER	2.66	696.44				
· \ □	2" Threaded Riser Cap						
\	2 moddod Moor Gap						
\ \ \							
4-ft x 4-ft concrete pad							
	GROUND SURFACE	0.00	693.78				
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING						
\\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	SIZE: 4x4-inch						
	TYPE: Anodized Aluminum						
WATER LEVEL:	/						
	BOTTOM OF PROTECTIVE CASING						
Well Development: Pump/surge until							
clear.	BACKFILL MATERIAL						
	TYPE: Portland Cement Grout						
	AMOUNT: 21 bags						
	, i i						
	RISER CASING						
	DIA: 2-inch						
	TYPE: Schedule 40 PVC						
	JOINT TYPE: Flush Threaded						
	<u> </u>						
	TOP OF SEAL	79.20	614.58				
	ANNULAR SEAL	10.20	011.00				
	TYPE: 1/4-inch coated bentonite pellets						
	5-gal buckets						
	AMOUNT: 0.25 bucket						
	PLACEMENT: Tremie						
	TOP OF FILTER PACK	81.20	612.58				
	FILTER PACK	01.20	012.00				
	TYPE: DSI Sand - 1A (20/30)						
	Drillers Services, Inc.						
	AMOUNT: 1.5 bags; 50 lbs/bag						
	PLACEMENT: Tremie; wash with water						
	1 L. CLIVILIVI. Heilile, Wash with Water						
	BOTTOM OF RISER / TOP OF SCREEN	82.14	611.64				
	SCREEN	04.14	011.04				
	DIA: 2-inch						
	TYPE: Schedule 40 PVC						
	OPENING WIDTH: 0.01-inch						
	OPENING WIDTH: 0.01-IIICH OPENING TYPE: Slotted						
	SLOT SPACING: 0.25-inch						
	SLOT SPACING: 0.25-inch						
		92.14	601.64				
	BOTTOM OF SCREEN	JZ. 14	601.64				
	DOTTOM OF CACINO	92.44	601.34				
	BOTTOM OF CASING	<i>3</i> ∠.44	001.04				
1101 5 51	A . O!!						
HOLE DIA	4: δ						

sou [.]	THERN	<u> </u>	DRILLIN	IG L	OG			Hole No.	GWC-15F	₹
	to Serve You		GEOLOGICA					Sheet 1		
		Plant Bowen Dry Gypsum						SURF.	ELEV. <u>693</u>	3.78
LOCAT	ION									
ANGLE		0 BEARING								
DRILLIN	NG METHOD									
	SIZE	LENGTH								
		PTH ELEV								
		QUANTITY							5/23/2007	
DRILLE	R	S. Denty RECORDER K. Hob	DS APPROV			DRI dard Penetration Test		DMP. DATE	3/24/2001	
Depth	Elev.	Material Description, Classification and F	Remarks	No.		Blows	N	Comments	% Rec	RQD
0	693.78									
1	692.78									
2	691.78									
3	690.78	Light brown sandy SILT, slightly moist qua	artz sands	S-1	3.5-5	2-3-4	7		40	
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	Mottled light brown clayey SILT w/ layers	of light tan silty	S-3	14.5-16.0	3-6-8	14		100	
15	678.78	clay, slightly moist. Few sand grains.								
16	677.78									
17	676.78									
18	675.78									
19	674.78	Mottled light brown clayey SILT w/ tan & r	ed brown	S-4	19.5-21.0	3-5-7	12			
20	673.78	areas, slightly moist.								
21	672.78									
22	671.78									
23	670.78									

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

SITE -		riam zonom zry cypeam ctorage raemty			. IOTAL DEPTH		SURF.ELEV.	693	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25		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	SAA	S-6	29.5-31.0	15-5-5	10		100	
30	663.78								
31	662.78								
32	661.78								
33	660.78								
34	659.78	Medium stiff light brown sandy gravelly SILT. Approxiate 50% rock fragments, up to 2 mm diameter.	S-7	34.5-36.0	1-2-4	6		100	
35	658.78	Very moist							
36	657.78								
37	656.78								
38	655.78								
39	654.78	Soft light brown SILT w/ some small pebbles, wet	S-8	39.5-41.0	2-1-3	4		100	
40	653.78								
41	652.78								
42	651.78								
43	650.78								
44		Soft light brown SILT, very homogenous, wet	S-9	44.5-46	1-1-2	3		100	
45	648.78								
46	647.78								
47	646.78								
48 49	645.78	Soft, wet light brown SILT w/ small pebbles,	S-10	49.5-51	1-2-2	4		100	
50	643.78	saturated	0 10	10.001	1 Z -Z	т.		100	
51	642.78								
52	641.78								
53	640.78								
54	639.78	Very soft, saturated, light brown SILT, few pebbles	S-11	54.5-56	WOR	0			
55	638.78								
56	637.78								

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-15R

Plant Bowen Dry Gypsum Storage Facility

TOTAL DEPTH

95.5

SURF.ELEV.

Sheet 3 of

693.78 No. Depth Elev. Comments RQD Material Description, Classification and Remarks From To % Rec 57 636.78 58 635.78 59.5-61 634.78 Very soft light brown SILT w/thin bands of tan/white S-12 W.O.R 0 59 100 sand, saturated 60 633.78 632.78 61 62 631.78 630.78 63 629.78 Very soft, saturated light brown SILT w/ some sand S-13 64.5-66 1-1-1 2 100 64 layers less than 2 cm thick, few rock fragments 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 S-14 69.5-71 6-12-5 17 100 623.78 weathered dolomite. Some red & black banding in 70 the silt. 622.78 71 71.1: Top of rock, start coring 72 621.78 620.78 73 74.5-77.9 3.4/3.4 619.78 Chert rich DOLOMITE w/ stylolites 74 100 75 618.78 76 617.78 77.9-82.9 5.0/5.0 616.78 Grey DOLOMITE w/thin shale interbeds 100 77 78 615.78 79 614.78 80 613.78 612.78 81 82.9-88.5 6.0/6.0 100 Grey DOLOMITE w/ some calcite filled fractures 82 611.78 83 610.78 84 609.78 85 608.78 86 607.78 606.78 87 605.78

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-15R

Sheet 4 of 4

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



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

LOG OF TEST BORING

BORING GWC-15Z PAGE 1 OF 2 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES. INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 , HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (DEPTH) - SILT (ML), red orange (5 YR 5/8), dry Annular Fill Aquaguard Grout Mixture 688.1 - clayey SILT (ML), dark red (5 YR 4/6), dry 686.1 - SILT (ML), interbedded red, black and orange (5 YR 8/8), dry 10 15 20 - same as above, (7.5 YR 5/8), with chert lenses from 23-27', dry 25 665.1 - CLAY (CL) with chert nodules, tan and white (10 YR 7/6), moderate plasticity, moist 30 660.1 (33.0)Annular Seal: 3/8" bentonite chips 35



LOG OF TEST BORING

BORING GWC-15Z PAGE 2 OF 2 6122160287

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Plant Bowen

				Z	M (0		VA/ELL DATA
(#)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV	Weak Moderate REACTION Strong	GROUNDWATER	Compl Protec 2-foot	ctive casing set in concrete pad; square concrete pad
45		 - sandy CLAY (CH), tan, white and black (10 YR 7/6), high plasticity - clayey SAND (SC), tan, white and black (10 YR 7/6), moist - CLAY (CH), tan (10 YR 7/6), high plasticity, saturated 	648.1 646.1		Ā		Annular Seal: 3/8" bentonite chips
55		- same as above, saturated	633.1				Annular Seal: 3/8" bentonite pellets (non-coated) 6 Filter: silica filter sand
65 		- same as above, saturated	628.1				Standpipe: (6 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
		- same as above, saturated - Top of rock @ 72.0 feet Bottom of borehole at 72.0 feet.	621.1				
30							

WELL CONSTRUCTION LOG Southern Company Generation DRILLING CO.: SCS Civil Field Services PROJECT: Plant Bowen CCB WELL DRILLER: Milam NAME Cells 3 and 4 RIG TYPE: CME 550 LOCATION: LOGGER: D. Brooks DRILLING METHODS: Hollow stem/ HQ rock core GWC-16R DATE CONSTRUCTED: 12/13/2011 **ELEVATION** DEPTH FEET FT, MSL Locking Hinged Top TOP OF RISER 3.07 733.73 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole~ 4-ft x 4-ft concrete pad 0.00 730.66 **GROUND SURFACE** 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

HOLE DIA: 6.25"/4.25"

Flush-threaded end cap

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

BOTTOM OF CASING

94.70

95.00

635.96

635.66

SOU	THERN A	DRILLING LOG	Hole No. GWC-16R
Energy	to Serve Your V	World" GEOLOGICAL SERVICES	Sheet 1 of 4
SITE		Plant Bowen CCB Disposal Facility HOLE DEPTH 95'	
	LOCATION		_ E 2072608.08
ANGLE			RILL NO. NA
DRILLIN	NG METHOD	Hollow Stem/ HQ Rock Core NO. SAMPLES Continuous NO. U.D. SAMP 6.25" LENGTH 57' CORE SIZE 4.25" TOTAL OF	PLES NA NA NA
	CASING SIZE	701	12/12/2011
	WATER TAE	NA NA NA	10/0/2011
		S. Milam RECORDER D. Brooks APPROVED D. Brooks DRILLING COM	12/12/2011
- "		Sample Standard Penetration Test	
Depth	Elev.	Material Description, Classification and Remarks No. From To Blows N SAND, Silty; brown; dry; very fine to fine grained	Comments % Rec RQD
0	728.07	SAND, Sitty, brown, dry, very line to line grained	
2	727.07 726.07		
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	CLAY, Sandy; reddish yellow; damp; very fine to fine	
24 Form GS	704.07 9901 8-19-200	grained	

SOUT	COMP					WC-16			
Energy t	o Serve You	rWorld GEOLOGIC Plant Bowen CCB Disposal Facility Cells 3 and		RVICES	TOTAL DEPTH	95'	Sheet 2 SURF.ELEV.	of 72	4 8.07
_			Sample		dard Penetration Test				
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
25	703.07	CLAY, Sandy; reddish yellow; damp; very fine to fine							
26	702.07	grained with pieces of chert							
27	701.07								
28	700.07								
29	699.07								
30	698.07								
31	697.07								
32	696.07								
33	695.07								
34	694.07								
35	693.07								
36	692.07								
37	691.07								
38		CLAY, Silty, with Sand; orange; damp; very fine to fine grained with pieces of chert and blue grey dolomite							
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		1						
50	678.07								
51	677.07	CAA with last said							
52		SAA with less sand							
53	675.07								
54	674.07								
55 56	673.07								
56 Form GS	672.07 9901 8-19-	2008	1	<u> </u>		<u> </u>			

DRILLING LOG Hole No. GWC-16R SOUTHERN COMPANY **GEOLOGICAL SERVICES** Sheet of 3 Plant Bowen CCB Disposal Facility Cells 3 and 4 95' TOTAL DEPTH 728.07 SITE SURF.ELEV. Elev. RQD Depth Material Description, Classification and Remarks From To Blows % Rec 6 inch steel casing to 57' bgs 671.07 Auger refusal at 57' bgs 57 670.07 Dolomite; blue grey; hard; slightly weathered 669.07 59 60 668.07 667.07 62 666.07 Clay filled void from 59' to 66.4' 665.07 63 64 664.07 65 663.07 66 662.07 661.07 Dolomite; blue grey; hard; slightly weathered 67 68 660.07 69 659.07 70 658.07 Clay filled void from 67.1' to 74.4' 71 657.07 656.07 72 655.07 73 74 654.07 653.07 75 76 652.07 Dolomite; blue grey; hard; slightly weathered; contains 77 multiple small horizontal iron stained fractures 78 650.07 79 649.07 80 648.07 81 647.07 646.07 83 645.07 644.07 84 85 643.07 86 642.07 Dolomite; blue grey; hard; slighlty weathered 87 641.07

SOUT	THERN	DRILLI			GWC-16R				
Energy 1	o Serve You	World GEOLOGICA		RVICES			Sheet 4	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	95'	SURF.ELEV	728	3.07
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	639.07								
90	638.07								
91	637.07								
92	636.07	Dolomite; blue grey; hard; slightly weathered; multiple horizontal fractures show iron staining and some solutioning along fracture faces							
93	635.07	some solutioning along fracture faces							
94	634.07								
95	633.07	BOH @ 95' bgs							
96	632.07								
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									
113									
	614.07								
115	613.07								
116	612.07								
117	611.07								
118									
120	608.07								
	9901 8-19-2	008	-						

WELL CONSTRUCTION LOG Southern Company Generation PROJECT: DRILLING CO.: SCS Civil Field Services Plant Bowen CCB WELL DRILLER: Milam NAME Cells 3 and 4 RIG TYPE: CME 550 LOCATION: LOGGER: D. Brooks DRILLING METHODS: Hollow stem/ HQ rock core GWC-17R DATE CONSTRUCTED: 12/8/2011 **ELEVATION** DEPTH FEET FT, MSL Locking Hinged Top TOP OF RISER 3.07 733.73 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole~ 4-ft x 4-ft concrete pad 0.00 730.66 **GROUND SURFACE** 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

HOLE DIA: 6.25"/4.25"

Flush-threaded end cap

BOTTOM OF SCREEN

BOTTOM OF CASING

89.20

89.50

641.46

641.16

sou	THERN A	DRILLING LOG		Hole No. GWC-17R
Energy	to Serve Your	World GEOLOGICAL SERVICES		Sheet 1 of 4
SITE				gs surf.elev. 730.66
	LOCATION		1506068.86	E 2072829.56
				ILL NO. NA NA
DRILLI	NG METHOD	0.05"	NO. U.D. SAMPL	NA.
	CASING SIZE		hour	TAKEN 12/8/2011
	TYPE GROUT	NIA NIA NIA	DRILLING STAR	44/04/0044
		S. Milam RECORDER S. Bearce APPROVED D. Brooks	DRILLING COMF	P. DATE 12/8/2011
Depth	Elev.	Sample Standard Per Material Description, Classification and Remarks No. From To	netration Test Blows N	Comments % Rec RQD
0	730.66	SAND, Silty; brown; dry; very fine to fine grained with		
1	729.66	white chert fragments		
2	728.66			
3	727.66			
4	726.66			
5	725.66	CLAY, sandy; yellowish brown; dry; fine grained sand sand with chert fragments		
6	724.66	- I solid with short magnitude		
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 Form GS	706.66 9901 8-19-200			1 1

sou	THERN COMP	DRILLII				Hole No. GWC-17R			
Energy i	to Serve You	r World" GEOLOGICA		RVICES			Sheet 2	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	89.	5' SURF.ELEV.	73	0.66
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	705.66	SAA							
26	704.66	3" bed of white chert, HCl-							
27	703.66								
28	702.66								
29	701.66	CLAY; yellowish brown; moist; soft; slightly plastic							
30	700.66	Auger refusal at 30.7' bgs					6 inch steel casing o 30.7' bgs		
31	699.66	Auger relusar at 30.7 bys					0 30.7 bys		
32	698.66								
33	697.66	DOLOMITE; blue grey; micritic; small near vertical fracture with iron stained faces							
34	696.66	man non diamod idood							
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								
47	683.66	DOLOMITE; blue grey; hard; fresh; some small horizontal							
48		fractures with iron staining							
49	681.66								
50	680.66								
51	679.66								
52	678.66								
53	677.66								
54 55	676.66 675.66								
56	674.66								
	9901 8-19-	2008			<u> </u>	<u> </u>			

sou:	COMP	DRILLII TWOTIST GEOLOGICA						WC-17F	
Energy I	to Serve You	Plant Bowen CCB Disposal Facility Cells 3 and		KVICES	TOTAL DEPTH	89.5		of 730	4).66
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	673.66	waterial Description, Grassinoatori and Nethanos		TIOIII TO	blows	, N	Comments	70 Nec	NQD
58		DOLOMITE; blue grey; hard; fresh							
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	DOLOMITE; blue grey; hard; fresh; some horizontal							
78 79	652.66	fractures with iron staining; some solutioning along faces							
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 Form GS9901 8-19-2008

sou:	THERN A	NV					Hole No. G	WC-17F	₹
	o Serve Your	World GEOLOGIC		RVICES		90.5	Sheet 4	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	Sample	Stan	TOTAL DEPTH	89.5	SURF.ELEV.	730	0.66
Depth	641.66	Material Description, Classification and Remarks DOLOMITE; blue grey; hard; fresh; some horizontal fractures with iron staining; some solutioning along	No.	From To	Blows	N	Comments	% Rec	RQD
90	640.66	faces	-						
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	612.66 611.66								
120	610.66								
	9901 8-19-2	008	1	1		<u> </u>			

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUC		Southern Company Ge	eneration	
PROJECT:	Plant Bowen CCB	DRILLING CO.: Boart Longyear		WELL
LOCATION:	Cells 3 and 4	RIG TYPE: Rotosonic		4
LOGGER:	C. Sellers	DRILLING METHODS: Rotosonic		GWC-18
DATE CONSTRUCTED): 6/6/2011			=: =: /
			DEPTH	ELEVATION
	_	_	FEET	FT, MSL
Locking Hinged Top	─			
·	l <u>-</u>	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				
1,7,7,3,3		GROUND SURFACE	0.00	719.13
		PROTECTIVE CASING		
		SIZE: 4x4-inch		
		TYPE: Anodized Aluminum		
		BOTTOM OF PROTECTIVE CASING		
		DOTTOM OF TROTECTIVE GAGING		
		BACKFILL MATERIAL		
		TYPE: Portland Cement/ Grout Slurry		
		AMOUNT: 135 gallons		
		RISER CASING		
		DIA: 2-inch TYPE: Schedule 40 PVC		
		JOINT TYPE: Flush Threaded		
		JOINT TTPE. 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		
		i E. OLIVILIAT. Washi 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	70.70	040.40
Fluch throughd and and		BOTTOM OF SCREEN	76.70	642.43
Flush-threaded end cap	·	BOTTOM OF CASING	77.00	642.13
		BOTTOW OF CASING	11.00	042.13
	HOLE	DIA: 6"		
			_	-

ANGLE 90 BEARING NA CONTRACTOR BOART LONGYEAR DRILLING METHOD ROTSONIC NO. SAMPLES CONTINUOUS NO. U.D. SAM CASING SIZE 6" LENGTH NA CORE SIZE 4" TOTAL WATER TABLE DEPTH 71.3 ELEV. 647.83 TIME AFTER COMP. 1 hour DAT TYPE GROUT NA QUANTITY NA MIX NA DRILLING STA	E 2072930.02
LOCATION Cells 3 and 4 COORDINATES N 1506306.93 ANGLE 90 BEARING NA CONTRACTOR BOART LONGYEAR DRILLING METHOD ROTOSONIC NO. SAMPLES CONTINUOUS NO. U.D. SAM CASING SIZE 6" LENGTH NA CORE SIZE 4" TOTAL WATER TABLE DEPTH 71.3 ELEV. 647.83 TIME AFTER COMP. 1 hour DAT TYPE GROUT NA QUANTITY NA MIX NA DRILLING STA	E 2072930.02 DRILL NO. NA PLES NA % REC. NA TE TAKEN 6/6/2011 ART DATE 6/6/2011
ANGLE 90 BEARING NA CONTRACTOR BOART LONGYEAR DEPTH OF THE PROPERTY OF THE PRO	PILL NO. NA PLES NA % REC. NA 6/6/2011 ART DATE 6/6/2011
TYPE GROUT QUANTITY MIX TVY DRILLING STA	PLES NA % REC. NA TE TAKEN 6/6/2011 ART DATE 6/6/2011
TYPE GROUT QUANTITY MIX TVY DRILLING STA	6/6/2011 ART DATE 6/6/2011
TYPE GROUT QUANTITY MIX WIX DRILLING STA	6/6/2011 ART DATE 6/6/2011
TYPE GROUT QUANTITY MIX WIX DRILLING STA	6/6/2011
DRILLER Boart RECORDER C. Sellers APPROVED D. Brooks DRILLING CON	
Sample Standard Penetration Test	
Depth Elev. Material Description, Classification and Remarks No. From To Blows N	Comments % Rec RQD
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 CAA usilau harusa da	
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 Form GS9901 8-19-2008	

SOUTHERN ANY

Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-18
Sheet 2 of 3

Sheet 2 Plant Bowen CCB Disposal Facility Cells 3 and 4 77.0 719.13 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks Comments From To Blows 25 694.13 CLAY; reddish brown; wet 26 693.13 27 692.13 28 691.13 29 690.13 SAND; silty; yellow-brown; very fine; moist; had some 30 689.13 red and brown mixed throughout 688.13 31 687.13 32 33 686.13 34 685.13 35 684.13 SAA; with black banding; moist 36 683.13 37 682.13 38 681.13 680.13 39 40 679.13 41 678.13 SAA 677.13 42 43 676.13 675.13 44 45 674.13 46 673.13 47 672.13 671.13 48 670.13 49 SAA; chert gravel 50 669.13 668.13 51 52 667.13 53 666.13 665.13 664.13 SAND; silty; dolostone gravel 55 663.13

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-18
Sheet 3 of 3

Energy i	to Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet	3	ot	3
SITE		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	77	'.0'	SURF.ELEV.	719	9.13
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Com	nments	% Rec	RQE
57	662.13	·					6 inch ste to 57' bgs	el casing		
58		Chert gravel; wet								
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									
68	651.13									
69	650.13									
70	649.13									
71	648.13									
72	647.13	Gravel; chert and dolostone; silty sand; yellowish brown; saturated								
73	646.13									
74	645.13									
75	644.13									
76	643.13									
77	642.13									
78	641.13	BOH @ 77.0' bgs								
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									

88 631.13 Form GS9901 8-19-2008

WELL CONSTRUCTION LOG Southern Company Generation DRILLING CO.: PROJECT: Plant Bowen CCB **Boart Longyear** WELL LOCATION: Cells 3 and 4 RIG TYPE: Rotosonic LOGGER: C. Sellers DRILLING METHODS: Rotosonic GWC-18R 6/2/2011 DATE CONSTRUCTED ELEVATION DEPTH FEET 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 127.00 592.13 TOP OF FILTER PACK 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 581.63 **BOTTOM OF CASING** 137.50

HOLE DIA: 6"

SOUT	THERN 4	DRILLING	3 LOG				Hole No.	GWC-18	3R
Energy 1	o Serve Your V	forld" GEOLOGICAL	SERVIC	ES			Sheet 1	of	4
SITE							5 SURF.EL		9.23
	LOCATION	Cells 3 and 4	ORDINATES					2072930.2	8
ANGLE			NTRACTOR			gyear _D	RILL NO.		
DRILLIN	IG METHOD	Rotosonic NO. SAMPLES				NO. U.D. SAME	PLES	NA	
	CASING SIZE				6"	TOTAL	% REC.	NA	
			AFTER COM	иР. <u> </u>			E TAKEN	6/2/2011 6/2/2011	
	TYPE GROUT		MIX D	. Broo			RT DATE	6/2/2011	
	DRILLER		mple		dard Penetration Te	DRILLING COM	IP. DATE	0/2/2011	
Depth	Elev.			om To	Blows	N	Comments	% Rec	RQD
0	719.23								
1	718.23	Top Soil							
2	717.23								
3		CLAY, sandy; red; dry; very fine							
	715.23	02.11, 03.13,1.03, 1.1,1.10.1							
4		Ol T							
5		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		SAND; silty; yellow; damp							
15	704.23								
16	703.23								
		SAA; yellow-brown; dry							
17	702.23								
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 Form GS9901 8-19-2008 SOUTHERN AS COMPANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-18R
Sheet 2 of 5

Sheet Plant Bowen CCB Disposal Facility Cells 3 and 4 137.5' 719.23 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks Comments From To Blows 25 694.23 CLAY; reddish brown; wet 26 693.23 27 692.23 28 691.23 29 690.23 SAND; silty; yellow-brown; very fine; moist; had some 30 689.23 red and brown mixed throughout 688.23 31 687.23 32 33 686.23 685.23 34 35 684.23 SAA; with black banding; moist 36 683.23 682.23 37 38 681.23 680.23 39 40 679.23 41 678.23 SAA 677.23 42 43 676.23 675.23 44 674.23 45 46 673.23 47 672.23 671.23 48 670.23 49 SAA; chert gravel 50 669.23 668.23 51 52 667.23 53 666.23 665.23 664.23 SAND; silty; dolostone gravel 55 663.23

SOUTHERN COMPANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-18R

Energy :	to Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet 3	of	5
SITE		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	137.5	SURF.ELEV.	719	9.23
Donth	Floy	Material Description Classification and Democks	Sample No.		ndard Penetration Test	N	Comments	۵, ۵	RQD
Depth	Elev.	Material Description, Classification and Remarks	NO.	From To	Blows	N	Comments	% Rec	RQD
57	662.23								
58	661.23	SAA; wet							
59	660.23								
60	659.23								
61	658.23								
62	657.23								
63	656.23								
		Chert Gravel; black; with dry cobbles							
64		Cheft Graver, black, with dry cobbles							
65	654.23	SAND; silty; yellowish brown; damp							
66	653.23	SAND; silty; yellowish white; dry							
67	652.23								
68	651.23								
69	650.23	SILT; sandy; brownish yellow; with dolostone gravel							
70	649.23	oic 1, sailuy, brownish yellow, with dolostone graver							
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								

88 631.23 Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-18R
Sheet 5 of 5

SITE	Plant Bowen CCB Disposal Facility			TOTAL DEPTH	13	7.5 SURF.ELEV.	719	9.23
Depth Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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	BOH @ 137.5' bgs							
138 581.23								
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								

Form GS9901 8-19-2008

WELL CONSTRUCTION LOG Southern Company Generation PROJECT: Plant Bowen CCB DRILLING CO.: Boart Longyear WELL LOCATION: Cells 3 and 4 RIG TYPE: Rotosonic C. Sellers LOGGER: DRILLING METHODS: Rotosonic GWC-19R DATE CONSTRUCTED: 6/7/2011 ELEVATION DEPTH FEET FT, MSL Locking Hinged Top TOP OF RISER 2.60 726.58 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole-4-ft x 4-ft concrete pad **GROUND SURFACE** 0.00 723.98 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING **BACKFILL MATERIAL** TYPE: Portland Cement/Grout Slurry AMOUNT: 225 gal **RISER CASING** DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 119.40 604.58 ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 2 bags PLACEMENT: Wash with water 122.50 601.48 TOP OF FILTER PACK **FILTER PACK** TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 5.5 bags PLACEMENT: Wash with water BOTTOM OF RISER / TOP OF SCREEN 133.70 590.28 **SCREEN** DIA: 2-inch inner/3.75-inch outer TYPE: Schedule 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch **BOTTOM OF SCREEN** 143.70 580.28 Flush-threaded end cap 579.98 **BOTTOM OF CASING** 144.00 HOLE DIA: 6"

sou [.]	THERN A	DRILL	ING I	LOG			Hole No.	GWC-1	9R
Energy .	o Serve Your V	Yorld" GEOLOGIC	AL SE	RVICES			Sheet 1	of	5
SITE		Plant Bowen CCB Disposal Facility					0' SURF.EI	LEV. 72	3.98
		Cells 3 and 4						2073158.9) 1
ANGLE		90 BEARING NA	CONTR	RACTOR		igyear _D	RILL NO.		
DRILLIN	IG METHOD			Continuo	us	NO. U.D. SAMF	PLES	NA	
	CASING SIZE		co	RE SIZE	4"	TOTAL	% REC.	NA	
	WATER TAE		IME AFT	ER COMP.		DAT	E TAKEN		
	TYPE GROUT		N	D. Broc	IA		RT DATE		
	DRILLER	Boart RECORDER C. Sellers APPRO	VED		dard Penetration		IP. DATE	6/8/2011	
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N N	Comments	% Rec	RQD
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	CLAV: condy light brown: trace chart grovel							
9	714.98	CLAY; sandy; light brown; trace chert gravel							
10	713.98								
11	712.98								
12	711.98								
13	710.98	SAA; yellowish orange							
14	709.98	or try yourself or unigo							
15	708.98								
16	707.98		-						
17	706.98	CLAY; silty; light brown; damp							
18	705.98	- , , , ,							
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	600.08		1	I				I	

24 699.98 Form GS9901 8-19-2008 SOUTHERN A

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-19R

Sheet 2 of 5 Plant Bowen CCB Disposal Facility Cells 3 and 4 144' 723.98 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks From To Comments Blows 25 698.98 26 697.98 27 696.98 28 695.98 29 694.98 SAND; silty; light brown; fine-grained; damp 30 693.98 692.98 31 691.98 32 33 690.98 CLAY; silty; yellowish orange; chert gravel; damp 689.98 34 35 688.98 trace sand @ 35' 36 687.98 686.98 37 38 685.98 684.98 39 40 683.98 41 682.98 681.98 SAA; saturated 43 680.98 679.98 44 678.98 45 46 677.98 47 676.98 675.98 48 674.98 49 50 673.98 672.98 51 52 671.98 Chert; very fractured 53 670.98 54 669.98 CLAY; silty; yellowish orange; some chert gravel; damp 668.98 55 667.98

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-19R

Energy	to Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet	3	of	5
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	14	4'	SURF.ELEV.	723	3.98
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Cor	mments	% Rec	RQD
									70 1100	
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		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									

88 635.98 Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-19R

Energy	o Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet 4	of	5
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	144	4' SURF.ELEV	. 723	3.98
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
		·							
89	634.98	SAA							
90	633.98	SAA							
91	632.98		1						
92		Void; no recovery							
93	630.98								
94	629.98								
95	628.98								
96	627.98								
97		Dolostone; chert gravel; fractured							
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		1						
107	616.98								
108	615.98								
109	614.98	Dolostone; blue gray; heavily fractured							
110	613.98								
111	612.98								
112	611.98	Void; mud tilled							
113	610.98								
114	609.98								
115	608.98	Dolostone; blue gray; heavily fractured							
116	607.98								
117	606.98								
118	605.98								
119	604.98								
120	603.98]	

120 603.98 Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-19R Sheet 5 of 5

inergy i	to Serve You	r World GEOLOGICA	AL SE	KVICES			Sheet	5	of	5 5
SITE _		Plant Bowen CCB Disposal Facility			TOTAL DEPTH	144	4.0'	SURF.ELEV.	723	.98
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Con	nments	% Rec	RQI
121	602.98									
122	601.98	Dolostone; blue gray; heavily fractured								
123	600.98									
124	599.98									
125	598.98									
126	597.98									
127	596.98	Void; gravel filled								
128	595.98									
129	594.98									
130	593.98									
131	592.98									
132	591.98									
133	590.98									
134	589.98									
135	588.98	Dolostone; blue gray; heavily fractured								
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		BOH @ 144' bgs								
145										
146 147										
147										
149	574.98									
150	573.98									
151	572.98									
152	571.98									

152 571.98 Form GS9901 8-19-2008

WELL CONSTRUCTION LOG Southern Company Generation PROJECT: Plant Bowen CCB DRILLING CO.: **Boart Longyear** WELL LOCATION: Cells 3 and 4 RIG TYPE: Rotosonic Sellers/Dyer LOGGER: DRILLING METHODS: Rotosonic GWC-20R DATE CONSTRUCTED: 6/9/2011 DEPTH **ELEVATION** FEET FT, MSL Locking Hinged Top TOP OF RISER 2.71 721.09 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole-4-ft x 4-ft concrete pad **GROUND SURFACE** 0.00 718.38 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING **BACKFILL MATERIAL** TYPE: Portland Cement/Grout Slurry AMOUNT: 120 gallons **RISER CASING** DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 67.00 651.38 ANNULAR SEAL TYPE: 50 lbs bentonite chips AMOUNT: 3 bags PLACEMENT: Wash with water 72.00 646.38 TOP OF FILTER PACK **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 634.08 **BOTTOM OF CASING** 84.30

HOLE DIA: 6"

SOUT	THERN 4	DRILLING LOG	Hole No. GWC-20R
Energy 1	o Serve Your V	Yorld" GEOLOGICAL SERVICES	Sheet 1 of 3
SITE			
	LOCATION	Cells 3 and 4 COORDINATES N 1506601.52	E 2073487.28
ANGLE			RILL NO. NA
DRILLIN	IG METHOD	Rotosonic NO. SAMPLES CONTINUOUS NO. U.D. SAMP	PLES NA
			% REC. NA
		LE DEPTH 84.3 ELEV. 634.08 TIME AFTER COMP. 1 hour DATE	· · · · · · · · · · · · · · · · · · ·
	TYPE GROUT		RT DATE 6/8/2011 6/8/2011
	DRILLER	Boart RECORDER Sellers/Dyer APPROVED D. Brooks DRILLING COMI	1P. DATE 6/8/2011
Depth	Elev.	Material Description, Classification and Remarks No. From To Blows N	Comments % Rec RQD
0	718.38		
1	717.38	Top Soil	
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		
9	709.38	SAA	
10	708.38		
11	707.38		
12	706.38		
13	705.38		
14	704.38		
15	703.38	SAA	
16	702.38		
17	701.38		
18	700.38		
19	699.38		
20	698.38	CLAY; silty; yellowish orange	
21	697.38	,, , iiiiii	
22	696.38		
23	695.38		
24 Form GS	694.38 9901 8-19-200		

SOUTHERN ANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-20R

Sheet 2 of 3 Plant Bowen CCB Disposal Facility Cells 3 and 4 100.0' 718.38 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks From To Comments Blows 25 693.38 SILT; sandy; trace clays; med-grained sand; yellowish 692.38 orange 26 27 691.38 690.38 28 29 689.38 688.38 SILT; sandy; chert gravel throughout; yellow; damp 30 687.38 31 686.38 32 33 685.38 684.38 34 35 683.38 36 682.38 37 681.38 38 680.38 679.38 39 40 678.38 41 677.38 42 676.38 675.38 SILT; clayey; 20% chert gravel; some med-grained sand 43 674.38 44 673.38 45 46 672.38 47 671.38 670.38 48 669.38 Dolostone @ 47.5'; blue gray; red staining; very fractured 49 50 668.38 667.38 51 52 666.38 53 665.38 664.38 Void @ 52' to 67' 54 663.38 55 662.38

SOUTHERN COMPANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-20R Sheet 3 of

Plant Bowen CCB Disposal Facility Cells 3 and 4 100.0 718.38 SITE TOTAL DEPTH SURF.ELEV. Depth Elev. No. RQD Material Description, Classification and Remarks From To N Comments 661.38 57 660.38 659.38 59 60 658.38 657.38 Void 61 656.38 62 63 655.38 64 654.38 65 653.38 652.38 66 67 651.38 650.38 68 69 649.38 70 648.38 647.38 71 72 646.38 73 645.38 Dolomicrite; fine-grained; gray; contains prevalent calcine 74 veining in a unimodal direction; sparse oxidation staining; weakly laminated in some individual samples 75 643.38 76 642.38 77 641.38 78 640.38 639.38 79 80 638.38 81 637.38 636.38 83 635.38 84 634.38 BOH @ 84.3' bgs 633.38 85 86 632.38 87 631.38

Form GS9901 8-19-2008

WELL CONSTRUCTION LOG Southern Company Generation DRILLING CO.: SCS Civil Field Services WELL PROJECT: Plant Bowen CCB DRILLER: Milam NAME Cells 3 and 4 RIG TYPE: CME 550 LOCATION: LOGGER: D. Brooks DRILLING METHODS: Hollow stem/ HQ rock core GWC-21R DATE CONSTRUCTED: 12/16/2011 ELEVATION DEPTH FEET FT, MSL Locking Hinged Top 723.46 TOP OF RISER 2.61 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole~ 4-ft x 4-ft concrete pad 0.00 720.85 **GROUND SURFACE** 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 89.50 631.35 **BOTTOM OF CASING** HOLE DIA: 6.25"/4.25"

sou [.]	THERN 4	A NV	DRILLING I	_OG			Hole No.	GW	/C-21R
Energy	to Serve Your V	World"	GEOLOGICAL SE	RVICES			Sheet	1 of	f 4
SITE		Plant Bowen CCB Dis	<u> </u>		HOLE DEPTH		SURF		720.85
	LOCATION	Cells 3 and 4	COORE		1506694		E		784.63
		90 BEARING		RACTOR	SCS CFS		RILL NO.	NA NA	IA .
	NG METHOD CASING SIZE	Hollow Stem/ HQ Rock Core 6.25" LENGTH	40'	RE SIZE	4.25"	U.D. SAMP	LES 6 REC.		iA
	WATER TAE	FC FF	004.0	ER COMP.	4 5	•	TAKEN	40/40	
	TYPE GROUT	NIA				•	RT DATE		/2011
	DRILLER	Milam RECORDER D. Br	ooks APPROVED	D. Broo	oks DRIL	LING COM	P. DATE	12/16	/2011
Depth	Elev.	Material Description, Classification and	Sample No.	Stan From To	dard Penetration Test Blows	N	Comment	s	% Rec RQD
0	730.66								
1	719.85	Top Soil							
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								
11	709.85								
12	708.85	SILT; clayey with trace sand and chert	gravel; light brown						
13	707.85								
14	706.85								
15	705.85								
16	704.85								
17	703.85	SILT; clayey; light brown							
18	702.85								
19	701.85								
20	700.85								
21	699.85	SAA; with chert gravel throughout							
22	698.85	-							
23	697.85								
24	696.85								
	9901 8-19-200	8	<u>I</u>						

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-21R
Sheet 2 of 4

SITE	o Serve You	Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	89	Sheet 2 9.5 SURF.ELEV.	72	0.85
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	695.85								
26	694.85	SAA							
27	693.85								
28	692.85								
29	691.85								
30	690.85								
31	689.85								
32	688.85	SILT; clayey; yellowish orange							
33	687.85								
34	686.85								
35	685.85								
36	684.85								
37	683.85								
38	682.85								
39	681.85								
40	680.85								
41	679.85								
42	678.85								
43	677.85								
44	676.85								
45	675.85								
46	674.85	SAA; 10% sand							
47	673.85								
48	672.85								
49	671.85								
50	670.85								
51	669.85								
52	668.85								
53	667.85								
54	666.85								
<u>55</u> 56	665.85 664.85	Dolostone; blue gray; no fractures							
	004.85						l		

SOUTHERN COMPANY

DRILLING LOG

Hole No. GWC-21R

Energy	COMP. o Serve You	er World"		Sheet 3	of	4			
SITE _		Plant Bowen CCB Disposal Fac	ility Cells 3 and 4		TOTAL DEPTH	89.5	SURF.ELEV.	720).85
Depth	Elev.	Material Description, Classification and Ro	Sample emarks No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	663.85								
58	662.85								
59	661.85								
60	660.85								
61	659.85	Dolostone; blue gray; fractured; slight red	staining						
62	658.85	Dolostone, blue gray, fractured, slight red	Stalling						
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								
74	646.85								
75	645.85								
76	644.85								
77 78	643.85 642.85								
79	641.85								
80	640.85								
81	639.85	SAA							
82	638.85								
83	637.85								
84	636.85								
85	635.85								
86	634.85								
87	633.85								
88 Form GS	632.85 9901 8-19-2	2008							

SOUTHERN COMPANY

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-21R

Energy i	o Serve You	r World GEOLOGIC	AL SE	RVICES			Sheet 4	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	89	SURF.ELE	v. <u>72</u>	0.85
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Star From To	ndard Penetration Test Blows	N	Comments	% Rec	RQD
				11010	Dione -		Commente	70 TVEC	- rigg
89	631.85								
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								

120 600.85 Form GS9901 8-19-2008

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bowen CCB	DRILLING CO.: Boart Longyear	Tioration	WELL
LOCATION: Cells 3 and 4	RIG TYPE: Rotosonic		
LOGGER: C. Sellers	DRILLING METHODS: Rotosonic		GWC-22R
DATE CONSTRUCTED: 6/14/2011			
		DEPTH	ELEVATION
		FEET	FT, MSL
Locking Hinged Top ————			
Γ.	TOP OF RISER	2.60	715.85
1/4-inch Vent	2" Threaded Riser Cap		
.			
1/4-inch Weep Hole			
4-ft x 4-ft concrete pad			
4 11 X 4 11 dollorote pad	GROUND SURFACE	0.00	713.25
	333	0.00	
	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
	BOTTOM OF PROTECTIVE CASING		
	TYPE: Portland Cement/Grout Slurry		
	AMOUNT: 150 gallons		
	7.III GOTTI. 100 gallorio		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	102.00	611.25
	ANNULAR SEAL		
	TYPE: 50 lbs bags of bentonite chips		
	AMOUNT: 1- 50 lbs bags PLACEMENT: Wash with water		
	TOP OF FILTER PACK	105.30	607.95
	FILTER PACK		
	TYPE: DSI Sand #1A		
	Drillers Services, Inc.		
	AMOUNT: 5 bags / 50 lbs bags PLACEMENT: Wash with water		
	. E. SEMERT. Wash water		
	BOTTOM OF RISER / TOP OF SCREEN	106.70	606.55
	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		
Flush threaded and ass	BOTTOM OF SCREEN	116.70	596.55
Flush-threaded end cap —————	BOTTOM OF CASING	117.00	596.25
	DOTTOM OF ONOR		300.20
HOLE	E DIA: 6"		

SOU	THERN A	NY	DRILL	ING I	_OG			Hole N	No. G	WC-22	R
Energy .	io Serve Your V	Vorld"	GEOLOGIC					Sheet	1	of	4
SITE		Plant Bowen	CCB Disposal Facility			HOLE DEP	тн 11	7'	SURF.ELEV.	713	
		Cells 3			DINATES N		6717.2			4105.68	3
ANGLE		90 BEAR	NG NA		RACTOR		ngyear			NA	
DRILLIN	NG METHOD	Rotosonio				ous	NO. U.D. SAM	MPLES	N	IA NA	
	CASING SIZE	6" LENG	NA NA	co	RE SIZE	6" 4 h =	TOTAL			NA 4/2044	
		BLE DEPTH 68'	ELEV. 645' msl	TIME AFT	ER COMP.	1 nour	DA	TE TAKEN	0.14	4/2011 3/2011	
	TYPE GROUT	- .	QUANTITY NA D. Brooks APPRO		D. Bro	NA oks		-	C/4	4/2011	
	DRILLER	Boart RECORDER	D. BIOOKS APPRO	Sample		ndard Penetration	DRILLING CO	MP. DATE	0/1	1/2011	
Depth	Elev.	Material Description, (Classification and Remarks	No.	From To	Blows	N	Cor	nments	% Rec	RQD
0	713.25	CAND City brief red dry	in a sucional								
1	712.25	SAND, Silty; brick red; dry; t	ine grained								
2	711.25										
3	710.25										
4	709.25										
5	708.25										
6	707.25										
7	706.25										
8	705.25			_							
9	704.25										
10	703.25										
11	702.25	SAND, Clayey; brick red; dr chert fragments	y; fine grained with white								
12		g									
	701.25										
13	700.25										
14	699.25										
15	698.25										
16	697.25										
17	696.25										
18	695.25										
	694.25										
19			ish yellow; damp; fine grained								
20	693.25	sand; low plasticity									
21	692.25										
22	691.25										
23	690.25										
24	689.25			L							
	9901 8-19-200	0									

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SOUTHERN COMPANY Energy to Serve Your World*

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-22R
Sheet 2 of 4

Energy	to Serve You			KVICES			Sneet 2	UI	4
SITE		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	11	SURF.ELEV.	71	3.25
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Star From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25	688.25								
26	687.25	CLAY, Sandy; red and reddish yellow; damp; fine grained sand; low plasticity							
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								
40	673.25								
41	672.25								
42	671.25	SAA except fine to medium sand; moist							
43	670.25								
44	669.25								
45	668.25								
46	667.25								
47	666.25								
48	665.25								
49	664.25								
50		SAND, Silty; tan; moist; medium grained sand with pieces of highly solutioned limestone							
51	662.25								
52	661.25								
53	660.25								
54	659.25	CLAV Sandy tan majet fine to madium avaisad and							
55 56	658.25	CLAY, Sandy; tan; moist; fine to medium grained sand; no plasticity							
• ປປ	1 UU/.ZO					•			

SOUTHERN COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-22R

Energy i	o Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet	3	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	1′	17'	SURF.ELEV.	713	3.25
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Com	ments	% Rec	RQD
		wachar Beschpach, Grassineach and Remarks		11011110	blows	.,	6 inch stee	el casing	% Rec	riqu
57	656.25	1' bed of white chert					to 57' bgs			
58	655.25									
59	654.25									
60	653.25									
61	652.25	Mud filled void from 58' to 69'								
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								
	642.25									
71										
72	641.25	Void with an annual form 7014-051								
73		Void with no recovery from 70' to 85'								
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		ł							
86		DOLOMITE; blue grey; hard; slightly weathered								
87	626.25									
88	625.25									

SOUTHERN COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-22R

Energy	o Serve You			RVICES			S	heet 4	of	4
SITE		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	11	7'	SURF.ELEV.	713	3.25
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N		Comments	% Rec	RQD
		material Description, oracomount and remaine		7.10	Biomo			Commonto	70 TVEC	1100
89	624.25									
90	623.25									
91	622.25									
92	621.25	Void with no recovery from 88' to 103.5'								
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;								
105	608.25	contains purple chert inclusions								
106	607.25									
107	606.25	DOLOMITE blue meet bead eliable meet								
108	605.25	DOLOMITE; blue grey; hard; slighlty weathered; horizontal fractures with iron staining along faces								
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	, in the second								
119	594.25									
120	593.25									

120 593.25 Form GS9901 8-19-2008 WELL CONSTRUCTION LOG Southern Company Generation PROJECT: Plant Bowen CCB DRILLING CO.: **Boart Longyear** WELL LOCATION: Cells 3 and 4 RIG TYPE: Rotosonic C. Sellers LOGGER: DRILLING METHODS: Rotosonic GWC-23R DATE CONSTRUCTED: 6/28/2011 DEPTH ELEVATION FEET FT, MSL Locking Hinged Top TOP OF RISER 2.54 691.41 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole-4-ft x 4-ft concrete pad **GROUND SURFACE** 0.00 688.87 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING **BACKFILL MATERIAL** TYPE: Portland Cement/Grout Slurry AMOUNT: 45 gallons **RISER CASING** DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 18.00 670.87 ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 4 - 50 lbs bags PLACEMENT: Wash with water TOP OF FILTER PACK 34.40 654.47 FILTER PACK TYPE: DSI Sand #1A Drillers Services, Inc. AMOUNT: 4 bags / 50 lbs bags PLACEMENT: Wash with water BOTTOM OF RISER / TOP OF SCREEN 36.70 652.17 **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 642.17 **BOTTOM OF SCREEN** 46.70 Flush-threaded end cap 47.00 **BOTTOM OF CASING** 641.87

HOLE DIA: 6"

sou [.]	THERN A	DRILL	ING I	LOG			Hole No.	GWC-23	3R
Energy .	o Serve Your V	Vorld" GEOLOGIC	AL SE	RVICES			Sheet 1	of	2
SITE)' SURF.ELE		8.87
	LOCATION	Cells 3 and 4	COOR	DINATES N			_ E 2		.6
ANGLE		90 BEARING NA	CONTR	RACTOR			RILL NO.		
		Rotosonic NO. SAMPLES	s	Continuo	us	NO. U.D. SAMF	PLES	NA	
	CASING SIZE		co	RE SIZE			% REC.	NA	
	WATER TAE	LE DEPTH 33.33 ELEV. 000.02		ER COMP.		DAT		6/28/2011	
	TYPE GROUT							6/28/2011	
	DRILLER	Boart RECORDER C. Sellers APPRO	VED				IP. DATE	6/28/2011	l .
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	From To	dard Penetration Blows	l est N	Comments	% Rec	RQD
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	1						
8	680.87	0							
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	CLAV city raddish brown; short gravel throughout							
22	666.87	CLAY; silty; reddish brown; chert gravel throughout							
23	665.87								
24	664 97								

24 664.87 Form GS9901 8-19-2008 SOUTHERN COMPANY
Energy to Serve Your World

Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-23R
Sheet 2 of 2

Plant Bowen CCB Disposal Facility Cells 3 and 4 47.0' 688.87 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks From To Comments Blows 25 663.87 26 662.87 27 661.87 660.87 28 29 659.87 30 658.87 657.87 31 656.87 Dolostone; blue gray; very little fractrures red staining at 32 33 655.87 654.87 34 35 653.87 36 652.87 37 651.87 650.87 38 SAA 39 649.87 40 648.87 41 647.87 646.87 42 43 645.87 44 644.87 Dolostone; blue gray; very fractured; red staining 643.87 45 46 642.87 47 641.87 BOH @ 47.0' bgs 48 640.87 639.87 49 50 638.87 637.87 51 52 636.87 53 635.87 634.87 633.87 55 632.87

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCT		Southern Company Genera	<u>ation</u>	
PROJECT:	Plant Bowen CCB	DRILLING CO.: Boart Longyear		WELL
LOCATION:	Cells 3 and 4	RIG TYPE: Rototsonic		014/0 045
LOGGER:	C. Sellers 6/21/2011	DRILLING METHODS: Rotosonic		GWC-24R
DATE CONSTRUCTED:	0/21/2011	Loc		EL EL (ATION
				ELEVATION
		FE	ET	FT, MSL
Locking Hinged Top	─			
	_	TOP OF RISER 2.	65	676.92
1/4-inch Vent —		2" Threaded Riser Cap		
	•			
1/4-inch Weep Hole				
4-ft x 4-ft concrete pad				
. (((,) ,)		GROUND SURFACE 0.0	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		
				004.07
			.00	664.27
		ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips		
		AMOUNT: 8 - 50 lbs bags		
		PLACEMENT: Wash with water		
			.80	649.47
		FILTER PACK		
		TYPE: DSI Sand #1A	1	
		Drillers Services, Inc.	1	
		AMOUNT: 5 bags / 50 lbs bags	1	
		PLACEMENT: Wash with water	1	
				o
			.70	647.57
		SCREEN DIA: 2-inch inner/ 3.75-inch outer	1	
		TYPE: Schedule 40 PVC Prepack	1	
		OPENING WIDTH: 0.01-inch	1	
		OPENING WIDTH: 0.01-IIIGH OPENING TYPE: Slotted	1	
		SLOT SPACING: 0.25-inch	1	
		SLOT LENGTH: 1.5-inch	1	
			.70	637.57
Flush-threaded end cap			T	
		BOTTOM OF CASING 37	.00	637.27
			1	
		DIA. CII		
	HOLE	ه :AIC	1	
			L	

SOU'	THERN 4	DRILL	ING I	_OG			Hole No.	GWC-24	₽R
Energy	o Serve Your V	'orld" GEOLOGIC	AL SE	RVICES			Sheet 1	of	2
SITE							0' SURF.ELE		4.27
	LOCATION	Cells 3 and 4	COOR	DINATES N				2074805.7	6
ANGLE		90 BEARING NA				gyear	DRILL NO.		
DRILLIN	IG METHOD	Rotosonic No. SAMPLE					IPLES	NA	
	CASING SIZE		co	RE SIZE		TOTAL	% REC.	NA O(0.1/0.0.14	
				ER COMP.				6/21/2011	
	TYPE GROUT			D. Broc				6/20/2011 6/21/2011	
	DRILLER	Boart RECORDER C. Sellers APPRO	Sample		dard Penetration		MP. DATE	0/21/2011	
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N N	Comments	% Rec	RQD
0	674.27								
1	673.27	Top Soil							
2	672.27								
		SAND; silty; brownish red; very fine grained							
3	671.27								
4	670.27								
5	669.27	SAND; silty; red; more silt; 10% clay							
6	668.27	, - ,,,							
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		1						
18	656.27								
19	655.27								
20	654.27	Dolostone; blue gray; very fracture; minimal staining							
21	653.27	20.00.00, blad gray, vory maddid, millima dailling							
22	652.27								
23	651.27								
20	001.21								

24 650.27 Form GS9901 8-19-2008

SOUTHERN ALL COMPANY
Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

 Hole No.
 GWC-24R

 Sheet
 2
 of
 2

Energy	to Serve You			RVICES			Sheet	2	of	2
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	37	.0' SUF	RF.ELEV.	67	4.27
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	ndard Penetration Test Blows	N	Comments	3	% Rec	RQD
25	649.27									
26	648.27									
27	647.27									
28	646.27									
29	645.27									
30	644.27									
31	643.27									
32	642.27	Dolostone and Chert gravel; red staining on the dolostone								
33	641.27									
34	640.27									
35	639.27									
36	638.27									
37	637.27									
38	636.27	BOH @ 37.0' bgs								
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 53	622.27 621.27									
54	620.27									
55	619.27									
56	618.27									

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT: Plant Bo	owen CCB	DRILLING CO.: Boart Longyear	- auon	WELL
LOCATION: Cells 3 a		RIG TYPE: Rotosonic		
LOGGER: C. Selle		DRILLING METHODS: Rotosonic		GWC-25R
DATE CONSTRUCTED: 6	5/21/2011			
		DE	EPTH	ELEVATION
		F	EET	FT, MSL
Locking Hinged Top ————	→			
ı			2.55	676.75
1/4-inch Vent		2" Threaded Riser Cap		
	 			
1/4-inch Weep Hole				
A ft v A ft concrete pad	\	*		
4-ft x 4-ft concrete pad		GROUND SURFACE 0	0.00	674.20
		GROUND SURFACE U	7.00	074.20
	\ \	PROTECTIVE CASING		
		SIZE: 4x4-inch		
		TYPE: Anodized Aluminum		
		POTTOM OF PROTECTIVE CACING		
	Y	BOTTOM OF PROTECTIVE CASING		
		BACKFILL MATERIAL		
		TYPE: Portland Cement/Grout Slurry		
		AMOUNT: 100 gallons		
		RISER CASING		
		DIA: 2-inch		
		TYPE: Schedule 40 PVC		
		JOINT TYPE: Flush Threaded		
		700.05.05.4177	- 00	E00.00
		TOP OF SEAL 75	5.00	599.20
		TYPE: 50 lbs bags of bentonite chips		
		AMOUNT: 3 - 50 lbs bags		
		PLACEMENT: Wash with water		
			4.80	589.40
		FILTER PACK		
		TYPE: DSI Sand #1A Drillers Services, Inc.		
		AMOUNT: 5.5 bags / 50 lbs bags		
		PLACEMENT: Wash with water		
			6.70	587.50
		SCREEN DIA: 2-inch inner/ 3.75-inch outer		
	4-	TYPE: Schedule 40 PVC Prepack		
		OPENING WIDTH: 0.01-inch		
		OPENING TYPE: Slotted		
		SLOT SPACING: 0.25-inch		
		SLOT LENGTH: 1.5-inch	6 70	577 FO
Flush-threaded end cap ——		BOTTOM OF SCREEN 96	6.70	577.50
		BOTTOM OF CASING 97	7.00	577.20
	HOLE DIA	6"		
			ļ	

SOUT	THERN 4	DRILL	ING I	_OG			Hole No.	GWC-25	5R
Energy I	COMPA o Serve Your V	Vorld" GEOLOGIC	AL SE	RVICES			Sheet 1	of	4
SITE							0' SURF.ELE	v. <u>67</u>	4.2
	LOCATION			DINATES N				071414.6	9
ANGLE		90 BEARING NA				igyear _c	DRILL NO.		
DRILLIN	IG METHOD	Rotosonic NO. SAMPLES	´	Continuo		NO. U.D. SAM		NA	
	CASING SIZE	00.00	co	RE SIZE	4"		% REC.	NA 0/04/0044	
				ER COMP.				6/21/2011	
	TYPE GROUT	<u> </u>	N	D. Broo				6/21/2011 6/21/2011	
	DRILLER	Boart RECORDER C. Sellers APPRO	Sample		dard Penetration		MP. DATE	5/2 1/2011	
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N N	Comments	% Rec	RQD
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 micacous; yellowish orange							
13	661.20								
14	660.20								
15	659.20								
16	658.20	Chert gravel; well rounded	-						
17		SILT; sandy; medium grained sand; some chert gravel; light brown							
18	656.20								
19	655.20	SAND;with chert gravel; brownish yellow; medium							
20	654.20	grained; wet							
21	653.20								
22	652.20								
23	651.20								
			1		l				

24 650.20 Form GS9901 8-19-2008 SOUTHERN COMPANY
Energy so Serve Your World

Form GS9901 8-19-2008

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-25R

Sheet 2 of 4 Plant Bowen CCB Disposal Facility Cells 3 and 4 97.0' 674.2 TOTAL DEPTH SURF.ELEV. Standard Penetration Test Elev. N RQD Depth Material Description, Classification and Remarks From To Comments Blows 25 649.20 26 648.20 Dolostone and chert gravel mixed 27 647.20 28 646.20 29 645.20 30 643.20 Dolostone; cherty; blue gray; heavy red staining; very 31 fractured; 642.20 32 33 641.20 640.20 34 35 639.20 36 638.20 37 637.20 38 636.20 635.20 39 40 634.20 41 633.20 SAA 632.20 42 43 631.20 44 630.20 629.20 45 46 628.20 47 627.20 48 626.20 625.20 49 50 624.20 623.20 51 52 622.20 SAA 53 621.20 620.20 619.20 55 618.20

SOUTHERN COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-25R
Sheet 3 of

inergy i	to Serve You	r World GEOLOGICA	AL SE	RVICES			Sheet	3	ot	4
SITE		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	97	'. 0 '	SURF.ELEV.	67	4.2
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Star From To	ndard Penetration Test Blows	N	Con	nments	% Rec	R
57	617.20									
58	616.20									
59	615.20									
60	614.20									
61	613.20									
62	612.20									
63	611.20	SAA								
64	610.20									
65	609.20									
66	608.20									
67	607.20		1							
68	606.20									
69	605.20									
70	604.20									
71	603.20									
72		VOID; clay filled with dolostone gravel and trace sand								
73	601.20	Color, oray mad man about one grants and a date cand								
74	600.20									
75	599.20									
76	598.20									
77		Dolostone; blue gray	1							
78	596.20	<u></u>	1							
79	595.20									
80	594.20									
81	593.20									
82	592.20	Dolostone; blue gray; very fracture; heavy red staining								
83	591.20	Clay filled void from 83' to 84'								
84	590.20									
85	589.20									
86	588.20									
87	587.20	 	•							
88	586.20									

88 586.20 Form GS9901 8-19-2008

SOUTHERN COMPANY Energy to Serve Your World

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-25R

Energy	to Serve You	r World GEOLOGICA	AL SE	RVICES			She	et 4	of	4
SITE		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	97	.0'	SURF.ELEV.	67	4.2
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Star From To	dard Penetration Test Blows	N	,	Comments	% Rec	RQD
		wateriai Description, Grassification and Remarks	140.	FIGHT 10	biows	IN	,	Jonniens	% Kec	RQD
89	585.20									
90	584.20									
91	583.20									
92	582.20	Dolostone; blue gray; heavy red staining; with coarse angular sand								
93	581.20									
94	580.20									
95	579.20									
96	578.20									
97	577.20	BOH @ 97' bgs	1							
98	576.20									
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										
115										
116	558.20									
117	557.20									
118	556.20									
119	555.20									
120	554.20		Ī							

120 554.20 Form GS9901 8-19-2008 WELL CONSTRUCTION LOG Southern Company Generation PROJECT: Plant Bowen CCB DRILLING CO.: **Boart Longyear** WELL LOCATION: Cells 3 and 4 RIG TYPE: Rotosonic LOGGER: D. Brooks DRILLING METHODS: Rotosonic GWA-36 DATE CONSTRUCTED: 6/15/2011 DEPTH ELEVATION FEET FT, MSL Locking Hinged Top TOP OF RISER 2.61 684.91 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole-4-ft x 4-ft concrete pad **GROUND SURFACE** 0.00 682.30 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 46.00 636.30 ANNULAR SEAL TYPE: 50 lbs bags of bentonite chips AMOUNT: 4 - 50 lbs bags PLACEMENT: Wash with water TOP OF FILTER PACK 64.00 618.30 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 65.70 616.60 **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 606.60 **BOTTOM OF SCREEN** 75.70 Flush-threaded end cap 76.00 606.30 **BOTTOM OF CASING** HOLE DIA: 6"

sou:	THERN A	DRILLING LOG		Hole No.	GWA-36
Energy	to Serve Your V	World GEOLOGICAL SERVICES		Sheet 1	of 3
SITE		Plant Bowen CCB Disposal Facility HOLE DEP			
	LOCATION		5057.05		73383.57
				RILL NO.	NA NA
	IG METHOD	C" NA C"	NO. U.D. SAMP		NA
	CASING SIZE	LENGTH INA CORE SIZE 0 BLE DEPTH 31.8 ELEV. 650.5 TIME AFTER COMP. 1 hour	TOTAL 9		/16/2011
	TYPE GROUT	NIA NIA	DRILLING STAF		/16/2011
	DRILLER	D. Procks	DRILLING COM	IP. DATE 6/	/16/2011
Depth	Elev.	Material Description, Classification and Remarks Sample Standard Penetration No. From To Blows	Test N	Comments	% Rec RQD
0	682.30				
1	681.30	SAND, Silty; brick red; dry; fine grained			
2	680.30				
3	679.30				
4	678.30				
5	677.30				
6	676.30				
7	675.30				
8		CLAY, Sandy; reddish yellow; damp; very fine to fine			
9	673.30	grained sand with grey chert fragments; low plasticity			
10	672.30				
11	671.30				
12	670.30				
13	669.30				
14	668.30				
15	667.30				
16	666.30				
17	665.30				
18	664.30	SAND, Silty; pale yellow; damp; very fine grained			
19	663.30				
20	662.30				
21	661.30				
22	660.30				
23	659.30	CLAY, Silty; orange and white; low plasticity			
24	658.30 9901 8-19-200				

Plant Bowen CCB Disposal Facility Cells 3 and 4 TOTAL CEPTH 76 SURFELLEY 582.3	SOUT	THERN COMP	DRILI						3WA-36	
Corp. Circ. Nate at December Clear factors and Remands Nate Tront To Corp. Nate Corp. Nate Regular Nate Nate Regular Nate Nate Regular Nate Regular Nate N		o Serve You			RVICES		76'			
25 657.30 26 656.30 27 655.30 28 656.30 29 653.39 30 652.30 31 651.30 32 650.30 33 649.30 34 648.30 35 647.30 38 644.30 39 643.30 39 643.30 40 642.30 40 642.30 41 643.30 52 640.30 43 633.30 44 633.30 45 633.30 46 633.30 47 635.30 48 633.30 49 633.30 40 642.30 40 642.30 41 643.30 52 635.30 53 633.30 54 633.30 55 637.30 56 638.30 57 638.30 58 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 638.30 59 688.30 50 688.30 50 688.30 50 688.30 50 688.30 50 688.30 50 688.30 50 688	SITE _	l	I faint bowen cob bisposar racinty cens our		Star			SURF.ELEV.	68	32.3
26 656.30 27 655.30 28 654.30 29 653.30 30 652.30 31 651.30 32 650.30 33 648.30 34 648.30 35 648.30 36 648.30 37 645.30 38 644.30 39 643.30 40 642.30 41 641.30 5AND, Clayey, brown and orange; moist; fine grained sand with pieces of weakly cumented sandstone and with pieces of weakly cumented sandstone 42 640.30 43 638.30 44 638.30 45 637.30 CLAY, Sandy, orange and brown; moist; fine grained sand with pieces of chert and dolomite 48 634.30 49 633.30 50 633.30 50 632.30 51 633.30 52 630.30 53 628.30 54 628.30 55 627.30 56 628.30	Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
27 655.30 28 654.30 29 653.30 30 652.30 31 650.30 32 650.30 33 648.30 34 648.30 35 647.30 36 648.30 37 645.30 38 644.30 39 643.30 40 642.30 41 641.30 5AND, Clayey, brown and orange; moist, fine grained sand with pieces of weakly cemented sandstone 42 640.30 43 639.30 44 633.30 45 637.30 CLAY, Sandy, orange and brown; moist; fine grained sand with pieces of heat and with pieces of heat and with pieces of sand with pieces of	25	657.30	CLAY, Silty; orange and white; low plasticity							
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 5AND, Clayey; brown and orange; moist; fine grained sand with piscos of weakly cemented sandstone 42 640.30 43 639.30 44 638.30 45 637.30 46 633.30 47 635.30 48 634.30 49 633.30 50 632.30 51 631.30 52 630.30 55 629.30 55 627.30 55 627.30 55 627.30 55 627.30	26	656.30								
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 41 641.30 541.30 542.30 543.30 544.30 545.30 546.30 547.30 548.30 548.30 549.30 549.30 540.3	27	655.30								
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 Language Sand with pieces of weakly cemented sandstone sand with pieces of chert and dolomite sand with pieces of chert and dolomite sandstone sand	28	654.30								
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 SAND, Clayey; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone 42 640.30 43 639.30 44 638.30 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 55 627.30 55 627.30	29	653.30								
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 camented sandstone 42 640.30 43 639.30 44 638.30 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 55 627.30	30	652.30								
33 649.30 34 648.30 35 647.30 38 646.30 37 645.30 38 644.30 39 643.30 40 642.30 41 641.30 SAND, Clayer; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone 42 640.30 43 639.30 44 638.30 45 637.30 46 633.30 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 55 627.30	31	651.30								
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 45 637.30 46 636.30 47 635.30 48 634.30 49 633.30 50 632.30 51 631.30 52 630.30 55 627.30 56 628.30	32	650.30								
36 646.30 37 645.30 38 644.30 39 643.30 40 642.30 41 641.30 42 640.30 43 639.30 44 638.30 45 637.30 46 636.30 47 635.30 48 634.30 49 633.30 50 632.30 51 631.30 52 630.30 55 627.30 56 626.30	33	649.30								
36 646.30 37 645.30 38 644.30 39 643.30 40 642.30 41 641.30 5AND, Clayey; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone 42 640.30 43 639.30 44 638.30 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	34	648.30								
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 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	35	647.30								
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 cernented sandstone 42 640.30 43 639.30 44 638.30 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	36	646.30								
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 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	37	645.30								
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 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	38	644.30								
41 641.30 And with pieces of weakly cemented sandstone 42 640.30 43 639.30 44 638.30 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	39	643.30								
42 640.30 43 639.30 44 638.30 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	40	642.30								
42 640.30 43 639.30 44 638.30 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	41	641.30	SAND, Clayey; brown and orange; moist; fine grained							
44 638.30 45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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 56 626.30	42	640.30								
45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	43	639.30								
45 637.30 CLAY, Sandy; orange and brown; moist; fine grained sand with pieces of chert and dolomite 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	44	638.30								
sand with pieces of chert and dolomite 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	45		CLAY, Sandy; orange and brown; moist; fine grained							
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	46		sand with pieces of chert and dolomite							
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	47									
49 633.30 50 632.30 51 631.30 52 630.30 53 629.30 54 628.30 55 627.30 56 626.30										
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52 630.30 53 629.30 54 628.30 55 627.30 56 626.30	50	632.30								
53 629.30 54 628.30 55 627.30 56 626.30	51	631.30								
54 628.30 55 627.30 56 626.30	52	630.30								
55 627.30 56 626.30	53	629.30								
56 626.30	54	628.30								
56 626.30	55	627.30								
FORM (=\$490) 8-19-7008	56	626.30	2008							

OUI	THERN COMP						Hole No.	Hole No. GWA-36			
	comp o Serve You	r World" GEOLOGIC		RVICES			Sheet 3 of 3				
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	14		TOTAL DEPTH	76'	SURF.ELEV.	68	2.3		
epth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	R		
57	625.30	CLAY, Sandy; orange and brown; moist; fine grained									
58	624.30	sand with pieces of chert and dolomite									
9	623.30										
0	622.30										
31	621.30										
32	620.30										
3	619.30										
64	618.30										
35	617.30										
66	616.30										
67	615.30										
88	614.30										
9	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										
30	602.30										
31	601.30										
2	600.30										
33	599.30										
34	598.30										
35	597.30										
36	596.30										
37	595.30										

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUC		Southern Company Generation	
PROJECT:	Plant Bowen CCB	DRILLING CO.: Boart Longyear	WELL
LOCATION: LOGGER:	Cells 3 and 4	RIG TYPE: Rotosonic	CWA 26D
DATE CONSTRUCTED	D. Brooks D: 6/15/2011	DRILLING METHODS: Rotosonic	GWA-36R
DATE CONCINCOTED	J. 0/10/2011	DEPTH	ELEVATION
		FEET	FT, MSL
Locking Hinged Top			11,100
Locking minged rop		TOP OF RISER 2.71	604 50
1/4-inch Vent —		TOP OF RISER 2.71 2" Threaded Riser Cap	684.53
1/4-IIICII Veiit		2 Threaded Niser Cap	
1/4-inch Weep Hole—			
1, 1 mon 11 dop 11010 \(\infty\)			
4-ft x 4-ft concrete pad	•		
•		GROUND SURFACE 0.00	681.82
		PROTECTIVE CASING	
		SIZE: 4x4-inch	
		TYPE: Anodized Aluminum	
		POTTOM OF PROTECTIVE CASING	
		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	
		. D. O. M. H. 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	0	BOTTOM OF SCREEN 85.70	090.1Z
i idon inicaded end cap		BOTTOM OF CASING 86.00	595.82
	HOLE	DIA: 6"	

sou [.]	THERN 4	DRILL	ING I	LOG			Hole No.	GWA-36	ŝR
Energy :	COMPA to Serve Your V	0=01.0016	AL SE	RVICES			Sheet 1	of	3
SITE		Plant Bowen CCB Disposal Facility			HOLE DEP	тн 86'	SURF.EL	EV. 68	1.82
	LOCATION		COOR	DINATES N	1505	5050.78	Е	2073384.0)1
ANGLE			CONTR		Boart Lor	ngyear _D	RILL NO.		
DRILLIN	IG METHOD	Rotosonic NO. SAMPLE	s	Continuo		NO. U.D. SAMF	PLES	NA	
	CASING SIZE	00 040.00	co	RE SIZE	4"	TOTAL '	% REC	NA 0/45/0044	
				ER COMP.	1 hour		E TAKEN	6/15/2011	
	TYPE GROUT	NA QUANTITY NA		D. Broo		DRILLING STA	•	6/14/2011 6/15/2011	
	DRILLER	Boart RECORDER D. Brooks APPRO	Sample		idard Penetration	DRILLING COM	IP. DATE	0/10/201	
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
0	681.82								
1	680.82	SAND, Silty; brown; dry; fine grained							
2	679.82		_						
3	678.82	SAA except yellowish red							
4	677.82								
5	676.82								
6	675.82								
7	674.82								
8	673.82	CLAY, Sandy; reddish and pale yellow; damp; very fine to fine grained sand with grey chert fragments;							
9	672.82	low plasticity							
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	gramed							
20	661.82								
21	660.82								
22	659.82								
23	658.82								
24	657.82	CLAY, Silty; orange and white; low plasticity							

Form GS9901 8-19-2008

SOU		DRILLI	NG L	.OG			Hole No. G	WA-36	R
Energy i	COMP to Serve You		AL SE	RVICES			Sheet 2	of	3
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH _	86'	SURF.ELEV.	68	1.82
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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								
38	643.82	CLAY, Sandy; strong brown, white, and orange; damp very fine to fine grained with pieces of grey chert							
39	642.82	very line to line grained with pieces of grey cheft							
40	641.82								
41	640.82	SAND, Clayey; brown and orange; moist; fine grained sand with pieces of weakly cemented sandstone							
42	639.82	Sand with pieces of weakly define the distance							
43	638.82								
44	637.82								
45	636.82	CLAY, Sandy; orange, white, and brown; moist; fine fine grained sand with pieces of chert and dolomite							
46	635.82	and grained saind with pieces of cheft and doloinite							
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 Form GS9901 8-19-2008

DRILLING LOG Hole No. GWA-36R SOUTHERN COMPANY **GEOLOGICAL SERVICES** Sheet of 3 Plant Bowen CCB Disposal Facility Cells 3 and 4 86' TOTAL DEPTH SURF.ELEV. 681.82 SITE Elev. RQD Depth Material Description, Classification and Remarks From To Blows Ν Comments 1' bed of dolomitic gravel 57 624.82 58 623.82 CLAY, Sandy; orange and brown; moist; fine grained 59 622.82 sand with pieces of chert and dolomite 60 621.82 61 620.82 619.82 62 618.82 63 617.82 64 616.82 66 615.82 67 614.82 68 613.82 69 612.82 70 611.82 71 610.82 609.82 72 608.82 DOLOMITE; blue grey; hard; slightly weathered; some horizontal fractures with sand infilling 73 74 607.82 606.82 75 605.82 76 77 604.82 78 603.82 79 602.82 80 601.82 81 600.82 599.82 83 598.82 597.82 84 85 596.82 86 595.82

Form GS9901 8-19-2008

594.82

87

BOH @ 86' bgs

WELL CONSTRUCTION LOG Southern Company Generation Plant Bowen CCB DRILLING CO.: SCS CFS PROJECT: WELL LOCATION: Cells 3 and 4 RIG TYPE: CME 550 LOGGER: D. Brooks DRILLING METHODS: Hollow Stem Auger GWA-37 9/11/2013 DATE CONSTRUCTED: DEPTH **ELEVATION** FEET FT, MSL Locking Hinged Top 703.66 2.64 TOP OF RISER 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole-4-ft x 4-ft concrete pad 701.02 0.00 **GROUND SURFACE** 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 89.00 612.02 TOP OF SEAL 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 606.82 94.20 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 104.20 596.82 **BOTTOM OF SCREEN** Flush-threaded end cap **BOTTOM OF CASING** 104.50 596.52 HOLE DIA: 6"

sou	THERN A	DRILLING LOG	Hole No. GWA-37
Energy	to Serve Your V	Vorld* GEOLOGICAL SERVICES	Sheet 1 of 4
SITE		Plant Bowen CCB Disposal Facility HOLE DEPTH 104.5	
	LOCATION	Cells 3 and 4 COORDINATES N 1505341.85	E 2073070.71
	IO METUOD		- N.I.A
DRILLIF	NG METHOD CASING SIZE	NA A"	NA.
		45' bgg 656.02 1 bgur	9/11/2013
	TYPE GROUT	NIA NIA	RT DATE 9/9/2013
	DRILLER	Denty RECORDER D. Brooks APPROVED D. Brooks DRILLING COMP	P. DATE 9/11/2013
Depth	Elev.	Sample Standard Penetration Test Material Description, Classification and Remarks No. From To Blows N	Comments % Rec RQD
0	701.02	SAND, Silty; reddish brown; dry; very fine to fine	
1	700.02	grained sand	
2	699.02	SAA except red; fine grained	
3	698.02		
4	697.02		
5	696.02		
		SAND, Clayey; brick red; damp; very fine to fine grained	
6	695.02		
7	694.02		
8	693.02		
9	692.02		
10	691.02		
11	690.02	SAA except red and yellow	
12	689.02		
13	688.02		
14	687.02		
15	686.02		
16	685.02		
17	684.02		
18	683.02		
19	682.02		
		SAND, Silty; yellow and white; damp; fine to medium	
20	681.02	grained with white chert fragments	
21	680.02		
22	679.02		
23	678.02		
24	677.02 9901 8-19-200		

DRILLING LOG Hole No. GWA-37 SOUTHERN COMPANY **GEOLOGICAL SERVICES** of Sheet 2 Plant Bowen CCB Disposal Facility Cells 3 and 4 104.5 701.02 SURF.ELEV. Standard Penetration Test Depth Elev. Material Description, Classification and Remarks RQD From To Ν Comments % Rec Blows 676.02 CLAY, Sandy; yellow and white; damp; very fine to fine 26 675.02 grained sand with small grey chert fragments 27 674.02 28 673.02 672.02 29 30 671.02 670.02 31 669.02 32 33 668.02 667.02 34 35 666.02 36 665.02 37 664.02 38 663.02 662.02 39 40 661.02 41 660.02 42 659.02 SAA with grey chert increasing in content and size; moist 43 658.02 657.02 44 656.02 45 46 655.02 47 654.02 48 653.02 652.02 SAND, Clayey; yellow and white; moist; fine to medium 49 grained 50 651.02 650.02 51 649.02 52 CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments 53 648.02

55

647.02 646.02

DRILLING LOG Hole No. **GWA-37** SOUTHERN COMPANY **GEOLOGICAL SERVICES** Sheet of 3 Plant Bowen CCB Disposal Facility Cells 3 and 4 104.5 TOTAL DEPTH 701.02 SITE SURF.ELEV. Elev. RQD Depth Material Description, Classification and Remarks From To Blows Ν Comments 644.02 57 58 643.02 CLAY, Sandy with Silt; pale yellow; moist; very fine to fine grained sand with white chert fragments 642.02 59 60 641.02 61 640.02 639.02 62 638.02 63 64 637.02 65 636.02 66 635.02 67 634.02 633.02 68 69 632.02 70 631.02 71 630.02 72 629.02 628.02 73 SAA except mottled pale yellow, yellow, and brown 74 627.02 626.02 75 76 625.02 77 624.02 78 623.02 79 622.02 80 621.02 81 620.02 619.02 83 618.02 617.02 84 616.02

615.02

grained sand

614.02 CLAY, Sandy; brownish yellow; wet; very soft; fine

85

86

SOUT	THERN	DRILLI	NG L	.OG			Hole No.	GWA-37	
Energy i	COMP to Serve You	-World" GEOLOGICA		RVICES			Sheet 4	of	4
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	104.5	SURF.ELEV.	701	.02
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan- From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	612.02	CLAY, Sandy; brownish yellow; wet; very soft; fine grained sand							
90	611.02	granieu sanu	1						
91	610.02	SAND, Clayey; yellow and brown; wet; fine grained with fragments of grey chert							
92	609.02	with fragments of grey cheft							
93	608.02	CLAY, Sandy; yellow and brown; wet; fine to medium grained sand with chert and dolomite cobbles							
94	607.02	grained sand with chert and dolornite cobbles							
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	with fragments of grey cheft							
101	600.02								
102	599.02								
103	598.02	DOLOMITE; blue grey; hard; slightly weathered;							
104	597.02	fractured with iron staining BOH @ 104.5' bgs							
105	596.02	BON @ 104.5 bgs							
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 Form GS9901 8-19-2008

WELL CONSTRUCTION LOG

Southern Company Generation

	LL CONSTRUCTION LOG Southern Com					
PROJECT:	Plant Bowen CCB DRILLING CO.: Boart Longyear Cells 3 and 4 RIG TYPE: Rotosonic					
LOCATION:	Cells 3 and 4	RIG TYPE: Rotosonic				
LOGGER:	D. Brooks	DRILLING METHODS: Rotosonic		GWA-38		
DATE CONSTRUCTED	D: 6/13/2011			=: =: /A =: 0.1		
			DEPTH	ELEVATION		
		_	FEET	FT, MSL		
Locking Hinged Top	─					
·		TOP OF RISER	2.68	716.43		
1/4-inch Vent —		2" Threaded Riser Cap				
	•					
1/4-inch Weep Hole—	_					
4-ft x 4-ft concrete pad	*					
1, 1, 1, 1, 1		GROUND SURFACE	0.00	713.75		
		PROTECTIVE CASING				
		SIZE: 4x4-inch				
		TYPE: Anodized Aluminum				
		BOTTOM OF PROTECTIVE CASING				
		DETTOM OF TROTECTIVE GAGING				
		BACKFILL MATERIAL				
		TYPE: Portland Cement/Grout Slurry				
		AMOUNT: 130 gallons				
		RISER CASING				
		DIA: 2-inch				
		TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded				
		JOINT TTPE. 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				
		I LAGEIVILIVI. Wasii Willi Walei				
		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	04.70	040.05		
Fluch throaded and com	<u>.</u>	BOTTOM OF SCREEN	64.70	649.05		
Flush-threaded end cap		BOTTOM OF CASING	65.00	648.75		
		BOTTOW OF CASING	00.00	040.73		
	HOLE	DIA: 6"				
			_			

SOU	THERN A	DRILLING LOG		Hole No.	GWA-3	8
Energy	to Serve Your W	Vorld* GEOLOGICAL SERVICES		Sheet 1	of	3
SITE		Plant Bowen CCB Disposal Facility HOLE DEPTH		SURF.E		3.75
	LOCATION			E	2072833.0	9
ANGLE		90 BEARING NA CONTRACTOR BOART LONG		RILL NO.		
DRILLIN	NG METHOD	C" NA A"	NO. U.D. SAMF		NA NA	
	CASING SIZE	45 15' 660 06 1 hour		% REC.	6/13/2011	
	WATER TAB	No.		E TAKEN RT DATE	6/13/2011	
	DRILLER	D. Proeke	DRILLING COM		6/13/2011	
Depth	Elev.	Sample Standard Penetration Te Material Description, Classification and Remarks No. From To Blows	st N	Comments	% Rec	RQD
		material Description, Classification and Nemarks		Comments	% Rec	NQD
0		SAND, Silty; red and yellowish red; dry; very fine to fine				
1	712.75	grained				
2	711.75					
3	710.75					
4	709.75					
5	708.75					
6	707.75					
7	706.75					
8	705.75					
9	704.75	SAA except damp				
10	703.75					
11	702.75					
12	701.75					
13	700.75					
14	699.75					
15		CLAY, Silty; white to pale yellow; damp; no plasticity				
		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
16	697.75					
17	696.75					
18	695.75	CLAY, Sandy, Sitly; mottled pale yellow and brown;				
19		damp; no plasticity				
20	693.75					
21	692.75					
22	691.75					
23	690.75					
24 Form GS	689.75 9901 8-19-2008					

sou [.]	DRILLING LOG					Hole No. GWA-38			
Energy :	to Serve You	-World GEOLOGIC		RVICES		=01	Sheet 2	of	3
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and			TOTAL DEPTH	76'	SURF.ELEV.	71	3.75
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
25		CLAY, Sandy, Sitly; mottled pale yellow and brown; damp; no plasticity; contained 1' bed of white chert							
26	687.75	at 25.5 to 26.5 feet							
27	686.75								
28	685.75								
29	684.75								
30	683.75								
31	682.75	CLAV Silty Sandy raddish valley strong brown and							
32	681.75	CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with pieces of weakly cemented sandstone							
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	SAA							
49	664.75								
50	663.75								
51	662.75								
52	661.75								
53	660.75								
54	659.75								
55	658.75								

56 657.75 Form GS9901 8-19-2008

SOUT	THERN COMP	DRILLI	NG L	.OG			Hole No.	GWA-38	}
Energy i	COMP to Serve You	r World" GEOLOGIC		RVICES			Sheet 3	of	3
SITE _		Plant Bowen CCB Disposal Facility Cells 3 and	4		TOTAL DEPTH	76'	SURF.ELEV.	713	3.75
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQE
57	656.75								
58	655.75								
59		CLAY, Silty, Sandy; reddish yellow, strong brown, and and black; moist; fine to medium grained sand with							
60	653.75	pieces of weakly cemented sandstone							
61	652.75								
62	651.75								
63	650.75								
64	649.75								
65	648.75								
66	647.75								
67	646.75		1						
68	645.75								
69	644.75	SAA with lenses of water bearing purple chert/ gravel							
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	1						
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 9901 8-19-2								



REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL

SERVICE COMPLEX/CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE GDT - 5/5/16 16:54 - S:WORKGROUPS/APC GENERAL

LOG OF TEST BORING

BORING GWA-39 Z PAGE 1 OF 3 GPC633179

PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 DEPTHDURING** 58 ft. **COMP.** 55.9 ft. DELAYED 55.5 ft. after 96 hrs. **NOTES** , HCL REACTION **WELL DATA** 3ROUNDWATER 3BSERVATIONS **ELEVATION SRAPHIC** DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards; **Joderate** 4-foot square concrete pad Sandy Lean Clay (CL) Surface Seal: - and red (2.5YR 4/6) dry, stiff Concrete 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 Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale 10 brown / very pale orange (10YR 8/2) dry, stiff, some gravel **Dolostone (COBBLES AND BOULDERS)** - dolostone boulders Annular Fill: Sandy Silt (ML) Portland Cement-Bentonite - brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brown / Grout (4 - 94lbs bags PC, 1 very pale orange (10YR 8/2) dry, stiff, some gravel 50lbs bags Gel, 45 gal. Water) 15 **Dolostone (COBBLES AND BOULDERS)** - dolostone boulders 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 20 - with dolostone cobbles and gravel (pulverized rock) 25 - pale yellow (5Y 8/2) and yellow (2.5Y 7/6) dry, medium stiff, medium plasticity 30 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')) 35 - with dolostone cobbles and gravel (pulverized rock) - pale yellow (2.5Y 8/2) and white (N9) dry, medium plasticity



S		LOG OF TEST BOI	RINO	3			BORING GWA-39 Z PAGE 2 OF 3 GPC633179
SOI EAI	JTHERI RTH SCI	N COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plan LOCATION Plan			Moni	torin	g Wells
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak Moderate Strong	GROUNDWATER OBSERVATIONS	pro 4-f	otecti oot s	WELL DATA etion: live aluminum cover with bollards; equare concrete pad
		Sandy Lean Clay (CL)(Con't)	S ≥ 0	00	CONTI	NUED)	
45		- interbedded with 6 inch clayey-sand lense					
		Sandy Fat Clay (CH)	-				
		- and brownish yellow (10YR 6/8) very damp, soft					
50							
		- with gravel					
55							
		- Well-graded Gravelly Sand (SW) - white (10YR 8/1) and brownish yellow (10YR 6/8) wet					
		7					
60		- saturated, gravel lense					
00							
		Sandy Elastic Silt (MH) - and light brownish gray / pale yellowish brown (10YR 6/2) soft, medium to high plasticity					←Annular Seal: Pel-Plug 3/8 Bentonite Coated
65		- with gravel Elastic Silt (MH)					Pellets (0.5 - 5gal buckets (101.5'-98.0')) and Baroid Hole
		- very pale brown / very pale orange (10YR 8/2) and light yellowish brown (10YR 6/4) very damp, soft, medium plasticity					Plug 3/8 Chips (19 - 50lbs bags (98.0'-25.0'))
70		Fat Clay (CH)					
		 pale brown (10YR 6/3) and yellowish brown (10YR 5/6) very damp, medium stiff, medium plasticity with gravel 					
75							
80		Sandy Elastic Silt (MH) - pale brown (10YR 6/3) and yellowish brown (10YR 5/6) damp, medium stiff, medium plasticity, with gravel					
85							



sc	UTI	LOG OF TEST BOI	RING	3			BORING GWA-39 Z PAGE 3 OF 3 GPC633179
SOU	UTHER	EN COMPANY SERVICES, INC. PROJECT Lanc			Mon	itoring	g Wells
		CIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plan					MELL DATA
DEPTH (ff)	GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak Moderate REACTION Strong	GROUNDWATER OBSERVATIONS	pr 4-	omple otecti foot s	ve aluminum cover with bollards; quare concrete pad
		Sandy Elastic Silt (MH)(Con't) - and yellowish brown (10YR 5/6) wet, medium to high plasticity, with	720	00	CON	INOLD	
90		gravel - saturated, very soft					
95		15.14 (40)(0.74)					Annular Seal: Pel-Plug 3/8 Bentonite Coated
		- and light gray (10YR 7/1)					Pellets (0.5 - 5gal buckets (101.5'-98.0')) and Baroid Hole
		4000 000					Plug 3/8 Chips (19 - 50lbs bags (98.0'-25.0'))
100		- very dark brown / dusky yellowish brown (10YR 2/2), yellowish brown (10YR 5/6) and light gray (10YR 7/1) wet, soft					
100		- with gravel					
							Filter: ←Filter Media 20/40 Silica Sand
							- 50 lbs bags)
105					E		
		 - dark gray (10YR 4/1) and brownish yellow / dark yellowish orange (10YR 6/6) saturated 			H		Standpipe: 2" OD PVC (SCH 40)
110					E		Screen: 10 ft; 0.010" Slot Prepack
					E		,
		- with gravel			H		
445		- top of competent rock at 115 ft.				부	—Sump:0.29999999999997 ft.
115		Bottom of borehole at 115.0 feet.			1		—Çave-in to 115 ft.
120							
125							
130	_						
135							



SOUTH CONTROL SOUTHER EARTH SC	OMPANY N COMPANY SERVICES, INC. IENCE AND ENVIRONMENTAL ENGINEERING LOCATION	andfill Rep	olacement Monitoring Wells	G GWA-39 Z PAGE 1 OF 3 GPC633179
CONTRACTO DRILLED BY BORING DEP NOTES	ED_2/26/2016 COMPLETED_3/1/2016 SURF. ELEV733. IR_Cascade EQUIPMENT _Tracked MET T. Ardito LOGGED BY _W. Shaughnessy CHECKED BY TH_115 ft. GROUND WATER DEPTHDURING _58 ft. 0	HOD Roto	osonic er ANGLEBE	ARING
DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION Weak Moderate REACTION Strong	COMMENTS	Natural Gamma
SOUTHERIEARTH SCIENT CONTRACTOR DRILLED BY BORING DEP NOTES 10 15 20 25 40	Sandy Lean Clay (CL) - and red (2.5YR 4/6) dry, stiff Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very p 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 Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very p brown / very pale orange (10YR 8/2) dry, stiff, some gravel Dolostone (COBBLES AND BOULDERS) - dolostone boulders Sandy Silt (ML) - brownish yellow (10YR 6/8), red (2.5YR 4/6) and very pale brow very pale orange (10YR 8/2) dry, stiff, some gravel Dolostone (COBBLES AND BOULDERS) - dolostone boulders Sandy Silt (ML) - mottled brownish yellow (10YR 6/8), red (2.5YR 4/6) and very p 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 yellow orange (10YR 6/6) dry, medium stiff, medium plasticity	ale ale	(Recovery=95% between 7 and 17ft.) (Recovery=95% between 7 and 17ft.)	Mary Mary Mary Mary Mary Mary Mary Mary
30	- pale yellow (5Y 8/2) and yellow (2.5Y 7/6) dry, medium stiff, medium plasticity - with dolostone cobbles and gravel (pulverized rock)		(Recovery=95% between 27 and 37ft.)	WANTY WAS AND WANTY WAS AND WANTY WA



	OMPANY 200 01 1201 201	RING	PAGE 2 OF 3 GPC633179
	IENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plan	-	
DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak HCL Strong	Natural Gamm
45	Sandy Lean Clay (CL)(Con't) - interbedded with 6 inch clayey-sand lense Sandy Fat Clay (CH) - and brownish yellow (10YR 6/8) very damp, soft	(Con't) (Recovery=100% between 47 and 57ft.)	,
60	- with gravel Well-graded Gravelly Sand (SW) - white (10YR 8/1) and brownish yellow (10YR 6/8) wet - saturated, gravel lense Sandy Elastic Silt (MH) - and light brownish gray / pale yellowish brown (10YR 6/2) soft, medium to high plasticity	(Recovery=100% between 57 and 67ft.)	Monthy May May May May May May May May May Ma
70	- with gravel Elastic Silt (MH) - very pale brown / very pale orange (10YR 8/2) and light yellowish brown (10YR 6/4) very damp, soft, medium plasticity Fat Clay (CH) - pale brown (10YR 6/3) and yellowish brown (10YR 5/6) very damp,	(Recovery=100% between 67 and 77ft.)	My M
75 80 85	medium stiff, medium plasticity - with gravel Sandy Elastic Silt (MH) - pale brown (10YR 6/3) and yellowish brown (10YR 5/6) damp, medium stiff, medium plasticity, with gravel	(Recovery=100% between 77 and 87ft.)	WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW



EART	THERN	MATERIAL DESCRIPTION Sandy Elastic Silt (MH)(Con't) - and yellowish brown (10YR 5/6) wet, medium to high plasticity, with gravel - saturated, very soft	_	COMMENTS	Natural Gamm
06 (ft)		MATERIAL DESCRIPTION Sandy Elastic Silt (MH)(Con't) - and yellowish brown (10YR 5/6) wet, medium to high plasticity, with gravel	HCL	COMMENTS	
		- and yellowish brown (10YR 5/6) wet, medium to high plasticity, with gravel	≥ ₹ ₹		55 110 165
95				and 97ft.) (Con't)	
		- and light gray (10YR 7/1) - very dark brown / dusky yellowish brown (10YR 2/2), yellowish		(Recovery=80% between 97 and 107ft.)	wy/m//M~~/~/w
105		brown (10YR 5/6) and light gray (10YR 7/1) wet, soft - with gravel - dark gray (10YR 4/1) and brownish yellow / dark yellowish orange (10YR 6/6) saturated		(Recovery=62% between 107 and 115ft.)	WINDWAM WANTED TO THE WANTED THE
110		- with gravel - top of competent rock at 115 ft.			
120		Bottom of borehole at 115.0 feet.	<u>-</u>		
125					
130					



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE GDT - 1/6/17 11:11 - C.USERSIMACKENZIE. FIOCAIDESKTOPIPLANT BOWEN SOUTHERN COMPANY GP.

LOG OF TEST BORING

BORING GWA-39RZ PAGE 1 OF 4 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 NOTES *Sample Logged by geologist employed by Amec Foster Wheeler , HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV. (DEPTH) - 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 704.8 - CLAY (CL), white and gray (5 YR 8/1 - 8/2), low plasticity, slightly moist 30 35 693.8 - SILT (ML), light orange (5 YR 7/8), stiff, moist 692.8 - CLAY (CL), light brown, moist



BORING GWA-39RZ PAGE 2 OF 4 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ELEV (DEPTH (Cont.) Annular Fill: **Aquaguard Grout Mixture** 45 50 - same as above, light brown to white (5 YR 8/1 - 6/6), low plasticity, chert nodules and lenses, moist SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GPJ 55 60 - same as above, (5 YR 8/1), moist 667.8 (62.0)Annular Seal: 3/8" bentonite chips 65 70 - same as above, orangish brown (5 YR 6/6), very moist ▼ 654.8 75 - sandy CLAY (CL), orangish brown (5 YR 6/6), black layering 80

642.8

85

- NO RECOVERY



BORING GWA-39RZ PAGE 3 OF 4 6122160287

PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA

EARINS	CIENCE AND ENVIRONMENTAL ENGINEERING LOCATIO				
DEPTH (ft) GRAPHIC LOG		ELEV	Weak Moderate Strong REACTION	GROUNDWATER OBSERVATIONS	WELL DATA Completion: Protective casing set in concrete pad; 2-foot square concrete pad (CONTINUED) (DE
90	(Cont.) - sandy CLAY (CL), orangish brown (7.5 YR 5/6), gravel, stiff, very moist - CLAY with gravel (CL), white (7.5 YR 8/1), stiff, saturated	638.8		$ar{m{\Lambda}}$	Annular Seal: 3/8" bentonite chips
100	- competent DOLOMITE, gray, wet	630.8		-	
105	- same as above				
110 /	- same as above				
120	- same as above, white siliceous veins				Annular Seal: (1' 3/8" bentonite pellets (non-coated)
125 /					Filter: (12 silica filter sand Standpipe: (12 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
135	- same as above, white siliceous veins				



BORING GWA-39RZ PAGE 4 OF 4

SOUTHERN COMPANY 6122160287 **LOG OF TEST BORING** PROJECT Plant Bowen SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION GROUNDWATER WELL DATA GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: Protective casing set in concrete pad; 2-foot square concrete pad ATTA Voeak Moderate ELEV. (DEPTH) (Cont.) 592. Bottom of borehole at 137.0 feet. 140 145 SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/6/17 11:11 - C:\USERS\MACKENZIE.FIOCA\DESKTOP\PLANT BOWEN SOUTHERN COMPANY.GPJ 150 155 160 165 170 175 180

WELL CONSTRUCTION LOG

Southern Company Generation

PROJECT:	CCB Disposal	DRILLING CBoart Longyear	WELL
		DRILLER: Boart	NAME
LOCATION:	Bowen	RIG TYPE: RotoSonic	
LOGGER:	D. Brooks	DRILLING METHODS: RotoSonic	GWA-39R
DATE CONSTRU	JCTED: 6/15/2011		
NOT ADDI 10 AD	ı.e.	DEPTH	ELEVATION
NOT APPLICAB		FEET	FT, MSL
Locking Hinged 1	Гор		705.00
1/4-inch Vent		TOP OF RISER 0.00 2" Threaded Riser Cap	735.23
1/4-inch Vent 1/4-inch Weep H	ole	2 Tilleaded Risel Cap	
2-ft x 2-ft concret			
	'	GROUND SURFACE 2.80	732.43
		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 86.00	646.43
		ANNULAR SEAL	
		TYPE: Hole Plug 3/8"	
		Bentonite Pellets	
		AMOUNT: 2 bags	
		PLACEMENT: Free fall	
		TOP OF FILTER PACK 91.00	641.43
		FILTER PACK	
		TYPE: DSI Sand - 2A (20/30)	
		AMOUNT: 7 bags	
		PLACEMEN Tremie; wash with water	
		BOTTOM OF RISER / TOP OF SCREEN 91.70	640.73
		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:	
		SLOT LENGTH. BOTTOM OF SCREEN 101.70	630.73
Flush-threaded e	end cap	DOTTOM OF GOILLING	300.70
		BOTTOM OF CASING 102.00	630.43
		HOLE DIA: 6"	

BORING GWA-39 R PAGE 1 OF 3

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE	STAF	RTED _6/14/2011 COMPLETED _6/14/2011 SU	JRF. EL	EV. 732.5	51'	_ COORDIN	ATES	N:1502637.1009 E:2071145.5474
CON	TRACT	OR Boart Longyear EQUIPMENT		ME	THOD _	Rotosonic		
DRIL	LED B	YLOGGED BY _D. Brooks	_ CHE	CKED BY			ANG	LE BEARING
BOR	ING DE	EPTH 102 ft. GROUND WATER DEPTH: DURIN	NG		COMP.		DELA	AYED 84.85 ft. after 24 hrs.
NOT	ES _ W	/ell installed. Refer to well data sheet.						
					_			
HL (;	OHIC G	MATERIAL RECORDERS	TION	E TYPE BER	DEPTI	NV NTS LUE)	ERY %	OOMMENTO
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY (RQD)	COMMENTS
<u> </u>		Silty Sand (SM)						
<u> </u>	lii.	- brown, very fine to fine grain, Top Soil	748.0					
≨ 		- brick red, dry						
<u>.</u>								
5								
		- mottled red, yellow and white, damp	744.0					
2		. Include roa, your and write, damp						
<u></u>	111							
10								
2								
<u> </u>	1414							
g								
15		- yellow and white, fine to medium grain, with	735.0					
2		pieces of white chert						
<u>[</u>			700.0					
3		Clayey Sand (SC)	732.0					
20		- reddish yellow, damp, very fine to fine grain, with pieces of white chert						
≦ ⊔ ∪ 0								
[]								
25								
×			724.0					
		Silty Sand (SM)	721.0					
5		- reddish yellow, damp, fine to medium grain, with white chert						
<u> </u>		white cheft						
30								
<u></u>	111							
ğ[1111							
j								
35		Silt (ML)	715.0					
<u> </u>	1	- reddish yellow, damp, low plasticity, with very						
Z	1	fine grained sand						
<u></u>								
40								





SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen SAMPLE DEPTH (ft.) BAG HOUSE UNITS 14\DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ SAMPLE TYPE NUMBER ELEVATION GRAPHIC LOG RECOVERY (RQD) DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Silt (ML)(con't) 709.0 Lean Clay (CL) - mottled reddish yellow and strong brown, damp, no plasticity, with silt 706.0 Silty Sand (SM) 45 - mottled red, yellow and pale yellow, fine to medium grain 701.0 Sandy Lean Clay (CL) 50 - pale yellow and white, damp, low plasticity, with very fine to fine grained sand 696.0 Silty Sand (SM) 55 - pale yellow and white, damp, fine to medium GEOTECH ENGINEERING LOGS - ESEE DATABASE GDT - 1/27/12 15:36 - T:ESEE MAJOR PROJECTS/PROJECTS/BOWEN/2011/ES2042 grain, with large pieces of chert 693.0 Lean Clay (CL) - red and pale yellow, damp, low plasticity, with fine grained sand and small pieces of chert 60 686.0 Silty Sand (SM) - brown, yellow and black, moist, medium grain, with chert 70 680.0 Sandy Lean Clay (CL) - yellow brown with black organic specks, damp, low plasticity, with very fine to fine grained sand and chert and dolostone 75 80 670.0 - NO RECOVERY \mathbf{I} 85





125

130

LOG OF TEST BORING

PROJECT Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE TYPE NUMBER SAMPLE DEPTH (ft.) BAG HOUSE UNITS 1-4/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL. GPJ ELEVATION RECOVERY 9 (RQD) GRAPHIC LOG BLOW COUNTS (N VALUE) DEPTH (ft) MATERIAL DESCRIPTION COMMENTS 663.0 Silty Sand (SM) 661.0 Top of Dolostone. - Dolostone 90 95 653.0 - Dolostone with small (approximately 0.5 feet) sand filled solution zones 100 648.0 Bottom of Hole. Bottom of borehole at 102.0 feet. GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T.\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 105 110 115 120

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONS		Southern Company Ge	neration	
PROJECT:	CCB Disposal	DRILLING Boart Longyear		WELL
OCATION	Da	DRILLER: Boart		NAME
OCATION:	Bowen	RIG TYPE: RotoSonic		0144 40
OGGER:	D. Brooks	DRILLING METHODS: RotoSonic		GWA-40
DATE CONSTRU	JCTED: 6/7/2011			İ
	. =		DEPTH	ELEVATION
NOT APPLICAB			FEET	FT, MSL
_ocking Hinged	Гор	<u> </u>		
		TOP OF RISER	0.00	731.95
/4-inch Vent		2" Threaded Riser Cap		
/4-inch Weep H				
2-ft x 2-ft concret	e pad] []		
	V.	GROUND SURFACE	2.80	729.15
		PROTECTIVE CASING		
		SIZE: 4x4-inch		
		TYPE: Anodized Aluminium		
	7	BOTTOM OF PROTECTIVE CASING		
	· · · · · · · · · · · · · · · · · · ·			
		PACKELL MATERIAL		
	•	BACKFILL MATERIAL		
	<u>/</u>	TYPE: Portland Cement		
		AMOUNT:		
		DIOED OVOING		
		RISER CASING		
	<u> </u>	DIA: 2-inch		
	5	TYPE: Schedule 40 PVC		
	•	JOINT TYPE: Flush Threaded		
	· · · · · · · · · · · · · · · · · · ·			
			100.00	500.45
	- 4	TOP OF SEAL	136.00	593.15
	i i	ANNULAR SEAL		
	16	TYPE: Hole Plug 3/8"		
	į.	Bentonite Pellets		
	8	AMOUNT: 2 bags		
		PLACEMENT: Free fall		
	6	TOP OF FILTER PACK	140.50	588.65
	2	FILTER PACK		
	Ř	TYPE: DSI Sand - 2A (20/30)		
		AMOUNT 71		
	5	AMOUNT: 7 bags		
	R	PLACEMENT Tremie; wash with water		
		POTTOM OF DIOFF (TOD OF CODEFU	140.70	E00 4E
		BOTTOM OF RISER / TOP OF SCREEN SCREEN	142.70	586.45
	R	DIA: 2-inch 10ft U-Pack		
		TYPE: Schedule 40 PVC		
	5	OPENING WIDTH: 0.01-inch		
		OPENING WIDTH: 0.01-Inch OPENING TYPE: Slotted		
	K	<u>1 8-3</u>		
	5	SLOT LENGTH:		
		SLOT LENGTH:	150 70	E76 AF
iluch throadad -	and can	BOTTOM OF SCREEN	152.70	576.45
lush-threaded e	nu cap	BOTTOM OF CASING	153.00	576.15
		BOTTOM OF CASING	100.00	370.13
	•			
	ПО	E DIA: 6"		
	H()	FULL D		I



SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

AL.GPJ											N:1503195.0681 E:2071300.6124
BOR											
FOR											LE BEARING
-068					R DEPTH: DURING	3		COMP.		_ DELA	AYED
ELL I	NOTE	S We	ell installed. Refer t	to well data sheet.							
IG LOGS\MONITORING M	ОЕРТН (ft)	GRAPHIC LOG		ERIAL DESCRIPTIO		ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
TS/BOWEN/2011/ES2042_ BAG HOUSE UNITS 1-4/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL	10		brown; sand es and silts and claustz, chert ar weakly cemented. - SAA; less more fragments more	ttling of color, more	gravel at 45% s subrounded flood deposits; red-brown; dry;	716.0					
- 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042_	20		 Zone of white, Sandy Silt; redof quartz, chert Clayey silt; mod cut throug pressure/dissol 	, clayey silt d-brown, few suban and dolomite; dry ostly white but veins h silt layers; Slightly ution features	s of brown-red v damp; shows	709.0 708.0 707.0					
GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1.	30		- Clayey Silt; whinterbedded lay (dolomitic and sto high plasticity	white and brown Gra gravels are very la damp hite to brown-tan are vers of fine sand; few subangular); slightly y; very strong/hard tan and orange, colow plasticity clay, generally	rge and angular Id orange with W gravels V damp, medium	698.0					
ЗЕОТЕСН Е	40		subangular and	I cherty	g						



SOUTHERN COMPANY SERVICES, INC.

PROJECT Monitoring Wells

EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE DEPTH (ft.) BAG HOUSE UNITS 14/DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ SAMPLE TYPE NUMBER ELEVATION GRAPHIC LOG RECOVERY (RQD) DEPTH (ft) MATERIAL DESCRIPTION COMMENTS (con't) 688.0 - Clayey Silt; white, gray, tan and orange; clay is low plasticity; gravel is angular chert; sand less than 5% 45 - Silty clay with gravel, tan and orange, clay is low plasticity, damp 50 55 GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T:ESEE MAJOR PROJECTS/PROJECTS/BOWEN/2011/ES2042 - Clayey silt to Silty Clay; tan and white, moist, low plasticity, few gravel sized fragments, moist 667.0 - Gravelly silt to Gravelly clayey silt; tan, white and gray; pressure solution features, banding and flow paths; wet, low plasticity 660.0 - Clayey Silt and Silty Clay with few dolomitic 70 gravels; tan, gray and white; very damp; low plasticity 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

85



SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen

MATERIAL DESCRIPTION AU AU AU AU AU AU AU AU AU A	LOGS FOR BORAL.GPJ DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
105	AGE HOUSE UNITS 1-4/DATABORING LOGS/MONITORING WELL 100 100 100 100 100 100 100		manganese staining (black); damp; medium to low plasticity; infrequent gravel beds (con't)						
	Mone		- Gravelly sand and sandy gravel; tan, gray and white; wet	623.0					





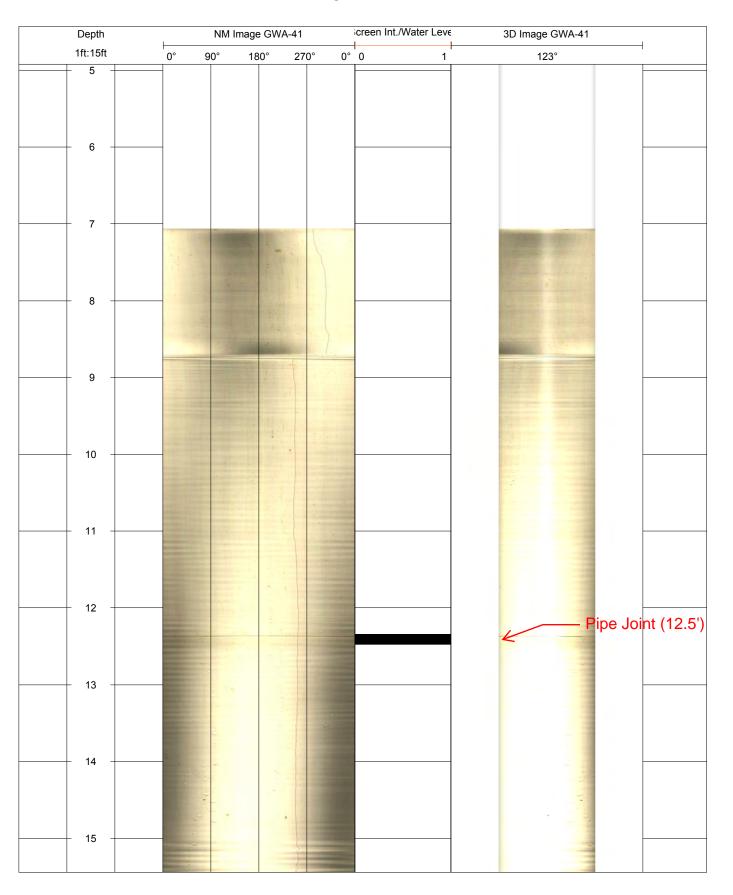
SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

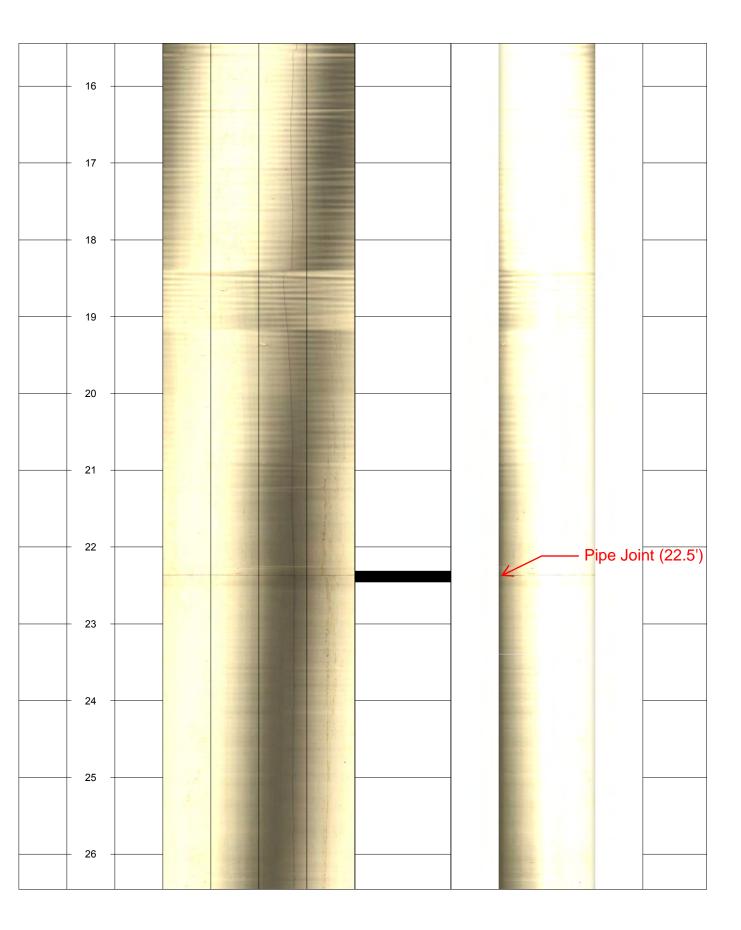
PROJECT Monitoring Wells

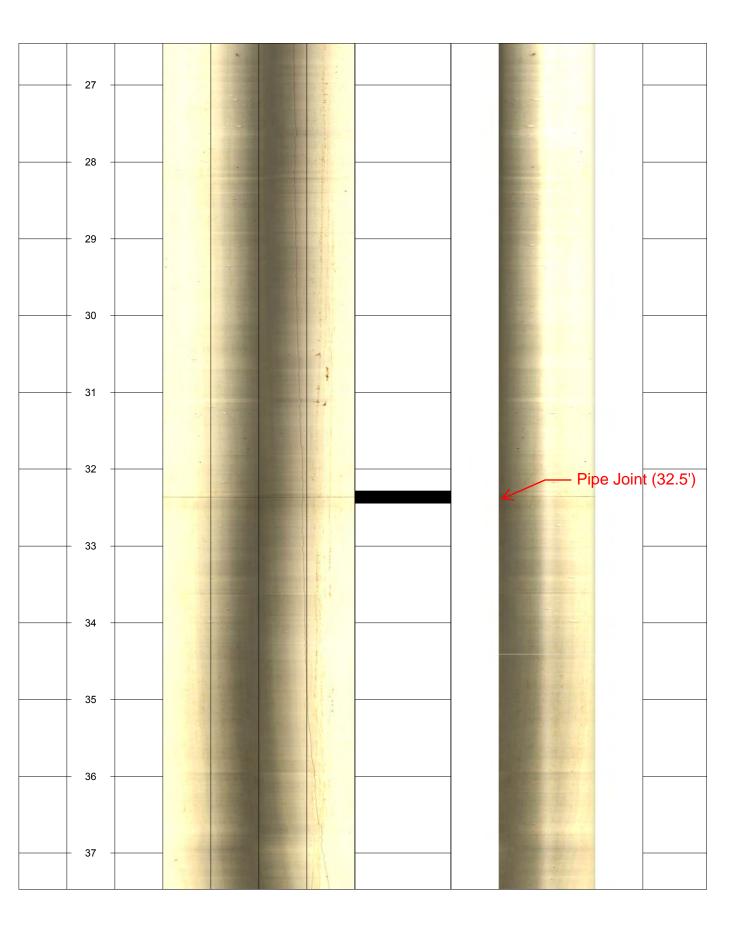
LOCATION Plant Bowen

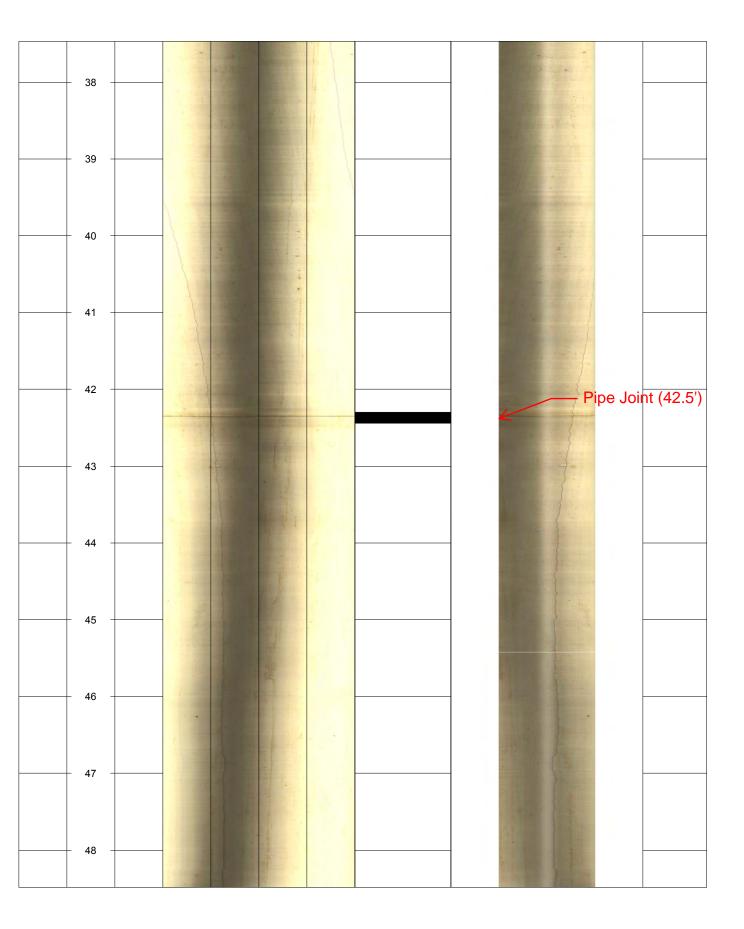
L							OATION				
LOGS FOR BORAL.GPJ		GRAPHIC LOG	N	MATERIAL DESCRIPTION	1	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/127/12 15:36 - TXESEE MAJOR PROJECTS/PROJECTS/BOWEN/2011/ES2042_BAG HOUSE UNITS 1-4/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL. GPJ	140		(con't)								
S\BOWEN\2011\ES2042_BAG HOUSE UNI	150			ttom of borehole at 153.0	feet.	576.0					Top of Rock: Bottom of Boring.
ESEE MAJOR PROJECTS/PROJECTS	160										
DATABASE.GDT - 1/27/12 15:36 - T:\	165										
GEOTECH ENGINEERING LOGS - ESEE	175										

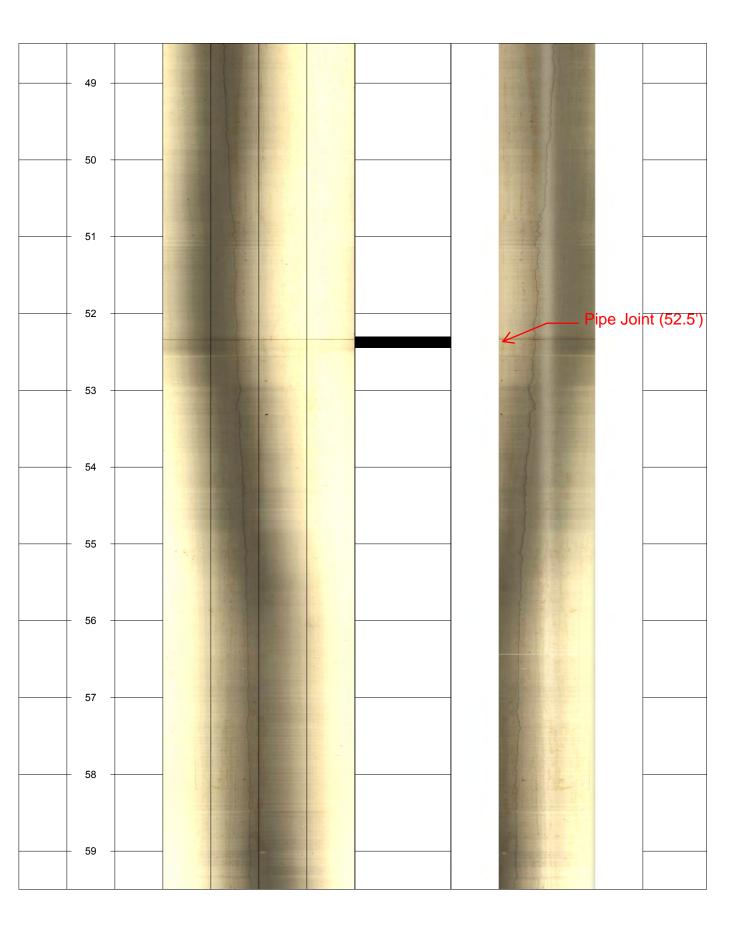
PLANT BOWEN Optical Teleview Magnetic North and 3D Image GWA-41

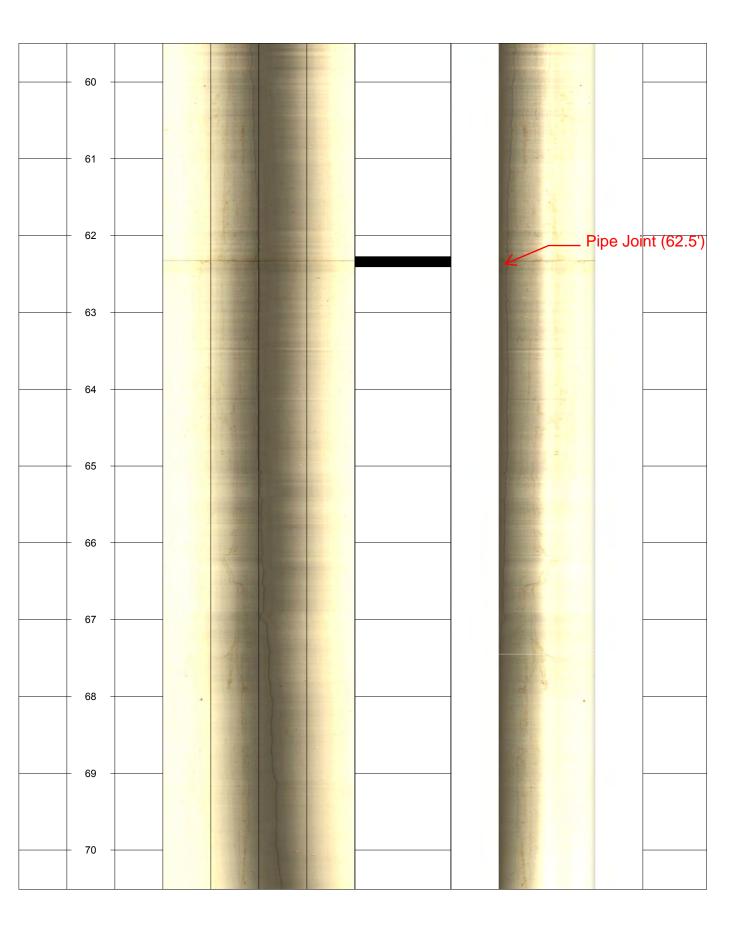


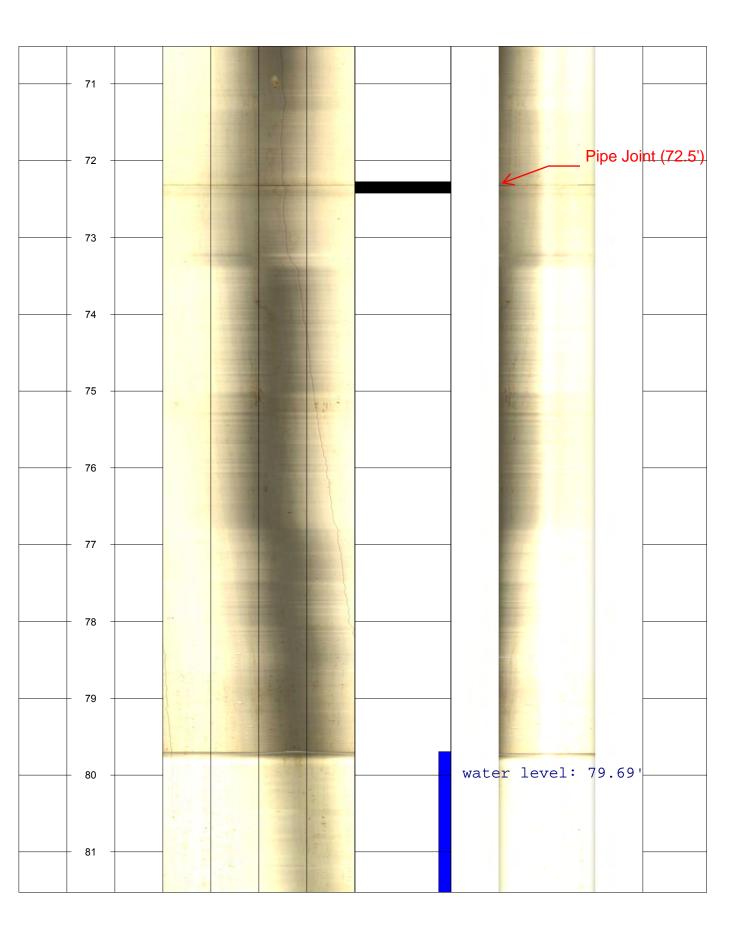


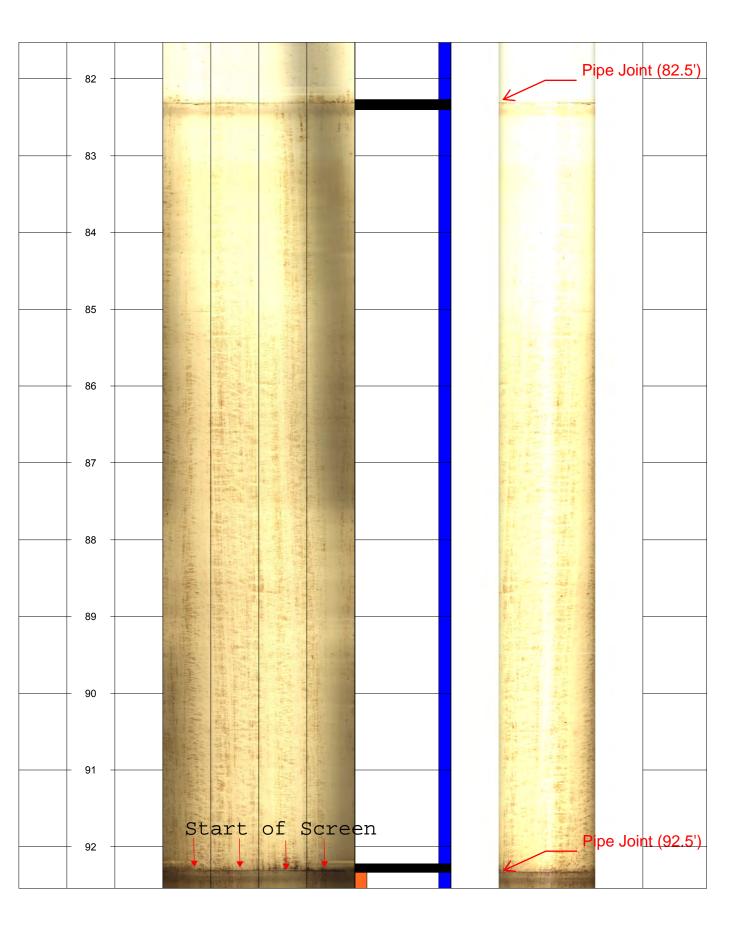


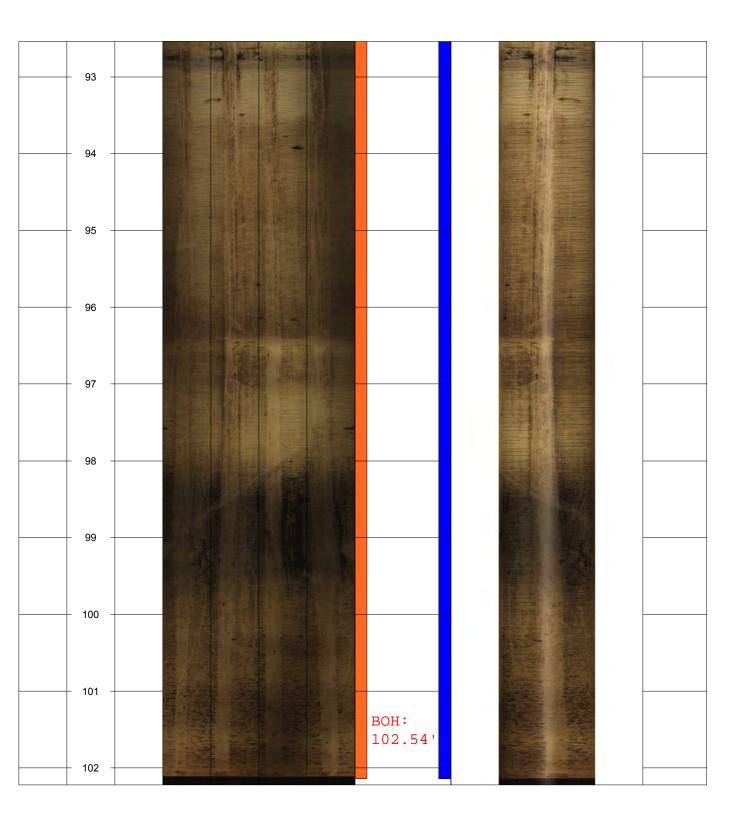


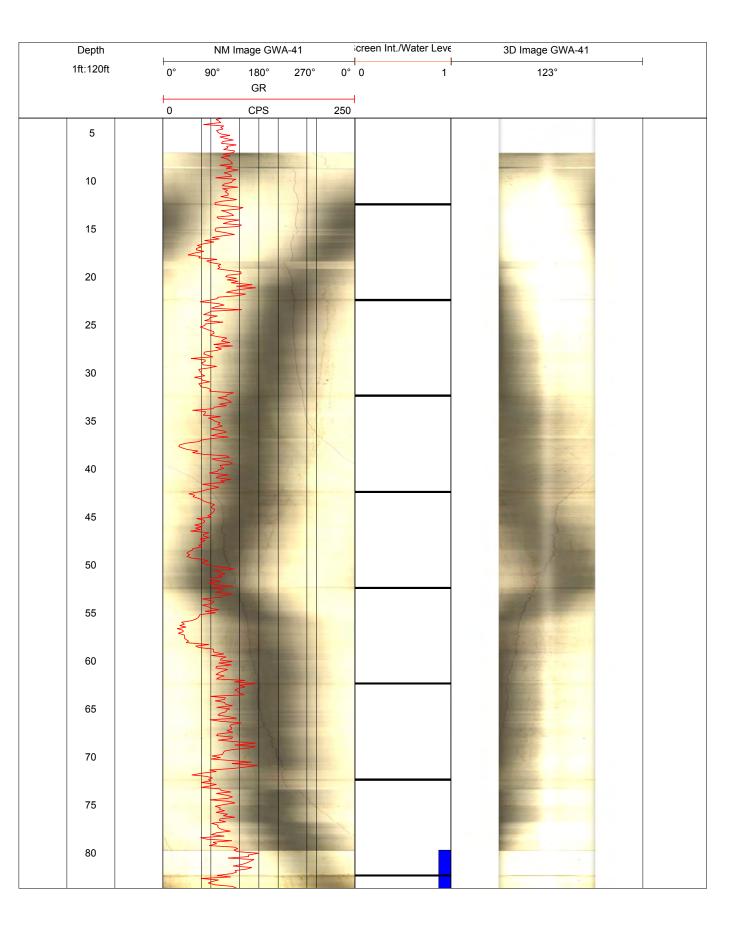


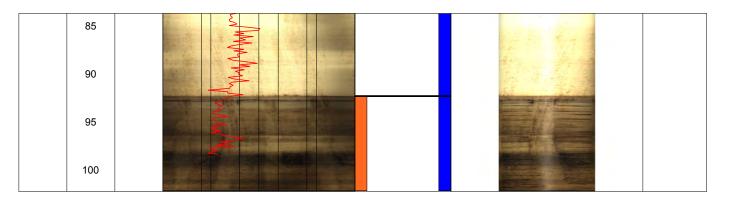












BORING GWA-41

PAGE 1 OF 2

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

5	DATE	STAR	TED 6/6/2011 COMPLETED 6/6/2011	SURF. ELI	EV . 739	9.6'	_ COORDIN	IATES:	: N:1503518.8194 E:2071046.7655
בל בלו	CONT	RACT	OR Boart Longyear EQUIPMEN	Г	MET	HOD F	Rotosonic		
֚֚֚֡֟֝֟֝֟֝֟֟֝֟֝֟֓֟֓֟֟֓֟֟֓֓֓֟֟֓֓֓֟֓֓֟֟ ֓֓			LOGGED BY _G. Dyer						
200	BORIN	IG DE	PTH <u>85 ft.</u> GROUND WATER DEPTH: DUP	RING		COMP.		_ DELA	AYED
	NOTE	s <u>W</u>	ell installed. Refer to well data sheet.						
IG LOGS/MONITORING WE	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	′					
A/B									
4			Other and with a second	724.0					
2		111	 Silty sand with some clay; gray; dry; material is competent and clumped 						
	5			721.0					
			- Clayey Silty Sandy; mottled gray, brown and ta						
5			dry; root structures and organic material	719.0					
4			 Gravelly Sand; tan and brown; moist to wet; cla present; moisture decreasing with depth; fines 	y					
E320	10		increasing with depth						
				714.0					
200			- SAA						
ׅ֝֟֝֝֟֝֝֟֝֝ ֚	15								
Ž									
2									
3									
ב ה	20								
MA									
ESE									
- 0		8. 1							
50.5	25								
7//7/				701.0					
		//	 Clayey Sand; tan to brown with large subangula clasts of chert; dry; clay increasing with depth; 	ar					
5 1			hard; low plasticity; fragments become smaller with depth						
Y DY	30		257						
4		//							
ģ									
	35								
	J.J.			691.0					
			- Fine to medium sand; tan; wet	330					
5				689.0					
			 Clayey Sand; brown to tan with prevalent chert and dolomitic clasts; damp 						
5	40	/	·					1	





SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

H SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plant Bowen

LOGS FOR BORAL.GPJ	OEP IT	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
ORING WELL			(con't) - SAA	684.5					
:	45			681.0					
UNITS 1-4/DATA/BORING L	50		- Sandy Clay; tan (some brown) with few chert and dolomitic fragments; clay is hard and of low plasticity; slightly moist						
42_BAG HOUSE	55			671.0					
GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT -1/27/12 15:36 - TXESEE MAJOR PROJECTS/BOWEN/2011/ES2042_BAG HOUSE UNITS 14/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL.GPJ	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						
OR PROJECTS	65		- Clayey Silty Sand; tan; very moist; coarse	661.0					
5:36 - T:\ESEE MAJC	70		grained; few chert and dolomitic fragments (subangular); moisture content increasing with depth						
ASE.GDT - 1/27/12 1	75			651.0					
ERING LOGS - ESEE DATAB/	80		- Gravelly Sand; tan; medium and coarse grained; wet; gravels are subangular; high yield zone from 76'-85'	351.0					
CH ENGINE	85	。 。 。 。		642.0					
GEOTE(Bottom of borehole at 85.0 feet.						Bottom of Hole.

WELL CONSTRUCTION LOG **Southern Company Generation** DRILLING Boart Longyear PROJECT: **CCB** Disposal WELL DRILLER: Boart NAME LOCATION: Bowen RIG TYPE: RotoSonic LOGGER: K. Lewis **DRILLING METHODS:** RotoSonic GWA-41R DATE CONSTRUCTED: 6/1/2011 DEPTH **ELEVATION NOT APPLICABLE:** FEET FT, MSL Locking Hinged Top TOP OF RISER 0.00 743.24 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole 2-ft x 2-ft concrete pad 740.30 2.94 **GROUND SURFACE 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 642.30 TOP OF SEAL 98.00 **ANNULAR SEAL** Hole Plug 3/8" TYPE: Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall 103.50 636.80 TOP OF FILTER PACK **FILTER PACK** TYPE: DSI Sand - 2A (20/30) AMOUNT: 7 bags PLACEMENT Tremie; wash with water 634.60 BOTTOM OF RISER / TOP OF SCREEN 105.70 **SCREEN** DIA: 2-inch 10ft U-Pack

TYPE:

HOLE DIA: 6"

Flush-threaded end cap

SLOT LENGTH:

Schedule 40 PVC

BOTTOM OF SCREEN

BOTTOM OF CASING

624.60

624.30

115.70

116.00

OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch

BORING GWA-41R

PAGE 1 OF 3

SOUTHERN A COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen

CONTRACTOR Boart Longyear EQUIPMENT									
		LOGGED BY K. Byrd							
		PTH116 ft GROUND WATER DEPTH: DURING	·		COMP.		_ DELAY	ΈU	
UIE	5 <u>VV</u>	ell installed. Refer to well data sheet.							
	O		N	YPE R	SAMPLE DEPTH (ft.)	တ 🛈	% }		
(f)	GRAPHIC LOG	MATERIAL DESCRIPTION	'ATI(HE T	E DE	ON ON T	VER QD)	COMMENTS	
7	GR/		ELEVATION	SAMPLE TYPE NUMBER	MPL)	BLOW COUNTS (N VALUE)	RECOVERY (RQD)		
	27527.27.2	Cille and the call model by called a factor of the		Ŋ	SA		<u>«</u>		
		- Silty sand; top soil; reddish yellow; dry; very fine grained	725.4						
		- SAA except gray - Clayey Sand; gray; damp; very fine to fine							
		grained; clay content increasing with depth - Sandy Clay with chert fragments; brown; damp;	723.9						
5		very fine to fine grained - Sandy Clay with quartz pebbles; brown; damp;							
		very fine grained; medium plasticity							
10									
10									
		- SAA except in reddish in color							
15									
[708.4						
20		Clayey Sand with quartz pebbles; orange reddish (brown); damp; very fine to fine grained							
		(blown), damp, very line to line grained							
ا			704.9						
······································		 Sandy clay with quartz pebbles decreasing in size; brown; fine grained 							
25									
······		- SAA with chert pieces							
30									
		- Sandy clay with quartz and chert pieces;							
		brownish yellow; moist; fine-grained							
		- Sandy Clay with small quartz pebbles and large							
35		carbonate chunks; light brown; moist; very fine grained							
			690.4						
		- Silty clay with small quartz fragments; light brown; moist; very fine grained							
40		- SAA with added chert pieces							

BORING GWA-41R PAGE 2 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen SAMPLE DEPTH (ft.) BAG HOUSE UNITS 14/DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ SAMPLE TYPE NUMBER ELEVATION GRAPHIC LOG RECOVERY (RQD) DEPTH (ft) MATERIAL DESCRIPTION COMMENTS (con't) - SAA with increasing chert size fragments; sand content increasing as well 683.4 - Clayey sand with weathered carbonate and chert 45 pieces; mottled yellowish very pale brown; damp, fine to medium grained 680.4 - Sandy clay with small chert pieces, very pale brown/yellowish brown; moist; very fine to fine grained 50 - SAA with weathered carbonates, sand content increasing 674 4 - Clayey Sand, weathered carbonates and large pieces of smokey quartz; mottled yellow, brown, 55 and white; damp; very fine to fine grained - Clayey sand with large pieces of cherty quartz; GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T:ESEE MAJOR PROJECTS/PROJECTS/BOWEN/2011/ES2042 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 - SAA except fine grained to medium grained, wet 85





PROJECT Monitoring Wells

	SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING		PROJECT Monitoring Wells LOCATION Plant Bowen						
	EAF	KIH SC	SIENCE AND ENVIRONMENTAL ENGINEERING	LO	CATION	Plant B	Bowen		
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
JONITORING WELL	90		(cont) - 0.5 feet lense of mottled purple, dark gray pieces of siltstone	635.9					
\BORING LOGS\	95		- Dolostone						
: UNITS 1-4\DATA			- Cavity	631.4 628.4					
	100		- Dolostone, 0.5 feet of recovery and small amount of gravel, wet, driller indictaed no cavity drilled like gravel filled cavity						
MAJOR PROJECTS/PROJECTS/BOWEN/2011/ES2042_	105								
CTS/PROJECTS/E	110								
111	115		- Dolostonered staining						
-T:\ESEE			Dettem of herebele at 440.0 feet	611.4					Rottom of hole, set well
DTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T:\\	120		Bottom of borehole at 116.0 feet.						Bottom of hole, set well.
TECH EN		-							

WELL CONSTRUCTION LOG Southern Company Generation PROJECT: **CCB** Disposal DRILLING C Boart Longyear WELL DRILLER: NAME Boart LOCATION: Bowen RIG TYPE: RotoSonic LOGGER: G. Dyer DRILLING METHODS: GWA-42 RotoSonic DATE CONSTRUCTED: 6/1/2011 DEPTH **ELEVATION NOT APPLICABLE:** FEET 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 735.33 GROUND SURFACE 2.94 **PROTECTIVE CASING** SIZE: 4x4-inch Anodized Aluminium TYPE: BOTTOM OF PROTECTIVE CASING **BACKFILL MATERIAL** TYPE: **Portland Cement** AMOUNT: **RISER CASING** DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE Flush Threaded 667.83 TOP OF SEAL 67.50 **ANNULAR SEAL** Hole Plug 3/8" TYPE: Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall 72.50 662.83 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 74.70 660.63 **SCREEN** DIA: 2-inch 10ft U-Pack

Schedule 40 PVC

BOTTOM OF SCREEN

BOTTOM OF CASING

84.70

85.00

650.63

650.33

OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch

TYPE:

HOLE DIA: 6"

Flush-threaded end cap

SLOT LENGTH:

BORING GWC-42 PAGE 1 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE STARTED COMPLETED				SU	RF. EL	EV . 735	.33	_ COORDIN	ATES:	N:15038	24.2292 E:207	1049.8535	
SORA				ear									
J S	DRILL	ED B	′	LOGGED BY _G	. Dyer	_ CHE	CKED BY			ANG	LE	BEARING	-
OGS	BORIN	NG DE	PTH <u>85 ft.</u>	_ GROUND WATE	R DEPTH: DURING	G		COMP.	55 ft.	DELA	AYED		
	NOTE	s <u>w</u>	ell installed. Refer	to well data sheet.									
IG LOGS/MONITORING WE		GRAPHIC LOG	MAT	FERIAL DESCRIPTI	ON	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)		COMMENTS	
SORIN				avel; brown; root ma ert and dolomite (su		726.5							
UNITS 1-4/DATA/E	5		- Silty sand; ta	n, orange and white ts; dry; black weathe	; with angular	120.3							
HSIO			- Silty clay with	n highly weathered o	chert and	722.0							
2042_BAG HC	10		dolomite clasts plasticity; dry	s; light tan, gray and	f white; low								
\BOWEN\2011\ES				n angular to subang range and gray; dry;									
JR PROJECTS/PROJECTS	20		- Silty clay with clasts; orange	n weathered chert a and white; damp; lo	nd dolomite ow plasticity	708.0							
SEE MAJO			 Clay with ang weathering sur white; low plas 	gular chert fragment rfaces; mottled oran sticity; damp	s with black ge, tan and								
5:36 - T:\E				ed tan and white; mo	oist; medium to								
1/2//12 1	25					701.5							
I ABASE GDI -	30		- Sandy, silty o dolmite fragme and hard	clay with few angula ents; orange; low pla	r chert and asticity; damp								
S - ESEE DA													
NG LOG	35					693.0							
		 	- Silty Sand; w	hite to gray; sand is	carbonate	u93.U							
OTECH ENGIN			- Clayey silty s fragments; dry	and with small carb	onate								
ij	40												

BORING GWC-42 PAGE 2 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.

PROJECT Monitoring Wells

EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE DEPTH (ft.) SAMPLE TYPE NUMBER BAG HOUSE UNITS 14/DATA\BORING LOGS\MONITORING WELL LOGS FOR BORAL.GPJ ELEVATION RECOVERY 9 (RQD) GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS (con't) 687.0 - Gravelly sand with some fines; slightly damp gravels are dolomitic in nature 684.0 - Clayey silty sand; orange and tan; hard; slightly 45 damp; few dolomitic fragments 682.0 - Clayey sand; orange and tan; hard; few chert and dolostone fragments 50 - SAA: less hard 55 - SAA: harder GEOTECH ENGINEERING LOGS - ESEE DATABASE. GDT - 1/27/12 15:36 - T.\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 60 - Moist Zone from 64 to 66 feet 65 70 75 80 - SAA: tan and brown 85 642.0

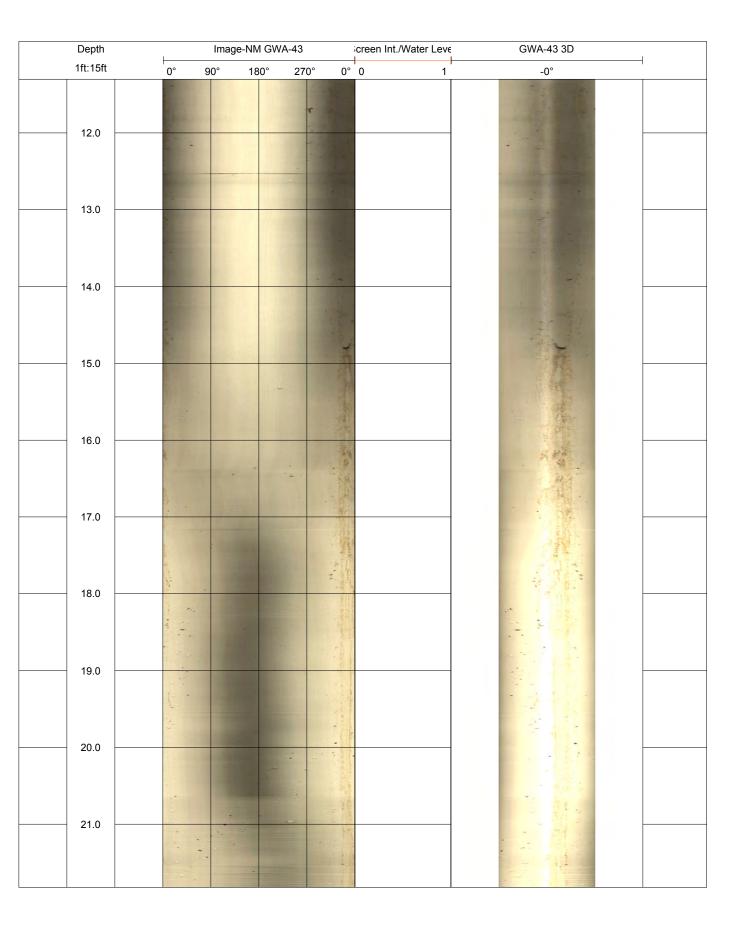
- Lost sample

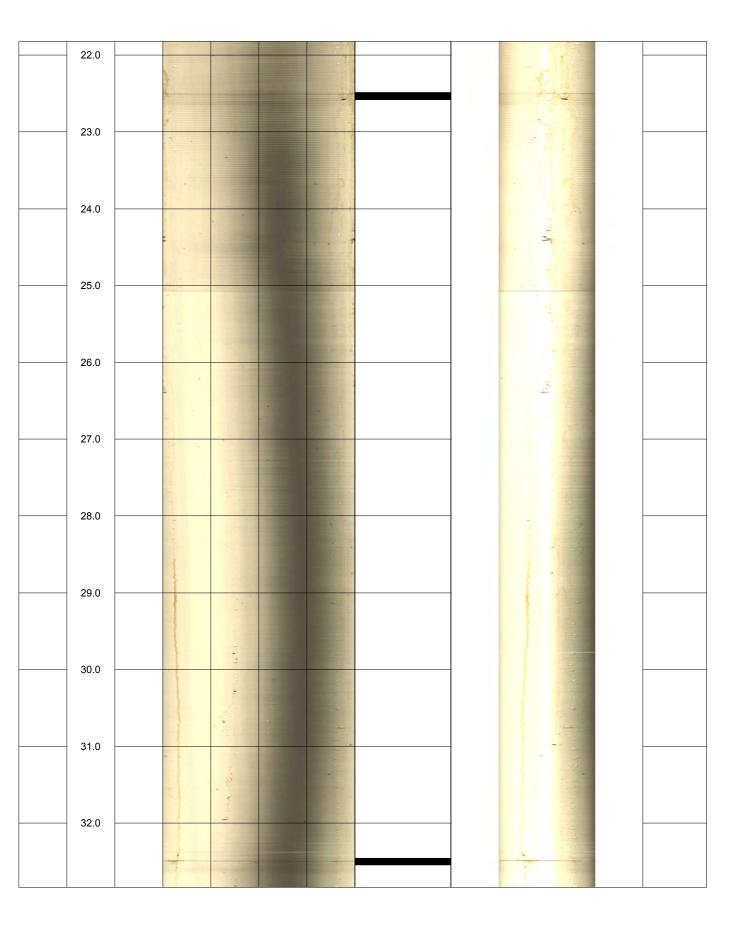


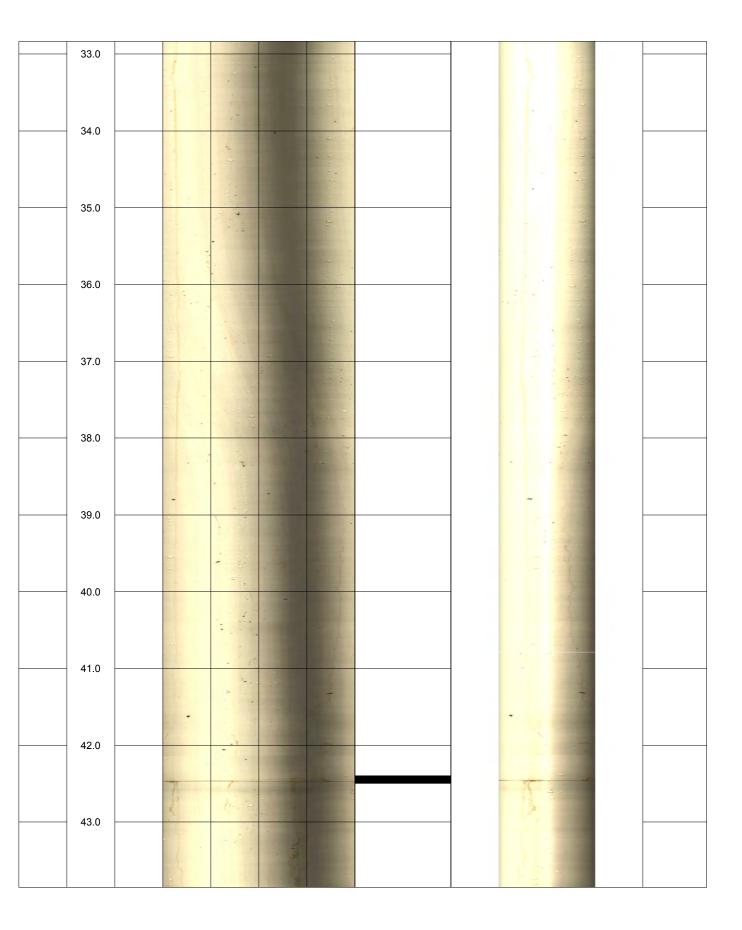


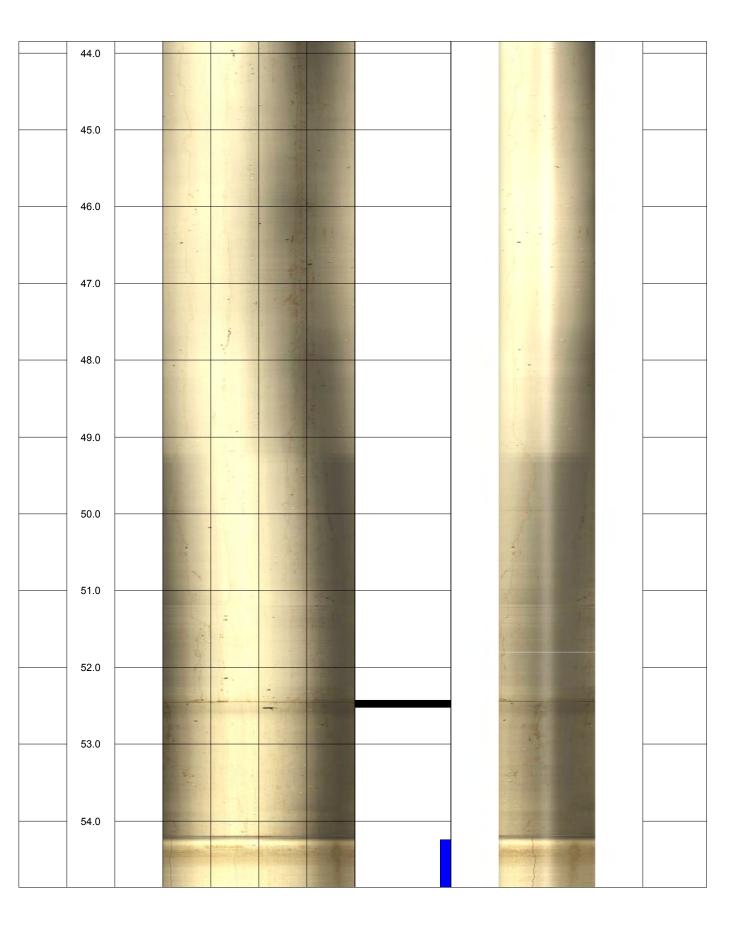
LOG OF TEST BORING

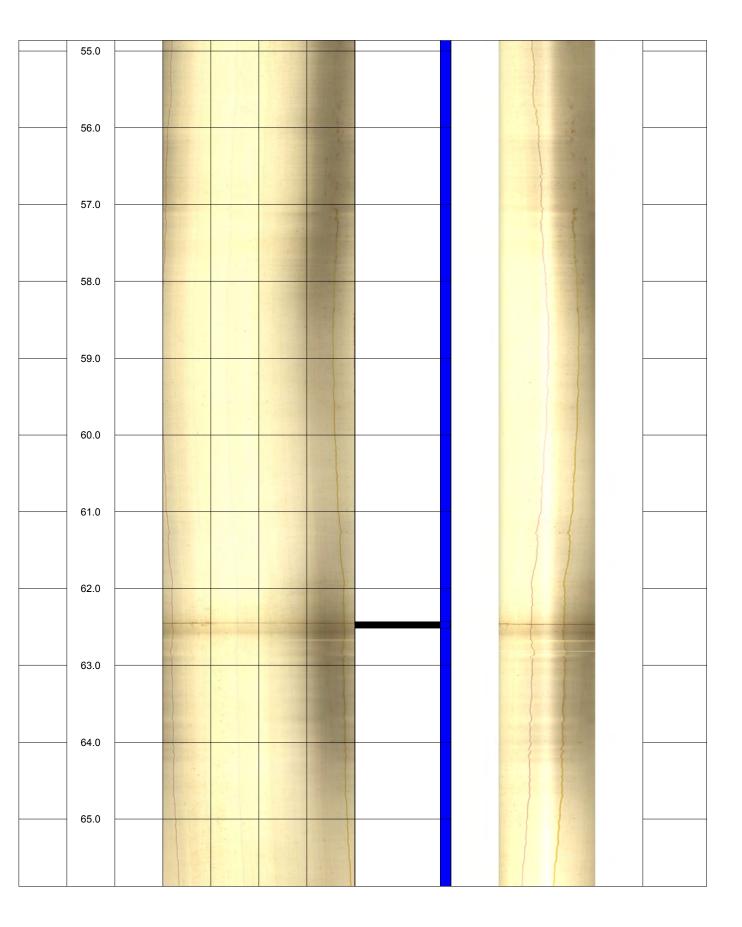
PROJECT Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE TYPE NUMBER SAMPLE DEPTH (ft.) RECOVERY % (RQD) GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T/ESEE MAJOR PROJECTS/BOWEN/2011/ES2042_BAG HOUSE UNITS 14/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL.GPJ ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS (con't) 90 636.0 - Clayey Silty Sane 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 110 115 612.0 Bottom of hole. Bottom of borehole at 85.0 feet. 120 125 130

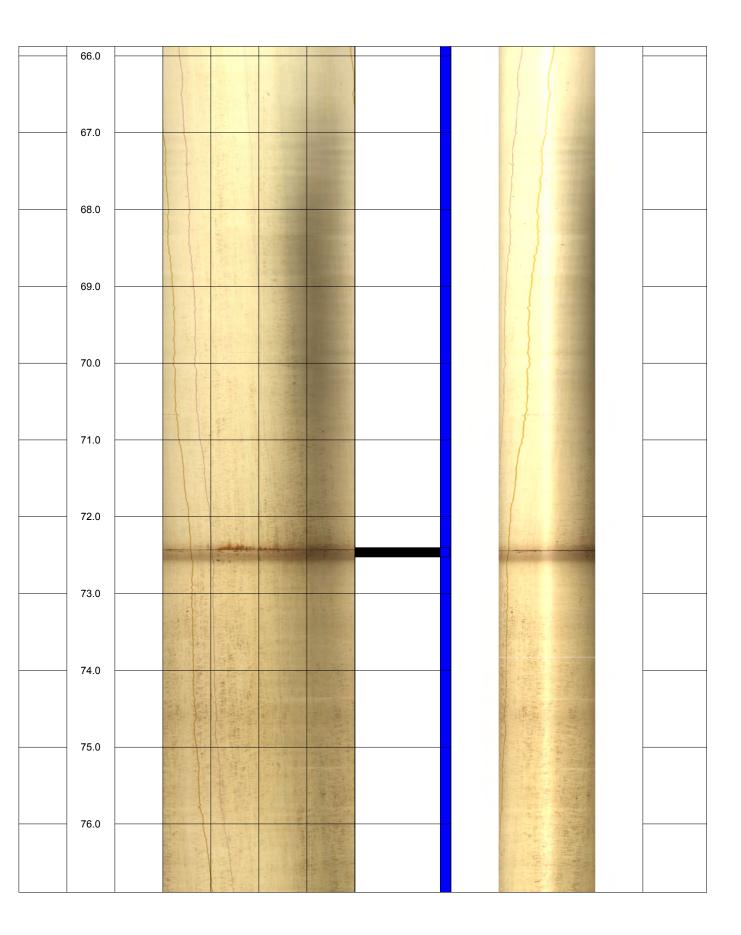


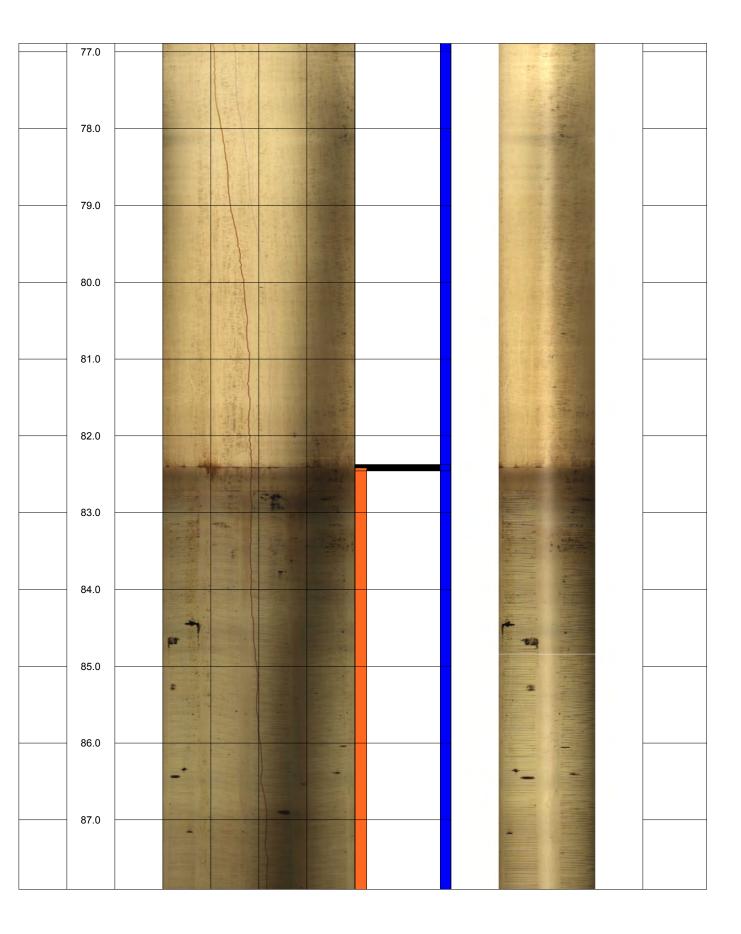


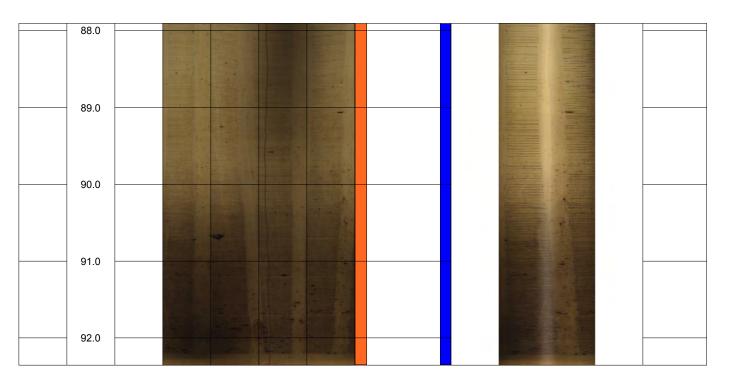


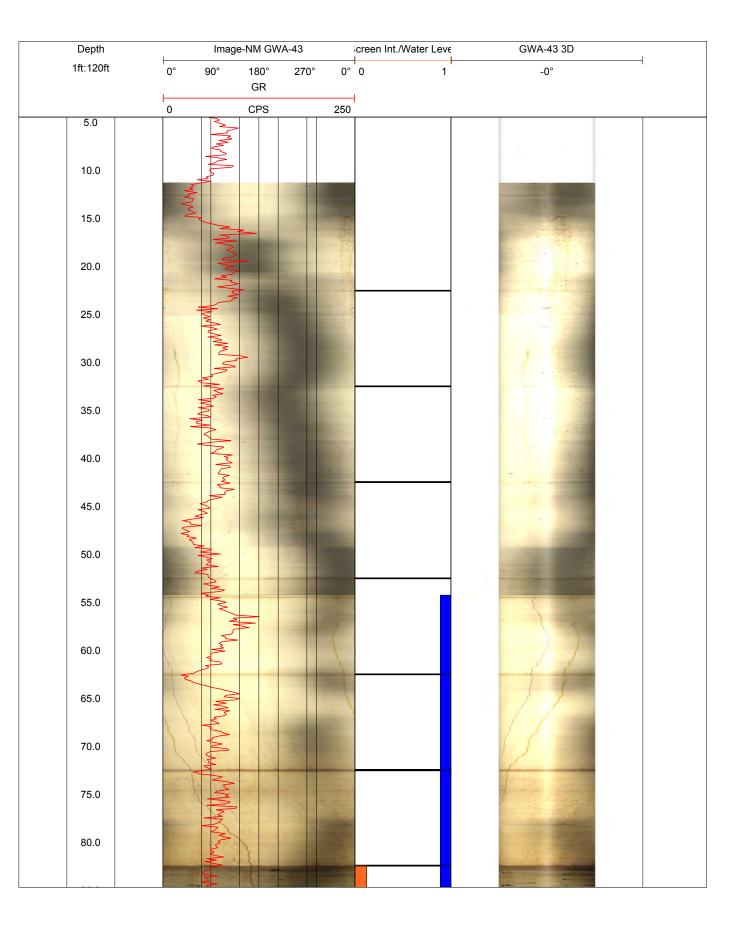












85.0	AMA	
90.0		

Southern Company Generation WELL CONSTRUCTION LOG DRILLING Boart Longyear PROJECT: **CCB** Disposal WELL DRILLER: Boart NAME LOCATION: Bowen RIG TYPE: RotoSonic DRILLING METHODS: LOGGER: G. Dyer **GWA-43** RotoSonic DATE CONSTRUCTED: 5/25/2011 **DEPTH** ELEVATION **NOT APPLICABLE:** FEET FT, MSL Locking Hinged Top TOP OF RISER 0.00 721.00 1/4-inch Vent 2" Threaded Riser Cap 1/4-inch Weep Hole 2-ft x 2-ft concrete pad 718.20 2.80 **GROUND SURFACE PROTECTIVE CASING** SIZE: 4x4-inch TYPE: Anodized Aluminium BOTTOM OF PROTECTIVE CASING **BACKFILL MATERIAL Portland Cement** TYPE: AMOUNT: **RISER CASING** DIA: 2-inch TYPE: Schedule 40 PVC JOINT TYPE: Flush Threaded 639.50 TOP OF SEAL 78.70 **ANNULAR SEAL** Hole Plug 3/8" TYPE: Bentonite Pellets AMOUNT: 3.25 bags PLACEMENT: Free fall 80.70 637.50 TOP OF FILTER PACK **FILTER PACK** TYPE: DSI Sand - 2A (20/30) AMOUNT: 2 bags PLACEMENT Tremie; wash with water BOTTOM OF RISER / TOP OF SCREEN 82.70 635.50 SCREEN DIA: 2-inch 10ft U-Pack Schedule 40 PVC TYPE: OPENING WIDTH: 0.01-inch **OPENING TYPE: Slotted**

SLOT SPACING: 0.25-inch

BOTTOM OF SCREEN

BOTTOM OF CASING

625.50

625.20

92.70

93.00

SLOT LENGTH:

HOLE DIA: 6"

Flush-threaded end cap

BORING GWC-43 PAGE 1 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen

DATE	STAR	TED <u>5/25/2011</u> (COMPLETED <u>5/25/2011</u> S	SURF. EL	EV . 708	3.14	_ COORDIN	ATES	N:1504128.209 E:2070982.0551
CONT	RACT	OR Boart Longyear	EQUIPMENT		ME1	THOD _F	Rotosonic		
DRIL	LED B	YL(OGGED BY G. Dyer	CHE	CKED BY			ANG	LE BEARING
BORI	NG DE	PTH 92.5 ft. G	ROUND WATER DEPTH: DURI	ING		COMP.		DELA	AYED
NOTE	S _W	ell installed. Refer to w	ell data sheet.						
EPTH (ft)	GRAPHIC LOG	MATERIA	AL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
				EFE	SAMF	SAMP	mo's	REC(
<u> </u>		crystalline calcite cl	; Brown; with few subangular, lasts; upper 1' contains						
<u> </u>		organics; damp	-red; with prevalent						
<u> </u>		subrounded to suba	angular dolomite and calcite more highly weathered, damp						
5		ciasis, dolonnie is i	nore mgmy weamered, damp						
ğ		- Gravelly Sand: Do	ed to brown; Gravels are	715.0					
P			ngular to subrounded dolomite,						
10									
		- Less Gravel							
<u> </u>		- LC33 ()(a)(C)							
15									
<u> </u>		Cond is mars	roo						
<u> </u>		- Sand is more coa	18 0						
ğ									
20									
<u>₹</u> 									
Ы Н Н				698.0					
- -			n clay; red; compositional	030.0					
25	00	sedimentary structu	on; bleaching zone or relict ure slightly intact; moist; gravel						
			cite; subangular to subrounded	l 694.5					
<u>.</u>		 Silty Clay with pel calcite/dolmite clas 	oble sized chert and ts; yellow-red; damp						
			. , ,						
30									
				689.0					
ģ		weathering of chert	mottled to white due to and carbonate material; low	089.0					
35		plasticity; damp							
5									
5 · · · · · · · · · · · · · · · · · · ·									

BORING GWC-43 PAGE 2 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

IENCE AND ENVIRONMENTAL ENGINEERING

LOCATION Plant Bowen

LOGS FOR BORAL.GPJ DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
IIIORING WELL		 (con't) Sandy clay with prevalent zones of weathered chert; mottled tan, white and yellowchert is white; moist 						
GEOTIECH ENGINEERING LOGS - ESEE DATABASE.GDT - 7/27/12 15:36 - TIESEE MAJOR PROJECT SINDOWEN/2011/ESZGAZ BAG HOUSE UNITS 14/DATABORING WELL LOGS FOR BORAL.GFU		- Sandy clay to clayey sand with prevalent subrounded to subangular fragments and chert and calcite; mottled tan, white and yellow; damp						
25 BAG HOUSE UNITS								
09 09 00 00 00 00 00 00 00 00 00 00 00 0		- SAA: higher moisture content, larger dolomite, chert and calcite fragments; soil contains non-parallel banding (black)						
MAJOR PROJECTS/PRO		- SAA: more silt						
7/12 15:36 - 1:\ESEE		- 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					
E DATABASE		- Silty clay; tan and orange; low plasticity; damp						
08 - ESE								
85 		- Gravelly, sandy clay; brown and tan; moist; gravels are composed of weathered chert and (Continued Next Page)	636.0					



SOUTHERN COMPANY

115

120

125

130

LOG OF TEST BORING PROJECT Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE DEPTH (ft.) SAMPLE TYPE NUMBER GEOTECH ENGINEERING LOGS - ESEE DATABASE.GDT - 1/27/12 15:36 - T/ESEE MAJOR PROJECTS/BOWEN/2011/ES2042_BAG HOUSE UNITS 14/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL.GPJ ELEVATION RECOVERY 9 (RQD) GRAPHIC LOG BLOW COUNTS (N VALUE) DEPTH (ft) MATERIAL DESCRIPTION COMMENTS dolomite (con't) 90 629.0 Bottom of hole. Bottom of borehole at 92.0 feet. 95 100 105 110

WELL CONSTRUCTION LOG Southern Company Generation DRILLING Boart Longyear PROJECT: **CCB** Disposal WELL DRILLER: Boart NAME LOCATION: Bowen RIG TYPE: RotoSonic DRILLING METHODS: LOGGER: D. Brooks GWA-43R RotoSonic DATE CONSTRUCTED: 5/24/2011 DEPTH ELEVATION **NOT APPLICABLE:** FEET FT, MSL Locking Hinged Top TOP OF RISER 0.00 721.00 2" Threaded Riser Cap 1/4-inch Vent 1/4-inch Weep Hole 2-ft x 2-ft concrete pad **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 65.00 653.20 TOP OF SEAL **ANNULAR SEAL** Hole Plug 3/8" TYPE: Bentonite Pellets AMOUNT: 2 bags PLACEMENT: Free fall 603.70 TOP OF FILTER PACK 114.50 **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:

HOLE DIA: 6"

Flush-threaded end cap

SLOT LENGTH:

Schedule 40 PVC

BOTTOM OF SCREEN

BOTTOM OF CASING

126.50

127.00

591.70

591.20

OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT SPACING: 0.25-inch

BORING GWA-43R PAGE 1 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING PROJECT Monitoring Wells

LOCATION Plant Bowen

5			RTED <u>5/24/2011</u> COMPLETED <u>5/25/2011</u> SU	IRF. EL	EV. 708	3.36'	_ COORDIN	IATES:	: N:1504117.863 E:2070972.781
			OR Boart Longyear EQUIPMENT						
5			Y LOGGED BY D. Brooks						
	BORI	NG DE	EPTH 127 ft. GROUND WATER DEPTH: DURIN	G		COMP.		_ DELA	AYED
1	NOTE	S _W	/ell installed. Refer to well data sheet.						
IO LOGO INICIALI CIVILAGI VIL	(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
		111	Silty Sand (SM) - brown, dry, fine grain, Top Soil	719.5					
שיהו השיביו טווווים בסטטו	5		Clayey Sand (SC) - red, damp, fine grain, with chert fragments	719.5					
2				713.0					
2011LO2042_1	10		Silty Sand (SM) - red, damp, fine to medium grain, with pieces of chert and carbonate						
				708.0					
	15		Silt (ML) - reddish yellow, damp, saprolite; highly weathered carbonate	706.0					
2000			Lean Clay (CL) - mottled red and reddish yellow, damp, red sandy clay with lenses of reddish yellow silt						
		///	Clayey Sand (SC)	702.0					
יוטטטטויי אאל	20		- red, damp, fine to medium grain, with quartz and chert fragments	699.0					
J. 1 - 00:01 - 1.1	25		Lean Clay (CL) - mottled orange and red, moist, contains pieces of highly weathered carbonate; becoming more yellow-orange with depth						
2/1 - 1/00:100			- CL: mottled yellow-orange and white and red, moist, very fine grain, with sand; lenses of weathered carbonate						
LOLL DATAB	30								
1111	35		- SAA with lenses of carbonate increasing in prominence						
ווארר									
O LOI LING			Silt (ML) - mottled yellow-orange and reddish orange, with sand and weathered chert	684.0					
jl	40			681.0					

BORING GWA-43R PAGE 2 OF 3



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.

PROJECT Monitoring Wells

EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen SAMPLE DEPTH (ft.) BAG HOUSE UNITS 1-4/DATA/BORING LOGS/MONITORING WELL LOGS FOR BORAL.GPJ SAMPLE TYPE NUMBER ELEVATION RECOVERY 9 (RQD) GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Silty Sand (SM) - mottled black, orange, red and white, fine to medium grain, with chert fragments 677.0 Lean Clay (CL) 45 - yellow-orange, damp, low plasticity 50 670.0 Clayey Sand (SC) - mottled orange and yellow, red and black, moist, fine to medium grain, with chert 667.0 Lean Clay (CL) 55 - reddish yellow, moist, no to low plasticity, with GEOTECH ENGINEERING LOGS - ESEE DATABASE. GDT - 1/27/12 15:36 - T:\ESEE MAJOR PROJECTS\PROJECTS\BOWEN\2011\ES2042 - black, tan and reddish yellow 60 - light brown 657.0 Clayey Sand (SC) 65 - black, red, and brown, damp, fine to medium 655.0 grain, with chert 654.0 - Dolostone - Cavity 70 75 80 85





LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.

EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Monitoring Wells

LOCATION Plant Bowen

EAI	EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING		LO	CATION	Plant Bowen			
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	COMMENTS
90 00 00 00 00 00 00 00 00 00 00 00 00 0		(con't)						
28 UNITS 14/DATA/BORING TO 100 100 100 100 100 100 100 100 100 10								
042_BAG HOU		- Dolostone	619.0	!				
MEN/2011/ESZ	X	- Cavity	616.0 614.0					
CEO ICCA EASE DATABASE GD 1/27/12 16:36 - 1 ICCA ICCA EASE DATABASE GD 1/27/12 16:36 - ICCA IC		- Dolostone						
120 120 120 125 125		Bottom of borehole at 127.0 feet.	595.0	·				Bottom of Hole.
GEOTECH ENGINEERING LOGS		25.61. 51. 25.61.616 dt 127.0 166t.						

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONST		Southern Company Generatio	
PROJECT:	CCB Disposal	DRILLING CBoart Longyear DRILLER: Boart	WELL
OCATION:	Bowen	RIG TYPE: RotoSonic	NAME
OGGER:	D. Brooks	DRILLING METHODS: RotoSonic	GWA-44
DATE CONSTRU		BITTLE INC INETTIONS. I TOUGGOING	1
		DEPTH	ELEVATION
NOT APPLICABI	_E:	FEET	FT, MSL
ocking Hinged T	ор		
		TOP OF RISER 0.00	713.21
I/4-inch Vent		2" Threaded Riser Cap	
/4-inch Weep Ho			
2-ft x 2-ft concrete	e pad	GROUND SURFACE 2.77	710.44
	<u> </u>	GROUND SURFACE 2.11	7 10.44
	<i>y</i>	PROTECTIVE CASING	
		SIZE: 4x4-inch	
	7	TYPE: Anodized Aluminium	
		POTTOM OF PROTECTIVE CACING	
		BOTTOM OF PROTECTIVE CASING	
		BACKFILL MATERIAL	
		TYPE: Portland Cement	
	5	AMOUNT:	
	· · · · · · · · · · · · · · · · · · ·		
		RISER CASING	
		DIA: 2-inch	
		TYPE: Schedule 40 PVC	
		JOINT TYPE Flush Threaded	
	· · · · · · · · · · · · · · · · · · ·		
		TOP OF SEAL 86.00	624.44
	Č	ANNULAR SEAL	
	S	TYPE: Hole Plug 3/8"	
	<u> </u>	Bentonite Pellets	
		AMOUNT: 2 bags	
	5	PLACEMENT: Free fall	
	i i	TOP OF FILTER PACK 73.50	636.94
	<u> </u>	FILTER PACK	
	R	TYPE: DSI Sand - 2A (20/30)	
	8	AMOUNT: 7 bags	
	5	PLACEMEN Tremie; wash with water	
	R	T D to Elviert Treffile, wash with water	
	5	BOTTOM OF RISER / TOP OF SCREEN 75.70	634.74
	R	SCREEN	
	5	DIA: 2-inch 10ft U-Pack	
	5	TYPE: Schedule 40 PVC	
	Ř	OPENING WIDTH: 0.01-inch	
	K	OPENING TYPE: Slotted	
	5	SLOT SPACING: 0.25-inch	
	R	SLOT LENGTH:	004.74
Turab Aber 1	5	BOTTOM OF SCREEN 85.70	624.74
Flush-threaded er	па сар	DOTTO 1 05 010 110 00 00	604.44
	8	BOTTOM OF CASING 86.00	624.44
	5		
	HOI	E DIA: 6"	
	HOL		

sou	THERN 4	DRILLII	NG L	.OG			Hole No.	GW	/A-4	4
Energy	COMPA to Serve Your V	Vorld"GEOLOGICF	L SE	RVICES			Sheet	1 of 2		
SITE _					HOLE DEPTH		SUF	RFELEV 7	25.15	
LOCATION	ON	Landfill Cells 9 &10	COORI	DINATES	34.1300	195	<u> </u>	- 84.91′	11336	
ANGLE		BEARING	CONTR	RACTOR	Boart		ORILL NO.			
DRILLIN	G METHOD				NO. U.					
CASING	SIZE	LENGTH 10'	_ co	RE SIZE		TOTAL	% REC			
WATER	TABLE DEPTH	58.55' _{ELEV.} 654.66 _{TIM}	IE AFTE	R COMP.		DAT	TE TAKEN	8/25/2	2014	
TYPE G	ROUT	QUANTITY	N	1IX	· DRIL	LING STA	ART DATE			
DRILLER	₹	RECORDER Dyer / Abraham APPRO			-	LING CO	MP. DATE	6/9/2	:011	
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan	ndard Penetration Test Blows	N	Comments		% Rec	RQD
0	725.15									
1	724.15	SILTY SAND (0 - 8 FT)								
2	723.15	Red to reddish-brown, moderately-cemented silty sand with minor angular gravels; damp.								l
3	722.15									l
4	721.15									ļ
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									l
16	709.15									ļ
17	708.15	SANDY SILT (8 -18 FT) Mottled white to reddisn brown silty sand to sandy silt,								l
18	707.15	rare gravels; contains angular to sub-angular nodular chert; poorly cemented; slighlty damp.								ļ
19	706.15									
20	705.15									l
21	704.15									
22	703.15	CLAYEY SILT (18 - 24 FT)								Ī
23	702.15	Tan-yellow to white clayey silt with rare gravels;								ì

slighlty damp.

DRILLING LOG GEOLOGICAL SERVICES

Hole No. **GWA-44**

Sheet 2 of 2

			Com-1	O:	dord Denotration Test				
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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	673.15 672.15								
53 54		CLAYEY SILT (24 - 56 FT) Tan-vellow to white silty clay to clayey silt: clay							
55	670.15	Tan-yellow to white, silty clay to clayey silt; clay varies from 15 to 30%; minor gravel.							
33	5. 5. 15								
Form GS	9901 7-26-2	2004						-	



DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-44

Sheet 2 of 2

 SITE
 Plant Bowen
 TOTAL DEPTH
 86
 SURF.ELEV.
 725.15

			Sample	Standard Felletration Test					
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Comments	% Rec	RQD
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		SILTY CLAY (56 - 67 FT)							
67		Tan silty clay to low-plasticity clay; few dolomitic fragments; very damp.							
68	657.15	g,,,							
69	656.15								
70	655.15								
71	654.15								
, ,	034.13								
72	653.15								
73	652.15								
74	651.15	SILT (67 - 74 FT) Tan to light yellow silt with minor sand; gravel absent;							
75	650.15	moist to wet.							
		SANDY GRAVEL							
76		Tan yellow, low plasticity, sandy gravel with some clay; moist to wet.							
77	648.15								
78	647.15								
79	646.15								
13	040.10								

SOU	THERN	DRILI	LING L	OG			Hole No.	GWA-4	4
	COMP	CENI NGI	CAL SEI	RVICES			Sheet 2	of 2	
SITE		Plant Bowen		TOTAL DE		86	SURF.EI	_EV 72 5	5.15
			Sample No.	Stan	dard Penetration Test				
Depth	Elev.	Material Description, Classification and Remarks	NO.	From To	Blows	N	Comments	% Rec	RQD
80	645.15								
81	644.15								
82	643.15								
83	642.15								
84	641.15								
85	640.45	SANDY GRAVEL (74 - 86 FT)							
65	640.15	Tan yellow, low plasticity, sandy gravel with some clay; wet.							
86	639.15	BOTTOM AT 86-FT							

Form GS9901 7-26-2004

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG	Southern Company Ge	neration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Denty		NAME
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	ELEVATION
		FEET	FT, MSL
	1	FEET	FI, WISL
Locking Hinged Top ———▶			
1/4-inch Weep Hole \	TOP OF RISER	2.69	701.45
	2" Threaded Riser Cap		
\	_ ·····oaaoa · ···ooi· oap		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	698.76
	(337)		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL:	<u></u> ;:/		
	BOTTOM OF PROTECTIVE CASING		
	y Berrein er merzenve eneme		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
clear.	TYPE: Portland Cement Grout		
	AMOUNT: 20 bags		
	DIOED GAOING		
	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		
	1 L/ (OLIVILIVI). Hellile, Wash with Water		
	BOTTOM OF RISER / TOP OF SCREEN	54.43	644.33
	SCREEN	J 1 .43	U -14 .33
	DIA: 2-inch		
	TYPE: Schedule 40 PVC Prepack		
	· · · · · · · · · · · · · · · · · · ·		
	OPENING TYPE: Slotted		
	OPENING TYPE: Slotted		
	SLOT SPACING: 0.25-inch		
	SLOT LENGTH: 1.5-inch	0.	05:55
	BOTTOM OF SCREEN	64.43	634.33
	BOTTOM OF CASING	64.73	634.03
	-		
HOLE DIA	: 8"		

sou [.]	THERN	DRILL	ING L	OG			Hole No.	. (GWC-45	
	COMP to Serve You						Sheet 1 of 3			
SITE _		Plant Bowen Dry Gypsum Storage Fac	ility							3.76
		Cells 1 & 2					E _			
ANGLE		0 BEARING 0	CONTR	RACTOR	SCS		DRILL NO	CI	ME 75	
	NG METHOD	NO. SAMPLI	s	13	NO. U	I.D. SAMP	LES	(0	
CASINO	SIZE	4/4 ID 7" OD LENGTH	co	RE SIZE		TOTAL	_ % REC			
WATER	TABLE DE	PTH ELEV								
	ROUT	QUANTITY							6/2007	
DRILLE	R	S. Denty RECORDER L. Millet APPR			DRI dard Penetration Test		MP. DATE _	5/1	0/200 <i>1</i>	
Depth	Elev.	Material Description, Classification and Remarks	No.		Blows	N	Comme	ents	% Rec	RQD
0	698.76									
1	697.76									
2	696.76									
3	695.76									
4	694.76									
5	693.76	Red silty CLAY, dry, firm, occasional pebbles	S-1	4.5-6	3-5-7	12			75	
6	692.76									
7	691.76									
8	690.76									
9		Red silty CLAY, dry, firm, some tan mottling,	S-2	9.5-11.0	4-5-6	11			100	
10	688.76	occasional pebbles and coarse sand grains								
11	687.76									
12	686.76									
13	685.76									
14	684.76	Same as above	S-3	14.5-16.0	11-16-20	36			100	
15	683.76									
16	682.76									
17	681.76									
18	680.76									
19	679.76									
20	678.76	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	
21	677.76									
22	676.76									
23	675.76									
24 Form GS	674.76 9901 7-26-2	004								

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

SITE _		Fight Bowell Dry Gypsulli Storage Facility			TOTAL DEPTH		SURF.ELEV.	698	.70
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
		Red & yellow orange CLAY, dry to damp, firm,	S-5	24.5-26.0	3-4-4	8	Comments	% Rec 90	NQD
25	673.76	carbonate pebbles and sand							
26	672.76								
27	671.76								
28	670.76								
29		Tan orange & dark red CLAY, dry, mottled firm, small	S-6	29.5-31.0	2-3-6	9		95	
30	668.76	carbonate pebbles							
31	667.76								
32	666.76								
33	665.76								
		Orango 8 tan cilty CLAV dry firm to clightly plactic	S-7	24 5 26 0	2 2 6	9		100	
34		Orange & tan silty CLAY, dry, firm to slightly plastic occasional small carbonate pebbles, coarse sand	3-1	34.5-36.0	3-3-6	Э		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	carbonate pennies, coarse sand							
41	657.76								
42	656.76								
43	655.76								
44		Light tan & tan silty CLAY, moist, moderately soft,	S-9	44.5-46	2-2-3	5		100	
45	653.76	orange & black mottles, few pebbles and sand							
46	652.76								
47	651.76								
48	650.76								
49		Tan silty CLAY, moist, moderately soft, dark red and black	S-10	49.5-51	5-2-5	7		80	
50	648.76	mottles, pebbles and gravel							
51	647.76								
52	646.76								
53	645.76								
		Top city CLAV caturated coft many short nabbles	S-11	54.5-56	11-19-19	38		E0.	
54		Tan silty CLAY, saturated, soft, many chert pebbles, carbonate sand	J-11	J 4 .J-50	11-19-19	36		50	
55	643.76								
56	642.76 9901 7-26-2								

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45

Sheet 3 of 3

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	64	SURF.ELEV.	698	.76
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	641.76								
58	640.76								
59	639.76	Tan clayey SILT, moist, moderately soft, sand pockets	S-12	59.5-61	4-5-7	12		100	
60	638.76								
61	637.76								
62	636.76								
63	635.76								
64	634.76								
65		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 85	614.76 613.76								
86	612.76								
87	611.76								
88	610.76								

WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG	Southern Company Gen	eration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: S. Denty		NAME
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	ELEVATION
		FEET	FT, MSL
l	7	FEET	FI, WISL
Locking Hinged Top———			
1/4-inch Weep Hole \	TOP OF RISER	2.47	701.93
\	2" Threaded Riser Cap		
	'		
	k		
4-ft x 4-ft concrete pad			
	GROUND SURFACE	0.00	699.46
	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
WATER LEVEL:	* :		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.			
	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 33 bags		
	RISER CASING		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	JOINT TYPE: Flush Threaded		
	TOP OF SEAL	110.40	589.06
	ANNULAR SEAL		
	TYPE: 1/4-inch coated bentonite pellets,		
	5-gal buckets		
	AMOUNT: 0.25 bucket		
	PLACEMENT: Tremie		
	TOP OF FILTER PACK	112.40	587.06
	FILTER PACK		
	TYPE: DSI Sand - 1A (20/30)		
	Drillers Services, Inc.		
	AMOUNT: 3 bags; 50 lbs/bag		
	PLACEMENT: Tremie; wash with water		
	BOTTOM OF RISER / TOP OF SCREEN	115.44	584.02
	SCREEN		
	DIA: 2-inch		
	TYPE: Schedule 40 PVC		
	OPENING WIDTH: 0.01-inch		
	OPENING TYPE: Slotted		
	SLOT SPACING: 0.25-inch		
	SLOT LENGTH: 1.5-inch		
	BOTTOM OF SCREEN	125.44	574.02
	BOTTOM OF CASING	125.74	573.72
HOLE DIA	A: 8"		

SOU	THERN	DRILLIN	NG L	OG			Hole No.	GWC-45F	۲
Energy :	COMP to Serve You						Sheet 1 c		
			ity		HOLE DEPTH	129.	SURF.ELE	v. <u>699</u>).46
LOCAT	ION	Cells 1 & 2					E15		
ANGLE		0 BEARING 0	CONTR	RACTOR	SCS		DRILL NO.	CME 75	
DRILLII	NG METHOI	HSA/HQ rock core with water NO. SAMPLES		17	NO. U.	D. SAMF	PLES	0	
CASING	G SIZE	LENGTH	_ co	RE SIZE		_тотаі	L % REC.		
	R TABLE DE			· · · · · · · · · · · · · · · · · · ·					
TYPE (GROUT	QUANTITY	N	IIX	DRIL	LING ST	ART DATE5	/17/2007	
DRILLE	R	S. Denty RECORDER L. Millet APPROV	/ED _		DRIL	LING CC	DMP. DATE5	/17/2007	
Depth	Elev.		Sample No.	Stan	dard Penetration Test Blows	N	Comments	% Rec	RQD
0	699.46								
1	698.46								
2	697.46								
3	696.46								
4	695.46	Red silty CLAY, dry, firm, tan mottling, small pebbles	S-1	4.5-6	3-3-4	7		100	
5	694.46	and occasional roots							
6	693.46								
7	692.46								
8	691.46								
9	690.46	Red silty CLAY, dry, firm, some coarse sand grains	S-2	9.5-11.0	4-4-6	10		100	
10	689.46								
11	688.46								
12	687.46								
13	686.46								
14	685.46	Red silty CLAY, dry, firm, small to medium chert & carbonate pebbles	S-3	14.5-16.0	5-6-9	15		100	
15	684.46								
16	683.46								
17	682.46								
18	681.46								
19	680.46	Red CLAY, dry, hard, some silt, occasional carbonate pebbles	S-4	19.5-21.0	6-11-17	28		100	
20	679.46								
21	678.46								
22	677.46								
23	676.46								

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

3116			O	i	deed Desertation Test		JORF.ELEV.		.40
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
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	carbonated pennies and commes							
31	668.46								
32	667.46								
33	666.46								
34	665.46	Tan silty CLAY, moist, firm, small degraded carbonate pebbles and coarse sand	S-7	34.5-36.0	3-4-5	9		100	
35	664.46								
36	663.46								
37	662.46								
38	661.46								
39	660.46	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	
40	659.46								
41	658.46								
42	657.46								
43	656.46			44 5 15					
44		Orange and light tan CLAY, dry, firm, black mottling, occasional carbonate pebbles, some silt.	S-9	44.5-46	5-7-9	16		100	
45 46	654.46 653.46								
47	652.46								
48	651.46								
49	650.46		S-10	49.5-51	2-3-4	7		100	
50		Tan clayey SILT, moist, moderately firm to moderately							
51	648.46	soft, black and dark red mottling							
52	647.46								
53	646.46								
54	645.46	Tan clayey SILT, moist, moderately soft, degraded carbonate cobbles, black mottling , some sand	S-11	54.5-56	8-7-8	15		100	
55	644.46	, , , , , , , , , , , , , , , , , , ,							
56	643.46								

SOUTHERN COMPANY

DRILLING LOG

Hole No. GWC-45R

GEOLOGICAL SERVICES Sheet 3 of Energy to Serve Your World Plant Bowen Dry Gypsum Storage Facility 129.2 TOTAL DEPTH SURF.ELEV. 699.46 Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. From To Blows Comments % Rec RQD 57 642.46 58 641.46 640.46 Tan clayey SILT, w/ sand, saturated, soft, carbonate S-12 59.5-61 8-50-1 R 59 50 cobble in bottom of spoon 639.46 60 60.8: Core through 8" boulder 61 638.46 637.46 62 63 636.46 635.46 Tan silty SAND, saturated, loose, medium-coarse S-13 64.5-66 3-1-4 5 64 50 grained w/ pebbles and gravel 65 634.46 66 633.46 67 632.46 68 631.46 69 630.46 69.5-71 Tan clayey SILT, saturated, soft, some black & S-14 2-3-4 7 10 70 629.46 orange mottling 71 628.46 627.46 72 73 626.46 74 625.46 75 624.46 S-15 7 623.46 No recovery 74.5-76 3-3-4 76 0 77 622.46 78 621.46 79 620.46 80 619.46 618.46 Tan silty CLAY, soft, saturated S-16 79.5-81 7 81 3-3-4 30 82 617.46 83 616.46 84 615.46 85 614.46 S-17 86 613.46 Same as above 84.5-86 9-11-12 23 5 87 612.46

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 4 of 5 Energy to Serve Your World Plant Bowen Dry Gypsum Storage Facility 129.2 SITE TOTAL DEPTH SURF.ELEV. 699.46 Standard Penetration Test Depth Elev. Material Description, Classification and Remarks No. From To Blows Ν Comments % Rec RQD 89 610.46 90 609.46 91 608.46 607.46 92 93 606.46 605.46 94 604.46 95.1: Start coring 95 Grey DOLOSTONE, some banding. Some fine fractures 603.46 filled w/ white mineralization. 96 97 602.46 96.7-102.2: Cavity 601.46 98 99 600.46 100 599.46 101 598.46 102 597.46 103 596.46 102.5-105.1: Cavity 595.46 104 105 594.46 106 593.46 107 592.46 Same as above 108 591.46 109 590.46 110 589.46 588.46 111 112 587.46 113 586.46 114 585.46 115 584.46 <u>583.46</u> 116 117 582.46 118 581.46 580.46 119 579.46 119.5-122.5: Cavity

DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWC-45R

Sheet 5 of 5

Energy	to Serve You		AL SE	KVICES				Sheet 5 of	5	
SITE _		Plant Bowen Dry Gypsum Storage Facility			. TOTAL DEPTH	12	9.2	SURF.ELEV.	699	.46
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N		Comments	% Rec	RQD
121	578.46									
122	577.46									
123	576.46									
124	575.46									
125	574.46	124.1-129.2: Cavity								
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									
	552.46									
	551.46									
149										
150										
	548.46									
	547.46 546.46									
	0001 7 36 4									



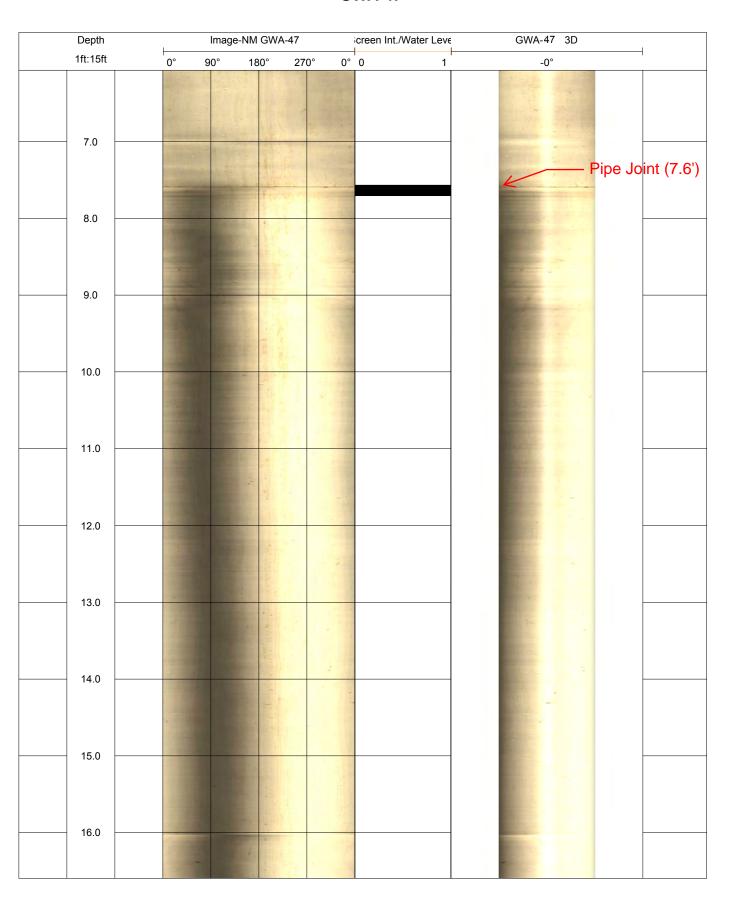
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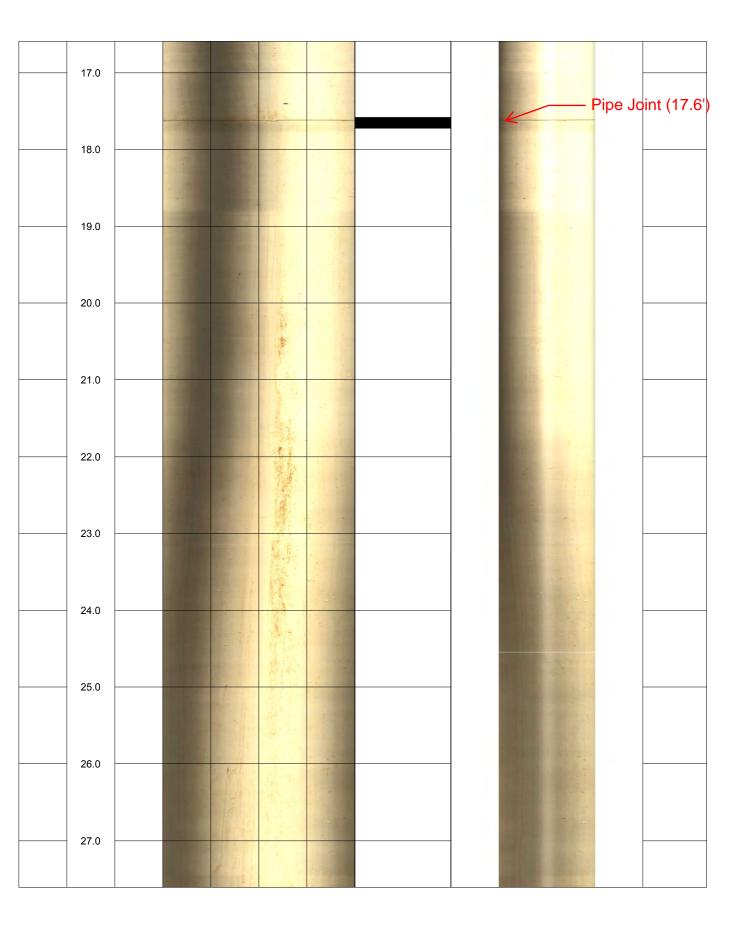
LOG OF TEST BORING

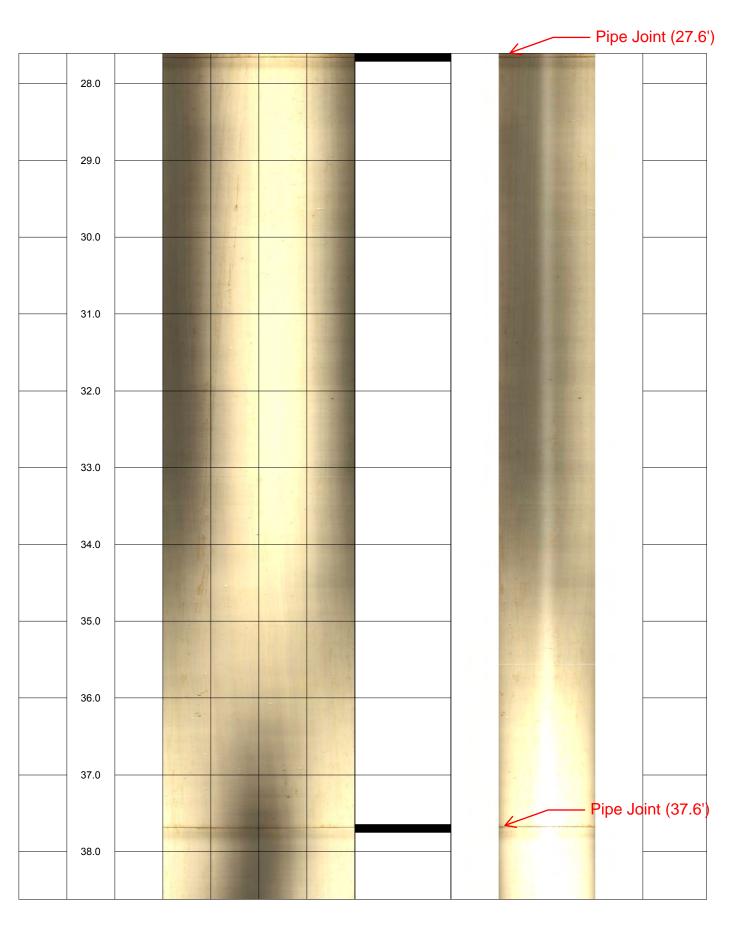
BORING GWC-46 R PAGE 1 OF 1 GPC353387

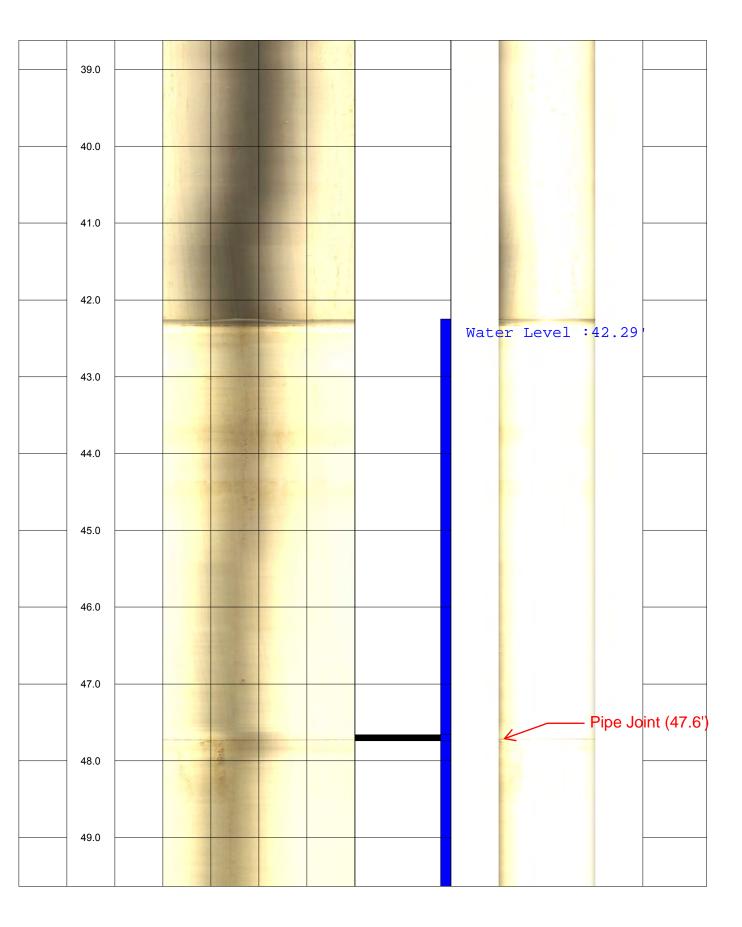
	C	OMPANY	ř.					
			SERVICES, INC.	PROJECT Monit	oring W	Vells, Cel	l No. 9	
EAF	RTH SCI	ENCE AND EN	NVIRONMENTAL ENGINEERING	LOCATION Plan	t Bowe	n		
					_			
			COMPLETED <u>8/15/2014</u> S				ATES:	
				METHOD			41101.5	DEADINO
			LOGGED BY W. Shaughnessy					
			GROUND WATER DEPTH: DURI		·		_ DELAYE	32 π. aπer 24 nrs.
NOIE	S							
DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		Weak Moderate Strong	GROUNDWATER OBSERVATIONS		WELL DATA etion: ive aluminum cover with bollards; square concrete pad Surface Seal: concrete
		(CL) - CLAY (CL), \	wet, red-yellow to yellow					Concrete
20		- gravelly CLA lesser gravel csome gravelly CLA (COBBLES A	AY (CH), wet, yellow-red, cobbles	k mottling, cobbles,				▲ Annular Fill: cement-bentonite grout
30	Ā	(CH) - gravelly CLA	IE boulder, cobbles, pulverized rock,					
40		- DOLOSTON	ND BOULDERS) IE, cobbles, pulverized rock, dry, wh					Annular Seal: bentonite pellets
		- DOLOSTON reaction, thin o	IE, light gray and dark gray, some iro calcite veins	on staining, no HCl				■ Filter: ■ silica filter sand
50		- DOLOSTON calcite veins	IE, light gray and gray, iron staining,	no to low HCl reaction,				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
			Bottom of borehole at 56.5 fe	eet.				Sump:0.3999999999999999999999999999999999999

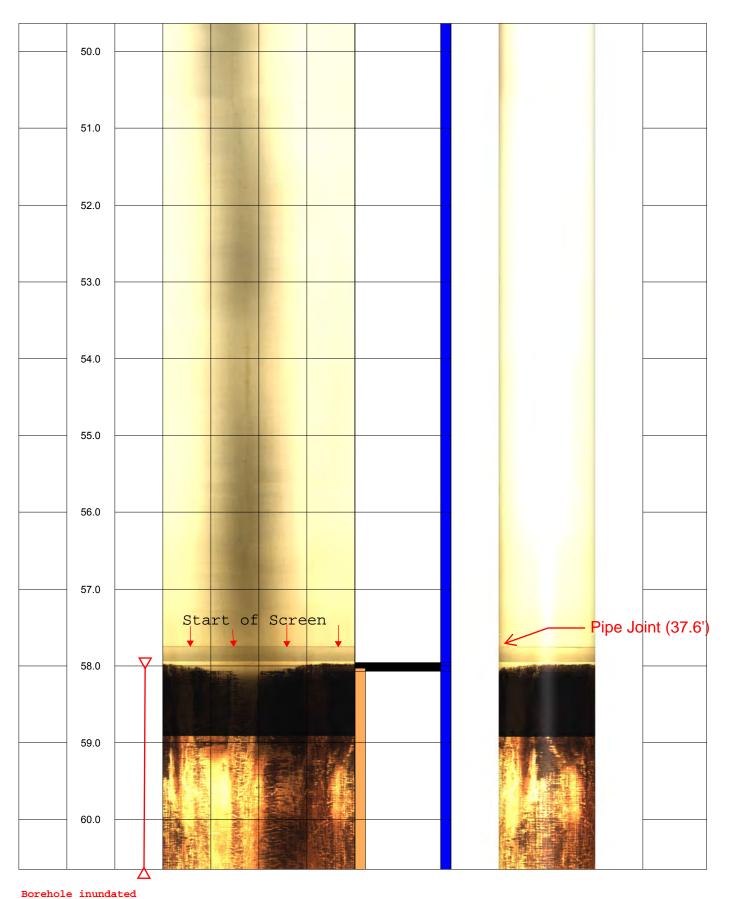
Optical Teleview Magnetic North and 3D Image GWA-47



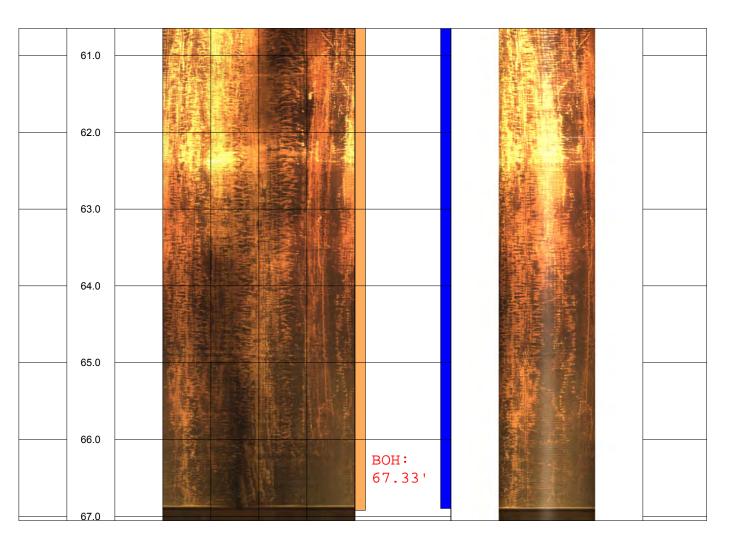


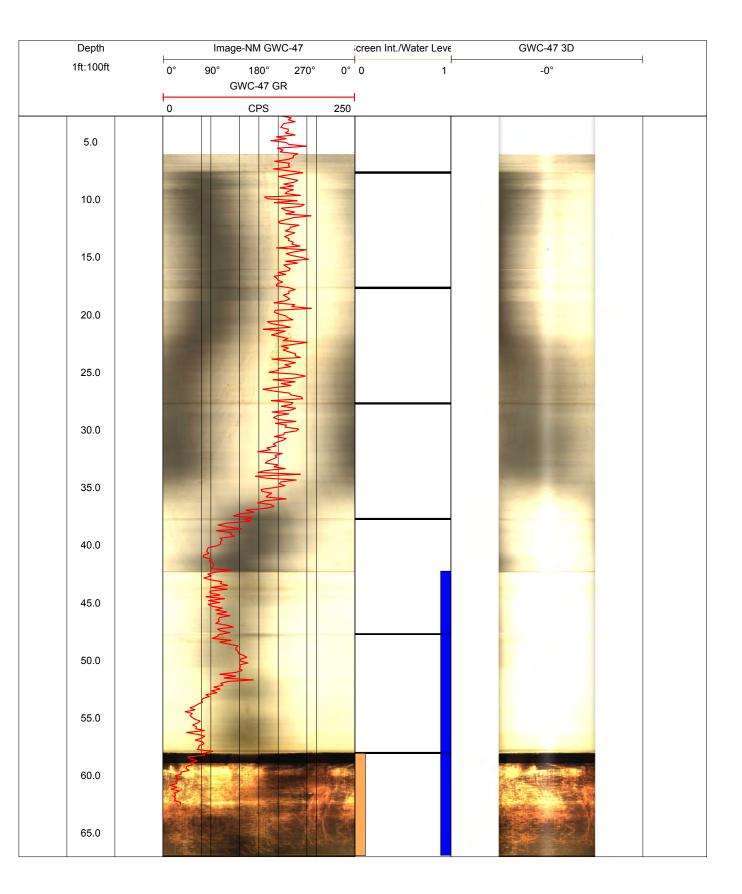






with dark material growing on sidewalls. In order to view bettter exposure and light were turned up.





	GWC-47 Gamma		Depth	
0	CPS	250	1ft:200ft	
			5	
			10	
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		15	
			20	
			25	
			30	
	Bento 5' - 50	onite Grout	35	
	Water ~42'		40	
	Water 12		45	
	Bentonite Seal 50' - 5	E'	50	
	Filter Sand 55' - 57'	3	55	
**	Screen 57' - 67'		60	



GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:42 - \\SOUTHERNCO.COM\SHARED DATA\WORKGROUPS\APC GENERAL

2012

BORING GWC-47R

SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICCB WELLS 2014/MW49-49R-47R.GPJ PAGE 1 OF 2 LOG OF TEST BORING ECS18611 AND WELL INSTALLATION PROJECT 9 & 10 Landfill Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 CHECKED BY L. Millet ANGLE -90 **BEARING** 0 LOGGED BY L. Millet BORING DEPTH 81.2 ft. GROUND WATER DEPTH: DURING 38.5 ft. COMP. **DELAYED** 35.45 ft. after 192 hrs. **NOTES** STRATA DESCRIPTION **WELL DATA** Œ GRAPHIC DEPTH Protective steel cover 4-foot square concrete pad Top of casing Elev. = 691.00 ELEV (DEPTH ELEV Silty Clay (CL-ML) Surface Seal: concrete - orange, moist, medium stiff, residuum, silty, dark red mottling, 685.8 partially weathered rock fragments (2.0)682.8 Silty Clay (CL-ML) - orange, moist, medium stiff, residuum, silty, red and yellow mottling, partially weathered rock fragments 9 677.8 - orange, moist, medium stiff, residuum, clayey, red and brown mottling 672.8 - yellow, damp, medium stiff, residuum, clayey, orange and brown mottling, partially weathered rock fragments 667.8 Silt (ML) - yellow, damp, stiff, residuum, clayey, orange and yellow mottling, partially weathered rock fragments, trace sand 662.8 Silt (ML) - yellow, damp, medium stiff, residuum, clayey, brown and orange mottling, trace sand 30 657.8 Silt (ML) - yellow, damp, stiff, residuum, clayey, brown and orange mottling, trace sand -Annular Fill: Portland Cement Grout 652.8 Lean to Fat Clay (CL-ML) - orange, wet, stiff, residuum, silty, red and yellow mottling, sandy in places 647

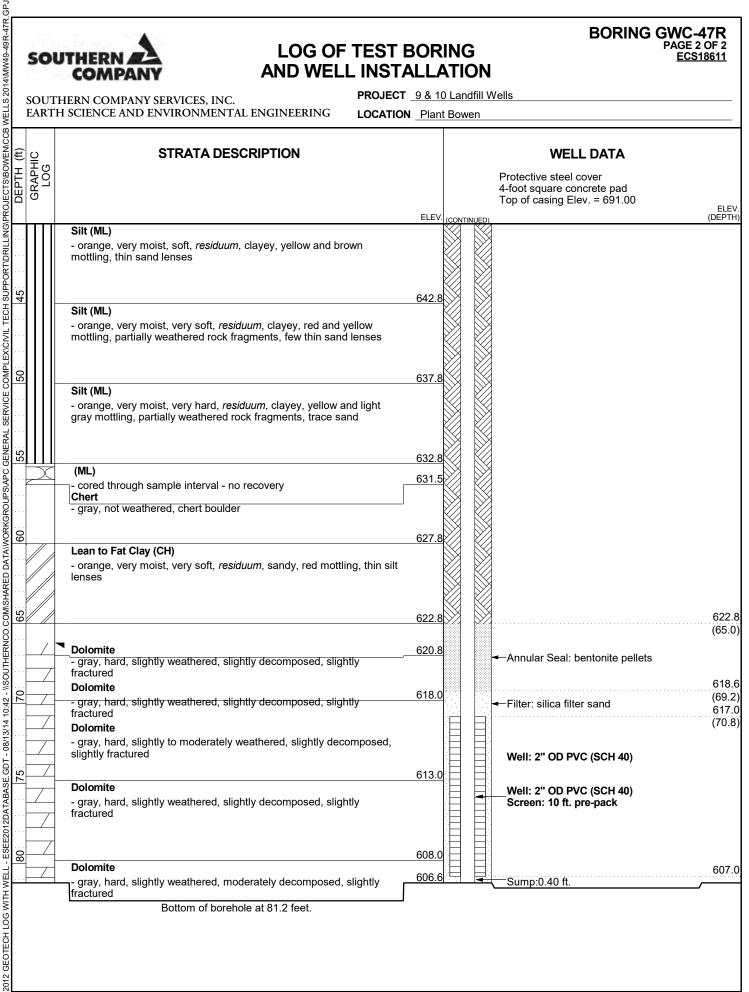


LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-47R PAGE 2 OF 2 ECS18611

SOUTHERN COMPANY SERVICES, INC.

PROJECT 9 & 10 Landfill Wells



WELL CONSTRUCTION LOG

	RUCTION LOG	Southern Company Generation	
PROJECT:	CCB Disposal	DRILLING Boart Longyear	WELL
LOCATION	Daws:	DRILLER: Boart	NAME
LOCATION:	Bowen	RIG TYPE: RotoSonic	
LOGGER:	G.Dyer	DRILLING METHODS: RotoSonic	GWA-48
DATE CONSTRU	CIED: 6/8/2011	1 2527	5, 5, 4, 7, 0, 1
NOT APPLICABL	E.	DEPTH	ELEVATION
		FEET	FT, MSL
Locking Hinged To	ор	TOD OF DIOSE 0.00	600.40
1/4-inch Vent		TOP OF RISER 0.00 2" Threaded Riser Cap	688.49
1/4-inch Weep Ho	ale.	Threaded Niser Cap	
2-ft x 2-ft concrete			
	7	GROUND SURFACE 2.00	686.49
		SKOSKI SSKI NOZ	000.10
		PROTECTIVE CASING	
	<u> </u>	SIZE: 4x4-inch	
	<u> </u>	TYPE: Anodized Aluminium	
	<u> </u>	BOTTOM OF PROTECTIVE CASING	
	<u> </u>	BACKFILL MATERIAL	
		TYPE: Portland Cement	
		AMOUNT:	
	<u> </u>		
	5	RISER CASING	
		DIA: 2-inch	
		TYPE: Schedule 40 PVC	
		JOINT TYPE: Flush Threaded	
	· ·		
		40.00	0.40.40
	<u> </u>	TOP OF SEAL 40.00	646.49
	<u> </u>	ANNULAR SEAL TYPE: Hole Plug 3/8"	
	i -	TYPE: Hole Plug 3/8" Bentonite Pellets	
		AMOUNT: 2 bags	
	Ģ.	PLACEMENT: Free fall	
	<u> </u>	TOP OF FILTER PACK 43.50	642.99
	8	FILTER PACK	
	5	TYPE: DSI Sand - 2A (20/30)	
	R	126	
	5	AMOUNT: 7 bags	
	R	PLACEMENT Tremie; wash with water	
	5	45.50	0.40.00
	2	BOTTOM OF RISER / TOP OF SCREEN 45.50 SCREEN	640.99
	R	DIA: 2-inch 10ft U-Pack	
	5	TYPE: Schedule 40 PVC	
	R	OPENING WIDTH: 0.01-inch	
	8	OPENING TYPE: Slotted	
	5	SLOT SPACING: 0.25-inch	
	R	SLOT LENGTH:	
	5	BOTTOM OF SCREEN 55.50	630.99
Flush-threaded en	nd cap		
	8	BOTTOM OF CASING 56.00	630.49
	5	20	
	_		
	HOL	E DIA: 6"	

SOUT	HERN A	DRILLII	NG L	.OG			Hole No.	GWC-4	8
Energy t	COMPAN o Serve Your Wor		L SE	RVICES			Sheet 1	of 2	
SITE _		Plant Bowen			HOLE DEPTH	57'	SURFE	ELEV <u>686.49</u>	FT
LOCATI	ON	Landfill Cells 9 &10		DINATES	34.1336			84.9060434	
ANGLE		BEARING	CONTR	RACTOR	Boart	DF	RILL NO.		
DRILLIN	G METHOD				NO. U.				
CASING		2" LENGTH 10'	CORE SIZE			TOTAL %	6 REC.	0/05/00//	
WATER	TABLE DEPTH	39.73 FT _{ELEV.} 648.76 FT _{TIN}							
TYPE G		QUANTITY						6/8/2011	
DRILLEI	₹	RECORDER <u>Dyer / Abraham</u> APPROV			DRIL dard Penetration Test	LING COM	P. DATE	0/0/2011	
Depth	Elev.	Material Description, Classification and Remarks	No.		Blows	N	Comments	% Rec	RQD
0	686.49								
1	685.50	CLAYEY SILT (0 - 3 FT)							
2	684.49	White to tan and orange, weakly-cemented, clayey silt; few dolomitic fragments; dry.							
3	683.49	SILTY SAND (3 - 8 FT)							
4	682.49	Orange to red-brown silty sand with minor angular to sub-angular gravels; dry.							
5	681.49								
6	680.49								
7	679.49	OLAVEY OUT (O. 40 ET)							
8	678.49	CLAYEY SILT (8 - 16 FT) Tan to white clayey silt with few gravels; dark colored							
9	677.49	banding - likely manganese bands with contorted bedding; moist.							
10	676.49								
11	675.49								
12	674.49								
13	673.49								
14	672.49								
15	671.49								
16	670.49	GRAVELLY SAND (16 - 22 FT)							
17	669.49	Brownish gravelly sand with wet clay layers; Low plastic clay.							
18	668.49	plastic day.							
19	667.49								
20	666.49								
21	665.49								
22	664.49								
23	663.49								

662.49

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

632.49

630.49 END OF BORING, 57 FT

54

55



REPLAC

REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL

SERVICE COMPLEX/CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-BOWEN\LANDFILL

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE GDT - 5/5/16 16:54 - S:WORKGROUPS/APC GENERAL

LOG OF TEST BORING

BORING GWC-49 Z PAGE 1 OF 3 GPC633179

PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen DATE STARTED 2/23/2016 COMPLETED 3/1/2016 SURF. ELEV. 706.9 COORDINATES: N:34.132919 E:84.905887 EQUIPMENT Tracked METHOD Rotosonic CONTRACTOR Cascade **DRILLED BY** T. Ardito LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE **BEARING** BORING DEPTH 107 ft. GROUND WATER DEPTHDURING 48 ft. COMP. 47.3 ft. DELAYED 47.2 ft. after 96 hrs. NOTES , HCL REACTION WELL DATA 3ROUNDWATER 3BSERVATIONS **ELEVATION SRAPHIC** DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards; **Joderate** 4-foot square concrete pad Sandy Silt (ML) Surface Seal: - mottled grayish brown (10YR 5/2), strong brown (7.5YR 5/6) and Concrete brownish yellow / dark yellowish orange (10YR 6/6) very damp, soft, some clay and gravel - medium stiff - mottled reddish yellow (7.5YR 6/8) and yellowish red (5YR 4/6) moist, medium stiff, medium plasticity, some clay and gravel 10 Annular Fill: Portland Cement-Bentonite **Dolostone (COBBLES AND BOULDERS)** Grout (4 - 94lbs bags PC, 1 -- dolostone boulder, about 2 ft. thick, gray, fresh 50lbs bags Gel, 40 gal. Water) 15 - mottled strong brown (7.5YR 5/8) and red (2.5YR 4/6) dry, medium stiff, medium plasticity, some clay and gravel - stiff 20 - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) 25 Silt (ML) - mottled brownish yellow (10YR 6/8) and red (2.5yr 4/8) dry, medium stiff, low to medium plasticity, some sand 30 - damp 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')35 Elastic Silt (MH) - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) wet, medium



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE. GDT - 5/5/16 16:54 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORT/DRILLING/PROJECTS/GA-BOWEN/LANDFILL REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL REPLACEMENT LANDFILL REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL REPLACEMENT
LOG OF TEST BORING

BORING GWC-49 Z PAGE 2 OF 3 GPC633179

PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen HCL REACTION SROUNDWATER **WELL DATA** GRAPHIC LOG ELEVATION DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards: **Joderate** 4-foot square concrete pad Elastic Silt (MH)(Con't) - red (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) 45 clay seam 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 50 55 Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (0.5 - 5gal buckets - 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 60 of CHS Sandy Fat Clay (77.0'-74.0')) and Baroid Hole Plug 3/8 Chips (10 - 50lbs bags (74.0'-25.0')) 65 - yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel 70 75 -Filter Media 20/40 Silica Sand (4 - and dark yellowish brown (10YR 4/6) saturated, very soft, high - 50 lbs bags) plasticity, with cobbles and gravel 80 Standpipe: 2" OD PVC (SCH 40) Screen: 85 10 ft; 0.010" Slot Prepack



BORING GWC-49 Z PAGE 3 OF 3

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE. GDT - 5/5/16 16:54 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORT/DRILLING/PROJECTS/GA-BOWEN/LANDFILL REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL REPLACEMENT LANDFILL REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL REPLACEMENT GPC633179 PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen Weak Moderate REACTION Strong 3ROUNDWATER 3BSERVATIONS WELL DATA ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards; 4-foot square concrete pad Sandy Lean Clay (CL)(Con't) Sump:0.29999999999997 ft. 90 - and dark yellowish brown (10YR 4/6) saturated, very soft, high plasticity, with gravel 95 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') 100 105 Cave-in to 107 ft. Bottom of borehole at 107.0 feet. 110 115 120 125 130 135



SOU EAR	C(JTHERN	LOG OF TEST BOMPANY N COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEERING PROJECT Lar LOCATION PI	ıdfill Rej	G placement Monitoring Wells	G GWC-49 Z PAGE 1 OF 3 GPC633179
CONT DRILL BORII	RACTO LED BY NG DEP	ED 2/23/2016 COMPLETED 3/1/2016 SURF. ELEV. 706.9 R Cascade EQUIPMENT Tracked METHO T. Ardito LOGGED BY W. Shaughnessy CHECKED BY E TH 107 ft. GROUND WATER DEPTHDURING 48 ft. CO	D Rote	osonic er ANGLE BE	ARING
ОЕРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak Moderate REACTION	COMMENTS	Natural Gamma
5		Sandy Silt (ML) - mottled grayish brown (10YR 5/2), strong brown (7.5YR 5/6) and brownish yellow / dark yellowish orange (10YR 6/6) very damp, soft some clay and gravel - medium stiff		(Recovery=64% between 0 and 7ft.)	Moment
10		- mottled reddish yellow (7.5YR 6/8) and yellowish red (5YR 4/6) moist, medium stiff, medium plasticity, some clay and gravel - stiff		(Recovery=50% between 7 and 17ft.)	Mary May May May May May May May May May Ma
15		Dolostone (COBBLES AND BOULDERS) - dolostone boulder, about 2 ft. thick, gray, fresh			WM Jun
20		- mottled strong brown (7.5YR 5/8) and red (2.5YR 4/6) dry, mediun stiff, medium plasticity, some clay and gravel - stiff	n	(Recovery=90% between 17 and 27ft.)	Mw/m Mw/m
25		- mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8)			Why why have
30		Silt (ML) - mottled brownish yellow (10YR 6/8) and red (2.5yr 4/8) dry, medium stiff, low to medium plasticity, some sand - damp		(Recovery=90% between 27 and 37ft.)	MMW WWW. MMW WALLAND W
35		Elastic Silt (MH) - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) wet, medium stiff		(Recovery=100% between 37 and 47ft.)	JAM MANNAM MANNAM

EGG OI IEGI BOI	RINC		PAGE 2 OF GPC63317
N COMPANY SERVICES, INC. PROJECT Landf		•	
MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Veak Aoderate REACTION	COMMENTS	Natural Gamn
Elastic Silt (MH)(Con't)	<u>> ≥ 0</u>	(Con't)	
- red (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam 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.)	M. M
- 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.)	My Marin May Halleman
- 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.)	MMMANAMMAMANAMA
- and dark yellowish brown (10YR 4/6) saturated, very soft, high plasticity, with cobbles and gravel		(Recovery=17% between 77 and 92ft.)	MANNAMANAMANAMANAMANAMANAMANAMANAMANAMA
	PROJECT Land NCOMPANY SERVICES, INC. NATERIAL DESCRIPTION Blastic Silt (MH)(Con't) - red (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam 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 - 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 - yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel - and dark yellowish brown (10YR 4/6) saturated, very soft, high	N COMPANY SERVICES, INC. RENCE AND ENVIRONMENTAL ENGINEERING MATERIAL DESCRIPTION MATERIAL DESCRIPTION PROJECT Landfill Rep LOCATION Plant Bowe NOLLY BY MATERIAL DESCRIPTION Fred (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam 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 - 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 - yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel - and dark yellowish brown (10YR 4/6) saturated, very soft, high	LOG OF TEST BORING N. COMPANY SERVICES. INC. IENCE AND ENVIRONMENTAL ENGINEERING MATERIAL DESCRIPTION Flant Bowen COMMENTS WATERIAL DESCRIPTION Flant Bowen COMMENTS COMMENTS (Cont) Flastic Silt (MH)(Cont) Fred (2.5YR 4/6), very pale brown (10YR 8/3) and yellow (10YR 7/8) clay seam Sandy Lean Clay (CL) Fred (2.5YR 4/6) wet, medium stiff, medium plasticity, some gravel Fred (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 Fred (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 Fred (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 Fred (2.5YR 4/8), light gray (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 7/1) and black (10YR 2/1) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 7/1) and black (10YR 2/1) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity, some gravel Fred (2.5YR 4/8), light gray (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity and yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) wet, medium stiff, medium to high plasticity and yellowish brown (10YR 5/6) and yellowish brown (10YR 5/6) and



SC	OUTH	LOG OF T	EST BOF	RINC	BORING	GW PAG GI	C-4 GE 3 PC63	1 9 Z OF 3 3179
sou	JTHERN	COMPANY SERVICES, INC.			lacement Monitoring Wells			
EAF	RTH SCIE	ENCE AND ENVIRONMENTAL ENGINEERING L	OCATION Plan					
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate REACTION Strong	COMMENTS	Natur 99	ral Ga	165 mm
		Sandy Lean Clay (CL)(Con't)		<u>> ≥ 0</u>	(Con't)	>		-
90		- and dark yellowish brown (10YR 4/6) saturated, ve plasticity, with gravel	ry soft, high		(Recovery=13% between 92 and 107ft.)	W. Mary Jan Brand	Л	
100								
105								
		Bottom of borehole at 107.0 feet.						-
110								
110								
115								
110								
120								
120								
125								
130								
135								



BORING GWC-49R

SERVICE COMPLEXICIVIL TECH SUPPORT\DRILLING\PROJECTS\BOWEN\CCB WELLS 2014\MW49-49R-47R.GPJ PAGE 1 OF 3 LOG OF TEST BORING ECS18611 AND WELL INSTALLATION PROJECT 9 & 10 Landfill Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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 CHECKED BY L. Millet ANGLE -90 LOGGED BY L. Millet **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** STRATA DESCRIPTION **WELL DATA** Œ GRAPHIC DEPTH Protective steel cover 4-foot square concrete pad Top of casing Elev. = 709.57 ELEV ELEV (DEPTH Lean Clay (CL-ML) Surface Seal: concrete - orange, very moist, medium stiff, yellow mottling, partially 704.4 weathered rock fragments (2.0)701.4 GEOTECH LOG WITH WELL - ESEE2012DATABASE.GDT - 08/13/14 10:43 - \\SOUTHERNCO.COM\SHARED DATA\\WORKGROUPS\APC GENERAL Silt (ML) - brown, damp, very stiff, clayey, orange and dark red mottling, trace sand, partially weathered rock fragments 696. Well-graded Sand (SW) - gray, dry, medium dense, fine to coarse grain, yellow and red mottling, clay lenses, chert fragments 691.4 Lean Clay (CL-ML) - orange, damp, soft, yellow and red mottling, occasional partially weathered rock fragments, trace sand 686.4 Silt (ML) - orange, damp, very stiff, clayey, red and yellow mottling, partially weathered rock fragments, trace sand 681.4 Silt (ML) - orange, damp, very stiff, clayey, red and yellow mottling, partially weathered rock fragments, trace sand 30 676.4 Silt (ML) - orange, damp, very stiff, clayey, red, yellow, and light gray mottling, occasional partially weathered rock fragments, sandy lenses throughout 671.4 Silt (ML) - orange, damp, stiff, clayey, red and yellow mottling, partially weathered rock fragments

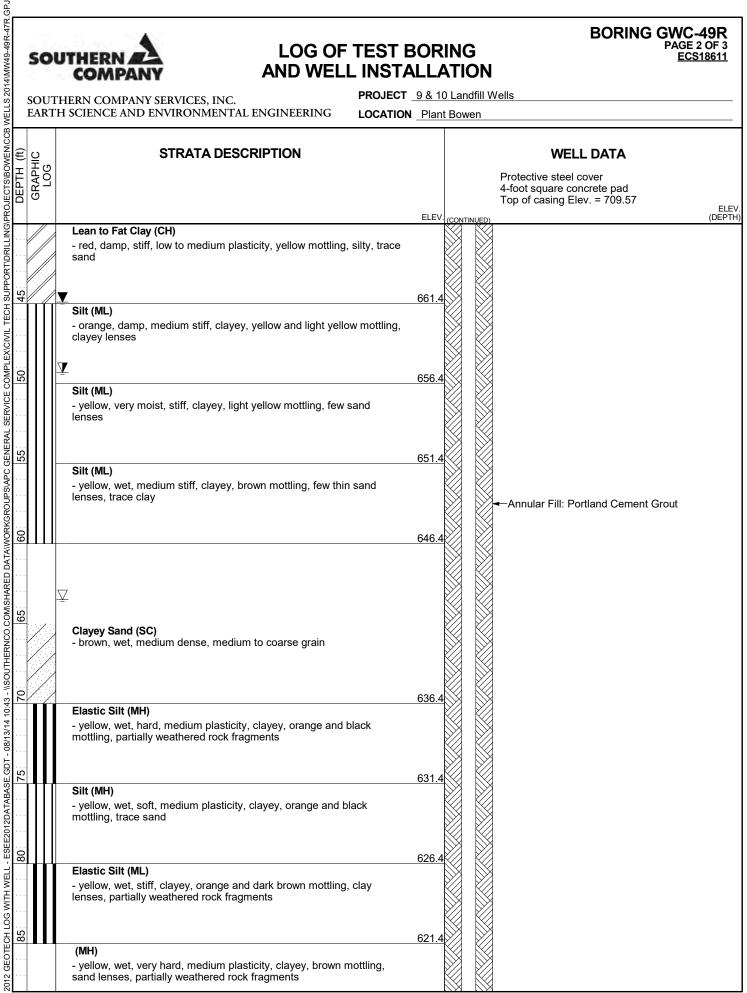


LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-49R PAGE 2 OF 3 ECS18611

SOUTHERN COMPANY SERVICES, INC.

PROJECT 9 & 10 Landfill Wells



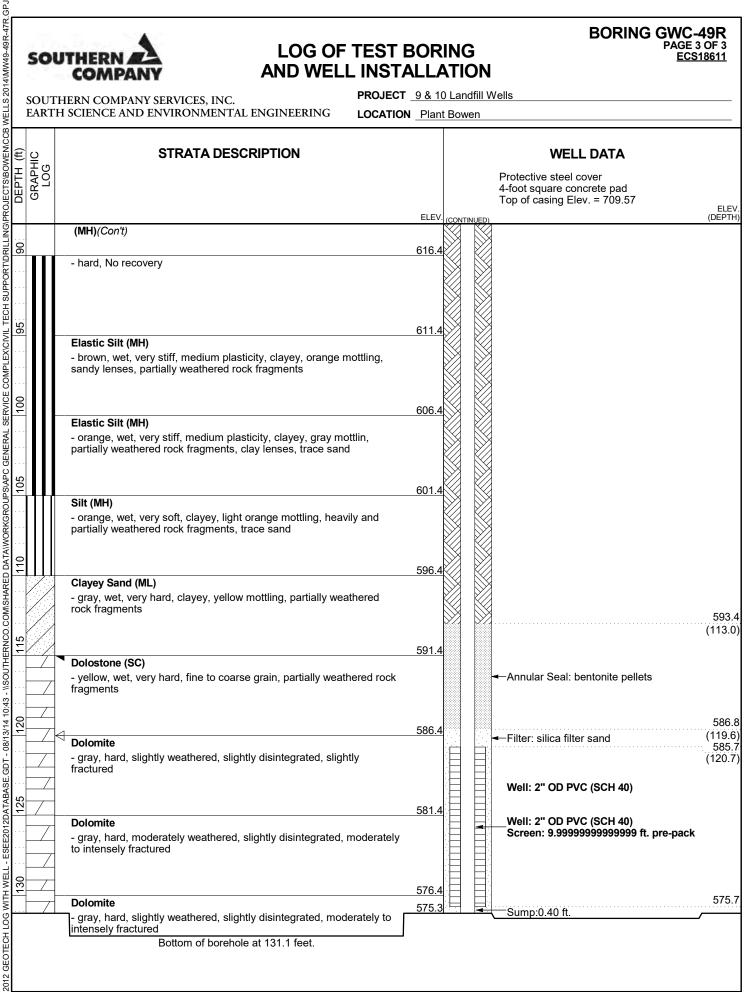


LOG OF TEST BORING AND WELL INSTALLATION

BORING GWC-49R PAGE 3 OF 3 ECS18611

SOUTHERN COMPANY SERVICES, INC.

PROJECT 9 & 10 Landfill Wells



WELL CONSTRUCTION LOG

Southern Company Generation

WELL CONSTRUCTION LOG	Southern Company Ge	eneration	
PROJECT: Plant Bowen Dry Gypsum	DRILLING CO.: SCS		WELL
Storage Facility	DRILLER: D. Willis		NAME
LOCATION: Cells 1&2	RIG TYPE: CME 550		
LOGGER: L. Millet	DRILLING METHODS: HSA/HQ Rock core with wa	ater	GWA-50
DATE CONSTRUCTED: 6/4/2008 - 8:00 am			
		DEPTH	ELEVATION
		FEET	FT, MSL
Leging Llinged Ten	✓ Padlock		,
Locking Hinged Top	= 0 ←		
1/4-inch Weep Hole	TOP OF RISER	-2.40	722.98
ackslash	2" Threaded Riser Cap		
	Pea Gravel in annular space		
4-ft x 4-ft x 4" concrete pad	R ca Graver in annual space		
	CROUND CUREACE	0.00	720.58
	GROUND SURFACE	0.00	720.56
	DDOTECTIVE CASING		
\:\!	PROTECTIVE CASING		
	SIZE: 4x4-inch		
	TYPE: Anodized Aluminum		
L Company of the Comp	₩ .:}		
	BOTTOM OF PROTECTIVE CASING		
Well Development: Pump/surge until			
clear.	BACKFILL MATERIAL		
	TYPE: Portland Cement Grout		
	AMOUNT: 20 bags @ 1.3 cf/bag = 26 cf		
	PLACEMENT: Tremie		
All drill equipment steam-cleaned			
between borings	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		
	TAE-LAGITIETER GAND. DOI- IA		
	BOTTOM OF RISER / TOP OF SCREEN	84.03	636.55
	SCREEN	U + .U3	000.00
	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	04.00	000 55
	BOTTOM OF SCREEN	94.03	626.55
		04.00	000.05
	BOTTOM OF CASING	94.33	626.25
HOLE DIA	: 10.5"		

SOU	THERN COMP	DRIL	LING L	OG			Hole No.	G	SWA-50	
Energy 1	to Serve You	r World [™] GEOLOG		RVICES			Sheet			
SITE _			acility							
		Cells 1 & 2	COORE	DINATES N	150215				2442.89	
		0 BEARING 0								
		HSA/HQ rock core with water NO. SAM								
	3 SIZE	LENGTH PTH 62.5ELEV							/2008	
		QUANTITY							3/2008	
		D. Willis RECORDER L. Millet AF					OMP. DATE		/2008	
	1		Sample	Stan	dard Penetration Test		_			
Depth	Elev.	Material Description, Classification and Remarks	No.	From To	Blows	N	Commen	ts	% Rec	RQD
0	720.58									-
1	719.58									
2	718.58									
3	717.58									
4	716.58									
			S-1	4.5.6	4.7.40	47				
5		Dark red CLAY, dry, stiff, with light gray mottling	5-1	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	S-2	9.5-11	5-10-14	24				
		orange silt, occassional coarse sand grains	0-2	3.5-11	0-10-14	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	S-3	14.5-16	6-8-8	16				
16	704.58	pebbles								
17	703.58									
18	702.58									
19	701.58									
20	700.58	Orange and dark red silty CLAY, dry, stiff,	S-4	19.5-21	7-8-11	19				
21	699.58	occassional pebbles								
22	698.58									
23	697.58									
24	696.58 9901 7-26-	2004								

SOUTHERN A COMPANY Energy to Serve Your World"

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-50

Sheet 2 of 4

SITE _	Plant Bowen Dry Gypsum Storage Facility		TOTAL DEPTH		TOTAL DEPTH	93	SURF.ELEV.	720).58
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard To	dard Penetration Test Blows	N	Comments	0/ 5	RQD
25		Light tan and white silty CLAY, dry, stiff, with	S-5	24.5-26	6-8-9	17	Comments	% Rec	RQD
26	694.58	occassional pebbles		21.0 20					
27	693.58								
28	692.58								
29	691.58								
30	690.58	Dark red and white silty CLAY, dry, crumbly,	S-6	29.5-31	6-12-13	25			
31	689.58	occassional tan mottling							
32	688.58								
33	687.58								
34	686.58								
35	685.58	Light tan and orange silty CLAY, moist, with occassional 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		Tan and light brown clayey SILT, moist, some white mottling, occassional coarse sand grains	S-9	44.5-46	5-10-10	20			
46	674.58								
47	673.58								
48	672.58 671.58								
50		Orange and brown clayey SILT, moist, firm,	S-10	49.5-51	3-4-5	9			
51		occassional dark brown mottling, degraded white cobbles							
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								

SOUTHERN COMPANY
Energy to Serve Your World*

DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-50

Sheet 3 of 4

SITE _	Plant Bowen Dry Gypsum Storage Facility				TOTAL DEPTH	93	SURF.ELEV.	720	.58
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stand From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
		machia becompany, oldesinedativi and remaine			2,6110	.,	Commence	70 Nec	NQD
57	663.58								
58	662.58								
59	661.58								
60	660.58	Same as above, with chert	S-12	59.5-61	3-4-5	9			
61	659.58								
62	658.58								
63	657.58								
64	656.58								
65		Same as above	S-13	64.5-66	5-8-12	20			
66	654.58								
67	653.58								
68	652.58								
69	651.58								
70	650.58	Orange clayey SILT, saturated, soft, with dark red, white, and dark brown mottling, carbonate	S-14	69.5-71	9-12-12	24			
71	649.58	and chert cobbles and gravel							
72	648.58								
73	647.58								
74	646.58								
75	645.58	Chert cobble in bottom of spoon	S-15	74.5-76	50/1	R			
76	644.58								
77	643.58								
78		Auger refusal - 78.2							
		Auger retusar - 70.2							
79	641.58	Toward common short and and a set of the set of the		70 5 00 5			4.7/40.0		
80		Tan and orange chert and carbonate, with fractures, fractures filled with sand and clay, iron		78.5-88.5			1.7/10.0		
81	639.58	staining, rock is fossiliferous and pitted							
82	638.58								
83	637.58								
84	636.58								
85	635.58								
86	634.58								
87	633.58								
88	632.58								

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DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-50

Sheet 4 of 4

Plant Bowen Dry Gypsum Storage Facility 93.5 SITE TOTAL DEPTH SURF.ELEV. 720.58 Sample No. RQD Elev. Depth Material Description, Classification and Remarks From To Blows N Comments % Rec 631.58 Same as above 88.5-93.5 0.8/5.0 89 630.58 90 91 629.58 628.58 92 93 627.58 93.5 Bottom of boring

WELL CONSTRUCTION LOG

Southern Company Generation

Storage Facility COATION: Cells 182 RIG TYPE: CME 550 LOGGER L. Millet DATE CONSTRUCTED: 6/10/2008 - 9:00 am DEPTH ELE FEET FOR GROUND SURFACE JAIN-INCLUDED SURFACE All drill equipment: Pump/surge until clear. All drill equipment steam-cleaned between borings Well Development: Pump/surge until clear. All drill equipment steam-cleaned between borings PACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 c/fbag = 34 cf PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: Flush Threaded TOP OF FILTER PACK TYPE: 33-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: OF FILTER SAND: DSI: 1A BOTTOM OF RISER / TOP OF SCREEN 128.18 SCREEN DIA: 2-inch TYPE: Slotted SCOT EARNING: 0.25-inch SLOT LENGTH: 15-inch	
LOCATION: Cells 1822 RIG TYPE: CME 550 DOTE CONSTRUCTED: 6/10/2008 - 9:00 am DEPTH EFET FEET Padlock TOP OF RISER -2.30 7 Protective Casing Size: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Size: 4x4-inch TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 cf/bag = 34 cf PLACEMENT: Tremie PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 128.00 5 ANNULAR SEAL TYPE: 38 lanch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: 38 lanch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 14 (20/30 grain size) Drillers Services, Inc. AMOUNT: 3.5 bags: 50 lbs/bag PLACEMENT: Tremie; Nash with water PRE-PACK FILTER SAND. DSI - 1A BOTTOM OF RISER / TOP OF SCREEN 128.18 SCREEN DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING WIDTH: 0.51-inch SCREEN DIA: 2-inch TYPE: Slotted SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT ENSITH: 1.5-inch	WELL
DRILLING METHODS: HSA/HQ Rock core with water DATE CONSTRUCTED: 6/10/2008 - 9:00 am DEPTH ELEFEET F FLOCKING Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE 0.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Annotized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. TYPE: Producted Aluminum BOTTOM OF PROTECTIVE CASING Well development steam-cleaned between borings RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL 128.00 5 ANNULAR SEAL TYPE: JSI-anch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 14 (20/30 grain size) Drillers Services, Inc. AMOUNT: 3.5 bags; 50 lbs/bag PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 14 (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 SCREEN DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	NAME
DATE CONSTRUCTED: 6/10/2008 - 9:00 am DEPTH ELE FEET F F FEET F F FEET F F F F F F F F F F F F F F F F F F F	
Locking Hinged Top 1/4-Inch Weep Hole 2" Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE O.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING SIZE: 4x4-inch TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 cf/bag = 34 cf PLACEMENT: Tremie DiA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 3 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Diffilers Services, Inc. AMOUNT: 3.5 bags; 50 lbs/bag PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Diffilers Services, Inc. AMOUNT: 3.5 bags; 50 lbs/bag PLACEMENT: Tremie SCREEN DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT EMOSTH! 1.5-inch	SWA-50R
Locking Hinged Top 1/4-inch Weep Hole Top OF RISER -2.30 7 Pea Gravel in annular space Pea Ground Surface 0.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 cf/bag = 34 cf PLACEMENT: Tremle RISER CASING DIA: 2-inch TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF SEAL 128.00 5 FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Drillers Services, Inc. AMOUNT: 3.5 bags; 50 lbs/bag PLACEMENT: Tremie TOP OF SEAL 128.18 5 FILTER PACK TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch	
Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE O.00 7 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 cifbag = 34 cf PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF FILTER PACK TYPE: DSI Sand - 1A (20/30 grain size) Dnillers 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 DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch	EVATION
Locking Hinged Top 1/4-inch Weep Hole 2" Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE O.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING Well Development: Pump/surge until clear. BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 c//bag = 34 cf PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: Flush Threaded TOP OF SEAL AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING MOTH: 0.01-inch OPENING TYPE: Slotted SLOT LENGTH: 1.5-inch	FT, MSL
1/4-inch Weep Hole TOP OF RISER -2.30 7 Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE 0.00 7 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 RISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: 3/8-inch coated bentonite pellets 5-qal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING YVPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	,
2" Threaded Riser Cap Pea Gravel in annular space GROUND SURFACE 0.00 7 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 PRISER CASING DIA: 2-inch TYPE: ASTM-NSF Schedule 40 PVC JOINT TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING TYPE: Slotted SLOT SPACING: 0.25-inch SLOT LENGTH: 1.5-inch	704.00
A-ft x 4-ft x 4" concrete pad Pea Gravel in annular space GROUND SURFACE O.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING BACKFILL MATERIAL TYPE: Portland Cement Grout AMOUNT: 26 bags @ 1.3 c/fbag = 34 cf PLACEMENT: Tremie RISER CASING DIA: 2-inch TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF SEAL TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 1 bucket PLACEMENT: Tremie TOP OF 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 DIA: 2-inch TYPE: ASTM-NSF Sch 40 PVC Prepack OPENING WIDTH: 0.01-inch OPENING WIDTH: 1.5-inch	721.30
4-ft x 4-ft x 4" concrete pad GROUND SURFACE 0.00 7 PROTECTIVE CASING SIZE: 4x4-inch TYPE: Anodized Aluminum BOTTOM OF PROTECTIVE CASING All drill equipment steam-cleaned between borings RISER CASING DIA: 2-inch TYPE: 3/8-inch coated bentonite pellets 5-gal buckets AMOUNT: 15 bucket PLACEMENT: Tremie TOP OF 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 5 SCREEN DIA: 2-inch TYPE: Slotted SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT SENGTING DIA: 2-inch TYPE: Slotted SLOT SPACING: 0.25-inch SLOT SPACING: 0.25-inch SLOT SENGTING: 0.25-inch	
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SLOT LENGTH: 1.5-inch	
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	580.82
BOTTOM OF CASING 138.48 5	580.52
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HOLE DIA: 7.5"	

Energy to Serve Your World* GEOLOGICAL SERVICES 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 O CONTRACTOR SCS DRILL NO. CME 550 DRILLING METHOD HSA/HQ rock core with water NO. SAMPLES 18 NO. U.D. SAMPLES 0	SOUTHERN A			DRILLIN	IG L	OG			Hole No.	G'	WA-50R	}
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13 706.00 14 705.00 15 704.00 16 703.00 17 702.00 18 701.00 19 700.00 20 699.00 21 698.00 22 697.00 23 696.00 24 695.00	11	708.00										
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21 698.00 22 697.00 23 696.00 24 695.00	20		Dark red silty CLAY dry hard with gra	avel and brown	S-4	19.5-21	7-12-16	28				
22 697.00 23 696.00 24 695.00					U-4	10.0.21	. 12 10					
23 696.00 24 695.00												
24 695.00	22	697.00										
	23	696.00										

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DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-50R

Sheet 2 of 5

Plant Bowen Dry Gypsum Storage Facility 142.9 TOTAL DEPTH SURF.ELEV. 719.00 Standard Penetration Test Elev. No. RQD Depth Material Description, Classification and Remarks From To Ν Comments Blows % Rec S-5 24.5-26 10-8-10 18 25 694.00 Orange and white silty CLAY, moist, hard, with sand and gravel 693.00 26 27 692.00 28 691.00 29 690.00 S-6 29.5-31 29 30 689.00 Pink and white silty CLAY, moist, firm, with degraded 15-16-13 carbonate pebbles 31 688.00 32 687.00 33 686.00 34 685.00 684.00 Pink and tan clayey SILT, dry, with trace sand, S-7 34.5-36 6-21-21 42 35 degraded carbonate cobbles 36 683.00 37 682.00 38 681.00 39 680.00 39.5-41 679.00 Orange and white silty CLAY, dry, firm, with pebbles S-8 6-25-14 39 40 and gravel 678.00 41 42 677.00 43 676.00 44 675.00 S-9 44.5-46 674.00 Tan and white silty CLAY, moist, plastic, some dark 5-5-3 8 45 orange mottling 46 673.00 47 672.00 48 671.00 670.00 S-10 50 669.00 Same as above 49.5-51 4-5-11 16 668.00 51 52 667.00 53 666.00 665.00 54 664.00 Tan and orange silty CLAY, moist, plastic, S-11 54.5-56 7-8-3 11 occassional white mottling, cobbles 663.00

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DRILLING LOG GEOLOGICAL SERVICES

Hole No. GWA-50R

GEOLOGICAL SERVICES Sheet 3 of 5

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

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	14:	2.9 SURF.ELEV.	719	.00
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
57	662.00								
58	661.00								
59	660.00								
60	659.00	Light orange and tan silty CLAY, moist, plastic,	S-12	59.5-61	6-9-7	16			
61	658.00	occassional white mottling, gravel							
62	657.00								
63	656.00								
64	655.00								
65	654.00	Tan and orange clayey SILT, moist, plastic, with	S-13	64.5-66	3-7-9	16			
66	653.00	chert sand and pebbles							
67	652.00								
68	651.00								
69	650.00								
70		Orange clayey SILT, moist, firm, occassional black	S-14	69.5-71	3-5-8	13			
71	648.00	mottling							
72	647.00								
73	646.00								
74	645.00		S-15	74.5-76	4-7-16	23			
75	644.00	Orange clayey SILT, moist, firm, with chert and carbonate pebbles, saturated last 3"							
76	643.00	our portuge possibles, surfaced last o							
77	642.00								
78	641.00								
79	640.00								
80	639.00	White and light tan clayey SILT, moist, firm, orange and brown mottling	S-16	79.5-81	4-6-7	13			
81	638.00	-							
82	637.00								
83	636.00								
84 85	635.00	Light tan silty CLAY, moist, firm, with chert and	S-17	84.5-86	7-7-24	31			
86	633.00	carbonate gravel	3-17	04.5-00	1-1-24	31			
87	632.00								
88	631.00								
	9901 7-26-2	2004							

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DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWA-50R

Sheet 4 of 5

SITE _		Plant Bowen Dry Gypsum Storage Facility			TOTAL DEPTH	14	SURF.ELEV.	719	.00
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Stan From To	dard Penetration Test Blows	N	Comments	% Rec	RQD
89	630.00								
90		Tan clayey SILT, moist, firm, with chert gravel	S-18	89.5-91	4-4-10	14			
91	628.00								
92		Auger refusal - 92.0							
93	626.00								
94		No recovery		92-97			0.0/5.0		
95	624.00								
96	623.00								
97		White fossiliferous carbonate gravel and cobbles,		97-107			0.2/10.0		
98		gray chert with pink veining and non-directional fractures							
99	620.00								
100	619.00								
101	618.00								
102	617.00								
103	616.00								
104	615.00								
105	614.00								
106	613.00								
107	612.00	Tan carbonate as above		107-117			1.5/10.0		
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		Same as above		447.407			4.040.0		
118	601.00			117-127			1.3/10.0		
119	600.00								
120 Form GS	599.00 9901 7-26-2	004							

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DRILLING LOG GEOLOGICAL SERVICES

Hole No.

GWC-45R

Sheet 5 of 5

142.9 Plant Bowen Dry Gypsum Storage Facility SURF.ELEV. 719.00 TOTAL DEPTH SITE Standard Penetration Test Elev. RQD Depth Comments Material Description, Classification and Remarks From To Blows % Rec 121 598.00 122 597.00 123 596.00 124 595.00 125 594.00 126 593.00 127-137 1.4/10.0 127 592.00 Same as above 591.00 128 590.00 129 130 589.00 131 588.00 132 587.00 133 586.00 134 585.00 135 584.00 583.00 136 137-142.9 1.5/6.7 137 582.00 Same as above 138 581.00 140 579.00 578.00 141 142 577.00 576.00 143 142.9 - Bottom of boring 144 145 146 147 148 149 150 151 152



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE. GDT - 5/5/16 16:54 - S:WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTURILLING/PROJECTS/GA-BOWENLANDFILL

LOG OF TEST BORING

BORING GWA-51R Z PAGE 1 OF 2 GPC633179

REPLACEMENT WELLS 2016\BORING LOGS\BOWEN LANDFILL REPLAC **PROJECT** Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen DATE STARTED 2/18/2016 COMPLETED 3/1/2016 SURF. ELEV. 706.3 COORDINATES: N:34.135881 E:84.902986 CONTRACTOR Cascade EQUIPMENT Tracked METHOD Rotosonic **DRILLED BY** T. Ardito LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE **BEARING** BORING DEPTH 92 ft. GROUND WATER DEPTHDURING 45 ft. COMP. 50.4 ft. DELAYED 41.2 ft. after 72 hrs. NOTES , HCL REACTION 3ROUNDWATER 3BSERVATIONS WELL DATA **ELEVATION SRAPHIC** DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards; **Joderate** 4-foot square concrete pad Silt (ML) Surface Seal: - mottled red (2.5YR 4/8) and yellow / pale yellowish orange (10YR 8/6) Concrete dry, with sand and clay - some gravel seams 5 - mottled red / moderate reddish brown (10R 4/6) and brownish yellow (10YR 6/8) dry, soft, low plasticity - medium stiff 10 Annular Fill: Portland Cement-Bentonite Grout (4 - 94lbs bags PC, 1 -- brownish yellow (10YR 6/8) 50lbs bags Gel, 45 gal. Water) 15 - mottled yellow (10YR 7/8) and black (10YR 2/1) dry, medium stiff, few seams of fine-gravel and white sand 20 25 - very damp - mottled yellow (10YR 7/6) and black (10YR 2/1) medium stiff, with white coarse-sand and weathered gravel 30 - with coarse gravel Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (0.5 - 5gal buckets (78.5'-75.0')) and Baroid Hole 35 Plug 3/8 Chips (15 - 50lbs bags (75.0'-22.0')) - wet Elastic Silt (MH) - dark yellowish brown (10YR 4/4), yellow (10YR 7/6) and black (10YR 2/1) wet, medium stiff 40 - saturated, with sand and coarse gravel (non-carbonate)



BORING GWA-51R Z PAGE 2 OF 2 GPC633179

PROJECT Landfill Replacement Monitoring Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **LOCATION** Plant Bowen HCL REACTION **SROUNDWATER**OBSERVATIONS WELL DATA GRAPHIC LOG ELEVATION DEPTH (ft) MATERIAL DESCRIPTION Completion: protective aluminum cover with bollards: **Joderate** 4-foot square concrete pad Elastic Silt (MH)(Con't) Clayey Gravel (GC) - reddish yellow (7.5YR 6/6) wet 50 - some cobbles, pulverized rock Dolostone - grayish brown (2.5Y 5/2) and gray (10YR 5/1) hard 55 - 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

> - 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

- 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

- thick to massive bedded

2" OD PVC (SCH 40) Screen:

Filter:

- 50 lbs bags)

Standpipe:

Annular Seal:

(75.0'-22.0'))

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

10 ft; 0.010" Slot Prepack

Filter Media 20/40 Silica Sand (4

Backfill:Filter Media 20/40 Silica Sand (0.25 - 50 lbs bags 92.0'-91.0')) **¢ave-in t**o 9∕2 ft.

Sump:0.29999999999997 ft.

Bottom of borehole at 92.0 feet.

95

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

60

65

75

80

85

90



GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 5/5/1/16 16:52 - S:WORKGROUPSYAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/GA-BOWEN/LANDFILL REPLACEMENT WELLS 2016/BORING LOGS/BOWEN LANDFILL REPLA

LOG OF TEST BORING

BORING GWA-51R Z PAGE 1 OF 2 GPC633179

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Landfill Replacement Monitoring Wells

LOCATION Plant Bowen

DATE	STAR	TED 2/18/2016	COMPLETED 3/1/2016 SURF. ELEV.	706.3	c	OORDINATES: N:34.135881 E:84	1.902986
CONT	RACTO	OR Cascade	EQUIPMENT Tracked	METHO	Roto:	sonic	
DRILL	ED BY	T. Ardito	LOGGED BY _W. Shaughnessy CHECKE	D BY <u>B.</u>	Smelse	er ANGLE BE	ARING
BORII	NG DEI	PTH 92 ft.	GROUND WATER DEPTHDURING _45 ft.	COM	IP. <u>50.</u>	4 ft. DELAYED 41.2 ft. after	72 hrs.
NOTE	s						
DEРТН (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION	ELEVATION	Weak Moderate REACTION Strong	COMMENTS	Natural Gamma
5		Silt (ML) - mottled re 8/6) dry, w - some gra	ed (2.5YR 4/8) and yellow / pale yellowish orang ith sand and clay avel seams	ge (10YR		(Recovery=100% between 0 and 7ft.)	
10		- mottled r yellow (10' - medium s	ed / moderate reddish brown (10R 4/6) and brown YR 6/8) dry, soft, low plasticity stiff	rnish		(Recovery=95% between 7 and 17ft.)	MMMMMMMM
		- brownish	yellow (10YR 6/8)				MWMM
20		- mottled y few seams	vellow (10YR 7/8) and black (10YR 2/1) dry, med s of fine-gravel and white sand	lium stiff,		(Recovery=100% between 17 and 27ft.)	Who have have
25			rellow (10YR 7/6) and black (10YR 2/1) medium se-sand and weathered gravel	stiff, with		(Recovery=90% between 27 and 37ft.)	MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
		- with coar	se gravel				Jam Jam
35		- wet				(Recovery=60% between 37	MMM
40	$\ $	(10YR 2/1)	It (MH) owish brown(10YR 4/4), yellow (10YR 7/6) and b) wet, medium stiff	olack		and 47ft.)	W/W/W
45	$\ $	Ţ - saturated	d, with sand and coarse gravel (non-carbonate)				Mrs My Mars



GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 5/5/16 16:52 - S.:WORKGROUPS'APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS'IGA-BOWENLANDFILL REPLACEMENT WELLS 2016/BORING LOGS'BOWEN LANDFILL REPLA

LOG OF TEST BORING

BORING GWA-51R Z PAGE 2 OF 2 GPC633179

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

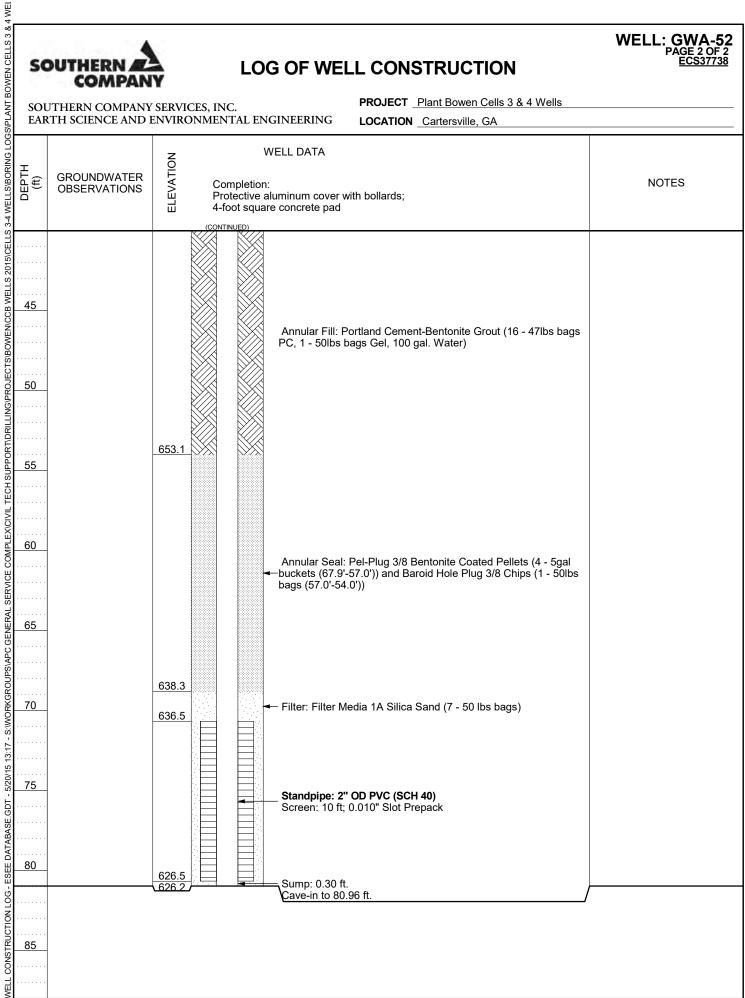
PROJECT Landfill Replacement Monitoring Wells

		ENCE AND ENVIRONMENTAL ENGINEERING LOCATION Plan	nt Bow	en	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Weak Moderate REACTION Strong	COMMENTS	Natural Gamma
		Elastic Silt (MH)(Con't)	<u>> ≥ 5</u>	(Con't)	\$
50		Clayey Gravel (GC) - reddish yellow (7.5YR 6/6) wet ▼		(Recovery=60% between 47 and 57ft.)	MWWW
		- some cobbles, pulverized rock			5
		Dolostone			<u></u>
55		- grayish brown (2.5Y 5/2) and gray (10YR 5/1) hard			<u>}</u>
_ 33					}
		- medium dark gray (N4) and dark greenish gray (5GY 4/1) fine grain, hard, not to slightly weathered on fractures weathered, slightly		(Recovery=30% between 57 and 67ft.)	Sam Mraya
60		fractured, carbonate, thin fractures healed with calcite			\$
					\rightarrow \\ \frac{1}{2}
					→
65					M
05					-
		dark gray (N2) fine grain hard not to clightly weathered medium to		(Recovery=100% between 67	Who will
		 dark gray (N3) fine grain, hard, not to slightly weathered, medium to thick bedded, slight to moderately fractured, vertical and cross-cutting 		and 77ft.)	\right\{ \right\}
70		thin fractures, calcite healed fractures			
					3
					}
75					3
75					J
		- dark gray (N3) and black (N1) fine grain, hard, not to slightly		(Recovery=100% between 77	MANAMA
	_	weathered, medium to thick bedded, slight to moderately fractured,		and 87ft.)	
80		low carbonate reaction, fractures healed with calcite, fractures up to 2 inch, cross-cutting, brown-yellow water staining on fractures			\{\bar{\}}
					_\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
					\$
85					\$
				(Recovery=60% between 87	-
				and 92ft.)	
90		- thick to massive bedded			
		Bottom of borehole at 92.0 feet.			
95					

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS SOUTHERN LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 707.1 ٠٥, Surface Seal: Concrete 703.6 10 15 20 Annular Fill: Portland Cement-Bentonite Grout (16 - 47lbs bags PC, 1 - 50lbs bags Gel, 100 gal. Water) 25 30 35

SOUTHERN COMPANY SERVICES, INC.

PROJECT Plant Bowen Cells 3 & 4 Wells





SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPS\APC GENERAL

BORING GWA-52 PAGE 1 OF 2

LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet **ANGLE BEARING** LOGGED BY B. Smelser GROUND WATER DEPTH: DURING 67 ft. DELAYED 56.79 ft. after 100 hrs. **BORING DEPTH** 80.96 ft. **COMP.** 55.75 ft. NOTES TOC Elevation 710.12, Sonic Drilling - 7"OD Casing in Overburden, 6"OD Core Well installed. Refer to well data sheet. HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma 1oderate 165 Silt (ML) Soil density gauged by thumb - trace mottling red / moderate reddish brown (10R 4/6) and brown penetration MINIMONI CHAN MINIMONO CONTRACTOR MINIMONO CONTRACTOR C (7.5YR 5/4) fill moist, very stiff, interbedded clayey zones, trace coarse to cobble/subrounded to rounded rock fragments 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, 10 trace coarse to very coarse/rounded to subrounded rock fragments 15 Silt (ML) - dusky red / dark reddish brown (10R 3/4) residuum moist, very stiff, trace medium to coarse rock fragments 20 - 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 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 30 trace zones of interbedded CL Lean Clay (CL) 35 - 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



GRAPHIC LOG

DEPTH (ft)

45

50

55

60

65

70

75

80

85

LOG OF TEST BORING

BORING GWA-52 PAGE 2 OF 2

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

Lean Clay (CL) (Con't)

PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA HCL REACTION ELEVATION MATERIAL DESCRIPTION **COMMENTS** Natural Gamma Moderate 65 My Sand How March Marchan Marchan Marchan Manne Marchan Manne Marchan March Marchan March March March March Ma - 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

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

<u>v</u>

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLINGIPROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3 & 4

- 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-

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

Dolomite with Chert fragments

Bottom of borehole at 81.0 feet.

WELL CONSTRUCTION LOG - ESEE DATABASE, GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEIL SOUTHERN LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 708.3 ٠٥, Surface Seal: Concrete 705.3 5 10 15 Annular Fill: Portland Cement-Bentonite Grout (39 - 47lbs bags PC, 3 - 50lbs bags Gel, 255 gal. Water) 20 25 30

SCELES 3 & 4 WI	OUTHERN #			LO	G OF WEI	L CONSTRUCTION	WELL: GWA-53 PAGE 2 OF 4 ECS37738
SOU	JTHERN COMPANY	SERVI	CES, IN	C.		PROJECT Plant Bowen Cells 3 & 4 Wells	
EAR	TH SCIENCE AND	ENVIR	ONMEN			LOCATION Cartersville, GA	
DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	Pro	mpletion tective a oot squa	WELL DATA i: aluminum cover w re concrete pad	vith bollards;	NOTES
WHELE COINS HANDERS COLD 1937 1- SIZULIS 1937		653.3			Annular Fill: P PC, 3 - 50lbs b	ortland Cement-Bentonite Grout (39 - 47lbs bags ags Gel, 255 gal. Water)	
FELL CONS ROLL 1972 - 55 EDE DATABASE. GDT - 5720/15 13:17 - 5					Annular Seal: buckets (105.5 50lbs bags (94	Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal '-94.0')) and Baroid Hole Plug 3/8 Chips (13 - .0'-55.0'))	

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICE WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8 4 WEI SOUTHERN COMPANY LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 70 75 80 85 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')) 90 95 100

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

603.3

105

sc	DUTHERN A LOG OF	WELL CONSTRUCTION	WELL: GWA-5 PAGE 4 OF ECS3773
	COMPANY		
SOU	JTHERN COMPANY SERVICES, INC. TH SCIENCE AND ENVIRONMENTAL ENGINEER	PROJECT Plant Bowen Cells 3 & 4 Wells RING LOCATION Cartersville, GA	
LAK	TITI SCIENCE AND ENVIRONMENTAL ENGINEER	Cartersville, GA	
DEPTH (ft)	교 4-foot square concre	n cover with bollards;	NOTES
	(CONTINUED)	Filter Media 1A Silica Sand (4.5 - 50 lbs bags)	
110	600.8 Filter.	. Filter Media 1A Silica Sanu (4.5 - 50 lbs bays)	
	Stance	Inine: 2" OD PVC (SCH 40)	
	Scree	dpipe: 2" OD PVC (SCH 40) en: 10 ft; 0.010" Slot Prepack	
115			
115			
	590.8 Sump	o: 0.30 ft. -in to 117.85 ft.	
	Cave	-in to 117.85 ft.	
120			
125			
130			
135			
133			
140			



SERVICE COMPLEXICIVIL TECH SUPPORTÜDRILLING/PROJECTS/BOWENICCB 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:\WORKGROUPS\APC GENERAL

LOG OF TEST BORING

BORING GWA-53 PAGE 1 OF 4 ECS37738

PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet **ANGLE BEARING** LOGGED BY B. Smelser BORING DEPTH 117.85 ft. **GROUND WATER DEPTH: DURING** 53.5 ft. DELAYED 59.15 ft. after 100 hrs. **COMP.** 56 ft. 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. , HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma **Aoderate** 165 Silt (ML) SPT N=42bpf(@3ft.) - mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, 12/18/24 some light gray to white/angular to subangular dolomite fragments 5 SPT N=32bpf(@8ft.) - mottled red (10R 4/8) and yellowish red (5YR 5/8) fill dry, hard, 7/15/17 trace white/medium to coarse/angular dolomite fragments 10 SPT N=21bpf(@13ft.) - mottled yellowish red (5YR 5/8) and red (10R 4/8) residuum dry, 8/9/12 very stiff, abundant white with orangish staining/coarse/angular to 15 subangular dolomite fragments SPT N=19bpf(@18ft.) Elastic Silt (MH) - mottled brownish yellow (10YR 6/8) and red (2.5YR 4/8) residuum 6/9/10 dry, very stiff, low plastic, abundant coarse/angular to 20 subangular/very brittle to friable dolomite fragments, trace light gray interbedded clay lenses SPT N=20bpf(@23ft.) - mottled brownish yellow (10YR 6/8) and red / moderate reddish 6/6/14 brown (10R 4/6) residuum moist, very stiff, low plastic, trace light gray 25 angular dolomite and chert fragments SPT N=11bpf(@28ft.) - trace mottling reddish yellow (7.5YR 7/8), reddish yellow (7.5YR 3/5/6 7/8) and brownish yellow (10YR 6/8) residuum moist, stiff, trace clay 30 and rock fragments

LOG OF TEST BORING

sc		LOG OF TE	ST BOR	RING		BORING GWA-5 PAGE 2 OF ECS3773
	JTHER	N COMPANY SERVICES, INC.	OJECT Plant		Cells 3 & 4 Wells	
(#)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS	Natural Gamn
35		Elastic Silt (MH) - trace mottling strong brown (7.5YR 5/8) and reddish y 7/8) residuum moist, very stiff, low plastic, abundant ligh gray/angular dolomite and dark bluish gray to brown che	it		SPT N=27bpf(@33ft.) 20/18/9	
40		- mottled strong brown (7.5YR 5/8) and red / moderate brown (10R 4/6) residuum moist, stiff, low plastic, trace of light gray/coarse/subangular chert and dolomite fragmen	dark gray to		SPT N=13bpf(@38ft.) 10/4/9	MANNAM MANNAM
15		Silt (ML) - mottled brown (7.5YR 4/4) and reddish yellow (7.5YR residuum moist, stiff, abundant medium to coarse/subro dolomite fragments, trace dark gray/coarse/subangular t subrounded chert fragments	unded	-	SPT N=14bpf(@43ft.) 8/6/8	Monder of the Manney of the Ma
50		- reddish yellow (7.5YR 6/8) residuum moist, stiff, dark l angular chert fragments, trace clay	brown		SPT N=13bpf(@48ft.) 4/7/6	WWWWW.
55		 ✓ Elastic Silt (MH) mottled strong brown (7.5YR 5/8) and reddish yellow residuum wet, very stiff, low plastic, subangular to subro and dolomite fragments 		-	SPT N=19bpf(@53ft.) 7/8/11	AN MANAMAN
60		▼ - yellowish red (5YR 5/8) residuum wet, soft, low plastic trace rock fragments	, cohesive,		SPT N=2bpf(@58ft.) 1/1/1	W~~~~
65		Lean Clay (CL) - yellowish red (5YR 5/8) residuum wet, very soft, low to plastic, trace rock fragments	o medium	_	SPT N=0bpf(@63ft.) WOH	

LOG OF TEST BORING

SOMEN CELLS	OUTH	ERN A	LOG OF	TEST B	OR	RING			GE 3 (ECS37	OF 4
SOU EAF	JTHERN	N COMPANY SERVICE	ES, INC. IMENTAL ENGINEERING	PROJECT _			Cells 3 & 4 Wells			
DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		ELEVATION	Weak Moderate Strong	COMMENTS	Natu 95	ıral Ga 01	ımma
SOU EAF (#)) 70 80 85 85 86 87 88 88 88		Dolostone - light gray (N7) ar medium hard to ha moderate- to high-trace total and no happrox. 71-72', cor calcite fracture fill v	nt brown (5YR 5/6) wet, very so hesive, abundant dark brown of the desire, abundant dark brown of the desire, abundant dark brown of the desired light bluish gray (10B 7/1) verd, slightly to moderately weath angle fractures visible, moderateling visible, staining visible to epieces stained from approx. Visible, trace dark brown interbestication cavity (77.5-100') and rock fragments recovered	ery fine to fine g nered, massive, te to partial heal within fractures t 72-77.5', trace edded chert	lrain, ling, from	NS N	SPT N=0bpf(@68ft.) WOH Degree of fracturing and fracturing orientation unknown due to sonic drilling method	J. M. M. M. J.		
90 95 100 100 100 100 100 100 100 100 100 10		weathered, massiv low-angle fractures healed fractures, tr	5/1) very fine to fine grain, har e, moderate- to high-angle frac , moderate to full healing, no v ace staining visible from appro visible, calcite fracture fill visib	ctures visible, tra isible staining w x. 106-108', no f	ithin to			MMM Jumphor Mayor Mallander Market Ma		



GEOLOGY LOG COLOR GAMMA - ESEE DATABASE.GDT - 5/20/15 13:24 - S.WORKGROUPSVAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTURILLING/PROJECTS/BOWENICGB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8 4 -

LOG OF TEST BORING

BORING GWA-53 PAGE 4 OF 4 ECS37738

SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING MATERIAL DESCRIPTION Dolostone (Con't) PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA COMMENTS Dolostone (Con't)	atural G	iamma
GF GF Weak Moderate Strong	0	
	<i>₹</i>	
- Dolostone: light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, medium hard to hard, slightly to moderately weathered, massive, moderate- to high-angle fractures visible, trace vertical (fully healed) fractures, moderate to partial healing with some fully healed with calcite fracture fill, trace orangish to yellowish-brown staining within partially healed fractures (108-112'), trace core pieces recovered from approx. 108-112' indicating more competent rock, less competent/more fractured rock from approx. 112-117', mostly fragments recovered		
Bottom of borehole at 117.9 feet.		:
125 125 130 135		

WELL: GWA

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 708.8 ٠٥, Surface Seal: Concrete 705.8 5 10 15 Annular Fill: Portland Cement-Bentonite Grout (28 - 47lbs bags PC, 2 - 50lbs bags Gel, 120 gal. Water) 20 25

WELL: GWA-53R PAGE 2 OF 5 ECS37738

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICE WELLS 2015/CELLS 3-4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3-8 4 WEI PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA WELL DATA ELEVATION **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 35 40 Annular Fill: Portland Cement-Bentonite Grout (28 - 47lbs bags PC, 2 - 50lbs bags Gel, 120 gal. Water) 45 50 656.8 55 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

WELL: GWA-53R PAGE 3 OF 5 ECS37738

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICE WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8 4 WEI LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 70 75 80 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')) 85 90 95 100

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEXCIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICG WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.4 WEI

LOG OF WELL CONSTRUCTION

WELL: GWA-53R PAGE 4 OF 5 ECS37738

PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC.

EAR	TH SCIENCE AND I	ENVIR	ONMENT	AL EN	GINEERING LOCATION Cartersville, GA	
					WELL DATA	
_		NC		١	NELL DATA	
DEPTH (ft)	GROUNDWATER	ELEVATION	•			NOTES
Ä (†	GROUNDWATER OBSERVATIONS		Com	pletion	: aluminum cover with hollards:	NOTES
		ELI	4-foo	t squa	: aluminum cover with bollards; re concrete pad	
			(CONTINU			
				-	-	
105						
110						
110						
115						
120						
120					Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal	
					Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal buckets (153.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 50lbs bags (140.0'-52.0'))	
125						
130						
125						
135						

SOU	OUTHERN COMPANY OUTHERN COMPANY OUTHERN SCIENCE AND	WELL: GWA-53F PAGE 5 OF 5 ECS37738				
DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	Completion Protective a	WELL DATA : aluminum cover re concrete pad	r with bollards;	NOTES
140 145 150		<u>555.8</u> <u>554.7</u>		← Filter: Filter l	al: Pel-Plug 3/8 Bentonite Coated Pellets (3 - 5gal 3.0'-140.0')) and Baroid Hole Plug 3/8 Chips (13 - 140.0'-52.0')) Media 1A Silica Sand (5 - 50 lbs bags)	
165		543.7 543.4		Screen: 11 f	2" OD PVC (SCH 40) ft; 0.010" Slot Prepack ft. 65.44 ft.	

SOUTHERN

SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:\WORKGROUPS\APC GENERAL

BORING GWA-53R PAGE 1 OF 5

LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet ANGLE **BEARING** LOGGED BY B. Smelser 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. , HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma **Aoderate** 165 Elastic Silt (MH) Soil density gauged by thumb - dusky red (10R 3/3) fill dry, very stiff, trace organics and medium to penetration coarse/subangular to subrounded rock fragments walled Minder and the company of the Many Manual and the second an 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 @ 5 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 15 - 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 20 25 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

zone of very coarse to cobble size @ approx. 35-36'

gray to white/medium to coarse dolomite and chert fragments, rubble

SOUTHERN

BORING GWA-53R PAGE 2 OF 5 ECS3<u>7738</u>

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S.WORKGROUPSVAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTUBRILLINGIPROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8 4 LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION GRAPHIC LOG MATERIAL DESCRIPTION COMMENTS Natural Gamma Moderate 110 65 Silt (ML) (Con't) 35 - 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 40 45 - 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 50 Lean Clay (CL) 55 - 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 lacksquare60 ¥ 65

SOUTHERN

BORING GWA-53R PAGE 3 OF 5

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLINGIPROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3 & 4 LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma Moderate 110 65 55 Lean Clay (CL) (Con't) ham what was the second with the second was the sec - No Recovery (67-77') 70 75 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 80 85 90 Limited Recovery Dolostone VOID - possible solution cavity (91-95') 95 **Dolostone with interbedded Chert** - light gray (N7) and bluish gray (10B 5/1) very fine to fine grain, Degree of fracturing and fracture medium hard, moderately weathered, massive, trace apparent high-angle fractures, partial healing, some calcite fracture fill visible, some orientation unknown due to sonic drilling method, no intact

core pieces recovered

chert, chert decreasing with depth

VOID - possible solution cavity (100-104')

100

light brown to orangish-brown mud staining, dark gray to dark brown

LOG OF TEST BORING

sc	OUTH	ERN LOG OF	TEST BOR	RING		RING GWA-53R PAGE 4 OF 5 ECS37738
	JTHERN	COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEERING	PROJECT Plant		Cells 3 & 4 Wells	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS	Natural Gamma
		VOID - possible solution cavity (100-104') (Con't)		> 2 0		
105		Dolostone - light gray (N7) and bluish gray (10B 5/1) very fin medium hard, moderately weathered, massive, tra high-angle fractures from core pieces recovered, nof healing (no visible fracture fill), zone of moderat and pitting @ approx. 106', heavily stained mud @	ce moderate- to no visible evidence ely healed fractures		Few intact core pieces recovered	
110		VOID - possible solution cavity (110-117') - mud and rock fragment-filled void, rock fragment cobble to coarse to very coarse with depth	s range from			J.M. M. J. J. M. J.
115		Dolostone - light gray (N7) and bluish gray (10B 5/1) very fir medium hard, moderately weathered, trace fragme high-angle fractures, moderately to not healed fractracture fill visible, trace fully healed fractures visib broke up the rock trace calcite crystallization is vis brown to orangish brown mud staining on some fra	ents show low- to stures, calcite le, where sonic ible, visible light		Limited Recovery	M. Varantaria de la companya de la c
		VOID - possible solution cavity (122-125') - no recovery				
125		Dolostone - light bluish gray (10B 7/1) and bluish gray (10B fine grain, medium hard, moderately weathered, m fragments from approx. 129-130'			Limited Recovery	
130		VOID - possible solution cavity (130-143') - mud and rock fragment filled void				May



LOG OF TEST BORING

sc	UTH	ERN LOG OF	TEST BOR	RING		ING GWA-53R PAGE 5 OF 5 ECS37738
	JTHERN	I COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEERING	PROJECT Plant		Cells 3 & 4 Wells	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS	Natural Gamma 102 102
140		VOID - possible solution cavity (130-143') (Con't) Dolostone - light gray (N7) and light bluish gray (10B 7/1) ve medium hard, slightly to moderately weathered, manual control in the co	ry fine to fine grain,		No intact recovery	A MANAMAN MANA
150		low-angle to horizontal fractures with no to partial healing, trace brown staining within some partially VOID - possible solution cavity (147-153') - no recovery	nealing, trace moderate to full			
155		Dolostone with trace interbedded Chert nodules - light gray (N7) and bluish gray (10B 5/1) very fin massive, mostly small pieces and fragments recov samples show fracture orientation, low- to high-ang moderate healing, trace fully healed fractures, calc visible, dark brown to red staining visible within sor 1-2mm thick fill, zone of thick 6-8mm thick modera fractures with large calcite crystals visible @ appro	rered, trace gle fractures, no to lite fracture fill me fractures, small tely to fully healed		No intact recovery	
160						
		Bottom of borehole at 165.4 fee	t.			
170						

WELL CONSTRUCTION LOG - ESEE DATABASE, GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEIL LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 701.7 ۰۵, Surface Seal: Concrete 698.7 10 20 Annular Fill: Portland Cement-Bentonite Grout (20 - 47lbs bags PC, 2.25 - 50lbs bags Gel, 120 gal. Water) 25 30 35

sc	OUTHERN &	IV		LOG	OF WELL CONSTRUCTION	WELL: GWA-5. PAGE 2 OF 2 ECS37738
SOU	JTHERN COMPANY	SERVI	CES, INC	C.	PROJECT Plant Bowen Cells 3 & 4 Wells	
EAR	ATH SCIENCE AND	ENVIRO	JINMEN			
			Pro 4-fo	mpletion: tective alumi oot square co	LL DATA ninum cover with bollards; oncrete pad	NOTES
40 45 50		647.7	(CONTI		Annular Fill: Portland Cement-Bentonite Grout (20 - 47lbs bags C, 2.25 - 50lbs bags Gel, 120 gal. Water)	
60		640.8			Annular Seal: Pel-Plug 3/8 Bentonite Coated Pellets (2 - 5gal uckets (60.9'-54.0'))	
65		638.8		- F	Filter: Filter Media 1A Silica Sand (8 - 50 lbs bags)	
70				S S	Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
75		628.8 628.5		S C	Sump: 0.30 ft. Cave-in to 73.17 ft.	
80						



LOG COLOR GAMMA - ESEE DATABASE, GDT - 5/20/15 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WELLS 2/15/CELLS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WATER SAWELLS 2/15/CELLS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WATER SAWELLS 2/15/CELLS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WATER SAWELLS 2/15/CELLS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WATER SAWELLS 2/15/CELLS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTSIBOWENICE WATER SAWELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS 3/4 WELLS 13:24 - S.WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS 3/4 WELLS 13:24 - S.WORKGROUPS 13:24 - S.WO

BORING GWA-54

LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet **ANGLE BEARING** LOGGED BY B. Smelser **BORING DEPTH** 73.17 ft. **GROUND WATER DEPTH: DURING** 58 ft. DELAYED 51.05 ft. after 100 hrs. **COMP.** 55 ft. 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. , HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma 1oderate 165 Silt (ML) Soil density gauged by thumb - red / moderate reddish brown (10R 4/6) fill moist, hard, trace penetration 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 - mottled red (10R 5/8) and reddish yellow (5YR 7/8) residuum moist, very stiff, white to light gray/coarse to cobble/angular to 10 subangular dolomite fragments, amount and size of rock fragments increases with depth, trace interbedded clay lenses 15 Elastic Silt (MH) - mottled reddish yellow (5YR 6/8) and red (10R 4/8) residuum dry, 20 very stiff, low plastic, abundant light gray to white/angular to subrounded rock fragments, clay content increasing with depth 25 - trace mottling strong brown (7.5YR 5/6) and red (10R 5/8) residuum moist, stiff to very stiff, low plastic, interbedded CL, 30 decrease in amount of dolomite fragments, increase in size of dolomite fragments, trace dark gray angular chert fragments 35



LOG OF TEST BORING

BOWEN CELLS 3 &	OUTH	В	BORING GWA-54 PAGE 2 OF 2 ECS37738					
SO SO	OUTHERN	I COMPANY SERVICES, INC.	PROJECT Plant					
EA	ARTH SCI	ENCE AND ENVIRONMENTAL ENGINEERING	LOCATION Carl					
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate REACTION Strong	COMMENTS	Natural Gamma		
		F1 41 014 (MID (O. 16)		Wes Mod Stro		55	110	165
40		Elastic Silt (MH) (Con't) - strong brown (7.5YR 5/6) residuum moist, very st interbedded CL, light gray/cobble/angular to suband chert fragments	tiff, low plastic, gular dolomite and					
SEAVICE COMPLEXICIAL TECH SUPPORT UMFLINGPROJECTS SUBJECTS 34 WELLS BOWEN GELTS 34 WELLS BOWEN GELTS 35 OF 10 OF 1		Sandy Lean Clay (CL) - trace mottling red (2.5YR 5/8), red (10R 4/8) and (7.5YR 6/4) residuum moist to wet, stiff, medium to interbedded pockets of very fine grained non plastic and trace interbedded CH, coarse to cobble/angula abundant dolomite and trace chert fragments	o high plastic, c silt (7.5YR 6/4)					
55 55 60 60 60 60 60 60 60 60 60 60 60 60 60		yellowish red (5YR 4/6) residuum wet, stiff, medioned abundant medium to coarse/angular dolomite and cosoft zone with slight decrease in clay @ approx. 61 interbedded CH	chert fragments,					
15.25 - 45.50 G								
07 P. 2001		- yellowish red (5YR 4/6) residuum wet, soft to ver plastic, coarse to cobble size chert fragments, thin to medium gray silty sand (>1' thick) @ approx. 72.	zone of light gray					
ES		Bottom of borehole at 73.2 feet.						
06Y LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:/WORKGROUPS/AP/C GENERAL 09								

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS SOUTHERN LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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** DELAYED 43.59 ft. after 100 hrs. BORING DEPTH 62.42 ft. GROUND WATER DEPTH: DURING 40.5 ft. COMP. 42.8 ft. NOTES TOC Elevation 697.01, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 694.2 ٠٥, Surface Seal: Concrete 691.7 10 Annular Fill: Portland Cement-Bentonite Grout (26 - 47lbs bags PC, 2.5 - 50lbs bags Gel, 150 gal. Water) 15 20

3 & 4 WEI							WELL CWA FF	
SC SCILS	UTHERN E	V		LC	G OF WEL	L CONSTRUCTION	WELL: GWA-55 PAGE 2 OF 3 ECS37738	
SOU EAR	JTHERN COMPANY TH SCIENCE AND	SERVI			NGINEERING	PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA		
le roes		z			WELL DATA			
3-4 WELLS/BORIN DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATIO	Completion: Protective aluminum cover 4-foot square concrete pace (CONTINUED)			ith bollards;	NOTES	
WELL CONSTRUCTION LOG- ESEE DATABASE.GDT - 5/20/15 13:17 - S:/WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORT/DRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS/PLANT BOWEN CELLS 3.8 WEILS/PL		651.2			Annular Fill: Po PC, 2.5 - 50lbs	ortland Cement-Bentonite Grout (26 - 47lbs bags bags Gel, 150 gal. Water)		
SE.GDT - 5/20/15 13:17 - S					Annular Seal: I buckets (50.4'-	Pel-Plug 3/8 Bentonite Coated Pellets (4 - 5gal 43.0'))		
LOG - ESEE DATABAS		643.8			⋖ – Filter: Filter Me	edia 1A Silica Sand (5 - 50 lbs bags)		
WELL CONSTRUCTION I		642.1			Standpipe: 2"	OD PVC (SCH 40) 0.010" Slot Prepack		

WELL: GWA-55 PAGE 3 OF 3 ECS37738

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEXCIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENCCB WELLS 2015/CELLS 3-4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3-8 4 WEI PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack 60 632.1 Sump: 0.30 ft. Cave-in to 62.42 ft 65 70 75 80



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

BORING GWA-55 PAGE 1 OF 3

LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet ANGLE **BEARING** LOGGED BY B. Smelser **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 HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma **Aoderate** 165 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 MINDER THE WAY MANDER THANKS MANDER AND THE WASHINGTON TO THE WASHINGTON THE WASHINGTON TO THE WASHINGTON TO THE WASHINGTON THE WASHINGTON TO THE WASHINGTON THE WASHINGTON TO THE WASHINGTON THE WASH 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 10 coarse/angular to subangular dolomite fragments 15 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 20 23.5', abundant white to light gray/angular to subangular dolomite fragments

BORING GWA-55 PAGE 2 OF 3

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE, GDT - 5/20/15 13:24 - S./WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORT/DRILLING/PROJECTS/BOWEN/CCB WELLS 3/4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3 & 4 LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma Moderate 65 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 AND MANAGER STANDER STANDER STANDER STANDER STANDERS STAN brown/angular chert fragments 30 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 Degree of fracturing and fracture medium grain, medium hard, moderately weathered, massive, visible orientation unknown due to fully healed fractures with calcite fracture fill, high-angle (vertical) sonic drilling method, no intact fractures with trace low-angle fractures, some samples show core pieces recovered bisecting healed fractures, fractures range from 1-2mm to few 4-6mm, some partially healed fractures observed VOID - possible solution cavity (48'-52') 50 **Dolostone** - light gray (N7) and light bluish gray (10B 7/1) very fine to fine grain, medium hard, moderately to highly weathered, moderate- to highangle 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



LOG OF TEST BORING

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	CC	MPANY						
SOU	JTHERN	COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEE		JECT Plant Bowen				
EAR	TH SCIE	ENCE AND ENVIRONMENTAL ENGINEE.	KING LOC	ATION Cartersville,	GA			
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIF	PTION	ELEVATION Weak Moderate HCL Strong	COMMENTS		Natural Gamma	
		noted a thin open section @ 58-58.5' Dolostone (Con't)		× × × × × × × × × × × × × × × × × × ×		22	<u> </u>	
		Dolostone (Cont)						
60								
		Bottom of borehole at	62.4 feet					
		Bottom of Borenole at	02.4 1001.					
						:		
65								
						:		
70								
						:		
75						:		
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						:		
80						:		
υU								
85						:		

WELL: GWA-55R

WELL CONSTRUCTION LOG - ESEE DATABASE, GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEIL LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 694.0 - Surface Seal: Concrete 691.5 10 Annular Fill: Portland Cement-Bentonite Grout (40 - 47lbs bags 20 PC, 4.5 - 50lbs bags Gel, 205 gal. Water) 25 30 35

WELL: GWA-55R PAGE 2 OF 3 ECS37738

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWENICE WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8 4 WEI PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 40 Annular Fill: Portland Cement-Bentonite Grout (40 - 47lbs bags PC, 4.5 - 50lbs bags Gel, 205 gal. Water) 45 647.5 50 55 60 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')) 65 70 75 80

LOG OF WELL CONSTRUCTION

sc	OUTHERN &	IV	LOG OF WELL CONSTRUCTION	WELL: GWA-55F PAGE 3 OF 3 ECS37738	
SOU EAR	JTHERN COMPANY TH SCIENCE AND	SERVI ENVIRO	CES, INC. PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA		
			WELL DATA		
DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	NOTES	
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')) Filter: Filter Media 1A Silica Sand (8.75 - 50 lbs bags) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack		
100		591.5 591.2			
110					
120					
125					



BORING GWA-55R PAGE 1 OF 3

LOG COLOR GAMMA - ESEE DATABASE, GDT - 5/20/15 13:24 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORT/DRILLING/PROJECTS/BOWEN/CCB WELLS 2/15/CELLS 3/4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3/8/4 LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet ANGLE **BEARING** LOGGED BY B. Smelser **BORING DEPTH** 102.83 ft. **GROUND WATER DEPTH: DURING** 38.5 ft. DELAYED 43.47 ft. after 100 hrs. **COMP.** 41.55 ft. NOTES TOC Elevation 696.84, Sonic Drilling - 6"OD Casing, 4"OD Core Well installed. Refer to well data sheet HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma **Aoderate** 165 Silt (ML) SPT N=26bpf(@3ft.) warring was promised by the properties of the pr - red / moderate reddish brown (10R 4/6) residuum moist, very stiff, 6/10/16 trace clay and subrounded coarse sand 5 SPT N=34bpf(@8ft.) - mottled red (10R 5/8) and reddish yellow (5YR 6/8) residuum dry, 8/14/20 10 hard, trace clay and subrounded coarse sand SPT N=33bpf(@13ft.) - mottled strong brown (7.5YR 5/8), light gray (10YR 7/1) and red 10/14/19 (10R 5/6) residuum dry, hard, increase in clay content within mottled 15 zones, trace white to light gray/angular rock fragments SPT N=41bpf(@18ft.) - mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum 12/24/17 dry, hard, light gray angular chert fragments 20 Elastic Silt (MH) SPT N=24bpf(@23ft.) - mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum 7/10/14 25 moist, very stiff, low plastic, light gray with yellowish staining/angular rock fragments SPT N=24bpf(@28ft.) - mottled red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) residuum 7/9/15 moist, very stiff, low plastic, light gray/coarse/angular to subangular 30 chert and dolomite fragments SPT N=22bpf(@33ft.) - mottled reddish yellow (5YR 6/8) and red (10R 5/8) residuum 4/13/9 35 moist, very stiff, low to medium plastic, gray angular to subrounded chert fragments

LOG OF TEST BORING

sc	UTH		BOR	RING		G GWA-55F PAGE 2 OF 3 ECS37738
	THERN	OMPANY	T Plant	Bower	n Cells 3 & 4 Wells	
(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS	Natural Gamm
10		Lean Clay (CL) (Con't) yellowish red (5YR 5/8) residuum wet, very stiff, low to med plastic, trace chert fragments	um		SPT N=16bpf(@38ft.) 5/7/9	W. J. W.
5		▼ Fat Clay (CH) - yellowish red (5YR 5/8) residuum wet, very stiff, medium to plastic, trace light gray rock fragments	high	-	SPT N=17bpf(@43ft.) 7/9/8	Mayora
0		Dolostone - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fir fine grain, medium hard, slightly to moderately weathered, sor visible high-angle fractures with calcite fracture fill, full healing chert VOID - possible solution cavity (53'-58') - some orangish mud with rock fragments recovered from voice	ne , trace		Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered	
0	X	Chert with Dolostone - bluish black (10B 2.5/1), dark brown (10YR 3/3) and light blue gray (10B 7/1) very fine to fine grain, medium hard, moderated highly weathered VOID - possible solution cavity (61'-63')	uish y to			
5		Chert with Dolostone - trace fully healed fractures, calcite fracture fill, very limited resome orangish mud staining visible VOID - possible solution cavity (66'-78')	ecovery,			Jan
5						
30		Dolostone with Chert - light bluish gray (10B 7/1) and bluish gray (10B 5/1) very fir fine grain, medium hard, not to moderately weathered, visible healed fractures, calcite fracture fill, moderate- to high- angle	ie to fully			A



LOG OF TEST BORING

sc	OUTH	ERN A	LOG OF	TEST BOI	RING	BORIN	PAGE	A-55R 3 OF 3 837738
SOI		COMPANY SEF	RVICES, INC.	PROJECT Plan	nt Bowen	Cells 3 & 4 Wells		
			IRONMENTAL ENGINEERING	LOCATION Ca	rtersville	, GA		
DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION	ELEVATION	Weak Moderate Strong	COMMENTS		Gamma
		chert, trace o	ole near bottom, bluish black to dark r rangish staining within some healed f ith Chert (Con't)	eddish brown ractures				
85		VOID - nossi	ble solution cavity (85'-86')				_ :	
		Dolostone wi	• • • •				[\$	
90		- light bluish of fine grain, me healed calcite	gray (10B 7/1) and bluish gray (10B edium hard, slightly weathered, trace e filled fractures, low- to high-angle fra eces recovered, trace chert, no visible	to some visible full _! actures visible on	y	Driller did not note any voids any voids within section 88'-103', but suggested open fractures due to the core barrel slipping 4"-6" in zones	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
95		- only fragme	nts recovered					
			Bottom of borehole at 102.8 fee	<u> </u>		_		: :
110 115 120								

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 5/20/15 13:17 - S.WORKGROUPS/APC GENERAL SERVICE COMPLEX/CIVIL TECH SUPPORTIDRILLING/PROJECTS/BOWEN/CCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3.8.4 WEILS SOUTHERN LOG OF WELL CONSTRUCTION PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING **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. WELL DATA ELEVATION DEPTH (ft) **GROUNDWATER NOTES** Completion: **OBSERVATIONS** Protective aluminum cover with bollards; 4-foot square concrete pad 689.5 ٠٥, Surface Seal: Concrete 685.5 5 10 15 Annular Fill: Portland Cement-Bentonite Grout (12 - 47lbs bags PC, 1 - 50lbs bags Gel, 65 gal. Water) 20 25

LOG OF WELL CONSTRUCTION

SO STATE STATE TO THE PROPERTY OF THE PROPERTY							WELL: GWC-56 PAGE 2 OF 3
S(COMPAN	IY		LO	G OF WEI	L CONSTRUCTION	PAGE 2 OF 3 ECS37738
SO EAI	UTHERN COMPANY RTH SCIENCE AND	Y SERVICI ENVIRON	ES, INC. NMENT	AL EN	GINEERING	PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA	
SING FOR		N O		W	/ELL DATA		
DEPTH (ft)	GROUNDWATER OBSERVATIONS	Vertical DATA			luminum cover w	vith bollards;	NOTES
ELLS 3-4 V			(CONTINU				
-LS 2013/L					Annular Fill: P PC, 1 - 50lbs b	ortland Cement-Bentonite Grout (12 - 47lbs bags bags Gel, 65 gal. Water)	
NCCB WE		054.5					
35		654.5					
4G/PROJEC		8888					
40		000000000000000000000000000000000000000					
		000000000000000000000000000000000000000					
AI		000000000000000000000000000000000000000					
45							
AL SERVIC		000000000000000000000000000000000000000					
50 50					Annular Soal:	Pel-Plug 3/8 Bentonite Coated Pellets (5 - 5gal	
AKOUPS/A		000000000000000000000000000000000000000			buckets (69.8'-bags (60.0'-35	60.0')) and Baroid Hole Plug 3/8 Chips (10 - 50lbs	
S.WORK		000000000000000000000000000000000000000		-	_		
55		300000000000000000000000000000000000000					
- IOD:		000000000000000000000000000000000000000					
DATABASE		300000000000000000000000000000000000000					
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LOG OF WELL CONSTRUCTION

sc	OUTHERN #	N N	LOG OF WELL CONSTRUCTION	WELL: GWC-56 PAGE 3 OF: ECS3773
SOU	UTHERN COMPANY	SERVIC	ES, INC. NMENTAL ENGINEERING PROJECT Plant Bowen Cells 3 & 4 Wells LOCATION Cartersville, GA	
L2 11		LITTING		
DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA Completion: Protective aluminum cover with bollards; 4-foot square concrete pad	NOTES
70 75 80		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')) Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack	
85		606.9	Sump: 0.30 ft. Cave-in to 82.96 ft.	
90				
95	-			
100				



BORING GWA-56 PAGE 1 OF 3

GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:24 - S:WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLINGIPROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3 & 4 LOG OF TEST BORING **PROJECT** Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING 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 CHECKED BY L. Millet **ANGLE BEARING** LOGGED BY B. Smelser GROUND WATER DEPTH: DURING 43 ft. DELAYED 39.02 ft. after 100 hrs. BORING DEPTH 82.96 ft. **COMP.** 38.8 ft. 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. , HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma 1oderate 165 Silty Clay (CL-ML) Soil density gauged by thumb - dusky red / dark reddish brown (10R 3/4) fill dry, very stiff to hard, penetration low plastic Silt (ML) 5 - dusky red / dark reddish brown (10R 3/4) fill dry, very stiff, trace interbedded clay lenses and medium to coarse/subangular to subrounded/brittle to friable dolomite fragments - trace mottling red (10R 5/6) and light brown (7.5YR 6/4) residuum 10 dry, very stiff, white with reddish staining/medium to very coarse/angular to subangular dolomite fragments, trace chert fragments 15 Elastic Silt (MH) - mottled red (10R 4/8), yellowish red (5YR 5/8) and light gray (10YR 7/1) residuum moist, very stiff to stiff, low plastic, white to light gray interbedded ML, light gray clayey zones have increased plasticity, trace light gray to white angular dolomite and chert fragments 20 25 **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

SOUTHERN

BORING GWA-56 PAGE 2 OF 3 ECS3<u>7738</u>

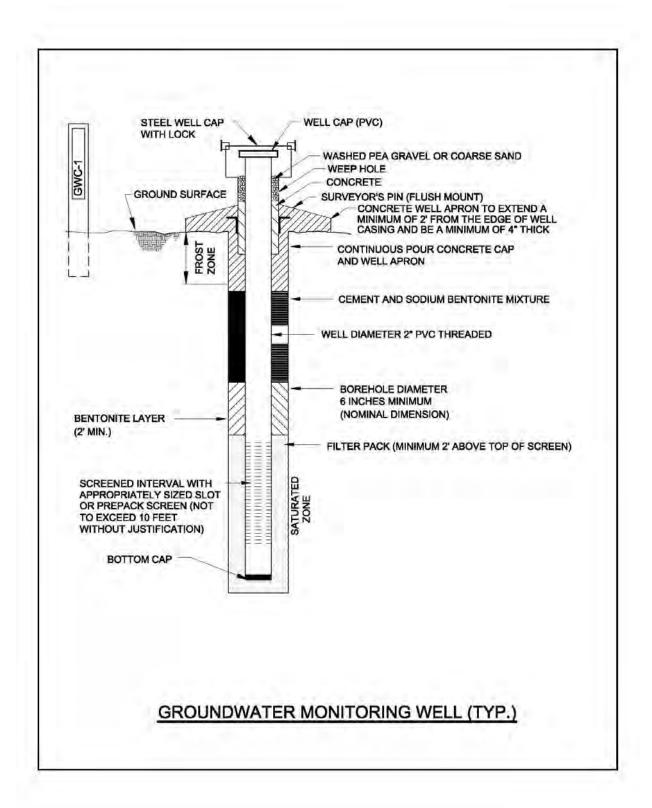
GEOLOGY LOG COLOR GAMMA - ESEE DATABASE GDT - 5/20/15 13:25 - S:WORKGROUPSIAPC GENERAL SERVICE COMPLEXICIVIL TECH SUPPORTIDRILLINGIPROJECTS/BOWENICCB WELLS 2015/CELLS 3.4 WELLS/BORING LOGS/PLANT BOWEN CELLS 3 & 4 LOG OF TEST BORING PROJECT Plant Bowen Cells 3 & 4 Wells SOUTHERN COMPANY SERVICES, INC. EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING LOCATION Cartersville, GA HCL REACTION ELEVATION GRAPHIC LOG DEPTH (ft) MATERIAL DESCRIPTION COMMENTS Natural Gamma Moderate 65 Gravelly Lean Clay (CL) (Con't) MILY MINING TO THE TONGO THE WANTED TO THE WANTED TO THE TONGO THE PART OF THE 35 **A** 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 45 Limited Recovery Chert (ledge) VOID - possible solution cavity (48'-68') - mud filled void, no recovery 50 55 60 65



LOG OF TEST BORING

sc	OUTH	ERN LOG C	OF TEST BO	RIN	G	BORII		AGE		- 3
SOU EAF	JTHERN	I COMPANY SERVICES, INC. ENCE AND ENVIRONMENTAL ENGINEERING	•			Cells 3 & 4 Wells				_
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Weak HCL	Strong REACTION	COMMENTS	Nat	tural (ma co
SOU EAR		VOID - possible solution cavity (48'-68') (Con't Dolostone with abundant interbedded Chert - light gray (N7), light bluish gray (10B 7/1) and very fine to fine grain, hard to medium hard, me weathered, massive, moderate- to high-angle f trace low-angle fractures, partial to full healing trace reddish-brown to brown staining within so fracture fill ranges from <1mm to few 5-6mm the to dark brown chert @ approx. 73-74', 3 core provided to fine grain, hard, moderately to slightly weath high-angle fractures visible, partial to full healing fill, approx. 1-2 mm thick fracture fill, some high vertical fractures with no visible calcite fill, trace staining within some fractures, trace chert @ a piece recovered	d bluish gray (10B 5/1 oderately to slightly ractures visible with with calcite fracture fi ome fractures, calcite nick, zone of dark gray oleces >6" recovered ay (10B 7/1) very fine lered, massive, low-to h-angle and trace e reddish-brown) , /	15	Degree of fracturing and fracture orientation unknown due to sonic drilling method, no intact core pieces recovered, limited recovery	5 MM MANAMANANANANANANANANANANANANANANANA		_ ,	
90		Bottom of borehole at 83.0 to	feet.							

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.