Alabama Power

Dustin G. Brooks
Environmental Affairs Supervisor
Environmental Compliance

600 North 18th Street
Post Office Box 2641
12N-0830
Birmingham, Alabama 35291

Tel 205.257.4194
Fax 205.257.4349
dgbrooks@southernco.com

Received: 4/30/20

April 30, 2020

Mr. S. Scott Story, Chief
Solid Waste Branch
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

Re: Revised Closure Permit Application for the Plant Gorgas Gypsum Pond

Dear Mr. Story:

Alabama Power Company is the owner and operator of the Plant Gorgas Gypsum Pond, located at Parrish, Alabama. Pursuant to rule 335-13-15-.09(1)(c) of the regulations of the Alabama Department of Environmental Management (ADEM), and in response to your letter dated April 10, 2020, please find enclosed a revised closure permit application for the Plant Gorgas Gypsum Pond. This revised closure permit application has been prepared to update the permit application package previously submitted to ADEM in December 2018. Specifically, a revised version of the Amended Closure Plan initially submitted to the Department on July 15, 2019 and a revised groundwater monitoring plan submitted on April 15, 2020 have been incorporated into the Plant Gorgas Gypsum Pond closure permit application package.

Alabama Power is seeking a closure permit for the Plant Gorgas Gypsum Pond pursuant to rule 335-13-15-.09(1)(c). That rule requires submission of "all the information as required for an existing CCR surface impoundment in 335-13-15-.09(1)(a), except for the requirements of 335-13-15.09(1)(a)3., 4. and 5." Thus, to the extent any materials fall within those exceptions, we have not included them in our submissions to the Department.

In response to your comment on the closure plan, please note that we revised Section 4.2.6 of the Amended Closure Plan. As before, the procedure calls for repeated verification of excavation of relatively small areas. Because the area to be excavated at the Plant Gorgas Gypsum Pond covers hundreds of acres, we anticipate extended periods of daily verification events over the course of the project. In addition, a comparable number and frequency of verification events will be occurring within the same general time frame at four other Alabama Power facilities. We will be pleased to work with ADEM to schedule as many

instances of in-person observation and participation as ADEM finds necessary to discharge its duties of regulation and oversight. In addition, new language in Section 4.2.6 provides that photographs will be taken once removal of CCR from a given area outside the consolidated footprint is deemed complete by the Construction Quality Assurance engineer. These photographs will be maintained at the site and will be available for review by ADEM personnel. Accordingly, our modified procedures establish transparency and provide ADEM the opportunity for complete and thorough oversight of the process.

Finally, per your request and in accordance with rule 335-13-15-.08(3)(i)4., we have uploaded both the Amended Closure Plan submitted on July 15, 2019 and the revised Amended Closure Plan that is incorporated in the revised permit application to Plant Gorgas's CCR website.

Thank you for your consideration. Please feel free to contact me if Alabama Power can provide additional information or answer any questions.

Sincerely,

Dustin Brooks

Enclosures

PERMIT APPLICATION FOR CCR SURFACE IMPOUNDMENT

PLANT GORGAS GYPSUM POND

PARRISH, ALABAMA

ALABAMA POWER COMPANY

PERMIT APPLICATION FOR CCR SURFACE IMPOUNDMENT

PLANT GORGAS GYPSUM POND

335-13-15-.09(1)(c)

1. ADEM Application form

The completed application form can be found in Appendix 1.

2. Boundary plat and legal property description

A boundary plat and legal description can be found in Appendix 2. This drawing includes a 100-ft offset line from the property boundary to reflect a buffer zone. See ADEM Admin. Code r. 335-13-15-.03(6).

3. Hazard Potential Classification [r. 335-13-15-.04(4)(a)2.] and Emergency Action Plan (EAP) [r.335-13-15-.04(4)(a)3.].

The Plant Gorgas Gypsum Pond is formed by an engineered cross-valley embankment on the south-southeast side of the impoundment. The Mulberry Fork of the Black Warrior River is located downstream of the embankment and impoundment. In the unlikely event of an embankment failure, water and CCR could potentially impact the Black Warrior River to the south of the impoundment.

Based on the potential impacts in the unlikely event of an embankment failure, a hazard potential classification of Significant Hazard Potential has been assigned to the Plant Gorgas Gypsum Pond, in that failure or mis-operation of the CCR unit would result in no probable loss of human life but could potentially result in economic loss and/or environmental damage.

A copy of the Initial Hazard Potential Classification document has been previously posted to Alabama Power Company's CCR website.

The Hazard Potential Classification and Emergency Action Plan for the Plant Gorgas Gypsum Pond can be found it Appendix 3.

4. History of Construction and Structural Stability Assessments:

i. History of Construction [r. 335-13-15-.04(4)(c)1.(i) through (xii)].

The History of Construction document, including applicable drawings and figures, can be ound in Appendix 4.

ii. Structural Stability Assessment [r. 335-13-15-.04(4)(d)].

The Structural Stability Assessment document can be found in Appendix 5.

iii. Safety Factor Assessment [r. 335-13-15-.04(4)(e)].

The Safety Factor Assessment document, including the applicable calculation, can be found in Appendix 6.

5. On-site Control Points

Control Points are shown on Drawings E72020-E720325 found in Appendix 7.

6. Topographical Maps, Grading Plans and Details

Drawings showing existing topographic maps, final grades of the clean closed pond and cross sections are shown in Appendix 8.

7. Quality Assurance/Quality Control (QA/QC) Plan

ADEM Admin. Code r. 335-13-15-.09(1)(a)10. Requires a QA/QC plan for all components of the final cover system. As the Plant Gorgas Gypsum Pond will undergo closure by removal, a QA/QC plan is not required and therefore not included.

8. Operation Plan

An Operation Plan for the facility can be found in Appendix 9. Attachments to this Operation Plan includes the following, unless as noted otherwise:

i. A CCR fugitive dust control plan [r. 335-13-15-.05(1).]
ii. An inflow design flood control system [r. 335-13-15-.05(3).]
iii. Groundwater monitoring and analysis program [r. 335-13-15-.06.]
iv. Recordkeeping and Notification Compliance Procedures [r. 335-13-15-.08.
v. Procedures for updating all plans and assessments.

9. Written Closure and Post-Closure Plan [r.335-13-15-.07.]

The Gorgas Gypsum Pond will be closed by removal. A written closure plan can be found in Appendix 10. As the facility will undergo closure by removal, a written post-closure care plan is not required.

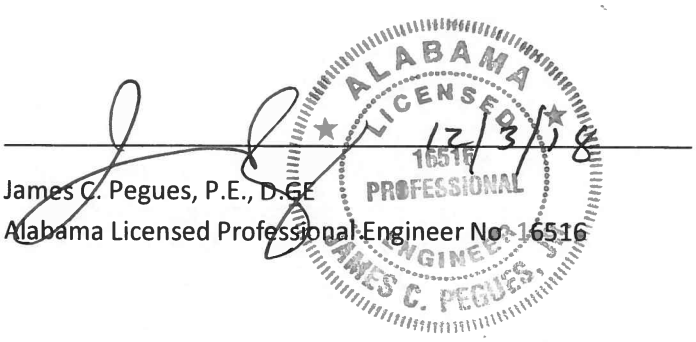
10. Supplemental Information

Reserved

11. Adjacent Property Owners

A list of adjoining property owners can be found in Appendix 11.

By signature below, I hereby certify that the information contained within this permit application is accurate and correct based on the available information.



James C. Pegues, P.E., D.GE
Alabama Licensed Professional Engineer No. 16516

Mike Godfrey
Alabama Power Company

APPENDIX 1

APPLICATION FORM

PERMIT APPLICATION
SOLID WASTE DISPOSAL FACILITY
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
(Submit in Triplicate)

1. **Facility type:**
   - _____ **Municipal Solid Waste Landfill (MSWLF)**
   - _____ **Industrial Landfill (ILF)**
   - _____ **CCR Landfill (CCRLF)**
   - X **CCR Surface Impoundment (CCRSI)**
   - _____ **Other (explain)**_____

2. **Facility Name** Plant Gorgas Gypsum Pond

3. **Applicant:**

   Name: Mr Mike Godfrey (Physical Address)

   Address: Alabama Power Company Plant Gorgas

   Post Office Box 2641 460 Gorgas Road

   Birmingham, Alabama 35291 Parrish, AL 35580-5715

   Telephone: (205) 257-6131

4. **Location: (include county highway map or USGSmap)**

   Township 16-South **Range** 06-West
   Section 13 **County** Walker

5. **Land Owner:**

   Name: Alabama Power Company

   Address: Post Office Box 2641

   Birmingham, AL 35291-0830

   Telephone: (205) 257-4194

   (Attach copy of agreement from landowner if applicable.)

6. **Contact Person:**

Name James Douglas | Che George

Position or Affiliation Environmental Affairs Specialist | Senior Compliance Specialist

Address: Post Office Box 2641 | 460 Gorgas Road

Birmingham, AL 35291-0831 | Parrish, AL 35580-5716

Telephone: (205) 257-6782 | (205) 686-2324

7. **Size of Facility:** 57.10 **Acres**

Size of Disposal Area(s): 18.70 **Acres**

8. **Identify proposed service area or specific industry that waste will be received from:**

The CCRSI service area was limited to waste generated only from Alabama Power Company.

9. **Proposed maximum average daily volume to be received at landfill (choose one):**

N/A **Tons/Day** N/A **Cubic Yards/Day**

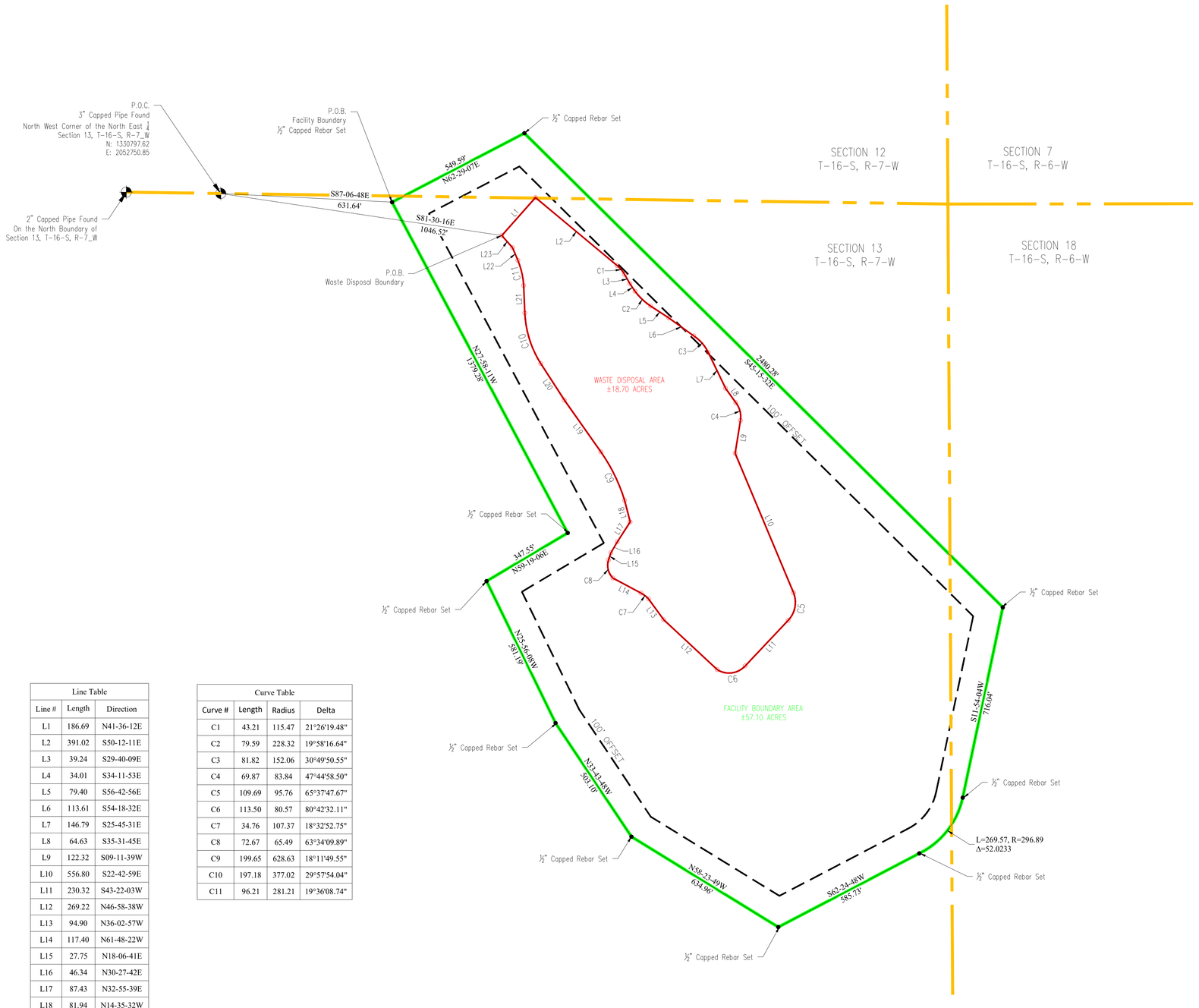
10. **List all waste streams to be accepted at the facility (i.e., household solid waste, wood boiler ash, tires, trees, limbs, stumps, etc.):**

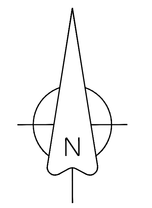
The CCRSI will undergo closure and it contains CCR materials.

SIGNATURE 11/26/18 DATE

APPENDIX 2

BOUNDARY PLAT AND LEGAL DESCRIPTION





GRID COORDINATES
ALABAMA STATE PLANE
NAD 83 WEST ZONE

Line Table		
Line #	Length	Direction
L1	186.69	N41-36-12E
L2	391.02	S50-12-11E
L3	39.24	S29-40-09E
L4	34.01	S34-11-53E
L5	79.40	S56-42-56E
L6	113.61	S54-18-32E
L7	146.79	S25-45-31E
L8	64.63	S35-31-45E
L9	122.32	S09-11-39W
L10	556.80	S22-42-59E
L11	230.32	S43-22-03W
L12	269.22	N46-58-38W
L13	94.90	N36-02-57W
L14	117.40	N61-48-22W
L15	27.75	N18-06-41E
L16	46.34	N30-27-42E
L17	87.43	N32-55-39E
L18	81.94	N14-35-32W
L19	233.31	N35-09-56W
L20	160.11	N32-54-50W
L21	101.46	N02-29-25W
L22	50.24	N22-48-38W
L23	59.60	N41-25-41W

Curve Table			
Curve #	Length	Radius	Delta
C1	43.21	115.47	21°26'19.48"
C2	79.59	228.32	19°58'16.64"
C3	81.82	152.06	30°49'50.55"
C4	69.87	83.84	47°44'58.50"
C5	109.69	95.76	65°37'47.67"
C6	113.50	80.57	80°42'32.11"
C7	34.76	107.37	18°32'52.75"
C8	72.67	65.49	63°34'09.89"
C9	199.65	628.63	18°11'49.55"
C10	197.18	377.02	29°57'54.04"
C11	96.21	281.21	19°36'08.74"

LEGEND:

P.O.C. = POINT OF COMMENCEMENT
P.O.B. = POINT OF BEGINNING
● = SET REBAR & CAP
○ = CALCULATED POINT
🟩 FACILITY BOUNDARY
🟥 WASTE/DISPOSAL BOUNDARY
— — — 100' OFFSET

Boundary Description
Gorgas Steam Plant
Gypsum Storage Pond Facility Boundary

A tract of land contained within the current boundary of the Alabama Power Electric Generating Facility Plant Gorgas. The described tract is located within Sections 12 and 13 of Township 16 South Range 7 West and Sections 18 of Township 16 South Range 6 West located in Walker County, Alabama.
More particularly described as follows.
Commencing at a three inch diameter capped pipe representing the North West Corner of the North East 1\4 of Section 13, Township 16 South, Range 7 West having State Plane Coordinates of N:1330797.62 and E:2052750.85.
Run thence S 87-06-48 E a distance of 631.64 feet to a half inch capped rebar set and the Point of Beginning of herein described tract of land.
thence bearing N 62-29-07 E a distance of 549.59 feet to a 1/2" Rebar Set;
thence bearing S 45-15-32 E a distance of 2480.28 feet to a 1/2" Rebar Set;
thence bearing S 11-54-04 W a distance of 716.04 feet to a 1/2" Rebar Set;
thence along a curve to the RIGHT, having a radius of 296.89
a delta angle of 52° 01' 24.02", and whose long chord bears
S 37-54-46 W a distance of 260.40 feet to a 1/2" Rebar Set;
thence bearing S 62-24-48 W a distance of 585.73 feet to a 1/2" Rebar Set;
thence bearing N 58-23-49 W a distance of 634.96 feet to a 1/2" Rebar Set;
thence bearing N 33-43-48 W a distance of 503.10 feet to a 1/2" Rebar Set;
thence bearing N 25-56-08 W a distance of 581.19 feet to a 1/2" Rebar Set;
thence bearing N 59-19-06 E a distance of 347.55 feet to a 1/2" Rebar Set;
thence bearing N 27-58-11 W a distance of 1379.28 feet to the
Point of Beginning of herein described tract containing 57.10 +/- acres.

Boundary Description
Gorgas Steam Plant
Gypsum Storage Pond Waste Disposal Boundary

A tract of land contained within the current boundary of the Alabama Power Electric Generating Facility Plant Gorgas. The described tract is located within Sections 12 and 13 of Township 16 South Range 7 West and Sections 18 of Township 16 South Range 6 West located in Walker County, Alabama.
More particularly described as follows.
Commencing at a three inch diameter capped pipe representing the North West corner of the North East 1\4 of Section 13, Township 16 South, Range 7 West having State Plane Coordinates of N: 1330797.62 and E:2052750.85.
Run thence S 81-30-16 E a distance of 1046.52 feet to the Point of Beginning of herein described tract of land.
thence bearing N 41-36-12 E a distance of 186.69 feet to a point;
thence bearing S 50-12-11 E a distance of 391.02 feet to a point;
thence along a curve to the RIGHT, having a radius of 115.47
a delta angle of 21° 26' 19.48", and whose long chord bears
S 40-23-19 E a distance of 42.96 feet to a point;
thence bearing S 29-40-09 E a distance of 39.24 feet to a point;
thence bearing S 34-11-53 E a distance of 34.01 feet to a point;
thence along a curve to the LEFT, having a radius of 228.32
a delta angle of 19° 58' 16.64", and whose long chord bears
S 46-43-48 E a distance of 79.18 feet to a point;
thence bearing S 56-42-56 E a distance of 79.40 feet to a point;
thence bearing S 54-18-32 E a distance of 113.61 feet to a point;
thence along a curve to the RIGHT, having a radius of 152.06
a delta angle of 30° 49' 50.55", and whose long chord bears
S 41-10-27 E a distance of 80.84 feet to a point;
thence bearing S 25-45-31 E a distance of 146.79 feet to a point;
thence bearing S 35-31-45 E a distance of 64.63 feet to a point;
thence along a curve to the RIGHT, having a radius of 83.84
a delta angle of 47° 44' 58.50", and whose long chord bears
S 14-40-50 E a distance of 67.87 feet to a point;
thence bearing S 09-11-39 W a distance of 122.32 feet to a point;
thence bearing S 22-42-59 E a distance of 556.80 feet to a point;
thence along a curve to the RIGHT, having a radius of 95.76
a delta angle of 65° 37' 47.67", and whose long chord bears
S 10-59-31 W a distance of 103.79 feet to a point;
thence bearing S 43-22-03 W a distance of 230.32 feet to a point;
thence along a curve to the RIGHT, having a radius of 80.57
a delta angle of 80° 42' 32.11", and whose long chord bears
S 82-30-39 W a distance of 104.34 feet to a point;
thence bearing N 46-58-38 W a distance of 269.22 feet to a point;
thence bearing N 36-02-57 W a distance of 94.90 feet to a point;
thence along a curve to the LEFT, having a radius of 107.37
a delta angle of 18° 32' 52.75", and whose long chord bears
N 52-31-56 W a distance of 34.61 feet to a point;
thence bearing N 61-48-22 W a distance of 117.40 feet to a point;
thence along a curve to the RIGHT, having a radius of 65.49
a delta angle of 63° 34' 09.89", and whose long chord bears
N 13-32-25 W a distance of 68.99 feet to a point;
thence bearing N 18-06-41 E a distance of 27.75 feet to a point;
thence bearing N 30-27-42 E a distance of 46.34 feet to a point;
thence bearing N 32-55-39 E a distance of 87.43 feet to a point;
thence bearing N 14-35-32 W a distance of 81.94 feet to a point;
thence along a curve to the LEFT, having a radius of 628.63
a delta angle of 18° 11' 49.55", and whose long chord bears
N 26-4-01 W a distance of 198.81 feet to a point;
thence bearing N 35-09-56 W a distance of 233.31 feet to a point;
thence bearing N 32-54-50 W a distance of 160.11 feet to a point;
thence along a curve to the RIGHT, having a radius of 377.02
a delta angle of 29° 57' 54.04", and whose long chord bears
N 17-28-22 W a distance of 194.94 feet to a point;
thence bearing N 02-29-25 W a distance of 101.46 feet to a point;
thence along a curve to the LEFT, having a radius of 281.21
a delta angle of 19° 36' 08.74", and whose long chord bears
N 13-0-34 W a distance of 95.74 feet to a point;
thence bearing N 22-48-38 W a distance of 50.24 feet to a point;
thence bearing N 41-25-41 W a distance of 59.60 feet to the
Point of Beginning of herein described tract containing 18.70 +/- acres.

State of Alabama

I, the undersigned,Charles E. O'Neal, for Alabama Power Company as a Registered Professional Land Surveyor, hereby certify that this map was based upon a survey performed by employees of Southern Company Services, Inc., and is a true and accurate depiction of the lands described hereon, and was produced, to the best of my knowledge, in compliance with the Standards of Practice for Land Surveying in the State of Alabama.

NO. 26015

Alabama Power Company
by

Charles E. O'Neal
Charles E. O'Neal
Alabama Register No. PLS 26015

Southern Company Generation
Engineering and Construction Services
FOR

ALABAMA POWER COMPANY

GORGAS STEAM PLANT
GYPSUM POND
FACILITY AND WASTE DISPOSAL BOUNDARY
PERMIT DRAWING

REVISION	DATE
	11/12/2018

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
ENP						

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	4348GOR	1	FINAL	0

ANSI E: 44x34

APPENDIX 3

HAZARD POTENTIAL CLASSIFICATION
&
EMERGENCY ACTION PLAN

The Hazard Potential Classification and the Emergency Action Plan for the Plant Gorgas Gypsum Pond were initially prepared to satisfy federal standards. They also satisfy 335-13-15-04(4)(a)2. and 335-13-15-.04(4)(a)3., respectively, as well as 335-13-15-.09(1)(a)6. and are included for that purpose.

INITIAL HAZARD POTENTIAL ASSESSMENT
PLANT GORGAS GYPSUM POND
ALABAMA POWER COMPANY

Section §257.73(a)(2) of EPA's regulations requires the owner or operator of an existing CCR surface impoundment to conduct periodic hazard potential classification assessments. The owner or operator must document the hazard potential of each surface impoundment as a high hazard potential CCR unit, a significant hazard potential CCR unit or a low hazard potential CCR unit.

The CCR surface impoundment located at Alabama Power Company's Plant Gorgas, also referred to as the Plant Gorgas Gypsum Pond, is located near Parrish, Walker County, Alabama. The CCR surface impoundment is formed by an engineered cross-valley embankment on the south-southeast side of the impoundment. The Mulberry Fork of the Black Warrior River is located downstream of the embankment and impoundment. In the unlikely event of an embankment failure, water and CCR could potentially impact the Black Warrior River to the south of the impoundment.

Based on the potential impacts in the unlikely event of an embankment failure, a hazard potential classification of Significant Hazard Potential has been assigned to the Plant Gorgas Gypsum Pond, in that failure or mis-operation of the CCR unit would result in no probable loss of human life but could potentially result in economic loss and/or environmental damage.

I hereby certify that the hazard potential classification was conducted in accordance with 40 C.F.R. Part 257.73 (a)(2).

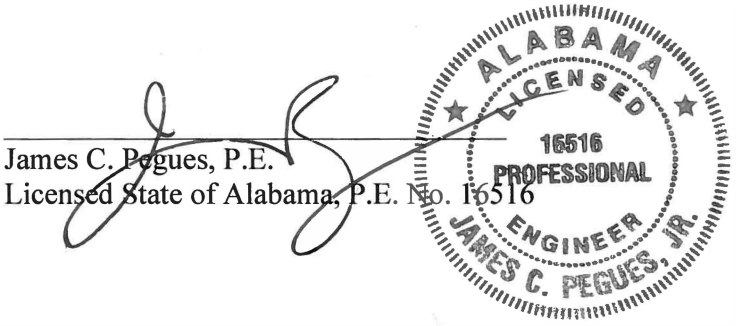
10/11

James C. Pegues, P.E.
Licensed State of AL, PE No. 16516

CCR SURFACE IMPOUNDMENT EMERGENCY ACTION PLAN

Plant Gorgas Gypsum Pond

I hereby certify that this Emergency Action Plan has been prepared in accordance with the requirements of 40 C.F.R. Part 257.73.



James C. Pegues, P.E.
Licensed State of Alabama, P.E. No. 16516

ISSUE DATE: **April 17, 2017**
REVISION #: **0**

REVISION RECORD

In accordance with 40 C.F.R. Part 257.73, this Emergency Action Plan (EAP) must be amended whenever there is a change in conditions that would substantially affect the EAP in effect. Additionally, the EAP must be evaluated, at a minimum, every five years to ensure the information is accurate. As necessary, this EAP must be updated and a revised EAP placed in the facility's operating record as required by 40 C.F.R. Part 257.105(f)(6).

Revision Number	Date	Sections Affected/Reason
0	04/17/2017	Creation of EAP

TABLE OF CONTENTS

APPENDICES

Appendix A Figures
Figure 1 – Plant Gorgas Location Map
Figure 2 – Gypsum Pond Overview

Appendix B Inundation Maps

Appendix C Incident Response Flowchart

Appendix D Response Notification Flowchart

Appendix E Notification and Documentation Forms
Data Recording Sheet

ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
AEMA	Alabama Emergency Management Agency
ALDOT	Alabama Department of Transportation
APC	Alabama Power Company
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
E&CS	Engineering & Construction Services
EAP	Emergency Action Plan
EMA	Emergency Management Agency
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
H:V	Horizontal:Vertical
HDPE	High-Density Polyethylene
ID	Inside Diameter
SCS	Southern Company Services

DEFINITIONS

Adverse Consequences. Negative impacts that may result from the failure of a dam. The primary concerns are loss of life, economic loss (including property damage), lifeline disruption and environmental impact.

Coal Combustion Residuals (CCR). Fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.

CCR Surface Impoundment. A natural topographic depression, man-made excavation, or diked area which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR.

Dam/Dike/Embankment. An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage.

Dam Failure. Catastrophic type of failure characterized by the sudden, rapid and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam's primary function of impounding water is properly considered a failure. These lesser degrees of failure can progressively lead to or heighten the risk of catastrophic failure. They are, however, normally amenable to corrective action.

> **Imminent Failure (Condition A Emergency).** Failure of a dam/dike/embankment is imminent or has occurred.
>
> **Potential Failure (Condition B Emergency).** A potential failure condition of a dam/dike/embankment is a developing condition, but adequate time is available to properly evaluate the problem and implement corrective actions that may alleviate or prevent failure.
>
> **Non-Failure Condition.** A condition that will not, by itself, lead to a failure, but that requires investigation and notification of internal and/or external personnel.

Emergency. A condition that develops unexpectedly, endangers the structural integrity of the dam, and requires immediate action. An emergency can lead to Adverse Consequences in the event of Imminent Failure.

Filter. One or more layers of granular material graded so as to allow seepage through or within the layers while preventing the migration of material from adjacent zones.

Inundation Map. A graphic representation of the inundation zone that shows the potential impact area due to a breach of the Gypsum Pond. The inundation maps in this procedure are based on a specific computer-modeled dam breach scenario; therefore, the boundaries depicted are estimates for that particular model. *The models are considered conservative but larger floods could potentially occur.* Please refer to Appendix B.

Inundation Zone. Area subject to flooding in the event of increased flows due to a dam/dike/embankment failure.

Piping. The progressive development of internal erosion of the dam/dike/embankment or foundation material by seepage.

Probable Maximum Flood. The flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin.

Sunny Day Failure. A night or day failure that occurs during fair weather or when weather-related flooding is not occurring.

1.0 STATEMENT OF PURPOSE

This Emergency Action Plan (EAP) has been prepared for the Plant Gorgas Gypsum Pond to meet the requirements of 40 C.F.R. Part 257.73(a)(3). The EAP identifies potential safety emergency conditions at the Plant Gorgas Gypsum Pond and specifies actions to be followed to minimize potential loss of life and property damage if such conditions exist.

This EAP will provide responding personnel with:

- Pertinent information and description related to Plant Gorgas Gypsum Pond;
- Definition of events or circumstances that represent a safety emergency;
- Procedures that will be followed to detect a safety emergency;
- Notification procedures in the event of a safety emergency;
- Information to assist in decision making;
- A list of responsible persons and their respective responsibilities;
- Provisions for an annual face-to-face meeting with local emergency responders;
- Contact information for emergency agencies and emergency responders
- A map that delineates the downstream area that could be affected in the event of a failure.

2.0 FACILITY DESCRIPTION

Plant Gorgas is a coal-fired power plant located near Parrish, Alabama. This EAP covers emergency response procedures for the Plant Gorgas Gypsum Pond (the Gypsum Pond), which is designed to receive and store coal combustion residuals produced during the electric generating process at Plant Gorgas. An overview of Plant Gorgas and the surrounding area is shown in Appendix A – Figure 1.

The Gypsum Pond is approximately 18 acres in size at its normal pool elevation of 428 feet (Appendix A – Figure 2). It should be noted that a significant portion of this 18 acres is utilized for dry storage and contains no standing water. The Gypsum Pond has a cross valley embankment that ties into natural terrain/fill on the eastern and western sides of the pond. Approximately one half of the perimeter of the Gypsum Pond is an earthen embankment with a consistent blanket of riprap protecting the downstream slopes. The embankment is most prevalent along the southeast side of the Pond and this area was considered during the breach scenario. The top of the embankment is at an elevation of 440 feet or approximately 50 feet above the invert of the discharge pipe. The entirety of the Gypsum Pond is lined with an HDPE liner. The Gypsum Pond system also includes a sedimentation pond and two clear pools that are used to decant water back to Plant Gorgas. The discharge system of the Gypsum Pond is located in the southwest portion of the pond and consists of the following features:

1. A 48-inch HDPE riser pipe that connects to a 36-inch pipe that discharges into the sedimentation pond.

2. A 36-inch HDPE pipe that collects Stormwater runoff from the perimeter ditch that discharges into the same 36-inch pipe as mentioned above before discharging to the sedimentation pond.

3. All flows from the pond are collected in the sedimentation pond before being pumped back to the plant for reuse or to the Ash Pond at Plant Gorgas.

The Gypsum Pond is not included in the National Inventory of Dams and there is no Safe Dams Program in the State of Alabama. The Gypsum Pond and has been assigned a Significant Hazard Potential classification under 40 C.F.R. Part 257.73 of the Environmental Protection Agency's (EPA's) Coal Combustion Residuals (CCR) Rule. This classification, by definition, indicates that there is no probable loss of human life in the event of a dam/dike failure or misoperation of the facility. However, failure or misoperation can cause economic loss, damage to the environment, disruption of lifeline facilities, or impact other concerns. There are no structures that could be impacted by the failure of the Gypsum Pond dam/dike or mis-operation of the surface impoundment other than gravel roads on Plant Gorgas property. There are no other dams located downstream that could be impacted by the failure of the Gypsum Pond dam/dike. The Gypsum Pond is located just above the Mulberry Fork of the Black Warrior River. The limits of potential flooding in the event of failure of the Gypsum Pond dam/dike can be seen on the Inundation Maps, which are included as Appendix B. The provided inundation maps were developed based on the results of routing the breach wave downstream using the computer software, HEC-RAS. HEC-RAS is a general application one-dimensional hydraulic model that can perform unsteady flow routing through an open channel system that may also include culverts, bridges, levees, tributaries, storage areas, and other dams. Unsteady flow analyses allow for flow conditions that vary temporally and spatially such as a dam breach simulation. Breach parameters such as failure time, breach width, and breach side slopes were

selected from industry accepted empirical formulas. Water surface elevation data was extracted from the hydraulic model and plotted on best available LiDAR topographic information for the downstream areas.

Normal river/lake levels and the flow from simulated dam breaches were superimposed over topographical maps to identify areas subject to flooding. ***These flood extents are provided for planning purposes only; actual flooding can vary due to actual conditions present at the time of the failure.***

3.0 DETECTION, EVALUATION, AND CLASSIFICATION PROCEDURES FOR EMERGENCIES

3.1 Inspection Schedule and Condition Detection/Evaluation

Trained personnel from Plant Gorgas inspect the Gypsum Pond dams/dike on a regular basis to pre-emptively detect conditions, in a timely manner, that could indicate a potential issue so that it can be addressed. Trained personnel from the Plant's Compliance group perform weekly inspections; and SCS E&CS Fossil Dam Safety (Fossil Dam Safety) personnel perform semi-annual inspections.

Plant personnel conducting inspections of the dams/dikes are trained on an annual basis by engineers from Fossil Dam Safety on the appropriate surveillance and monitoring requirements.

Any issues discovered during an inspection are reported to Fossil Dam Safety as prescribed in the Safety Procedure for Dams and Dikes at Fossil Generation Plants (GEN10004). The Fossil Dam Safety Engineer(s) working with plant personnel will recommend a corrective course of action, as needed.

3.2 Condition Severity Classifications

Gypsum Pond dam/dike conditions will be classified based on the type of event, severity of the situation, and the time required to take corrective measures. This procedure covers the following severity classifications:

NON-FAILURE CONDITION (NFC)

A situation that will not, by itself, lead to a failure and is not considered an emergency. However, an NFC does require investigation and notification of Fossil Dam Safety personnel and may require corrective action in order to prevent conditions that may lead to an emergency.

POTENTIAL FAILURE – Condition B Emergency (B)

A developing situation where failure of a dam/dike may occur but implementation of pre-planned actions may alleviate or prevent failure. In general, adequate time is considered available to properly evaluate and implement corrective actions. *Should conditions worsen, an Imminent Failure emergency may be declared.*

IMMINENT FAILURE – Condition A Emergency (A)

A situation where failure of the dam/dike is imminent or has already occurred.

3.3 Guidance for Determining the Condition Severity Level

The following table details potential situations that could occur at the Gypsum Pond dam/dike. *The Condition Level indicated in the right-most column corresponds with the Condition Severity Classifications in Section 3.2 above.*

Event	Situation	Condition Level
Discharge Structure Flow	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise	B
	Spillway flow that is flooding people downstream	A
Embankment Overtopping	Reservoir level is 1 foot below the top of the dam/dike	B
	Water from the reservoir is flowing over the top of the dam/dike	A
Seepage	New seepage areas in or near the dam/dike	NFC
	New seepage areas with cloudy discharge or increasing flow rate	B
	Seepage with discharge greater than 10 gallons per minute	A
Dropouts	Observation of new sinkhole in reservoir area or on embankment	B
	Rapidly enlarging sinkhole	A
Embankment Cracking	New cracks in the embankment greater than ¼-inch wide without seepage	NFC
	Cracks in the embankment with seepage	B
Embankment Movement	Visual movement/slippage of the embankment slope	NFC
	Sudden or rapidly proceeding slides of the embankment slopes	A
Earthquake	Measurable earthquake felt or reported on or within 50 miles of the dam/dike	NFC
	Earthquake resulting in visible damage to the dam/dike or appurtenances	B
	Earthquake resulting in uncontrolled release of water from the dam/dike	A
Security Threat	Verified bomb threat that, if carried out, could result in damage to the dam/dike	B
	Detonated bomb that has resulted in damage to the dam/dike or appurtenances	A
Sabotage / Vandalism	Damage to dam/dike or appurtenances that could adversely impact the functioning of the dam/dike	NFC
	Modification to the dam/dike or appurtenances that could adversely impact the functioning of the dam/dike	NFC
	Damage to dam/dike or appurtenances that has resulted in seepage flow	B
	Damage to dam/dike or appurtenances that has resulted in uncontrolled water release	A

4.0 INCIDENT RESPONSE

The following situations and conditions should be evaluated when performing condition severity detections and evaluations.

Overtopping. The Gypsum Pond reservoir has a drainage area of approximately 30 acres compared to a pond size of 18 acres. The Gypsum Pond receives only Stormwater runoff that falls within the local drainage area and water used to sluice the Gypsum slurry. The surface impoundment and principal spillway are designed and operated to safely manage the 1,000-year flood.

Seepage. Failures due to internal erosion and/or piping resulting from seepage would be detected in the early stages during the regular inspections conducted by plant personnel. Inspectors are trained to look for evidence of seepage. Inspection reports, including piezometer readings, are transmitted to trained dam safety engineers for evaluation. Therefore, the conditions that could lead to failures of this type would likely be discovered and corrected, making an actual failure a remote possibility.

Slope Instability. Slope instability would be demonstrated by sloughing of dam/dike slopes, which would be detected by Environmental Compliance personnel in their weekly inspections. The conditions that could potentially lead to a failure of this type would also be detected in advance and corrected making an actual failure a remote possibility.

In the event that conditions are detected that could potentially lead to a dam/dike failure, the flowcharts in Appendices C (Incident Response) and D (Response Notification) will be used to respond to the situation and alert applicable personnel and emergency agencies. In that situation, local emergency management agencies (EMAs) would respond and begin warnings and evacuations as soon as possible following the declaration of a safety emergency.

4.1 Access to the Site

Plant and emergency personnel are able to access the dam/dike from the main portion of Plant Gorgas by paved or gravel-surfaced roadways. Figures 1 and 2 in Appendix A show the location of the Gypsum Pond on Plant property.

4.2 Response during Periods of Darkness

Plant Gorgas is operational and/or manned 24 hours a day every day, and personnel and equipment are able to access the site at any time. Response times would not vary significantly from daylight conditions.

4.3 Response during Weekends and Holidays

Plant Gorgas is operational and manned 24 hours a day every day, and personnel and equipment will be able to access the site at any time. The response times of certain personnel may be affected.

4.4 Response during Adverse Weather

The dam/dike is accessed by paved and gravel-surfaced roads and is accessible during periods of adverse weather. If severe flooding causes road closures, response times may be adversely affected.

5.0 RESPONSIBLE PERSONS AND RESPONSIBILITIES

Designated personnel have been trained in the use of these response procedures and are aware of their responsibilities in making the procedures effective. The chain of command and the individual responsibilities for plant personnel, public officials, and agencies are outlined below.

5.1 Incident Commander

The Incident Commander is the 24-hour point of contact for all plant emergencies. The Primary Incident Commander is the Operations Team Leader on-shift. The Secondary Incident Commander is the Fuels Team Leader on-shift, and should be contacted if the Primary Incident Commander cannot be reached.

The Incident Commander is responsible for ensuring the following functions are addressed as required for emergency response situations:

1. Verifying that an emergency condition exists.

2. Assessing and declaring the emergency condition.

3. Consulting with Fossil Dam Safety to evaluate conditions and determine remediation actions.

4. Emergency Actions
   a. If necessary, implement actions to lower the water level in the impoundment in consultation with Fossil Dam Safety.
   b. Call-out of personnel necessary to perform the work required on plant site during the emergency.

5. Ensure the notification process as outlined in the Response Notification Flowchart (Appendix D) is completed in an expedient manner.

6. Other responsibilities include:
   a. Establishing lines of communication from the plant to the local and state EMAs.
   b. Ensuring emergency sources of power are available for the operation of essential equipment such as emergency lighting.
   c. Ensuring the availability of heavy equipment and trained operators to aid in the mitigation effort.

5.2 Dam Emergency Response Team Leader

The Incident Commander shall assign a Dam Emergency Response Team Leader as appropriate for the type of emergency incident. Duties include reporting matters relating to potential emergency action directly to the Incident Commander, accounting for his/her crew personnel and directing their actions.

5.3 Plant Security Department

The Plant Security Department is responsible for securing company property and controlling access to company facilities. The Plant Security Department will relay information to the Incident Commander. The Incident Commander will determine the appropriate people and agencies to notify. The Plant Security Department will perform emergency notifications to Plant departments as appropriate.

5.4 Plant Environmental Compliance

Environmental Compliance personnel are responsible for assessing conditions, contacting the Plant Manager, obtaining assistance from Fossil Dam Safety, and for providing technical updates to the Incident Commander. Compliance personnel can also request assistance from APC Environmental Affairs, if conditions warrant.

5.5 Alabama Control Center

The Alabama Control Center contacts the National Weather Service to inform them of conditions at the plant that may lead to potential flooding downstream.

5.6 SCS E&CS Fossil Dam Safety

Fossil Dam Safety is responsible for coordinating and providing the technical support necessary to mitigate the emergency condition and for notifying APC Corporate Communications and the Hydro General Manager (if the failure could impact a FERC regulated reservoir downstream of the surface impoundment) of the emergency condition. The SCS E&CS Manager shall notify the APC Supply Chain Management as shown on the Response Notification Flowchart (Appendix D).

5.7 APC Personnel

Environmental Affairs

APC Environmental Affairs is responsible for coordinating long-term environmental response (after the initial response) and to remediate environmental issues and provide the technical support necessary for any remediation needs. Environmental Affairs is also responsible for all communications with environmental regulatory agencies for appropriate reporting of releases to the environment and for securing variances to existing permits, if needed.

If necessary, Environmental Affairs will also help secure approved remediation contractors for the specific emergency condition that may exist. They will also provide additional support, such as emergency manpower, material, equipment, and expertise to assist in mitigation efforts, if needed.

Corporate Communications

APC Corporate Communications is responsible for coordinating the APC media response and will schedule news briefings and prepare news releases, as required. APC Corporate Communications will also work with local and State Public Information Officers to ensure that timely, accurate, and consistent information is made available to media outlets.

Corporate Security
APC Corporate Security is responsible for supporting Plant Security personnel and contracting with local law enforcement for additional security personnel as needed.

Supply Chain Management
Supply Chain Management is responsible for obtaining additional equipment and materials necessary to mitigate the emergency condition and begin the recovery process.

5.8 Emergency Agencies

Local EMAs are responsible for planning and implementing evacuation and sheltering plans as well as directing search, rescue, and recovery efforts. If additional resources are required, the local agencies can contact the Alabama Emergency Management Agency (Alabama EMA) for assistance.

The local EMAs are the point of contact between plant personnel and local jurisdictions. The EMAs are responsible for the direction and control of emergency operations at the local level and keeping local government officials informed of the status of emergency operations.

Alabama EMA generally becomes involved in an emergency situation if the local agencies are not capable of handling the situation or if assistance is requested by a local agency or by the Governor. Alabama EMA has responsibilities similar to the local EMAs but is also responsible for mobilizing state military support as well as State Disaster Center operations.

5.9 Law Enforcement

Local Law Enforcement agencies are notified by the appropriate EMA. Alabama EMA notifies the State Patrol as well as the Alabama Department of Transportation (ALDOT). Law Enforcement is responsible for traffic control and can assist with evacuation, mitigation, and rescue activities.

6.0 NOTIFICATION PROCEDURES

Communication during an emergency event will primarily be by company phone. In the event of system failure, Southern Linc radios and cell phones would be utilized as an alternate method of communication.

Local and state EMA will be notified in the event of an emergency, and these agencies will be responsible for notifying the public. In the event of an imminent failure, local and state EMA's will be notified to immediately begin evacuation procedures. APC Corporate Communications will provide information for media outlets and will be responsible for communicating relevant information to the public.

6.1 Incident Response Flowchart for Imminent Failure and Potential Failure Emergencies

Personnel responsible for executing mitigation and/or emergency actions shall be thoroughly familiar with their responsibilities under this EAP.

A. When a Condition B or Condition A situation is detected, notify plant personnel in accordance with the Incident Response Flowchart (below and in Appendix C). Plant Environmental Compliance should contact Fossil Dam Safety immediately for technical consultation. Fossil Dam Safety will provide the evaluation of the conditions and provide a determination if there is an immediate threat to the dam/dike. If there is an immediate threat of dam/dike or dike failure, declare an **Imminent Failure Emergency** and proceed to Step I.

B. If no immediate threat is detected, determine if the problem detected could possibly lead to failure of the dam/dike. If there is a potential for failure but corrective measures may be taken to moderate or alleviate failure, declare a **Potential Failure Emergency (Condition B)** and proceed to Step C.

C. If a **Potential Failure Emergency** has been declared, notify personnel and agencies listed on the Response Notification Flowchart (Appendix D). Document all communications using the appropriate forms contained in Appendix E. Once outside agencies have been notified of an issue or potential problem, plant management is responsible for keeping local EMAs informed of any change in conditions.

D. Begin corrective measures to attempt to alleviate or prevent failure.

E. Evaluate the effectiveness of the corrective measures. If the corrective actions are successful, update all personnel/agencies previously contacted of the status of the improved conditions and document relevant communications using the forms provided in Appendix E. At this time, the Incident Commander will end the emergency condition. Fossil Dam Safety will be responsible for preparing the after-action report.

F. If the corrective measures are not effective, Fossil Dam Safety will determine if there is time to take additional corrective measures.

G. If there is not time to take additional corrective measures and failure is imminent, declare an **Imminent Failure Emergency (Condition A)** and proceed to Step I.

H. If there is time to implement additional corrective measures, return to Step E. Additional support can be requested from Civil Field Services or outside contractors, as needed.

I. If an **Imminent Failure Emergency** has been declared by the Incident Commander or his designee, ensure that all personnel have been moved to a safe area and perform notifications per the Response Notification Flowchart (Appendix D). Document all communications using the appropriate forms contained in Appendix E. Once outside agencies have been notified of a problem or potential problem, the Incident Commander or his designee is responsible for keeping local EMAs informed of any change in conditions. Fossil Dam Safety will be responsible for preparing the after-action report.

6.2 Additional Considerations

All communication shall be documented using the *Data Recording Sheet* located in Appendix E.

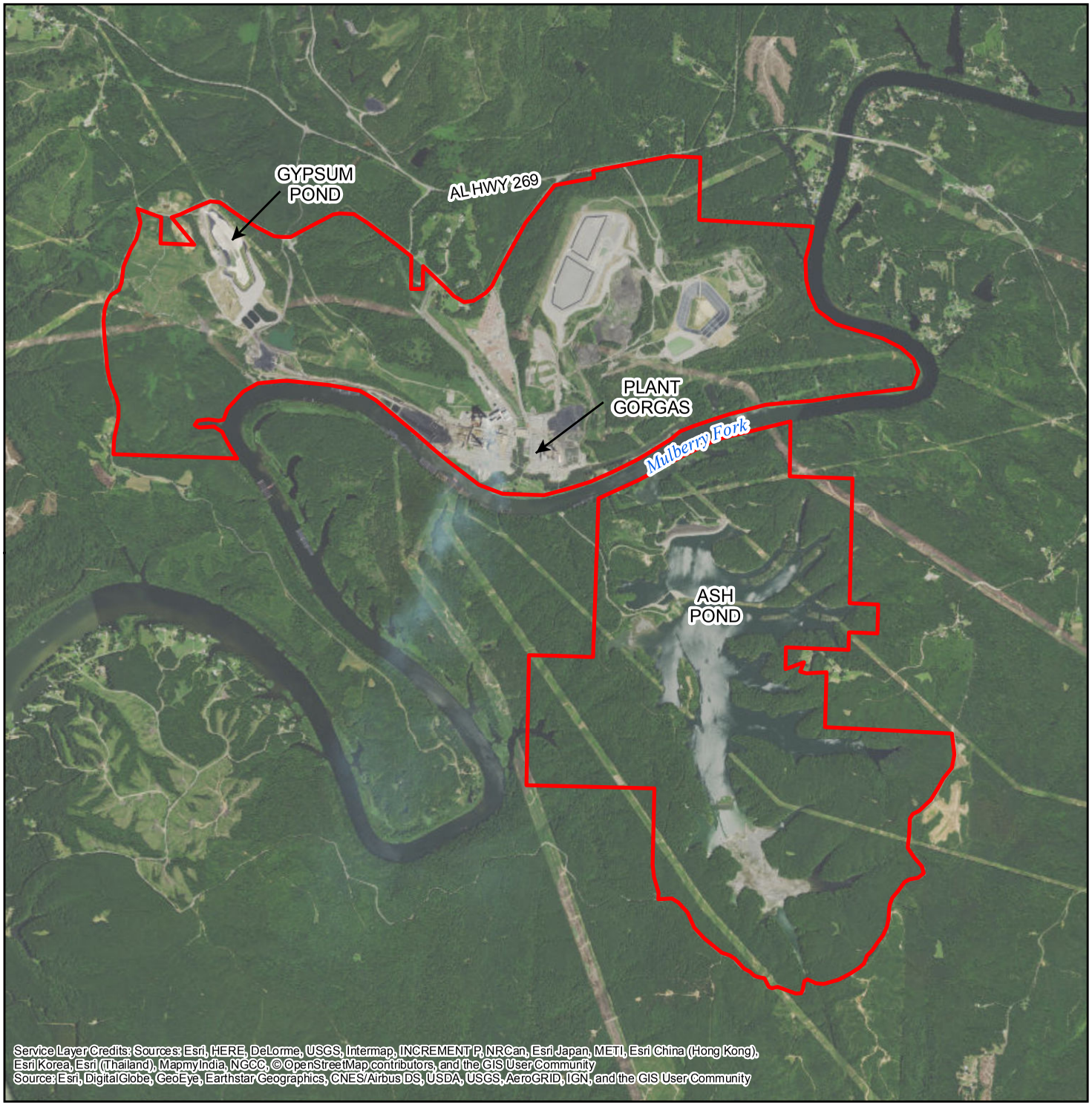
7.0 PROVISIONS FOR ANNUAL COORDINATION MEETING

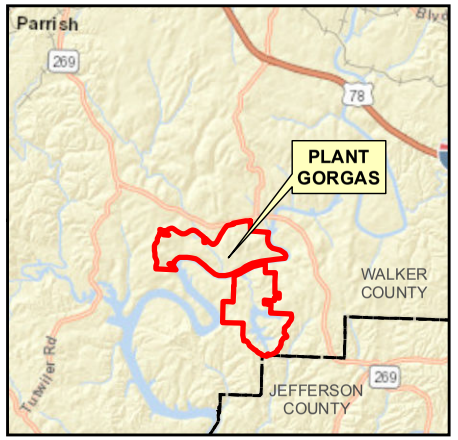
An annual face-to-face meeting will be held with representatives of Plant Gorgas, APC, and local emergency responders. The representatives may include:

- Southern Company Services Fossil Dam Safety
- Plant Gorgas Plant Manager and Team Leaders
- Plant Gorgas Emergency Response Team
- Alabama Power Environmental Affairs
- Alabama Power Corporate Communications
- Local Emergency Responders

APPENDIX A

Plant Gorgas Location Map – Figure 1
Gypsum Pond Overview – Figure 2





0 2.5 5
Miles

1 inch = 5 miles

LEGEND

Plant Boundary

N

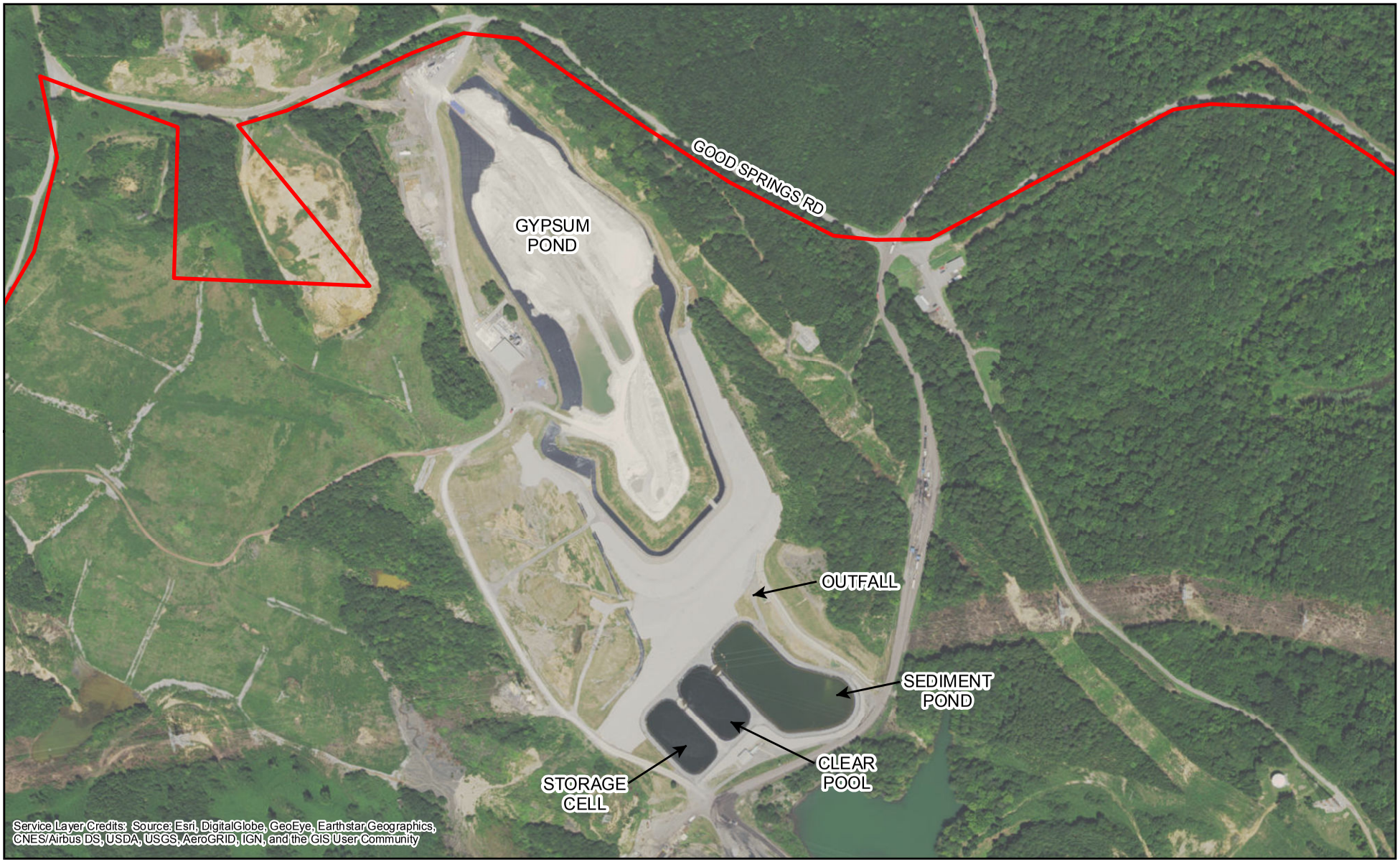
0 0.25 0.5 1
Miles

1 inch = 3,000 feet

FIGURE 1
PLANT GORGAS LOCATION MAP
WALKER COUNTY, ALABAMA

Southern Company Services
FOR

Alabama Power Company



LEGEND

Approximate Plant Boundary

N

0 250 500 1,000

Feet

1 inch = 500 feet

FIGURE 2
GYPSUM POND MAP
PLANT GORGAS
WALKER COUNTY, ALABAMA

Southern Company Services
FOR
Alabama Power Company

APPENDIX B

Inundation Maps

West Sunny Day Breach Summary

Point	Distance from Breach (miles)	Arrival Time (HH:MM)	Time to Peak (HH:MM)	Ground/ Water Elevation (ft-msl)	Breach Maximum Water Surface Elevation (ft-msl)	Maximum Water Depth (feet)	Description
AA	0.03	00:01	00:08	400.6	410.9	10.3	Downstream of Breach
BB	0.05	00:07	00:11	330.9	336.2	5.3	Access Road
CC	0.17	00:07	00:09	282.5	282.6	0.1	Sedimentation Pond
DD	0.30	00:08	00:10	254.4	263.6	9.2	Confluence with Mulberry Fork

Golder Associates

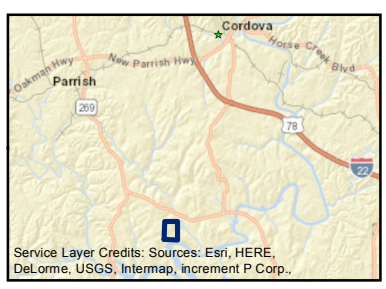
Projection
Transverse Mercator
NAD 1983 Alabama West State Plane

ISSUE DATE: 12/13/2016 PAGE 1 of 1

Notes
1. This map depicts the maximum water surface elevation from breaching of the western side of the embankment.
2. Mapping of flooded areas and flood wave travel times are approximate and should be used as guidance for establishing evacuation zones.
3. Actual areas inundated will depend on failure mode and pre-failure hydrologic conditions and may differ significantly form information shown on these maps.

PLANT GORGAS
GYPSUM POND DAM BREACH
WALKER COUNTY, AL

500 250 0 500
1"= 500 Feet

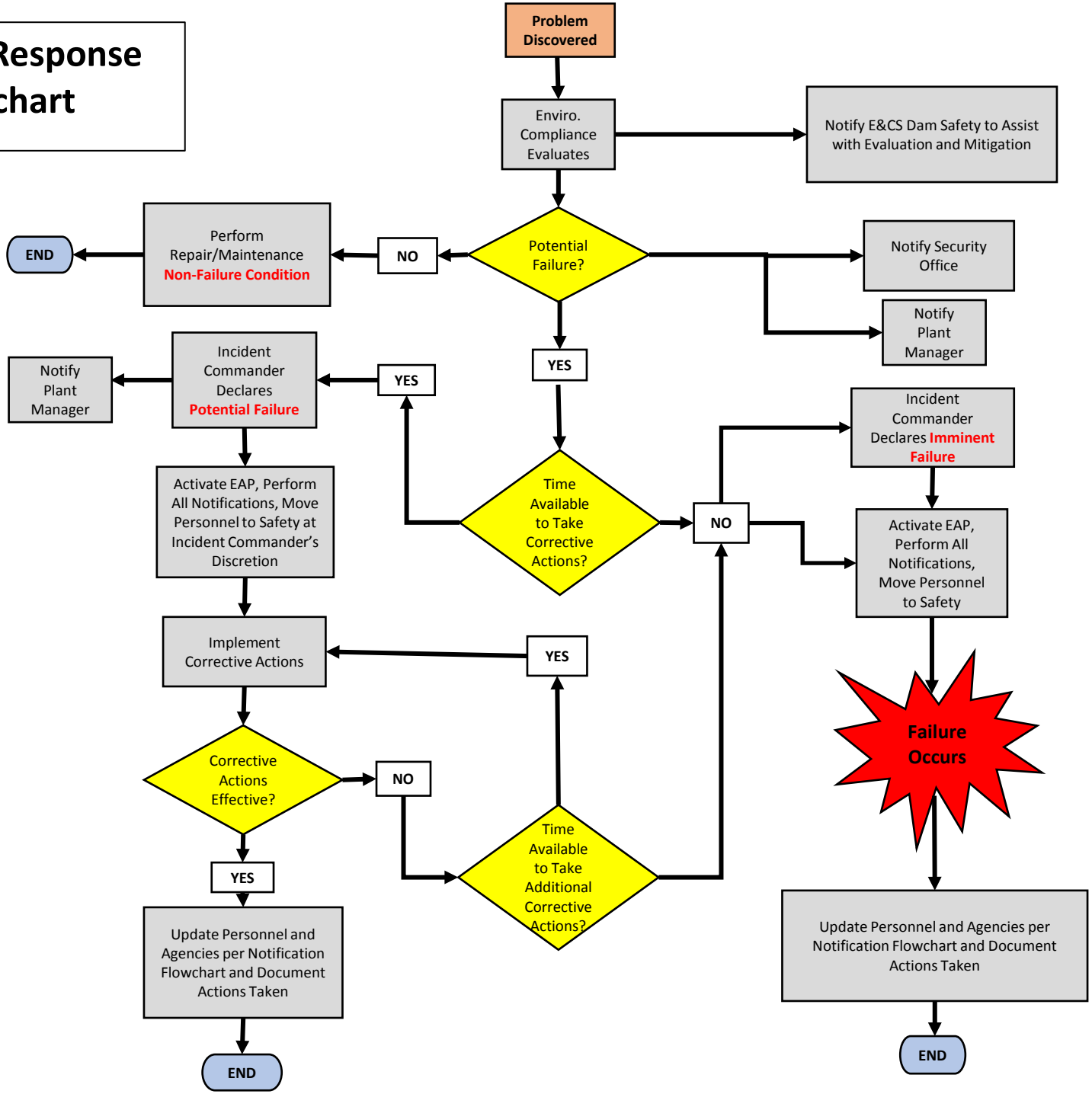


AA 0.00 POINT IDENTIFIER
DISTANCE FROM BREACH
5 FOOT CONTOUR
WEST BREACH
FEMA ZONE A 100 YEAR FLOODPLAIN

APPENDIX C

Incident Response Flowchart

Incident Response Flowchart



APPENDIX D

Response Notification Flowchart

Response Notification Flowchart

Imminent Failure or Potential Failure Emergencies

Incident Commander Declares Imminent or Potential Failure Emergency

2 → **Plant Gorgas Plant Manager**

1 → **Southern Co. Generation Senior Vice President**

1 → **Plant Gorgas Security Office**

1 → **Walker County EMA**
Regina Myers, Coordinator
(205) 384-7233

After hours, call 911

3 → **Plant Gorgas Compliance C&S Manager (Dam Emergency Response Team Leader)**

1 → **SCS Fossil Dam Safety**

Dam Safety Referral
(205) 992-6601

See Next Page for Notifications by Fossil Dam Safety

2 → **APC Enviro. Affairs**

4 → **Alabama System Owner**

National Weather Service
Birmingham, Alabama
(205) 664-3010

Alternate:
Mobile, AL
(251) 633-6443

Response Notification Flowchart

Imminent Failure or Potential Failure Emergencies

Fossil Dam Safety Notifications

SCS Fossil Dam Safety

Dam Safety Referral
(205) 992-6601

APC Corporate Communications

APC Supply Chain Management

Emergency Responders Contact Information

If a Condition A Emergency has occurred call 911

1) Parrish Police Department – 1-205-686-9991
2) Parrish Fire and Rescue – 1-205-686-5762
3) Walker County Sheriff's Office – 1-205-302-6464
4) Walker County Emergency Management Agency – 1-205-384-7233
5) Alabama Emergency Management Agency – 1-205-280-2200
6) National Weather Service
    a. Birmingham Office – 1-205-664-3010
    b. Mobile Office – 1-251-633-6443

APPENDIX E

Data Recording Sheet

EMERGENCY ACTION PLAN
DATA RECORDING SHEET

The Data Recording Sheet will be used to record important information relating to dam safety emergency.

Team Member(s): _____

Date of Incident: _____

Time of Incident: _____

Type of Emergency: _____

Emergency Coordinator: _____

Description of Events:* _____

_____

_____

_____

_____

What is Being Done:* _____

_____

_____

_____

_____

*Attach additional pages as necessary.

For incoming questions, refer all calls to:

Media Inquiries:	Alabama Power Company Corporate Communications
EMA Inquiries:	Plant Manager/Incident Commander
Environmental Agency Inquiries:	APC Environmental Affairs

APPENDIX 4

HISTORY OF CONSTRUCTION DOCUMENTS

HISTORY OF CONSTRUCTION FOR EXISTING CCR SURFACE IMPOUNDMENT
PLANT GORGAS GYPSUM POND
ADEM Admin. Code r. 335-13-15-.04(4)(c)

(i) Site Name and Ownership Information:

Site Name:	William C. Gorgas Electric Generating Plant
Site Location:	Parrish, Alabama
Site Address:	460 Gorgas Rd. Parrish, Alabama 36512
Owner:	Alabama Power Company
Address:	600 North 18th Street Birmingham, AL 35203
CCR Impoundment Name:	Plant Gorgas Gypsum Pond
NID ID:	NA

ADEM's rules governing coal combustion residuals require the owner or operator of an existing CCR surface impoundment to compile a history of construction. *See* ADEM Admin. Code r. 335-13-15-.04(4)(c)1.

(ii) Location of CCR Unit:

33.626385, -87.183952

See Location Map in the Appendix

(iii) Purpose of CCR Impoundment:

The William C. Gorgas Electric Generating Plant is a 3-unit electric generating facility, all of which are coal-fired units. The Plant Gorgas Gypsum Pond is designed to receive and store coal combustion residuals (gypsum) produced during the electric generating process at Plant Gorgas. The gypsum slurry from the flue gas desulfurization operation is wet-sluiced to the gypsum storage area. The gypsum is allowed to settle and the water decants to the sedimentation pond. The decant water flows from the sedimentation pond to a clear pool before it is returned to the scrubber process.

(iv) Watershed Description:

Plant Gorgas is located within the Baker Creek-Mulberry Fork HUC 12 watershed which has a total area of 37,044 acres. The Baker Creek-Mulberry Fork Watershed is located within the Mulberry HUC 8 watershed which has a drainage area of 878,212 acres. No run-on from the surrounding watershed flows into the Gypsum Pond.

(v) Description of physical and engineering properties of CCR impoundment foundation/abutments:

The Plant Gorgas Gypsum Pond is located within the Warrior Basin physiographic region of the Cumberland Plateau and is a subsection of the Appalachian Plateaus physiographic province. The Warrior Basin consists of a broad upland with moderate relief, and is formed on gently dipping strata of the Pottsville Formation. The upper reaches of the surface geology are dominated by the Pratt Coal Group and the Cobb Coal Group consisting of shale, siltstone, sandstone, and coal seams.

The specific area of the Gypsum Pond was filled with mine spoil after previous surface mining activities. Borings taken in the undisturbed areas of the site suggest that only a thin layer of soil (5 to 20 feet) was present above the residual Pottsville Formation. General soil conditions in most areas consisted of dark gray to black, fine to gravelly, shale and sandstone coal mine spoils. The topography of the area was variable. A terrace-type stratigraphy exists at the gypsum storage location due to the previous strip mining operations and backfilling of this area with mine spoils.

(vi) Summary of Site Preparation and Construction Activities:

The Gypsum Pond was constructed in 2007. An area approximately 50 acres in size was used to create the first cell of the gypsum storage area. The Gypsum Pond itself covers approximately 18 acres. There is an area to the east at a lower elevation that consists of a sedimentation pond, clear pool, and an emergency storage pond. The ponds are lined with an HDPE liner.

As a part of construction, the existing soils/minespoil was graded, the subgrade proofrolled and a granular fill was placed beneath the liner. Embankments were constructed of compacted soil fill obtained from nearby borrow pits. Subsequent to initial construction, the downstream slopes of the embankment were surfaced with limestone riprap.

(vii) Engineering Diagram:

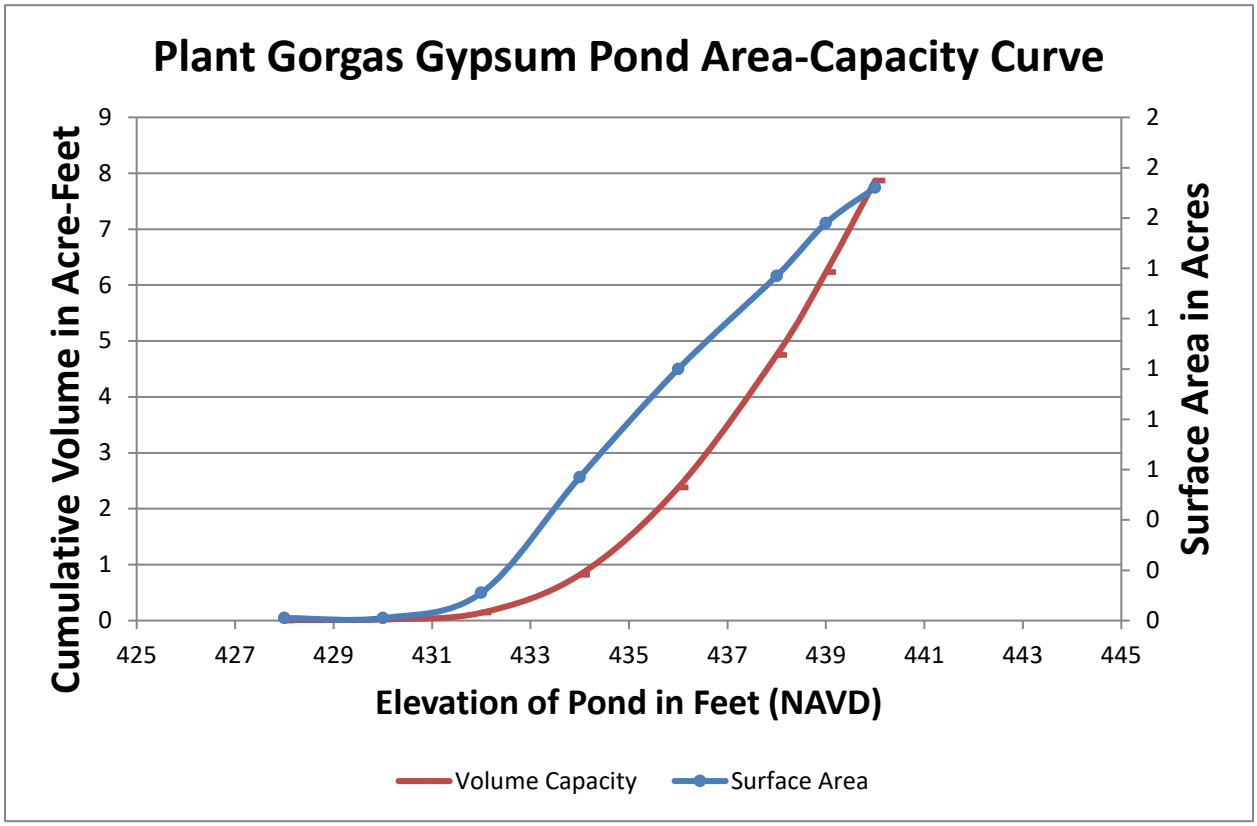
The following drawings reflecting the construction of the Plant Gorgas Gypsum Pond can be found in the Appendix:

- 2007 Site Grading Plan
- 2007 Cell Sections and Details
- 2007 Grading Plan Pond Sections and Details
- 2007 Grading Details

(viii) Description of Instrumentation:

There is currently no instrumentation at the Plant Gorgas Gypsum Pond.

(ix) Area-capacity curves:



(x) Spillway/Diversion design features and capacity calculations:

The Plant Gorgas Gypsum Pond spillway design consists of a 48-inch HDPE riser pipe that connects to a 36-inch pipe that discharges into the sedimentation pond. There is an additional 36-inch HDPE pipe that collects stormwater runoff from the perimeter ditch and discharges into the same 36-inch discharge pipe. The combined capacity of this discharge structure is approximately 100 cfs at a pond elevation of 439.0 ft.

(xi) Provisions for surveillance, maintenance and repair:

Inspections of dams and dikes are critical components and are conducted on a regular basis—at least annually by professional dam safety engineers and at a minimum interval of every seven days by qualified persons at the plant. In addition, inspections are performed after unusual events such as storms. The inspections provide assurance that structures are sound and that action is taken, as needed, based on the findings. Specific items addressed during the inspections include observations of pond levels, weather conditions, rainfall since the prior inspection, conditions of slopes and drains, erosion, animal damage, ant hills, alignment of retaining structures and more. Dam safety engineers assess any maintenance or remediation performed since the previous inspection, check the status of work recommended at prior inspections, ensure that the posting of emergency notification information is up to date and evaluate any items noted during plant personnel inspections.

Construction Specifications:

The following specifications relevant to the construction of the Plant Gorgas Gypsum Pond can be found in the Appendix:

- 2007 Technical Specifications for New Gypsum Storage Facility
- 2007 General Notes

(xii) Known record of structural instability:

There are no known instances of structural instability at the CCR unit.

Appendix

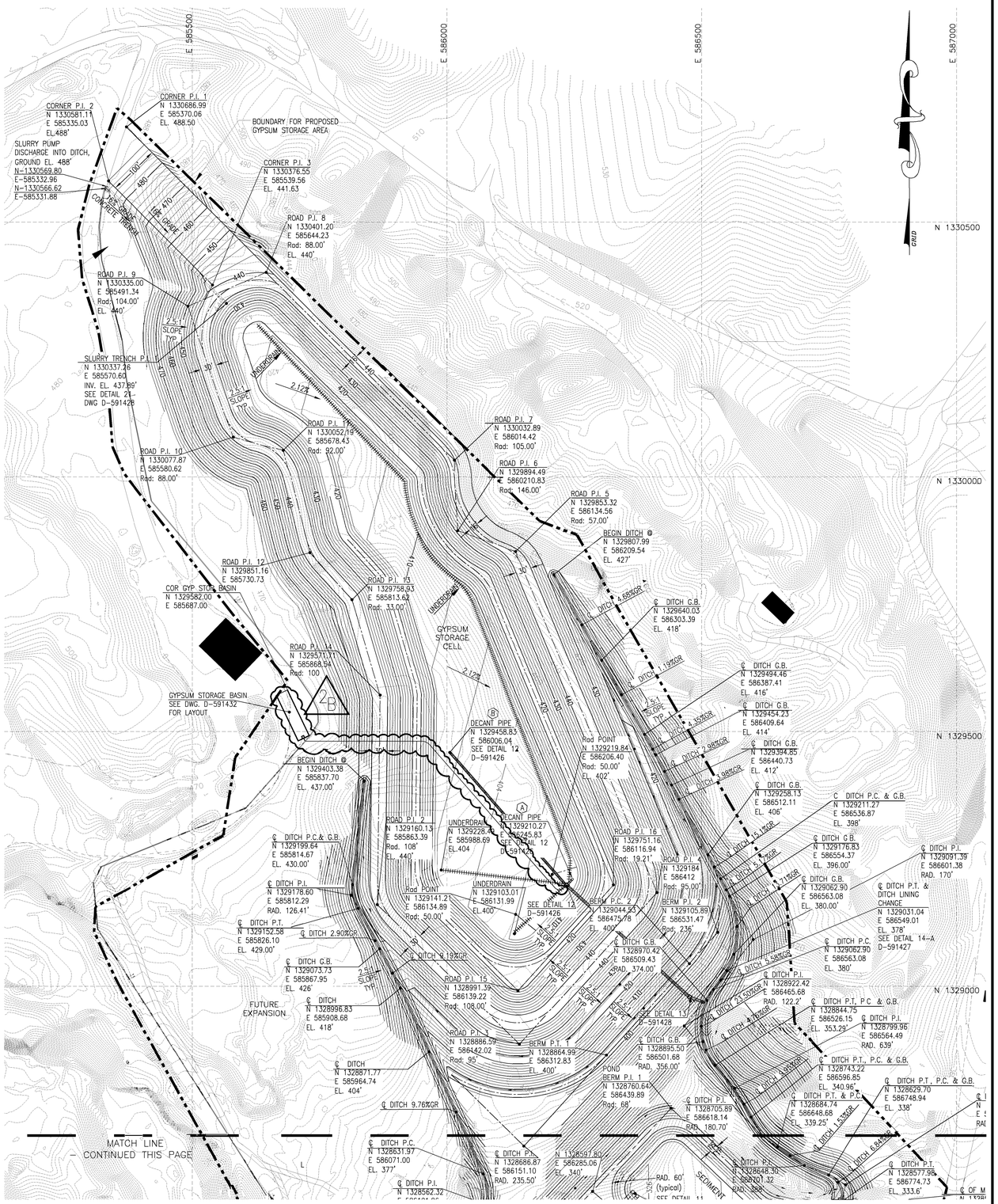
Plant Gorgas Gypsum Pond

Gypsum Pond Location

USA Topo Maps

N

0 0.25 0.5 1 Miles



LEGEND:

- PROJECT BOUNDARY
- 420 EXISTING GRADE CONTOURS (10')
- EXISTING GRADE CONTOURS (2')
- 400 FINAL GRADE CONTOURS (10')
- FINAL GRADE CONTOURS (2')
- STRUCTURES
- UNDERDRAINS
- RECYCLEX DITCH LINING
- CONCRETE DITCH LINING
- HDPE DITCH LINING
- CRUSHED AGGREGATE

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

PHOTOGRAMMETRIC SURVEY
GRID COORDINATES NAD 27
ALABAMA STATE PLANE
WEST ZONE

NOTES:

1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.
8) FOR REFERENCE DRAWINGS AND GENERAL NOTES SEE DRAWING NUMBER D-591420.
9) FINISHED GRADE CONTOURS REPRESENT BOTTOM OF 1' ASH LAYER WHEN ASH LAYER IS SHOWN ON SECTIONS.
10) FINISHED GRADE CONTOURS REPRESENT TOP OF TOPSOIL WHERE TOPSOIL IS REQUIRED AND NO ASH IS PRESENT.

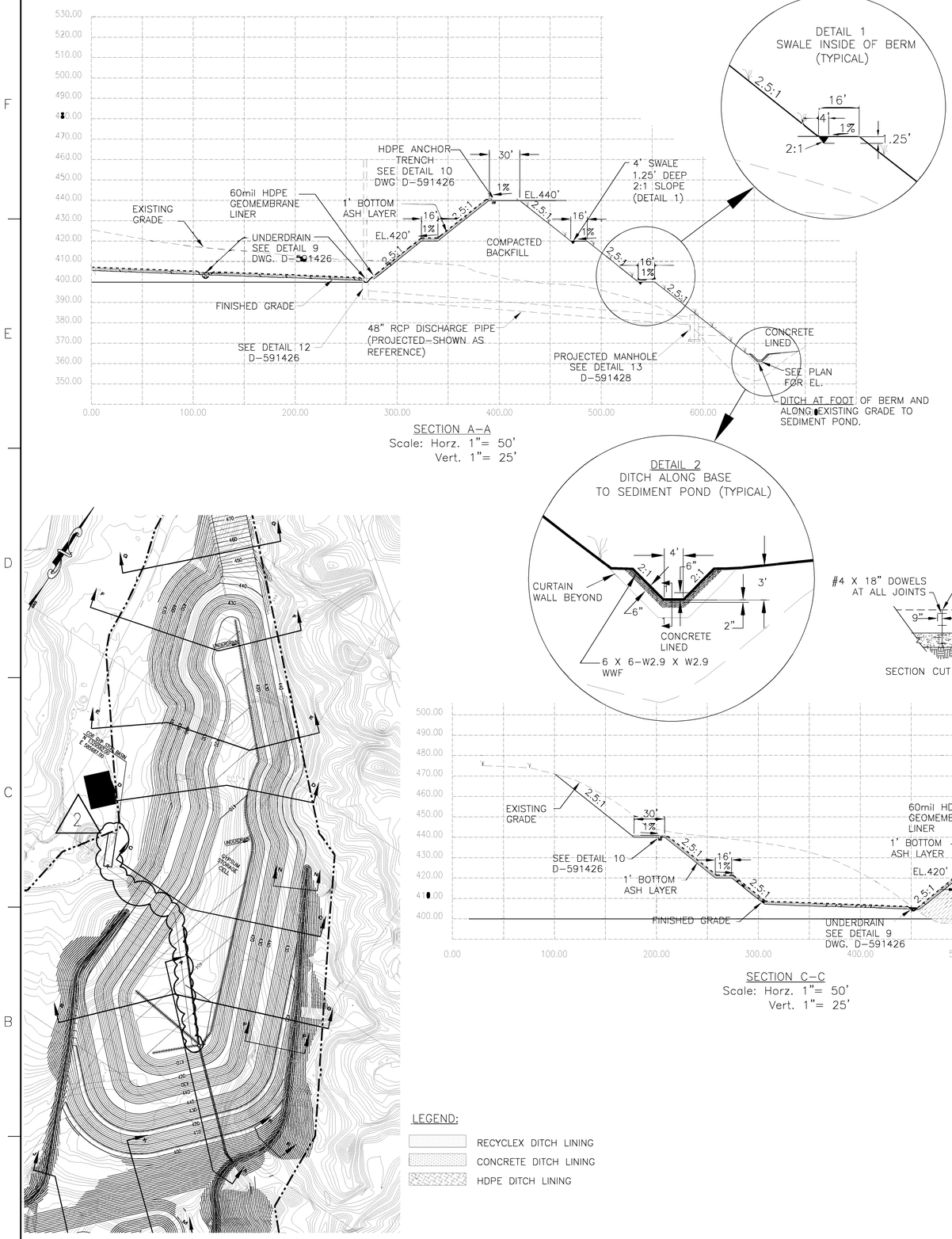
Southern Company Services, Inc.
FOR
Alabama Power Company

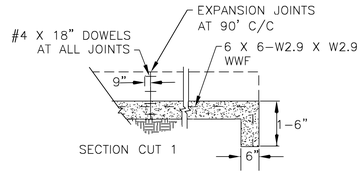
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
SITE GRADING PLAN

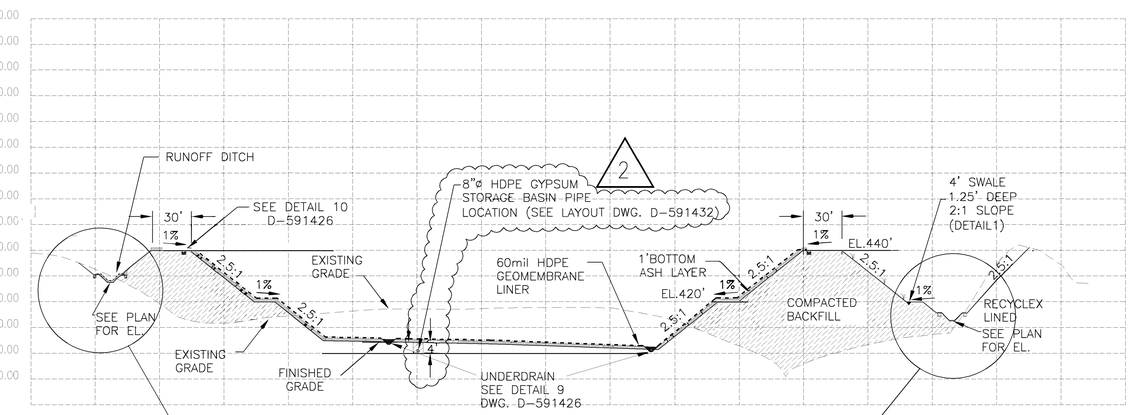
REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/15/2007	ASF	SSS	AMW RCB	JPS	RDP	DEK	KaM
A. ADDED NEW DESIGN FOR CULVERT OVER WEST DITCH FOR SLURRY PIPE. B. ADDED INFORMATION FOR GYPSUM STORAGE BASIN AND DRAIN.		EWO 2119			GO-05001			
1	09/21/2006	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS
ADDED 2' CONTOURS ON ROAD		EWO 2119			GO-05001			
0	05/12/2006	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS
ISSUED FOR CONSTRUCTION		EWO 2119			GO-05001			

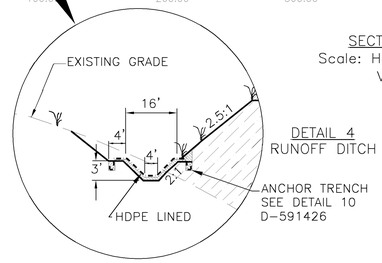
SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV.
AS SHOWN	210100	D-591422	1	FINAL	2

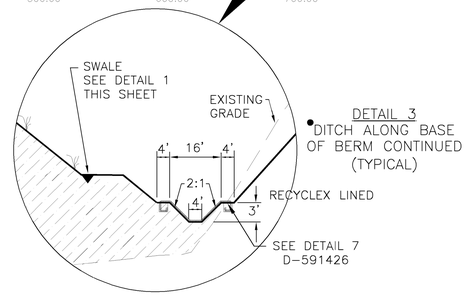
ANSI F: 28x40 ES1341 LandDesktop

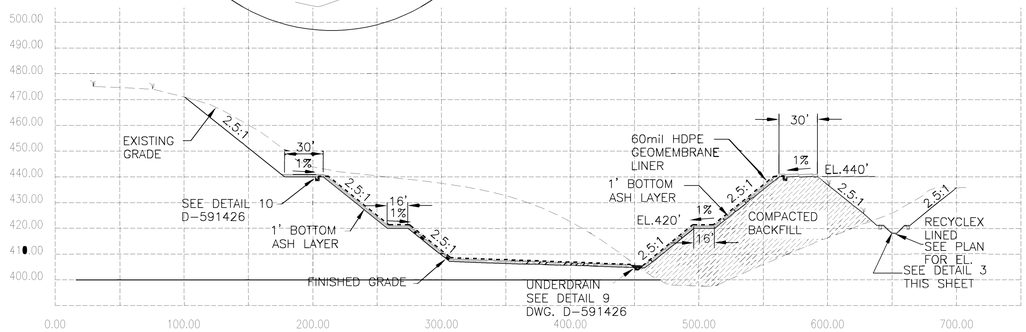


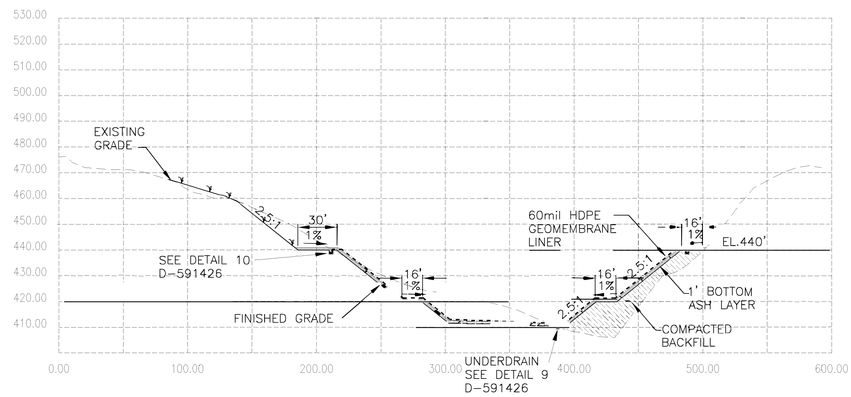












SECTION A–A
Scale: Horz. 1"= 50'
Vert. 1"= 25'

SECTION B–B
Scale: Horz. 1"= 50'
Vert. 1"= 25'

DETAIL 4
RUNOFF DITCH

DETAIL 3
DITCH ALONG BASE
OF BERM CONTINUED
(TYPICAL)

DETAIL 2
DITCH ALONG BASE
TO SEDIMENT POND (TYPICAL)

SECTION CUT 1

SECTION C–C
Scale: Horz. 1"= 50'
Vert. 1"= 25'

SECTION D–D
Scale: Horz. 1"= 50'
Vert. 1"= 25'

LEGEND:

░	RECYCLEX DITCH LINING
▨	CONCRETE DITCH LINING
▨	HDPE DITCH LINING

NOTES:

1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.
8) FOR REFERENCE DRAWINGS AND GENERAL NOTES SEE DRAWING NUMBER D-591420.
9) FINISHED GRADE CONTOURS REPRESENT BOTTOM OF 1' ASH LAYER WHEN ASH LAYER IS SHOWN ON SECTIONS.
10) FINISHED GRADE CONTOURS REPRESENT TOP OF TOPSOIL WHERE TOPSOIL IS REQUIRED AND NO ASH IS PRESENT.

LEGEND

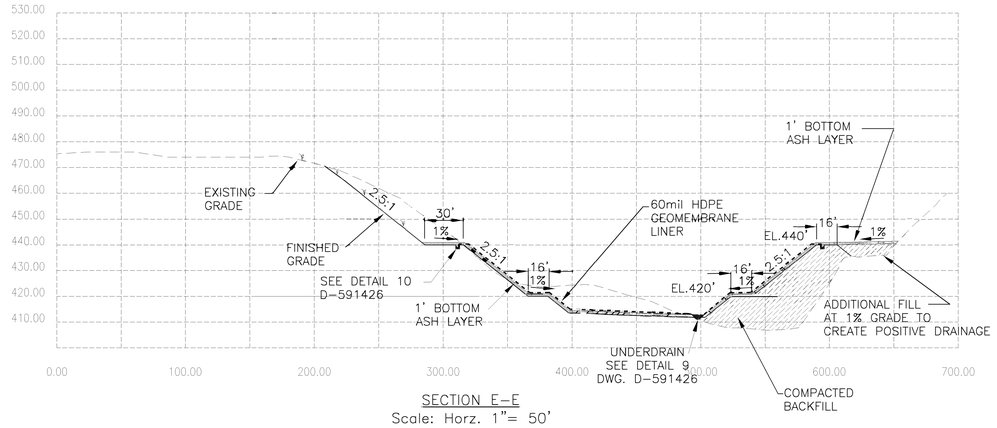
▤	1' BOTTOM ASH
▨	COMPACTED BACKFILL
– – –	EXISTING GRADE CONTOURS
———	FINAL GRADE CONTOURS
⅋ ⅋	FINAL GRADE CONTOUR AREAS TO RECEIVE TOPSOIL AND GRASSING
▓	RECYCLEX DITCH LINING
▭	CONCRETE DITCH LINING
— · — · —	HDPE LINING

Southern Company Services, Inc.
FOR
Alabama Power Company
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
CELL SECTIONS & DETAILS SHEET 1

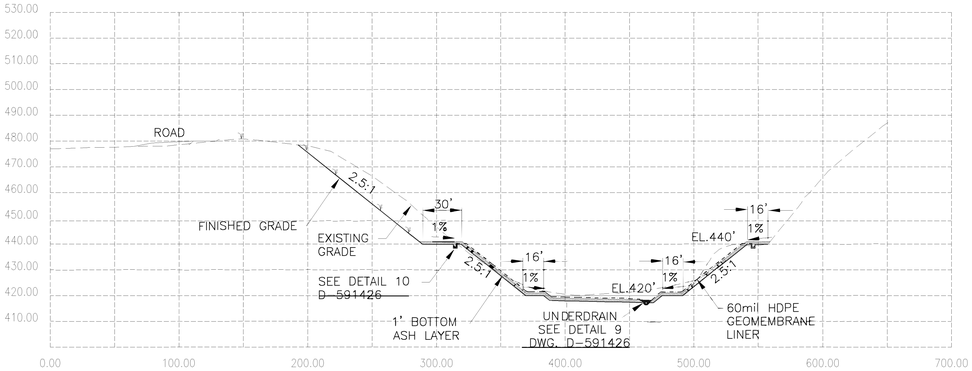
REVISION	DATE					
2	03/15/2007	ADDED GYPSUM STORAGE BASIN AND PIPE LOCATIONS				
1	09/21/2006	NO REVISION THIS SHEET				
0	05/12/2006	ISSUED FOR CONSTRUCTION				

REVISION	EWO	GO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	EWO 2119	GO–05001	ASF	SSS	AMW RCB	JPS	RDP	DEK	KaM
1	EWO 2119	GO–05001	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS
0	EWO 2119	GO–05001	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS

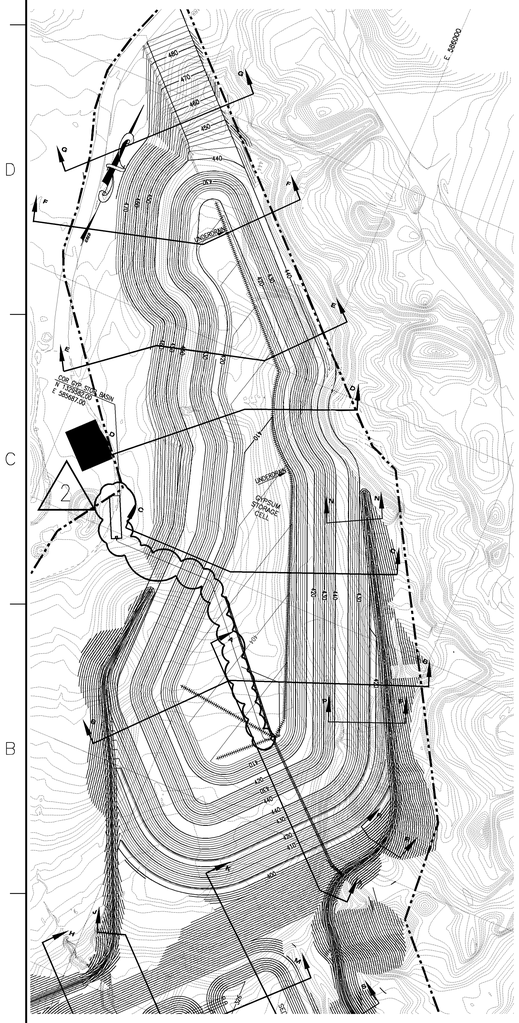
SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
AS SHOWN	210100	**D-591423**	1	FINAL	2

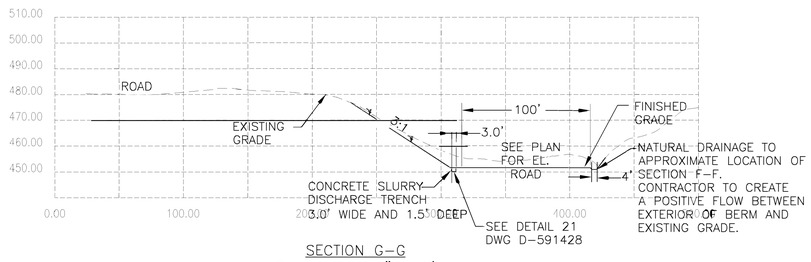


SECTION E–E
Scale: Horz. 1"= 50'
Vert. 1"= 25'

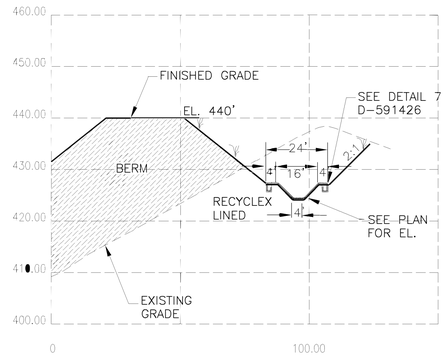


SECTION F–F
Scale: Horz. 1"= 50'
Vert. 1"= 25'

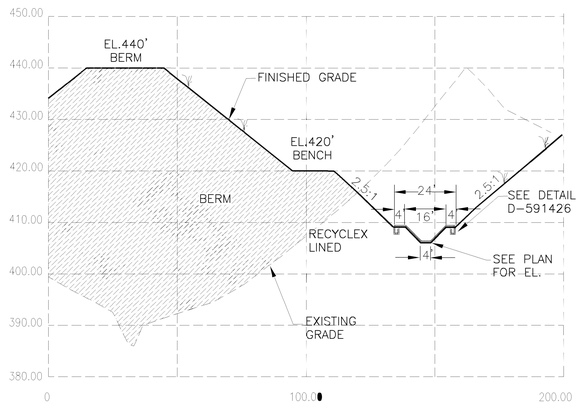




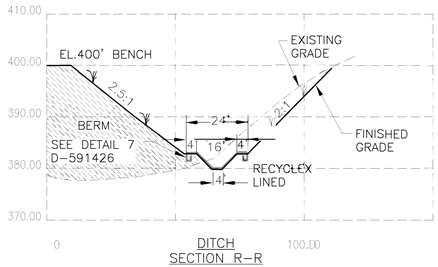
SECTION G–G
Scale: Horz. 1"= 50'
Vert. 1"= 25'



DITCH
SECTION N–N
Scale: Horz. 1"= 25'
Vert. 1"= 12.5'



DITCH
SECTION P–P
Scale: Horz. 1"= 25'
Vert. 1"= 12.5'



DITCH
SECTION R–R
Scale: Horz. 1"= 25'
Vert. 1"= 12.5'

LEGEND:

- RECYCLEX DITCH LINING
- CONCRETE DITCH LINING
- HDPE DITCH LINING

NOTES:

1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.
8) FOR REFERENCE DRAWINGS AND GENERAL NOTES SEE DRAWING NUMBER D–591420.
9) FINISHED GRADE CONTOURS REPRESENT BOTTOM OF 1' ASH LAYER WHEN ASH LAYER IS SHOWN ON SECTIONS.
10) FINISHED GRADE CONTOURS REPRESENT TOP OF TOPSOIL WHERE TOPSOIL IS REQUIRED AND NO ASH IS PRESENT.

LEGEND

- 1' BOTTOM ASH
- COMPACTED BACKFILL
- EXISTING GRADE CONTOURS
- FINAL GRADE CONTOURS
- FINAL GRADE CONTOUR AREAS TO RECEIVE TOPSOIL AND GRASSING
- RECYCLEX DITCH LINING
- CONCRETE DITCH LINING
- HDPE LINING

Southern Company Services, Inc.
FOR
Alabama Power Company

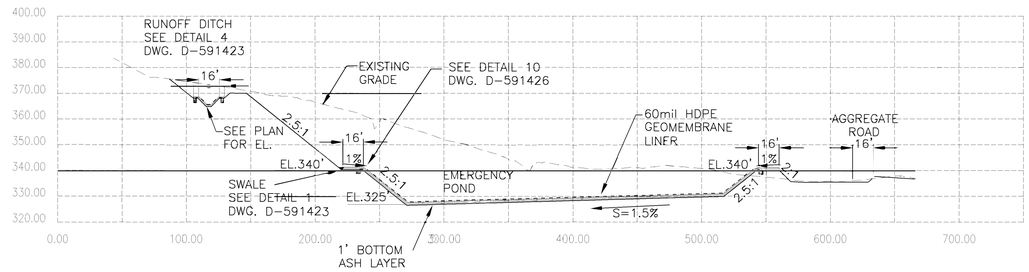
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
CELL SECTIONS & DETAILS SHEET 2

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/15/2007	ASF	SSS	AMW/RCB	JPS	RDP	DEK	KaM
1	09/21/2006	ASF	SSS/HLH	KaM/RCB	JPS	RDP	DEK	MDS
0	05/12/2006	ASF	SSS/HLH	KaM/RCB	JPS	RDP	DEK	MDS

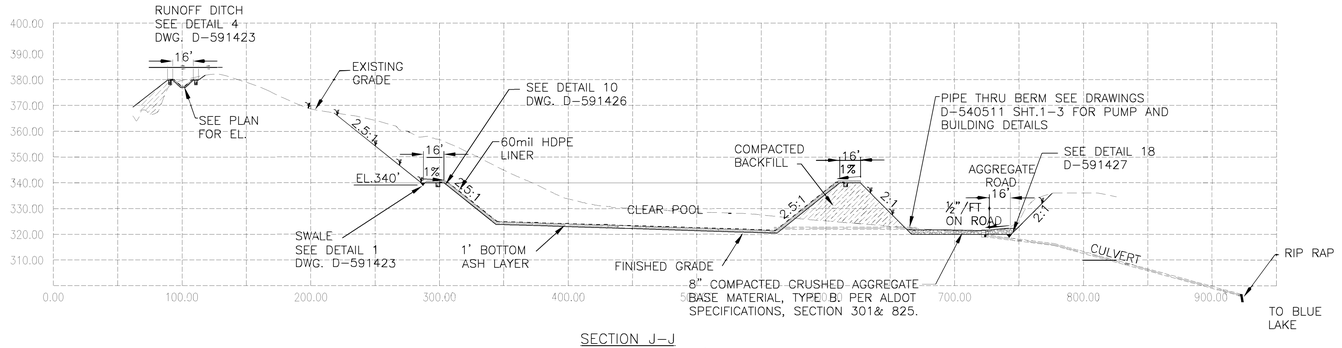
REVISION 2	REVISION 1	REVISION 0
ADDED GYPSUM STORAGE BASIN AND PIPE LOCATIONS	NO REVISION THIS SHEET	ISSUED FOR CONSTRUCTION
EWO 2119 / GO–05001	EWO 2119 / GO–05001	EWO 2119 / GO–05001

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
AS SHOWN	210100	D-591424	1	FINAL	2

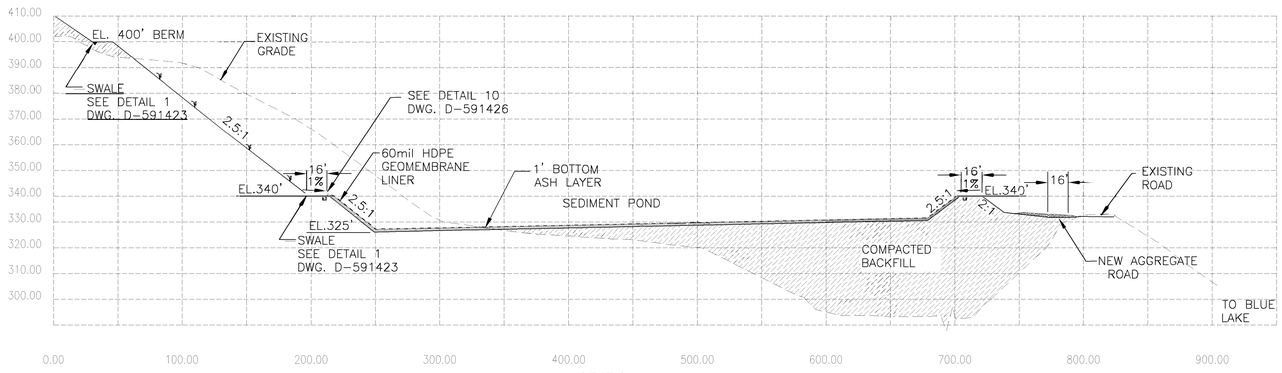
ANSI F: 28x40 ES1341 – LandDesktop



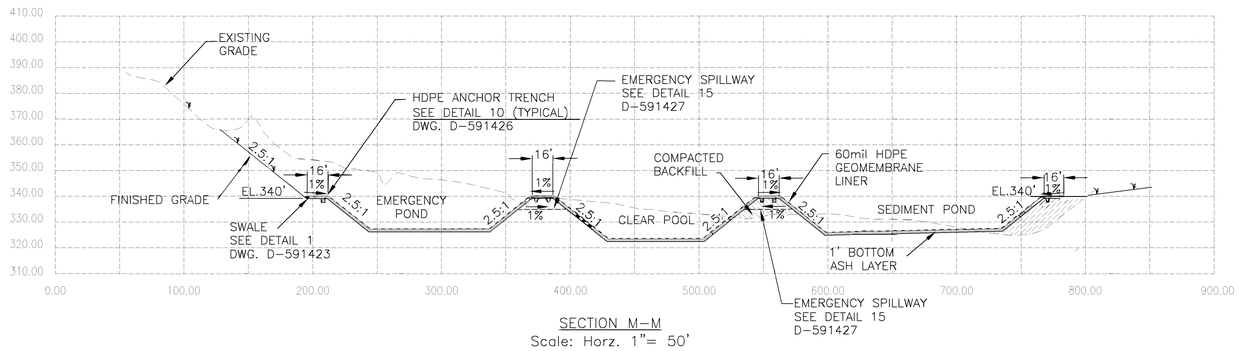
SECTION H–H
Scale: Horz. 1"= 50'
Vert. 1"= 25'



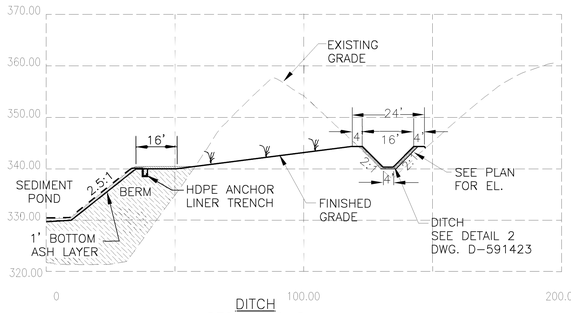
SECTION J–J
Scale: Horz. 1"= 50'
Vert. 1"= 25'



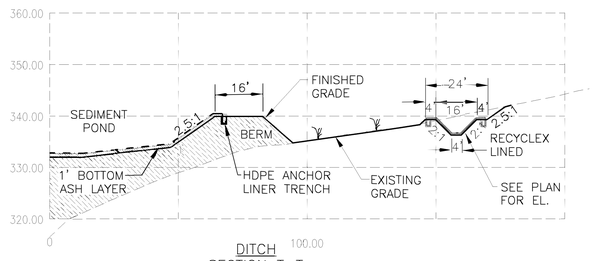
SECTION K–K
Scale: Horz. 1"= 50'
Vert. 1"= 25'



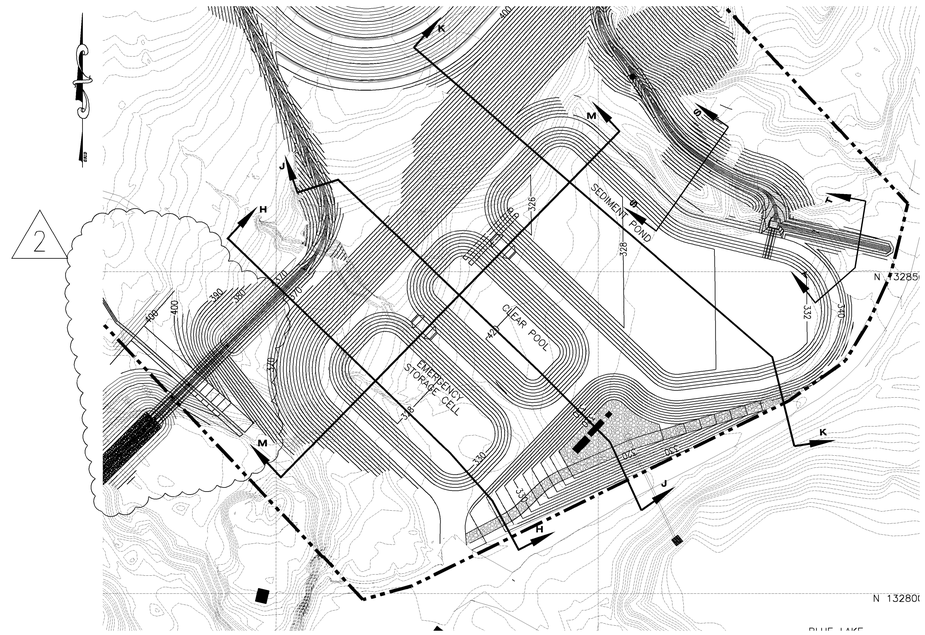
SECTION M–M
Scale: Horz. 1"= 50'
Vert. 1"= 25'



DITCH
SECTION S–S
Scale: Horz. 1"= 25'
Vert. 1"= 12.5'



DITCH
SECTION T–T
Scale: Horz. 1"= 25'
Vert. 1"= 12.5'



LEGEND:
- RECYCLEX DITCH LINING
- CONCRETE DITCH LINING
- HDPE DITCH LINING
- CRUSHED AGGREGATE

LEGEND
- 1' BOTTOM ASH
- COMPACTED BACKFILL
- EXISTING GRADE CONTOURS
- FINAL GRADE CONTOURS
- FINAL GRADE CONTOUR AREAS TO RECEIVE TOPSOIL AND GRASSING
- RECYCLEX DITCH LINING
- CONCRETE DITCH LINING
- HDPE LINING

NOTES:
1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.
8) FOR REFERENCE DRAWINGS AND GENERAL NOTES SEE DRAWING NUMBER D–591420.
9) FINISHED GRADE CONTOURS REPRESENT BOTTOM OF 1' ASH LAYER WHEN ASH LAYER IS SHOWN ON SECTIONS.
10) FINISHED GRADE CONTOURS REPRESENT TOP OF TOPSOIL WHERE TOPSOIL IS REQUIRED AND NO ASH IS PRESENT.

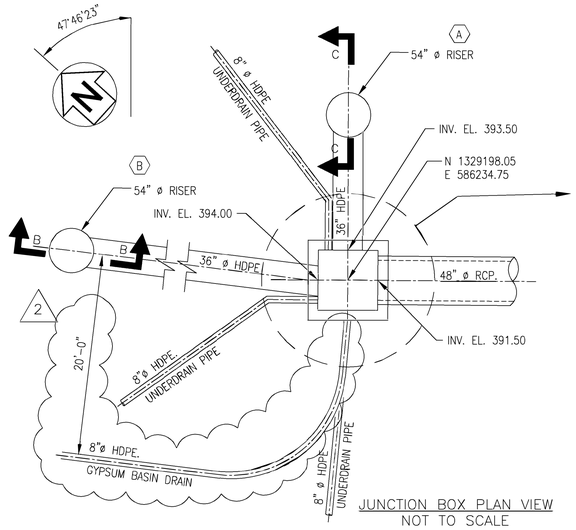
Southern Company Services, Inc.
FOR
Alabama Power Company

Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
POND SECTIONS & DETAILS

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/16/2007	ASF	SSS	AMW / RCB	JPS	RDP	DEK	KaM
ADDED NEW DESIGN FOR CULVERT OVER WEST DITCH FOR SLURRY PIPE. NO EFFECT TO SECTIONS ON THIS DRAWING				EWO 2119		GO–05001		
1	09/21/2006	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS
NO REVISION THIS SHEET				EWO 2119		GO–05001		
0	05/12/2006	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS
ISSUED FOR CONSTRUCTION				EWO 2119		GO–05001		

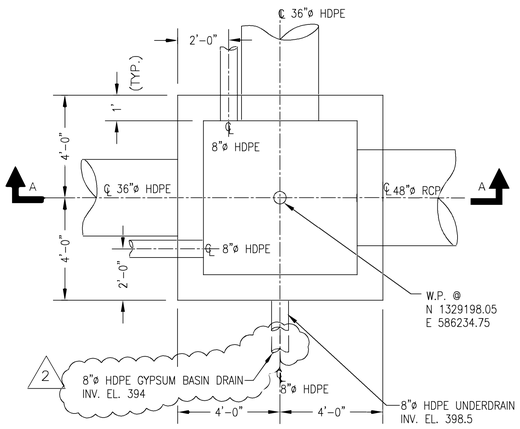
SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
AS SHOWN	210100	D-591425	1	FINAL	2

ANSI F: 28x40 ES1341 LandDesktop

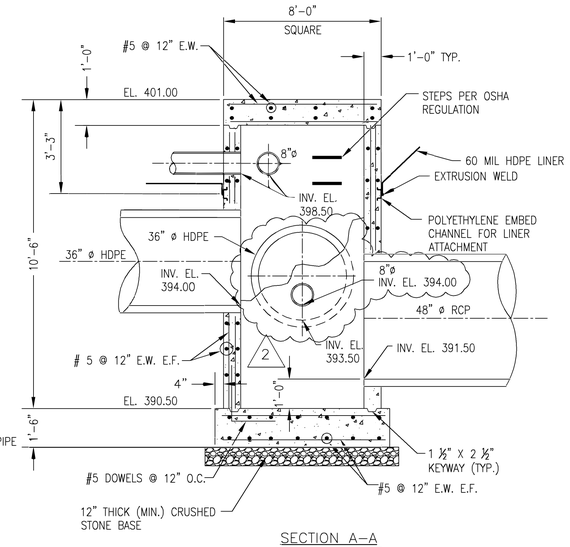


JUNCTION BOX PLAN VIEW
NOT TO SCALE

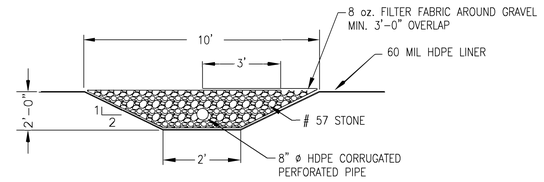
DETAIL 12



ENLARGE PLAN VIEW
NOT TO SCALE

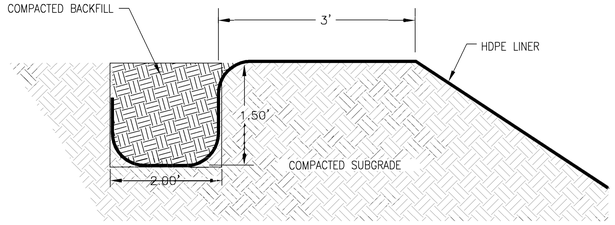


SECTION A–A
NOT TO SCALE



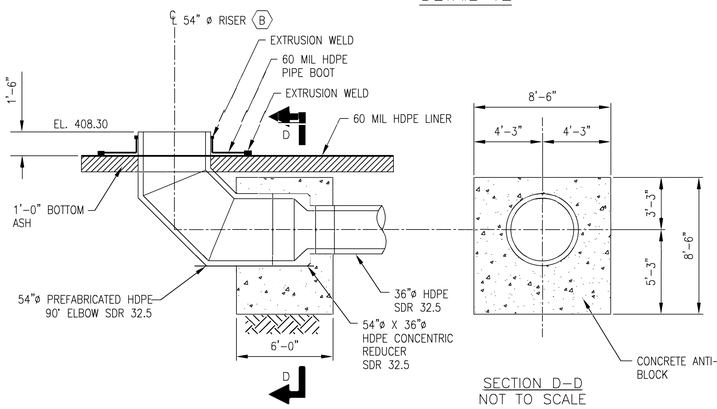
UNDERDRAIN
NOT TO SCALE

DETAIL 9



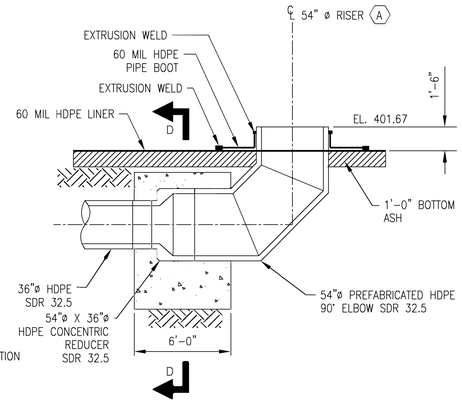
HDPE ANCHOR TRENCH
NOT TO SCALE

DETAIL 10



SECTION B–B
NOT TO SCALE

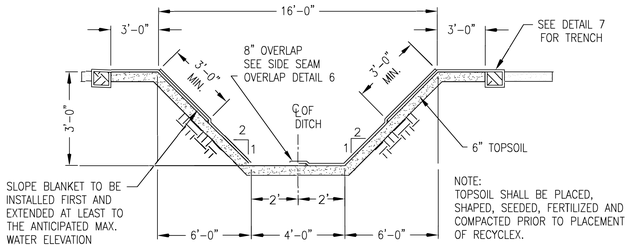
SECTION D–D
NOT TO SCALE



SECTION C–C
NOT TO SCALE

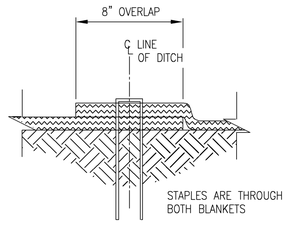
TABLE 1

PIPE DESIGNATIONS	TYPE (acceptable materials)	INITIAL LENGTH TO BE INSTALLED	ADDITIONAL SECTIONS FOR INITIAL PHASE	REQUIRED YD³ OF CONRETE FOR ANTI-FLOTATION BLOCK	FINAL RISER PIPE HEIGHT (ft) (for FUTURE use)
(A)	Solid in 18" Sections(Smooth HDPE, Corrugated HDPE, or PVC)	5' (from El. 401.67')	2	SEE SECTION C-C	60
(B)	Solid in 18" Sections(Smooth HDPE, Corrugated HDPE, or PVC)	2' (from El. 408.30')	2	SEE SECTION B-B	120



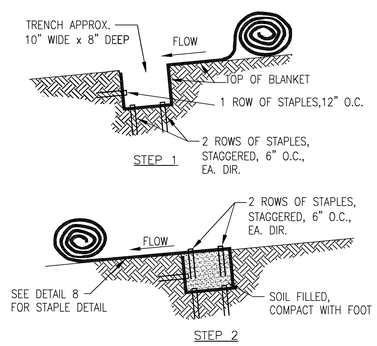
RECYCLEX OVERLAP DETAIL
NOT TO SCALE

DETAIL 5



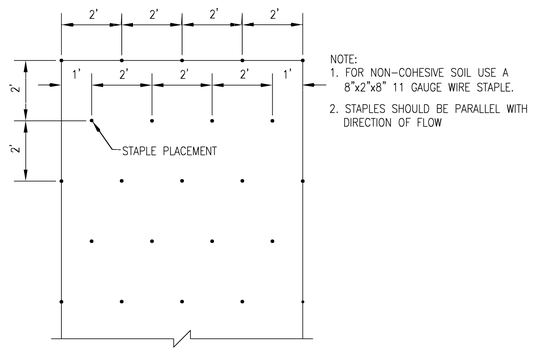
RECYCLEX SIDE SEAM OVERLAP STAPLE DETAIL
NOT TO SCALE

DETAIL 6



RECYCLEX TRENCH DETAIL
NOT TO SCALE

DETAIL 7



RECYCLEX STAPLE PATTERN
NOT TO SCALE

DETAIL 8

NOTES
FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE DRAWING D–591420.

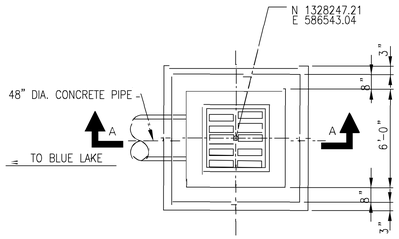
REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/16/2007	JRF/ASF	SSS	AMW/RCB	JPS	RDP	DEK	KaM
ADDED 8" GYPSUM BASIN DRAIN ON DETAIL 12		EWO 2119			GO–05001			
1	09/21/2006	ASF	SSS/HLH	KaM/RCB	JPS	RDP	DEK	MDS
REVISED SEC B–B, SEC C–C, AND TABLE 1 OF DETAIL 12. REVISIONS MADE TO CLARIFY QUESTIONS DURING THE BIDDING PROCESS.		EWO 2119			GO–05001			
0	05/12/2006	ASF	SSS/HLH	KaM/RCB	JPS	RDP	DEK	MDS
ISSUED FOR CONSTRUCTION		EWO 2119			GO–05001			

Southern Company Services
FOR
Alabama Power Company

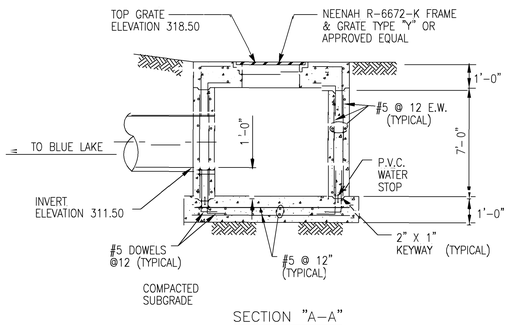
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
DETAILS – SHEET 1

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
NONE	210100	**D–591426**	1	FINAL	2

ANSI F: 28x40 ES1341 – LandDesktop

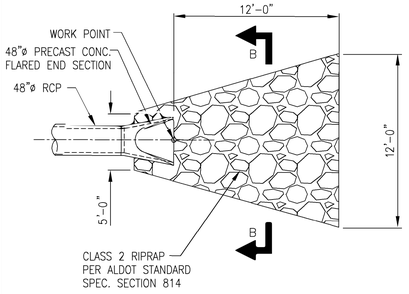


GRATE INLET CAST IN PLACE
NOT TO SCALE

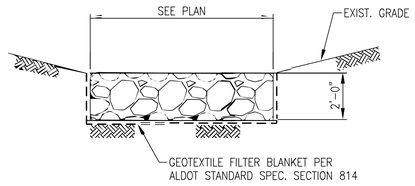


SECTION "A-A"
NOT TO SCALE

DETAIL 18



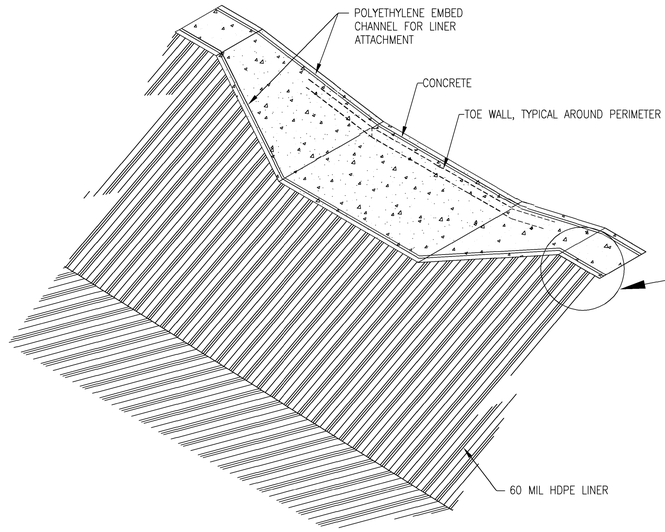
PLAN VIEW

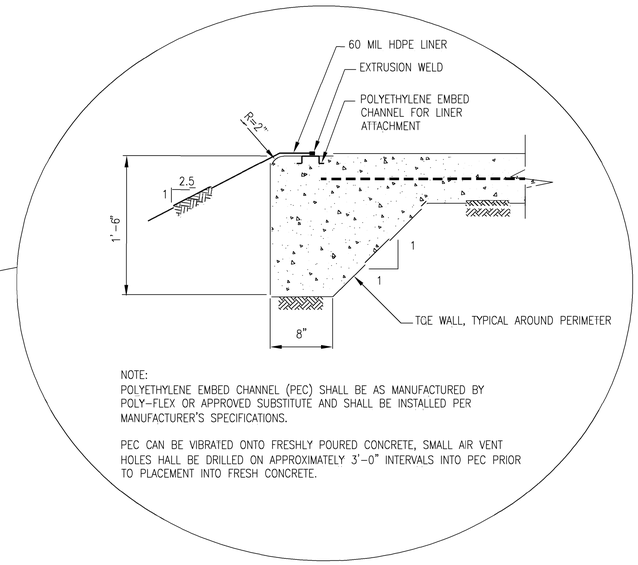


SECTION B-B

CULVERT TO BLUE LAKE
NOT TO SCALE

DETAIL 17



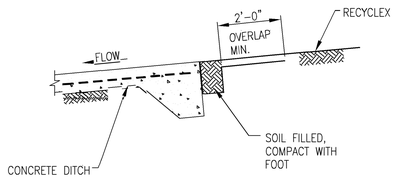


NOTE:
POLYETHYLENE EMBED CHANNEL (PEC) SHALL BE AS MANUFACTURED BY POLY-FLEX OR APPROVED SUBSTITUTE AND SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

PEC CAN BE VIBRATED ONTO FRESHLY POURED CONCRETE, SMALL AIR VENT HOLES HALL BE DRILLED ON APPROXIMATELY 3'-0" INTERVALS INTO PEC PRIOR TO PLACEMENT INTO FRESH CONCRETE.

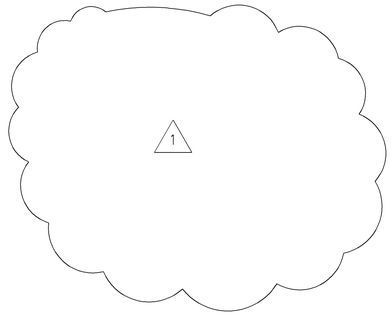
EMERGENCY SPILLWAY DETAIL
NOT TO SCALE

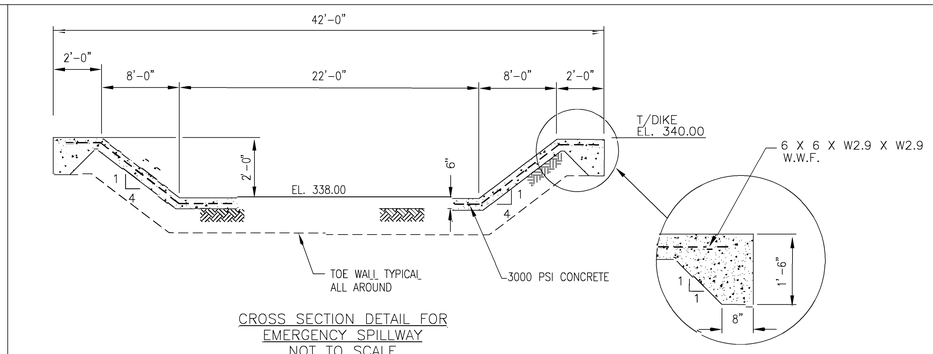
DETAIL 15



RECYCLEX TO CONCRETE
DETAIL
NOT TO SCALE

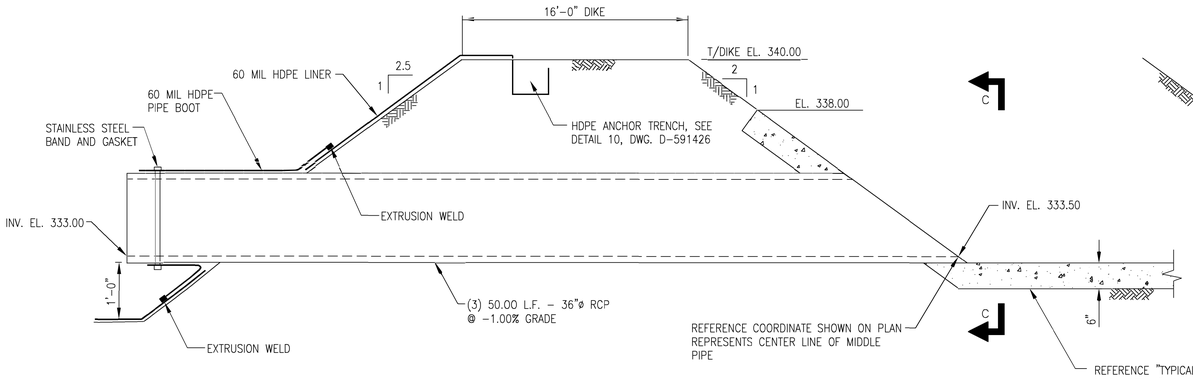
DETAIL 14-a





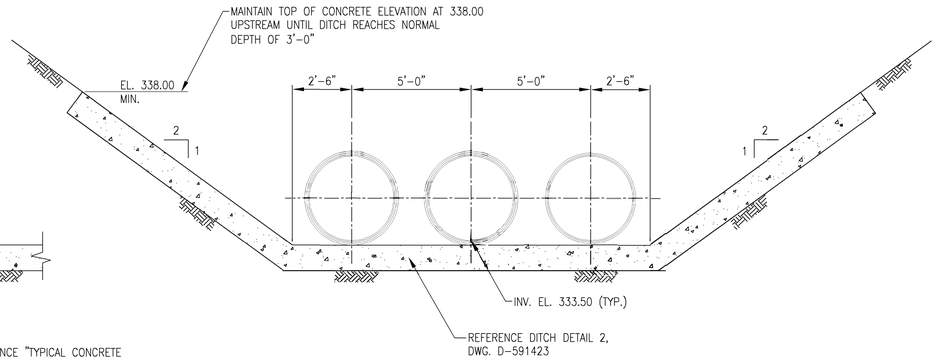
CROSS SECTION DETAIL FOR
EMERGENCY SPILLWAY
NOT TO SCALE

DETAIL 16



PIPES INTO SEDIMENTATION POND
NOT TO SCALE

DETAIL 19



SECTION C-C

NOTES
FOR GENERAL NOTES AND REFERENCE DRAWINGS
SEE DRAWING D-591420.

Southern Company Services
FOR
Alabama Power Company

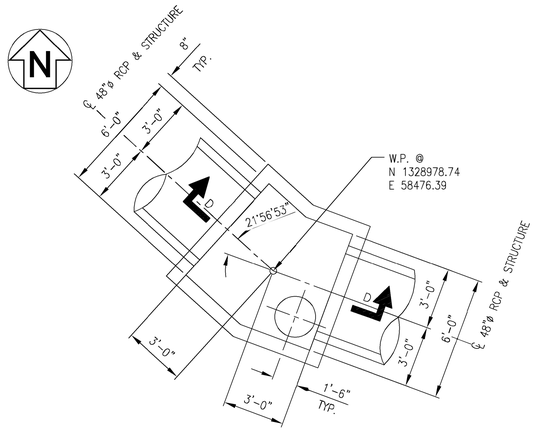
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
DETAILS - SHEET 2

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
REMOVED DETAIL 14. DETAIL NOT USED	09/20/2006	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS
ISSUED FOR CONSTRUCTION	05/12/2006	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS

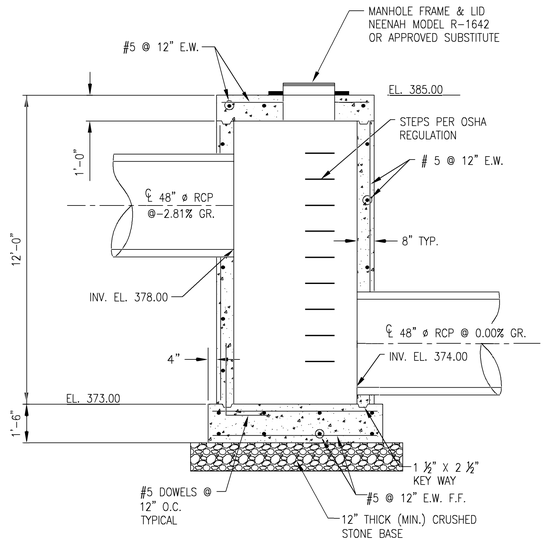
EWO 2119 | GO-05001 | EWO 2119 | GO-05001

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
NONE	210100	**D-591427**	1	FINAL	1

ANSI F: 28x40 ES1341 - LandDesktop

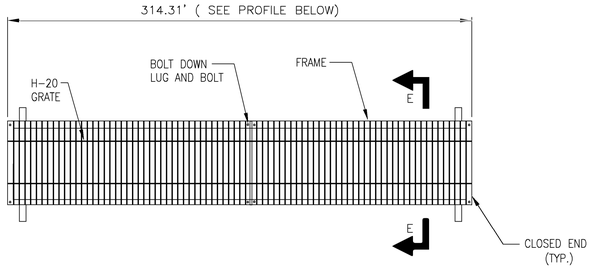


PLAN VIEW
NOT TO SCALE

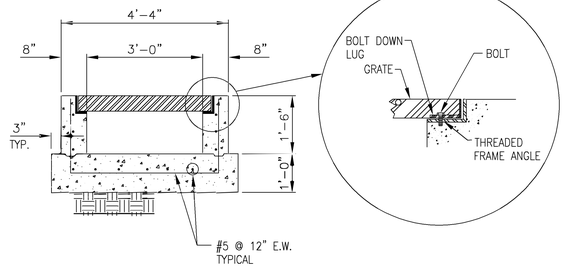


DETAIL 13

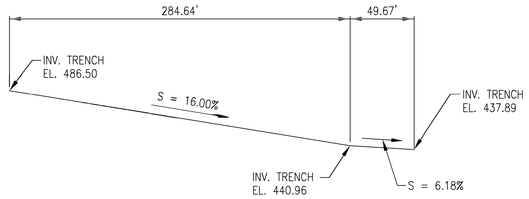
SECTION D–D
NOT TO SCALE



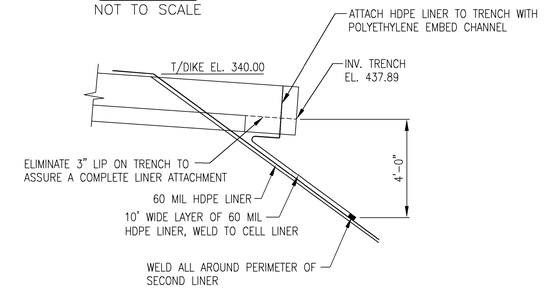
PLAN VIEW FRAME AND GRATES
NOT TO SCALE



SECTION E–E
NOT TO SCALE

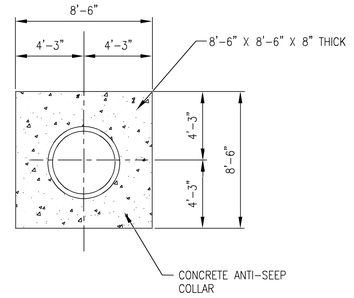


PROFILE OF TRENCH INVERT
NOT TO SCALE

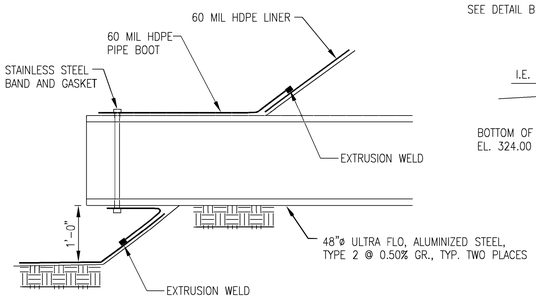


TRENCH TERMINATION DETAIL
NOT TO SCALE

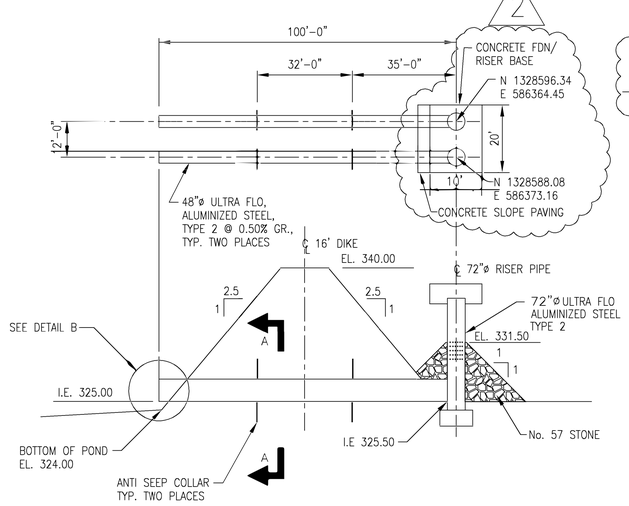
DETAIL 21



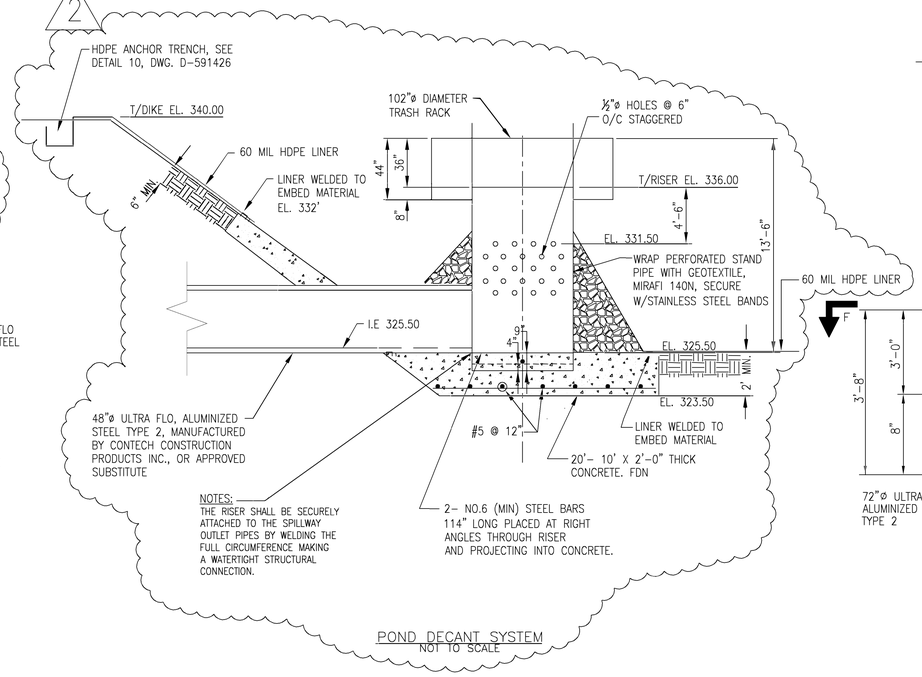
SECTION A–A
NOT TO SCALE



DETAIL B

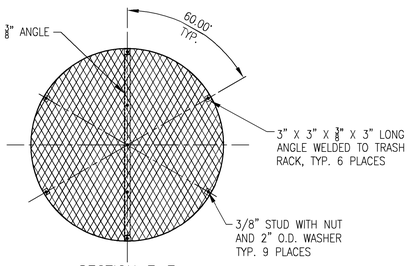


POND DECANT SYSTEM
NOT TO SCALE

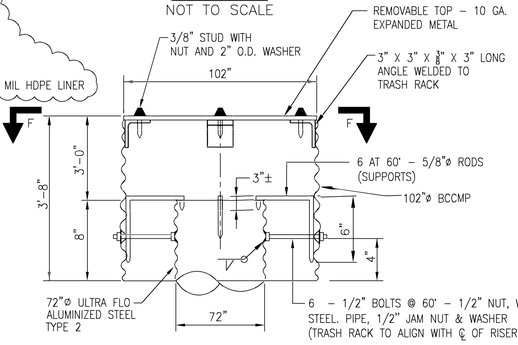


POND DECANT SYSTEM
NOT TO SCALE

DETAIL 11



SECTION F–F
NOT TO SCALE



TRASH RACK DETAIL
(2 REQ'D.)
SCALE: NONE

NOTES:
FOR GENERAL NOTES AND REFERENCE DRAWINGS
SEE DRAWING D-591420

Southern Company Services
FOR
Alabama Power Company

Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
DETAILS – SHEET 3

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/16/2007	ASF	SSS	AMW / RCB	JPS	RDP	DEK	KaM
1	09/21/2006	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS
0	05/12/2006	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS

REVISED FOR PIPE PENETRATION OF POND DECANT SYSTEM — EWO 2119 GO-05001
NO REVISION THIS DRAWING — EWO 2119 GO-05001
ISSUED FOR CONSTRUCTION — EWO 2119 GO-05001

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
NONE	210100	D-591428	1	FINAL	2

ANSI F: 28x40 ES1341 LandDesktop

INQUIRY NUMBER 000057593

GENERAL TECHNICAL SPECIFICATIONS

FOR

EARTHWORK

FOR

NEW GYPSUM STORAGE FACILITY

FOR

PLANT GORGAS - UNITS 8, 9 AND 10 FGD PROJECT

AT

GORGAS STEAM PLANT

Prepared For

ALABAMA POWER COMPANY

By

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

REV	DATE	DESCRIPTION	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
0	6/12/06	Issued for Construction	SSS	HLH	KAM/ RCB				DHF

INQUIRY NUMBER 000057593

GENERAL TECHNICAL SPECIFICATIONS
FOR
EARTHWORK
FOR
NEW GYPSUM STORAGE FACILITY
FOR
PLANT GORGAS - UNITS 8, 9 AND 10 FGD PROJECT

TABLE OF CONTENTS

INQUIRY NUMBER 000057593

GENERAL TECHNICAL SPECIFICATIONS
FOR
EARTHWORK
FOR
NEW GYPSUM STORAGE FACILITY
FOR
PLANT GORGAS - UNITS 8, 9 AND 10 FGD PROJECT
ALABAMA POWER COMPANY
PARRISH, ALABAMA

1.0 APPLICABLE DOCUMENTS

1.1 CODES AND STANDARDS

The following Codes, Standards, Specifications, Publications, and/or Regulations shall be made part of these Specifications and will become part of the contract entered into for performance of the work covered herein. The latest edition in effect at the time of the contract shall apply.

A. U.S. Department Of Labor, Occupational Safety and Health Administration (OSHA).

OSHA 29 CFR 1926 - Safety and Health Regulations for Construction

B. American Society for Testing and Materials (ASTM) Standards:

ASTM D420 - Standard Guide to Site Characterization for Engineering Design and Construction Purposes.

ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

ASTM D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort

ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

ASTM D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

ASTM D2488 Description and Identification of Soils (Visual-Manual Procedure)

ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D2937 Test Method for Density of Soil In Place by the Drive Cylinder Method

ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

ASTM D4643 Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method

ASTM D4959 Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method

C. The Storm Water Management For Construction Activities - Developing Pollution Prevention Plans And Best Management Practices Document, as amended, as adopted by the EPA
D. The Alabama Nonpoint Source Management Program Document, as amended, as adopted by the Department and approved by the EPA.

1.2 REFERENCES

1.2.1 Geotechnical Investigation

Soil test borings and rock cores have been performed in conjunction with the Subsurface Investigation for this area. This report and logs of these borings are included with this specification. The title of this report is, “Gorgas Steam Plant, Subsurface Investigation Report for Gypsum Storage Area, ES1341”, dated December 2005.

1.2.2 Grading Drawings and Plans

The following drawings should be considered part of these specifications:

Drawing No.	***Rev. No.***	***Drawing Title***	
D591420	0	DRAWING INDEX & VICINITY MAP	
D591421	1	EXISTING TOPOGRAPHY	BORINGS & POWER LINE LOCATIONS
D591422	0	INITIAL SITE DEVELOPMENT	SITE GRADING PLAN
D591423	0	INITIAL SITE DEVELOPMENT	CELL SECTIONS & DETAILS SHEET 1
D591424	0	INITIAL SITE DEVELOPMENT	CELL SECTIONS & DETAILS SHEET 2
D591425	0	INITIAL SITE DEVELOPMENT	POND SECTIONS & DETAILS
D591426	0	INITIAL SITE DEVELOPMENT	DETAILS - SHEET 1
D591427	0	INITIAL SITE DEVELOPMENT	DETAILS - SHEET 2
D591428	0	INITIAL SITE DEVELOPMENT	DETAILS - SHEET 3
D591429	1	FUTURE DEVELOPMENT PLAN	
D591430	0	FUTURE DEVELOPMENT	SECTIONS & DETAILS SHEET 1
D591431	0	FUTURE DEVELOPMENT	CELL SECTIONS & DETAILS SHEET 2
D591432	1	FUTURE DEVELOPMENT	DETAILS

2.0 SUBMISSIONS BY CONTRACTOR

The Contractor shall submit the following information to the Purchaser for review and appropriate action within the specified time unless otherwise noted or otherwise required in the contract documents. These submittals include, but are not limited to the following:

2.1 Submittals with Proposal

Submit to the Purchaser with the proposal, the following:

A. The name and statement of qualifications for the Contractor's proposed testing laboratory, from the approved list for the Purchaser's approval.

2.2 Preconstruction Submittals

Submit to the Purchaser for review, at least 30 days prior to commencement of construction, the following:

A. Compaction Equipment: Manufacturer's description of the compaction equipment to be used, including weight and tamping pressure data, drawings, and the densification character and depth efficiency of the equipment.

2.3 Construction Submittals

Submit to the Purchaser, for records, within 5 working days of completing each compaction operation, one copy of each the following:

A. Documentation that all areas received the proper compaction in accordance with this section. Documentation shall include details on compaction equipment used.

B. Documentation of results of in-place moisture content and density tests required by this section.

3.0 SEDIMENT AND EROSION CONTROL

3.1 The Construction Storm Water permit is being obtained by the Owner. The Contractor will be expected to periodically inspect the work areas to ensure that erosion control measures are still in place and performing their intended function. The Contractor is also expected to inspect the work areas and provide additional erosion control measures as required.

3.2 Sediment and erosion control measures shall be taken as required by Alabama Department of Environmental Management (ADEM) or as directed by the Owner to minimize erosion of soil.

3.3 During the course of this project, the Contractor shall plan and coordinate his work to minimize the amount of suspended soil particles entering rivers and streams or leaving the general work area and being deposited in undesirable places. Any property damage or fines resulting from the Contractor's negligence or the negligence of his subcontractors shall be borne by the Contractor.

3.4 The Contractor shall be responsible for ensuring that all Construction Storm Water Permit Compliance requirements are satisfied. However, said Permit does not require that the Contractor test for turbidity and Contractor shall not perform such test.

3.5 The Contractor shall not excavate, uncover or denude areas of work until adequate erosion and sediment control measures are installed. The Contractor's earthmoving operations shall at all times be in full compliance with the requirements of ADEM.

3.6 The Owner will inspect the sediment and erosion control practices employed to evaluate their effectiveness. Any deficiencies shall be immediately corrected by the Contractor at no cost to the Owner.

4.0 CLEARING, GRUBBING, AND STRIPPING

4.1 The area proposed for construction of the New Gypsum Storage Facility consisting of, but not limited to, the sediment pond, clear pool, emergency storage cell, gypsum storage cell, and all associated roads and construction areas will

require clearing, grubbing, and stripping prior to excavation and/or fill operations. These areas shall be cleared, grubbed, and stripped of any vegetation, organic matter and/or any other deleterious materials.

4.2 Grubbing and stripping shall be performed to ten (10) feet outside the greatest limits of any cut or fill slopes.

4.3 Trees, stumps, and brush cleared from the borrow areas shall be disposed of by burning or by removal to a designated area on site. Timber may also be sold by the Contractor.

4.4 Burning operations shall be conducted only in previously cleared areas and away from standing timber, structures, flammable vegetation or other flammable materials outside the cleared area. All burning shall be done in accordance with all State Regulations. Burn pits shall be located outside of the construction area and off right-of-ways (transmission or otherwise). Materials to be burned shall be properly stacked, by dozers, in piles sufficiently large enough to facilitate the complete burning of all the materials in the pile. The Contractor shall be subject to all public laws governing such burning operations and shall be responsible for any damage to life or property as a result of burning either on the Owner's property or the property of others. Fires shall not be started unless tractors are available in the immediate vicinity to check the spread of fire outside the cleared area. Fires shall be guarded at all times and shall be under constant attendance until they have burned out or have been extinguished.

4.5 Topsoil material, when encountered, shall be stockpiled only in areas designated by the Owner. The Contractor shall slope the spoil area for drainage. These materials will be used later to establish vegetation on slopes and any disturbed areas.

4.6 Spoil material shall be stockpiled only in areas shown or designated by the Owner. The Contractor shall slope the spoil area for drainage.

4.7 The Contractor shall install and maintain a "Construction Exit" for the site. This exit shall be 50'x 20' and constructed using No. 3 stone. The Contractor shall replace the stone with clean stone when plugged. The Contractor is responsible for disposing of the plugged stone.

5.0 FILL MATERIALS AND PROCEDURES

5.1 SOIL AND OTHER FILL MATERIALS

5.1.1 Non-organic, non-plastic soils excavated from the site are generally suitable for fill materials. Coal mine spoils present in the area are also suitable for fill materials.

5.1.2 On site soils consist of clay with various fractions of weathered rock. Coal mine spoils, consisting of predominantly gravel size particles, are also present.

5.1.3 Topsoil for the surface vegetation layer will be obtained predominantly from offsite. It shall be the responsibility of the Contractor to slope the topsoil stockpile area for drainage.

5.2 ROCK

5.2.1 Rock at the site consists of Shale and Sandstone.

5.2.2 Rock materials excavated from the site may be used for fill materials under the following conditions:

5.2.2.1 Rock fragments larger than 3 inches may not be used as structural fill.

5.2.2.2 Rock fill may not be placed within the upper 5 feet of any fill area.

5.2.3 Rock materials shall be placed as deep in the fill areas as possible.

5.2.4 Rock shall at no time be placed directly beneath a liner.

5.3 BOTTOM ASH

5.3.1 Bottom ash will be provided by the Owner for placement directly beneath the liner.

5.3.2 The Contractor will be provided a location to load and transport the bottom ash.

5.3.3 Bottom ash loaded directly from the pond will have to be stockpiled until it obtains the proper moisture content for fill placement and compaction.

5.3.4 Haul trucks used must be able to travel on county roads. Haul trucks will not be allowed to drive through the plant site.

5.4 STRUCTURAL FILL PLACEMENT

5.4.1 Structural fill will be required for the construction of the berms for the sedimentation pond, a clear pool, an emergency storage cell, the gypsum storage cell and other uses, if any, requiring compacted fill.

5.4.2 Fill material shall be obtained from the required excavation area.

5.4.3 Compacted fill shall consist of the soil, rock or mine spoils materials meeting the requirements stated herein and shall be placed and compacted in accordance with these Specifications.

5.4.4 Preparation for fill shall consist of the removal of any organic or deleterious materials present within the extent of the fill operation.

5.4.5 Deleterious materials are soft, wet, or highly plastic materials that cannot be densified in place. These materials may be found by proof-rolling the area that is to receive fill.

5.4.6 Proof-rolling the foundation area shall be conducted using a 20 to 30 ton loaded, tandem wheel, dual rear axle dump truck or other pneumatic tired vehicle of similar size, weight and load distribution under the supervision of the Contractor. Unsuitable materials and/or conditions shall be removed, placed in the designated spoil pile and replaced with compacted fill. Prior to receiving fill, the area shall be scarified by harrowing or other suitable means.

5.4.7 No fill shall be placed on any part of the foundation until such areas have been inspected and approved by the Owner.

5.4.8 Fill shall be placed in uniform layers of eight inches, nominal thickness, loose measurement, for one foot beyond the full width of the fill on each side. Each layer shall be kept level with the necessary grading equipment. Upon completion of compaction, the slopes shall be cut back to the final slope. Particular care must be used to obtain the required compaction along the edges of the fill slopes. Slopes will require compaction after they have been cut back to minimize water infiltration and erosion.

5.4.9 During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate for removal of roots and debris from all structural fill materials and all stones greater than three inch maximum dimension. Stones, roots, and debris shall be removed from the structural fill and disposed of in an approved manner.

5.4.10 When moisture content is too low, the moisture content shall be adjusted to within the specification. Moisture adjustment shall be done by wetting and disking sufficiently to bring the moisture content within the specified range.

5.4.11 If the moisture content is too high, the Contractor will be permitted to stockpile and disk the fill material to promote drying to bring it back within the allowable moisture range. Scarifying of the lift and recompaction after drying shall also be permitted.

5.4.12 The Contractor will be required to remove any compacted material that does not comply with the compaction requirements (density or moisture) and replace the fill at his own expense.

5.4.13 Fill which cannot be compacted with roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to the extent required by the specifications for structural fill material.

5.4.14 Compaction tests shall be performed daily in all types of soil being placed. A minimum frequency will be maintained of at least one field moisture and density test for every 10,000 square feet of lift area, or more often if deemed necessary in the opinion of the Owner. As a minimum, three in place density tests shall be performed for each lift in each area for each day fill material is placed.

5.4.15 If the construction of the embankment is interrupted, the Contractor shall be required to shape and smooth the last layer of earth fill material placed on the fill to provide a surface that will shed as much water as possible during the interruption. When the work is resumed, the Contractor shall be required to level, scarify and compact the last layer of fill material before placing additional layers.

5.5 SOIL COMPACTION REQUIREMENTS

Fill for all areas may be placed at a minimum of 95 percent of standard Proctor density (ASTM D 698) at plus or minus 2 percent of optimum moisture.

5.6 ROCK COMPACTION REQUIREMENTS

5.6.1 Rock fill shall be observed full-time during placement by the Contractor to insure adequate compaction.

5.6.2 Rock fill shall receive adequate moisture to aid in compaction of the material and to wash soil fines into any void spaces between larger rock particles. It is better to have more water than not enough in rock fill placement.

5.6.3 Rock shall be compacted sufficiently as indicated by the Contractor.

5.6.4 Should the rock material break down sufficiently to be conducive to in-place density testing, it should be performed. Compaction requirements shall be the same as those for soil.

5.7 TESTING

5.7.1 The Contractor shall hire an independent testing firm to perform all soil testing requirements specified.

5.7.2 Representative samples of the proposed materials for structural fill shall be obtained and tested by the Contractor to determine their soil type (Unified Classification), Atterberg Limits (plasticity) and moisture - density (Proctor) relationship.

5.7.3 Testing for soil type and Proctor relationship shall take place prior to fill placement so that compaction testing can begin with fill placement.

5.7.4 The Owner shall be copied immediately on all testing by the Contractor.

5.7.5 The Owner reserves the right to perform additional testing if so desired.

6.0 DEWATERING

6.1 Water shall not be allowed to pond or stand on any graded soil areas or on any rock surface.

6.2 The Contractor is responsible for dewatering any areas that may hold water until liner placement and vegetation of required areas is completed.

6.3 The Contractor is responsible for all dewatering required within the limits of this site work.

6.4 The Contractor shall dewater by grading materials to drain or by mechanical pumps. Pumped water shall be discharged to the areas designated by the Owner.

7.0 GRASSING AND SLOPE PROTECTION

7.1 A 6 inch layer of topsoil shall be placed on all areas to be grassed.

7.2 The Contractor shall produce a satisfactory stand of perennial grass. If it is necessary to repeat any or all the work, including plowing, fertilizing, watering, mulching and seeding, the Contractor shall repeat these operations until a satisfactory stand is obtained at no additional cost to the Owner.

7.3 All disturbed areas shall be grassed as indicated by the Owner. Hydroseeding methods may be used.

7.4 A satisfactory stand of grass is defined as a full cover (at least one plant in six inches when measured in any direction) of perennial plants that are alive and growing during the first growing season following seed application.

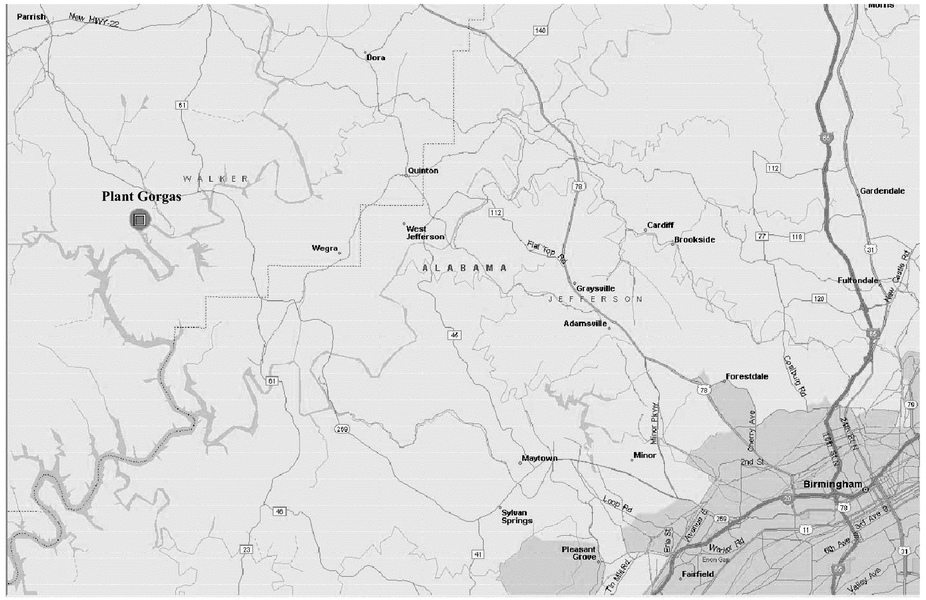
7.5 Measures shall be taken to prevent erosion of the topsoil layer and vegetation until a full vegetative growth has been obtained.

7.6 Water required to promote a satisfactory growth shall be furnished and applied by the Contractor.

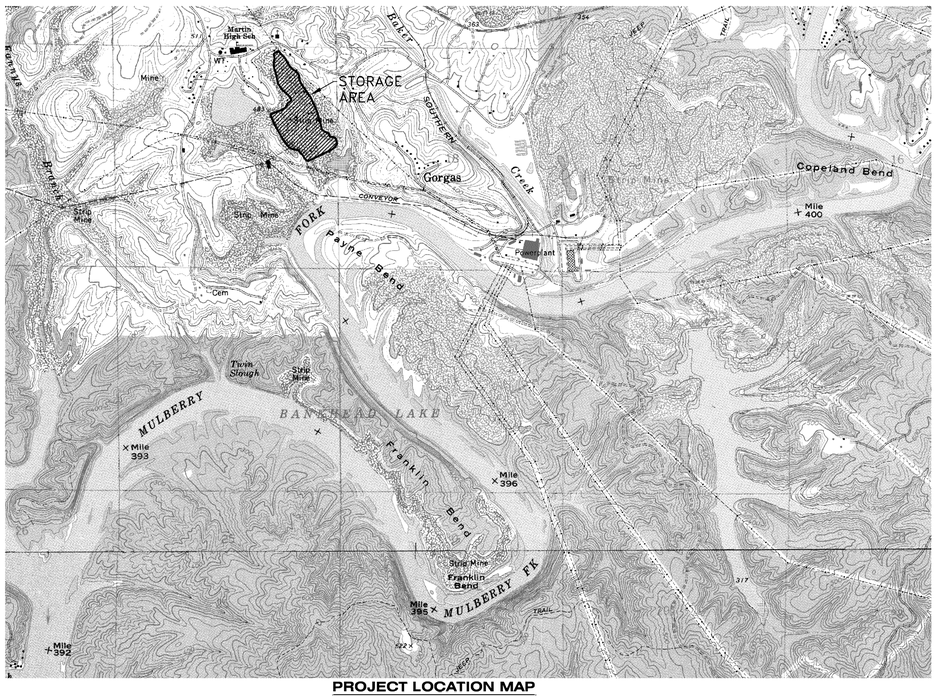
7.7 The Contractor shall make daily inspections of the seeded areas and repair all eroded areas to the satisfaction of the Owner.

7.8 Lateral drainage ditches shall be established at the top of the slopes. These ditches shall prevent runoff from traveling down the face of the slope and further eroding the soil.

PLANT GORGAS
GYPSUM STORAGE AREA



VICINITY MAP
NTS



PROJECT LOCATION MAP
NTS

GENERAL NOTES

SOIL AND FILL MATERIALS

1. After excavation and before placement of any fill, the entire subgrade shall be proofrolled with a loaded, tandem wheel, dual rear axle dump truck.
2. Any areas noted to be deficient during the proofrolling shall be excavated and replaced.
3. The fill material may consist of excavated mine spoils from the area or other suitable materials.
4. After establishing the base grade, a uniform layer of one foot of bottom ash shall be placed and compacted across the graded area.
5. The placement of fill soils shall consist of lifts with a maximum loose lift thickness measurement of 6 to 8 inches. The compaction criteria for all fill materials shall be a minimum of 95% of the maximum standard Proctor dry density at +/−2% of the optimum moisture.

LINER

1. The liner for the storage cell, sediment basin, clear pool and emergency storage pond shall consist of a minimum 60 mil textured high density polyethylene (HDPE) geomembrane. The liner shall be placed over the compacted mine spoil subgrade and the 1 foot protective layer of ash.
2. Construction procedures for liner placement, seaming, and testing shall be according to the manufacturer's specifications.

EROSION AND SEDIMENT CONTROL

1. Prior to landfill cell development, any necessary erosion and sediment control measures shall be constructed and put into place and any required diversion berms, ditches and other storm water management structures shall be constructed.
2. The sediment ponds shall be constructed first to receive any runoff from the construction of the storage cell.
3. The plans and details of permanent erosion and sediment control structures are included in these plans.
4. All erosion and sediment control at the site shall be performed in accordance with the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, latest edition.

CONSTRUCTION SEQUENCING

1. The future development and filling operations for this site may be in several cells dependent on required life of the storage area. For this development, one cell shall be developed.
2. The cell shall be graded, lined and filled with gypsum from base grade to El. 440. Additional lining and storage shall then take place in 20 foot elevation intervals, or as directed.
3. Prior to the initial cell becoming full, construction on the future berms should proceed.
4. The future berms should be constructed by excavating material from within the storage cell, placing gravel drains, lining, and compacting the excavated material to the grades shown.
5. At liner Tie−ins, care should be taken in uncovering the liner in the trench to not damge the liner. Clean the liner well to ensure a proper seal when the two liners are welded together.

VEGETATION

1. All disturbed and/or exposed areas that will remain exposed for more than three months shall be seeded, mulched and fertilized upon reaching final grades.
2. Areas of structural fill shall be grassed upon reaching final grades.
3. Should topsoil be required for vegetative growth, a minimum of 6 inches of topsoil shall be placed.
4. The following schedule indicates the recommended species, planting dates, and fertilization requirements. Walker County is located within the North Geographical area of the state. An appropriate species shall be chosen based on the time of seeding. Proper seeding rates shall be followed. Reference the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, latest edition for further information.

VEGETATION SCHEDULE

Species	Seeding Rates	North Seeding Dates
Bermudagrass, Common	10 lbs/ac	April 1 to July 1
Bermudagrass, Hybrid (Lawn Types)	Solid Sod	Anytime
Bermudagrass, Hybrid (Lawn Types)	Sprigs 1/sq ft	March 1 to August 1
Fescue, Tall	40−50 lbs/ac	
Sericea	40−60 lbs/ac	September 1 to November 1
Sericea	40−60 lbs/ac	March 15 to July 15
Common Bermudagrass	10 lbs	March 15 to July 15

CONCRETE

1. Design material and workmanship shall be in accordance with the following latest standards and specifications unless otherwise modified on the design drawings.
   - −ACI−318 building code requirements for reinforced concrete.
   - −ACI−315 manual of standard practice for detailing reinforced concrete structures.
   - −ACI−347R recommended practice for concrete formwork.
   - −CRSI recommended practice for placing reinforcing steel.
2. All cast in place concrete shall develop a minimum compressive strength of 4000 PSI in 28 days, unless otherwise noted.
3. Reinforcing steel shall be deformed bars conforming to ASTM A615, grade 60. Welded steel wire fabric shall be ASTM A185 plain type.
4. Chamfer all exposed external corners of concrete with a 45 degree chamfer, unless otherwise noted.
5. Provide a minimum cover of 3" for reinforcing steel when the concrete is placed directly against the ground, unless otherwise noted.
6. Provide a minimum cover of 2" for bars larger than #5 and 1½" for #5 bars or smaller if after removal of forms the concrete is exposed to weather or in contact with the ground, unless otherwise noted.
7. Provide a minimum cover of ¾" for reinforcing in slabs and 1½" for reinforcing in walls not exposed directly to weather or ground, unless otherwise noted.
8. Embedment and splice lengths for reinforcing steel shall conform to ACI−318, unless otherwise noted.
9. All reinforcing bar hooks shown on drawings shall be ACI Standard 90 degree hooks, unless otherwise noted.
10. Two #5 bars shall be placed on all sides top & bottom of openings in concrete where the largest opening exceeds 12". Extend the bar 2'−0" beyond the edge of opening, unless otherwise noted.
11. Concrete keys, when shown, shall be 1½" (DEEP) X 3½" (WIDE), unless otherwise noted.
12. Rebar fabricator shall obtain approval of his detail drawings before beginning fabrication, unless otherwise noted in purchase order.
13. All concrete exposed to weather and all liquid retaining structures shall be air entrainment concrete.

DRAWING INDEX

2

Southern Company Services, Inc.
FOR
Alabama Power Company

Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
DRAWING INDEX & VICINITY MAP

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
2	03/15/07	ASF	SSS	AMW / RCB	JPS	RDP	DEK	KaM
ADDED DRAWINGS D−591433 AND TITLE, D−541030 AND TITLE, D−541031 AND TITLE TO THE DRAWINGS INDEX.		EWO 2119			GO−05001			
1	09/21/06	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS
NO REVISION THIS SHEET		EWO 2119			GO−05001			
0	05/12/06	ASF	SSS / HLH	KaM / RCB	JPS	RDP	DEK	MDS
ISSUED FOR CONSTRUCTION		EWO 2119			GO−05001			

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
NONE	210100	D-591420	1	FINAL	2

ANSI F: 28x40 ES1341 LandDesktop

APPENDIX 5

STRUCTURAL STABILITY ASSESSMENT

The Initial Structural Stability Assessment for the Plant Gorgas Gypsum Pond was initially prepared to satisfy federal standards. It also satisfies 335-13-15-.04(4)(d) and 335-13-15-.09(1)(a)7.(ii) and is included for that purpose.

INITIAL STRUCTURAL STABILITY ASSESSMENT
PLANT GORGAS GYPSUM POND
ALABAMA POWER COMPANY

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (40 C.F.R. Part 257 and Part 261) section §257.73(d) requires the owner or operator of an existing CCR surface impoundment to conduct periodic structural stability assessments. The owner or operator must document whether the design, construction, operation and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein.

The CCR surface impoundment located at Alabama Power Company's Plant Gorgas also referred to as the Plant Gorgas Gypsum Pond is located on Plant Gorgas property near Parrish, Walker County, Alabama. The CCR surface impoundment is formed by an engineered cross-valley embankment. The foundations and abutments generally consist of a combination of stiff natural soils and mine reclamation fill material, both of which have been assessed to be stable.

Slope protection against surface erosion consists of a 60-mil HDPE liner on the inboard slopes and riprap on the exterior slopes. Wave action is not an issue with the Gorgas Gypsum Pond considering the configuration and operation of the facility. Furthermore, the pond is not operated in such a manner as to be subjected to rapid drawdown conditions, and the presence of the HDPE liner protects embankment slopes against rapid drawdown instability and erosion.

The cross-valley embankments have been properly constructed using mechanical stabilization, compacted to a density sufficient to withstand the range of loading conditions.

The primary spillway structures consist of HDPE riser structures that serve to decant water from the sluiced gypsum. There are no other spillways or discharge structures serving the Plant Gorgas Gypsum Pond. The spillways are designed, constructed operated and maintained to adequately manage flow during and following the peak discharge from the 1000-yr storm.

The CCR unit has HDPE piping leading from the riser structures that that penetrates the embankment. There is no evidence of deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the structure.

The downstream slopes of the embankment are not subject to inundation from adjacent water bodies.

I hereby certify that the structural stability assessment was conducted in accordance with 40 C.F.R. Part 257.73(d).

10/17/16

James C. Pegues, P.E.

Licensed State of Alabama, PE No. 16516

APPENDIX 6

SAFETY FACTOR ASSESSMENT

The Initial Safety Factor Assessment for the Plant Gorgas Gypsum Pond was initially prepared to satisfy federal standards. It also satisfies 335-13-15-.04(4)(e) and 335-13-15-.09(1)(a)7.(iii) and is included for that purpose.

INITIAL SAFETY FACTOR ASSESSMENT
PLANT GORGAS GYPSUM POND
ALABAMA POWER COMPANY

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (40 C.F.R. Part 257 and Part 261), §257.73(e), requires the owner or operator of an existing CCR surface impoundment to conduct periodic safety factor assessments. The owner or operator must document that the minimum safety factors outlined in §257.73(e)(1)(i) through (iv) for the critical embankment section are achieved.

The CCR surface impoundment located at Alabama Power Company's Plant Gorgas also referred to as the Plant Gorgas Gypsum Pond is located on Plant Gorgas property, southeast from Parrish, Alabama. The CCR surface impoundment is formed by an engineered cross-valley embankment. The critical section of this CCR unit has been determined to be located at the highest portion of the embankment in the area holding sluiced gypsum.

The analyses used to determine the minimum safety factor for the critical section resulted in the following minimum safety factors:

Loading Condition	Minimum Calculated Safety Factor	Minimum Required Safety Factor
Long-term Maximum Storage Pool (Static)	2.5	1.5
Maximum Surcharge Pool (Static)	2.5	1.4
Seismic	2.3	1.0

The embankments are constructed of silts, clays, clean sands and rip-rap that are not susceptible to liquefaction. Therefore, a minimum liquefaction safety factor determination was not required.

I hereby certify that the safety factor assessment was conducted in accordance with 40 C.F.R. Part 257.73 (e)(1).

10/17/16

James C. Pegues, P.E.
Licensed State of Alabama, PE No. 16516

SOUTHERN COMPANY

Engineering and Construction Services Calculation

Calculation Number:
TV-GO-APC389153-002

Project/Plant:	**Unit(s):**	**Discipline/Area:**
Plant Gorgas Gypsum Pond	Units 6-7	ESFS
Title/Subject: Slope Stability Analysis of Plant Gorgas Gypsum Pond Dam		
Purpose/Objective: Analyze slope stability of the Plant Gorgas Gypsum Pond Dam		
System or Equipment Tag Numbers: NA	**Originator:** Stacey H. Simpson, P.E.	

Contents

Revision Record

Rev. No.	Description	Originator Initial / Date	Reviewer Initial / Date	Approver Initial / Date
0	Issued for Information	SHS 10/06/16	JAL 10/10/16	JCP 10/10/16

Notes:

Purpose of Calculation

The William C. Gorgas Electric Generating Plant is a 5-unit electric generating facility, all of which are coal-fired units. The Plant Gorgas Gypsum Pond is designed to receive and store coal combustion residuals (gypsum) produced during the electric generating process at Plant Gorgas. The gypsum slurry from the flue gas desulfurization operation is wet-sluiced to the gypsum storage area. The gypsum is allowed to settle and the water decants to the sedimentation pond.

The purpose of this calculation is to provide a slope stability assessment of the Plant Gorgas Gypsum Pond dam under conditions prescribed by the EPA CCR rule.

Methodology

The calculation was performed using the following methods and software:

GeoStudio 2012 (Version 8.15.5.11777), August 2015 Release, Copyright 1991-2016, GEO-SLOPE International, Ltd.

Strata (Version alpha, Revision 0.2.0), Geotechnical Engineering Center, Department of Civil, Architectural, and Environmental Engineering, University of Texas.

The Morgenstern-Price analytical method with an entry-exit slip surface was used for slope stability calculation.

Criteria and Assumptions

The slope stability models were run using the following assumptions and design criteria:

- Seismic site response was determined using a one-dimensional equivalent linear site response analysis. The analysis was performed using Strata and utilizing random vibration theory. The input motion consisted of the USGS published 2008 Uniform Hazard Response Spectrum (UHRS) for Site Class B/C at a 2% Probability of Exceedance in 50 years. The UHRS was converted to a Fourier Amplitude Spectrum, and propagated through a representative one dimensional soil column using linear wave propagation with strain-dependent dynamic soil properties. The input soil properties and layer thickness were randomized based on defined statistical distributions to perform Monte Carlo simulations for 100 realizations, which were used to generate a median estimate of the surface ground motions.

- The median surface ground motions were then used to calculate a pseudostatic seismic coefficient for utilization in the stability analysis using the approach suggested by Bray and Tavasarou (2009). The procedure calculates the seismic coefficient for an allowable seismic displacement and a probability exceedance of the displacement. For this analysis, an allowable displacement of 0.5 ft, and a probability of exceedance of 16% were conservatively selected, providing a seismic coefficient of 0.053g for use as a horizontal acceleration in the stability analysis.

- The Corps of Engineers (COE) EM 1110-2-1902 standard, October 2003, allows the use of the phreatic surface established for the maximum storage condition (normal pool) in the analysis for the maximum surcharge loading condition. This is based on the short term duration of the surcharge loading relative to the permeability of the embankment and the foundation materials. This method is used in the analysis for the impoundments at this facility with surcharge loading.

- The current required minimum criteria (factors of safety) were taken from the Structural Integrity Criteria for Existing CCR Surface Impoundments, 40 CFR 257.73, published April 17, 2015.

- The critical section was selected at the location having the apparent maximum dam height and gypsum storage. The cross-section of the Plant Gorgas Gypsum Pond dam was modeled using the following sources:
    1) Alabama Power Company (APC) Drawing D-591423, Plant Gorgas Gypsum Storage Area Cell, Sections and Details Sheet 1.

- A phreatic surface within the dam was not modeled because the cell is lined with 60-mil HDPE, which for purposes of this analysis is considered to be impermeable.

Input Data

- Soil Properties: The soil properties (unit weight, phi angle, and cohesion) of coal mine spoils comprising the dam used in the analysis were conservatively estimated from evaluating average blow counts of the material encountered during drilling operations, and from laboratory testing of the coal mine spoils.
- The soil properties (unit weight, phi angle, and cohesion) of the gypsum were derived from laboratory testing of gypsum similar to what is produced and stored at Plant Gorgas.

Soil Description	Unit Weight, pcf	Effective Stress Parameters	
		Cohesion, psf	Phi Angle, degrees
Gypsum	100	100	34
Coal Mine Spoil	104	0	36

Summary of Conclusions

The following table summarizes the factors of safety resulting from the slope stability analyses. The results indicate the safety factors of the Plant Gorgas Gypsum Pond dam meet or exceed the minimum criteria set forth in the structural integrity criteria for existing CCR surface impoundments, 40 CFR 257.73.

Factor of Safety Summary Table

Loading Condition	Minimum Calculated Safety Factor	Minimum Required Safety Factor
Long-term Maximum Storage Pool (Static)	2.5	1.5
Maximum Surcharge Pool (Static)	2.5	1.4
Seismic	2.3	1.0

Design Inputs/References

- Bray, J. D. and Travasarou, T., *Pseudostatic Coefficient for Use in Simplified Seismic Slope Stability Evaluation*, Journal of Geotechnical and Environmental Engineering, American Society of Civil Engineers, September 2009
- D-591423, Plant Gorgas Gypsum Storage Area Cell Sections and Details Sheet 1, 2006
- Subsurface Investigation Report, Gypsum Storage Area at Alabama Power Company's Gorgas Steam Plant, Southern Company Technical Services, 2005

Body of Calculation

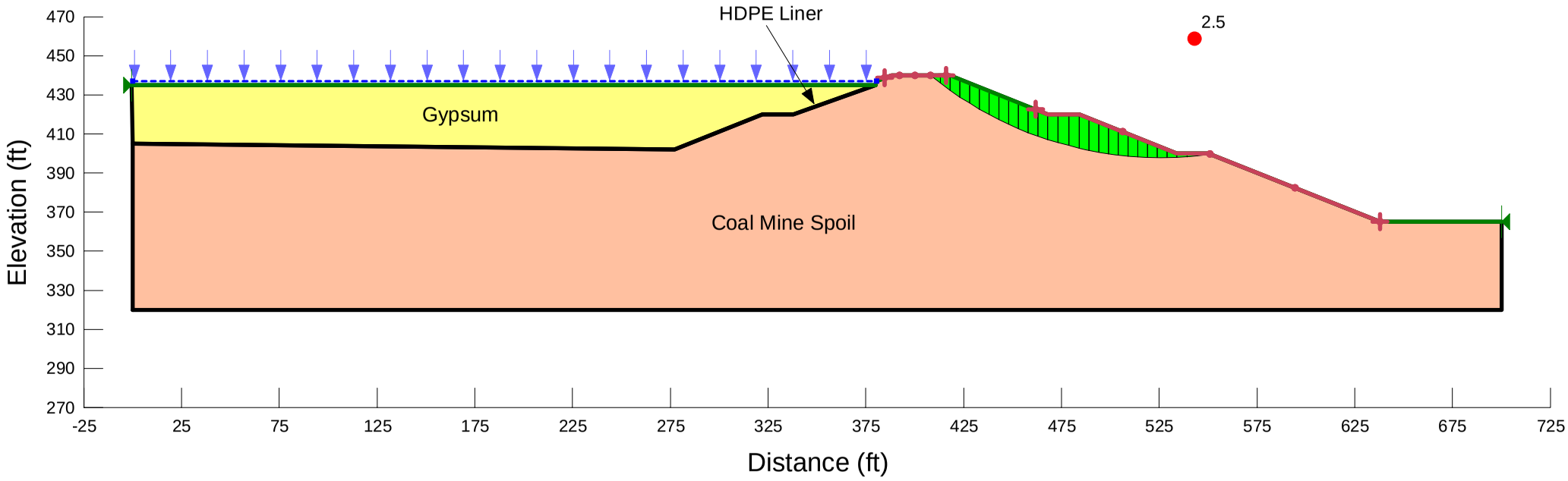
Name: Gypsum
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 34 °

Name: Coal Mine Spoil
Unit Weight: 104 pcf
Cohesion': 0 psf
Phi': 36 °

Plant Gorgas

Gypsum Storage Pond

Long Term Maximum Storage



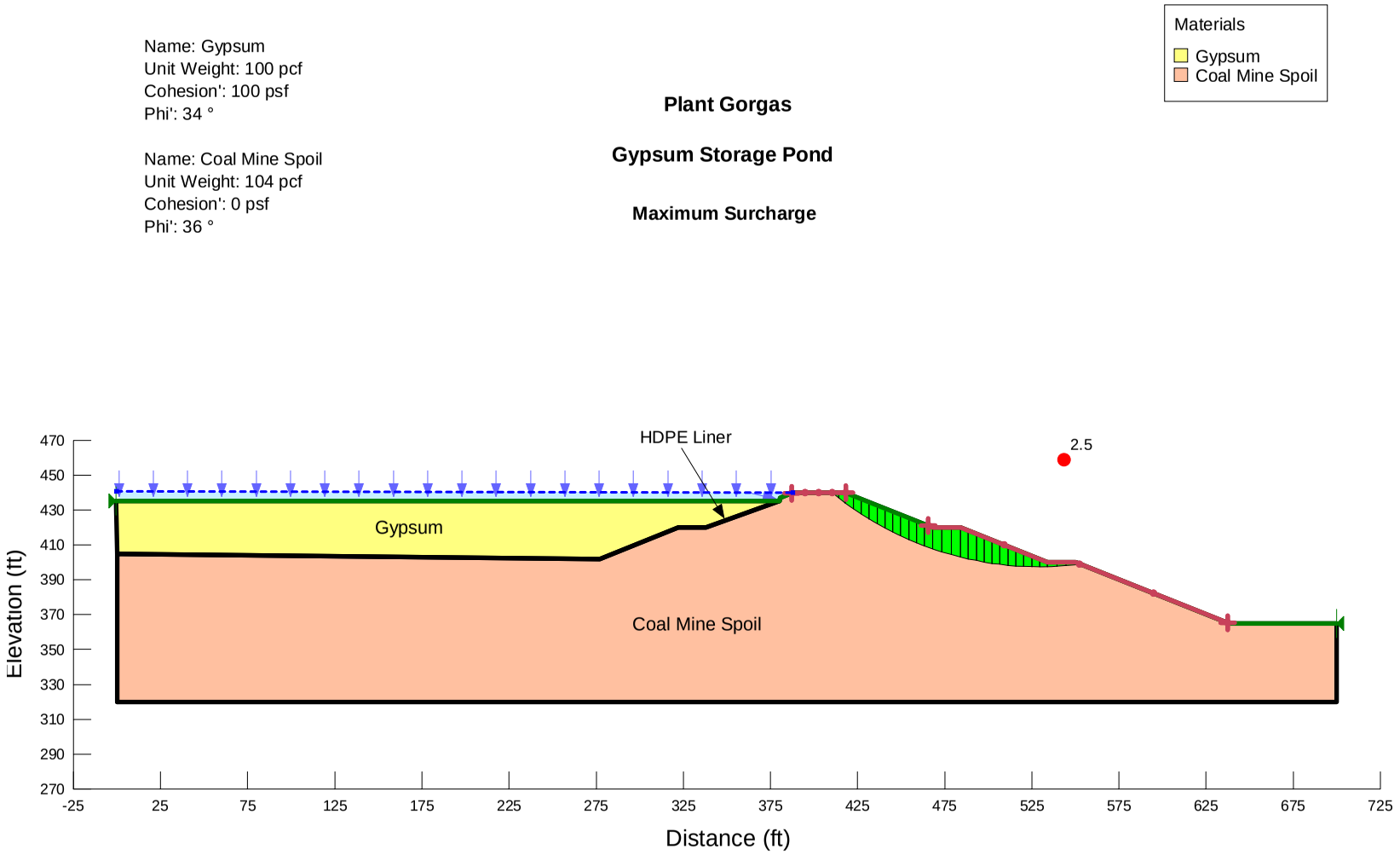
Name: Gypsum
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 34 °

Name: Coal Mine Spoil
Unit Weight: 104 pcf
Cohesion': 0 psf
Phi': 36 °

Plant Gorgas

Gypsum Storage Pond

Maximum Surcharge



Name: Gypsum
Unit Weight: 100 pcf
Cohesion': 100 psf
Phi': 34 °

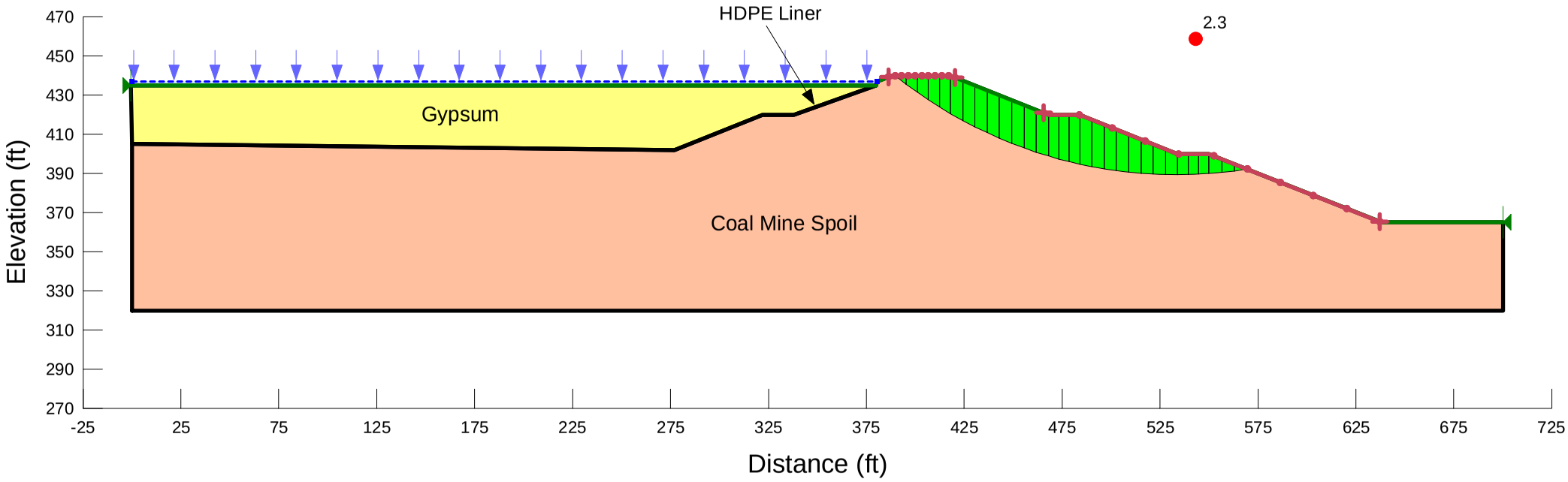
Name: Coal Mine Spoil
Unit Weight: 104 pcf
Cohesion': 0 psf
Phi': 36 °

Plant Gorgas

Gypsum Storage Pond

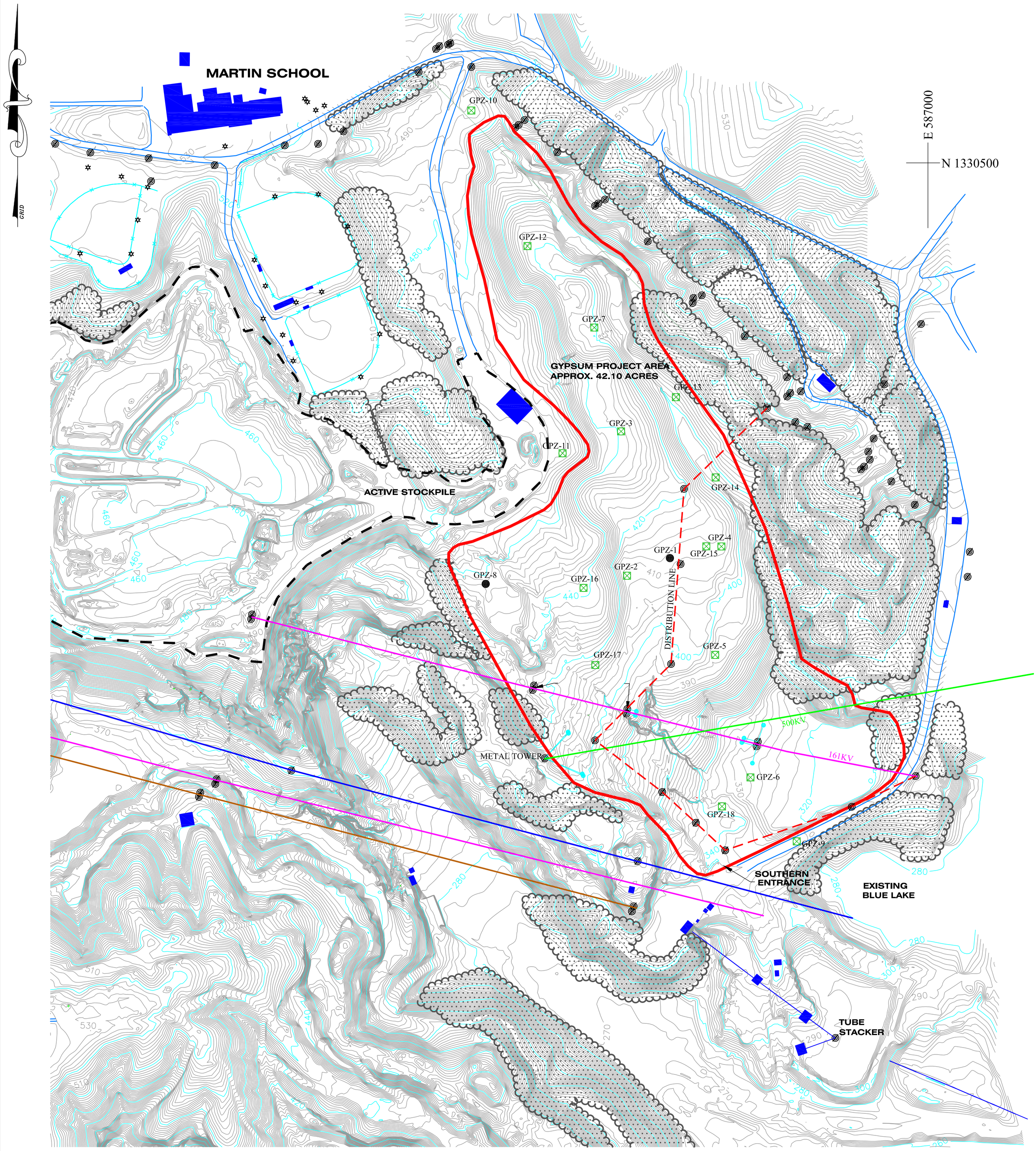
Seismic

Horizontal Seismic Coefficient.: 0.053



ATTACHMENTS

Attachment A - Boring Location Plan



LEGEND

- GPZ-1 ● BORING
- GPZ-6 ⊠ PIEZOMETER
- POWER POLE
- GUY WIRE
- LIGHT POLE
- FENCE
- ACTIVE STOCKPILE AREA
- ROADS
- STRUCTURES
- AREAS OF DENSE VEGETATION
- PROPOSED GYPSUM STORAGE AREA BOUNDARY
- DISTRIBUTION LINE
- 161KV TRANSMISSION LINE
- 500KV TRANSMISSION LINE

Hole	Surf. Elev	NORTHING	EASTING
GPZ-1	411.178	1329138.532	586110.801
GPZ-2	409.046	1329077.785	585962.932
GPZ-3	439.133	1329575.014	585942.474
GPZ-4	411.275	1329178.652	586288.212
GPZ-5	392.77	1328805.159	586266.769
GPZ-6	327.628	1328383.099	586388.351
GPZ-7	420.215	1329932.761	585850.253
GPZ-8	456.921	1329049.647	585475.962
GPZ-9	336.852	1328162.636	586547.693
GPZ-10	487.87	1330608.47	585426.44
GPZ-11	473.36	1329499.75	585740.85
GPZ-12	421.61	1330213.32	585619.97
GPZ-13	402.64	1329692.80	586131.45
GPZ-14	394.93	1329416.45	586268.34
GPZ-15	411.18	1329179.05	586236.28
GPZ-16	440.65	1329035.86	585813.17
GPZ-17	414.27	1328770.35	585853.67
GPZ-18	338.02	1328283.18	586290.18

NOTES:

1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.

GRAPHIC SCALE

160 0 80 160 320 640

(IN FEET)
1 inch = 160 ft.

PHOTOGRAMMETRIC SURVEY
GRID COORDINATES NAD 27
ALABAMA STATE PLANE
WEST ZONE

Southern Company Generation
for

ALABAMA POWER COMPANY

FIGURE 2
PLANT GORGAS
GYPSUM STORAGE AREA
BORING & PIEZOMETER LOCATIONS

SCALE: 1:160 ES1341S2

Attachment B - Boring Logs

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-1

Sheet 1 of 3

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **66.5'** SURF.ELEV. 411

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES 13 NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH Backfilled Hole ELEV. _____ TIME AFTER COMP. _____ DATE TAKEN _____

TYPE GROUT Auger Spoils QUANTITY _____ MIX _____ DRILLING START DATE 4/29/2003

DRILLER B. Filipovich RECORDER J. Chitwood APPROVED _____ DRILLING COMP. DATE 4/29/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Coal Mine Spoils 0 - 66.5'					
	3		Dark gray-black 10YR3/1 very dark gray					
	4							
	5							
	6			5.0-6.5	2-34-7	41	1	
	7							
	8							
	9							
	10							
	11			10.0-11.5	23-11-7	18	2	
	12							
	13							
	14							
	15							
	16			15.0-16.5	13-19-10	29	3	
	17							
	18							
	19							
	20							
	21			20.0-21.5	9-3-3	6	4	
	22							
	23							
	24							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-1

Sheet 2 of 3

SITE **Plant Gorgas Gypsum Disposal Area** TOTAL DEPTH **66.5'** SURF.ELEV. 411

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	25							
	26		Coal Mine Spoils	25.0-26.5	11-14-13	27	5	
	27							
	28							
	29							
	30							
	31			30.0-31.5	9-11-13	24	6	
	32							
	33							
	34							
	35							
	36			35.0-36.5	5-7-8	15	7	
	37							
	38							
	39							
	40							
	41			40.0-41.5	6-6-5	11	8	
	42							
	43							
	44							
	45							
	46			45.0-46.5	5-5-6	11	9	
	47							
	48							
	49							
	50							
	51			50.0-51.5	9-7-7	14	10	
	52							
	53							
	54							
	55							
	56			55.0-56.5	4-7-9	16	11	

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-1

Sheet 3 of 3

SITE **Plant Gorgas Gypsum Disposal Area** TOTAL DEPTH **66.5'** SURF.ELEV. 411

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	57							
	58							
	59							
	60							
	61		Coal Mine Spoils	60.0-61.5	4-7-7	14	12	
	62							
	63							
	64							
	65							
	66			65.0-66.5	9-7-6	13	13	
66.5		344.5						
	67		Boring terminated @ 66.5'					
	68		No water encountered. Hole backfilled with auger spoils.					
	69							
	70							
	71							
	72							
	73							
	74							
	75							
	76							
	77							
	78							
	79							
	80							
	81							
	82							
	83							
	84							
	85							
	86							
	87							
	88							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-2

Sheet 1 of 2

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **46'** SURF.ELEV. 410

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES 8 NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH 34 ELEV. 376 TIME AFTER COMP. 48 hrs DATE TAKEN 5/2/2003

TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 4/29/2003

DRILLER B. Filipovich RECORDER J. Chitwood APPROVED _____ DRILLING COMP. DATE 4/30/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1		Coal Mine Spoils 0 - 46'					
	2							
	3							
	4							
	5							
	6			5.0-6.5	2-2-3	5	1	
	7							
	8							
	9							
	10							
	11			10.0-11.5	2-2-2	4	2	
	12							
	13							
	14							
	15							
	16			15.0-16.5	2-2-2	4	3	
	17							
	18							
	19							
	20							
	21			20.0-21.5	5-4-4	8	4	
	22							
	23							
	24							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-2
Sheet 2 of 2

SITE **Plant Gorgas Gypsum Disposal Area** TOTAL DEPTH **46'** SURF.ELEV. 410

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	25							
	26		Coal Mine Spoils	25.0-26.5	2-4-3	7	5	
	27							
	28							
	29							
	30							
	31			30.0-31.5	2-20-20	40	6	
	32							
	33							
	34		Wet around 34'					
	35							
	36		Saturated @ 36'	35.0-36.5	2-2-3	5	7	
	37							
	38							
	39							
	40							
	41			40.0-41.5	1-1-2	3	8	
	42							
	43							
	44							
	45							
46.0	46	364.00	Boring terminated @ 46' - 10' of auger broke off in the hole.					
	47		Offset 5' and cored 5' of rock.					
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-3

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **65'** SURF.ELEV. 436

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES 1 NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH Dry ELEV. _____ TIME AFTER COMP. 48 hrs DATE TAKEN 5/2/2003

TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 4/30/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED _____ DRILLING COMP. DATE 4/30/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Coal Mine Spoils 0 - 65'					
	3		Dark gray-black 10YR3/1 very dark gray					
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	.							
	.							
	.							
	.							
	.							
	.							
	58							
	59							
	60							
	61			60.0-61.5	11-15-24	39	1	
	62							
	63							
	64							
65.0	65	371.00	Boring Terminated @ 65'. Set Piezometer.					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-4

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **65'** SURF.ELEV. 406

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N E

ANGLE BEARING CONTRACTOR SCS DRILL NO.

OVERBURDEN DEPTH NO. SAMPLES NO. U.D. SAMPLES

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH Dry ELEV. TIME AFTER COMP. 48 hrs DATE TAKEN 5/2/2003

TYPE GROUT QUANTITY MIX DRILLING START DATE 4/30/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED DRILLING COMP. DATE 4/30/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Coal Mine Spoils 0 - 65'					
	3		Dark gray-black 10YR3/1 very dark gray					
	4		No Rock Encountered. No water.					
	5							
	6							
	7							
	8							
	9							
	10							
	.							
	.							
	.							
	.							
	.							
	.							
	58							
	59							
	60							
	61							
	62							
	63							
	64							
65.0	65	341.00	Boring Terminated @ 65'. Set Piezometer.					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-5

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **60'** SURF.ELEV. 399

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES _____ NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH Dry ELEV. _____ TIME AFTER COMP. 24 hrs DATE TAKEN 5/2/2003

TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 5/1/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED _____ DRILLING COMP. DATE 5/1/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Coal Mine Spoils 0 - 60'					
	3		Dark gray-black 10YR3/1 very dark gray					
	4		Augered through mine spoils					
	5		No rock encountered. No water.					
	6							
	7							
	8							
	9							
	10							
	.							
	.							
	.							
	.							
	.							
	.							
	53							
	54							
	55							
	56							
	57							
	58							
	59							
60.0	60	339.00	Boring Terminated @ 60'. Set Piezometer.					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-6

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **61.5'** SURF.ELEV. 326

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES 1 NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH 8 ELEV. 318 TIME AFTER COMP. 24 hrs DATE TAKEN 5/2/2003

TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 5/1/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED _____ DRILLING COMP. DATE 5/1/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Coal Mine Spoils 0 - 61'					
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	.		Water encountered around 15'.					
	.							
	.							
	.		Lots of water around 25'.					
	.							
	.							
	55							
	56							
	57							
	58							
	59							
	60							
	61		Tan slightly clayey and sandy silt with Sandstone fragments @ 61'	60.0-61.5	5-13-10	23	1	
62.0	62	264.00	Boring Terminated @ 61.5'. Set Piezometer 30' - 35'.					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-7

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **45'** SURF.ELEV. 427

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES _____ NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH 18.5 ELEV. 408.5 TIME AFTER COMP. 24 hrs DATE TAKEN 5/2/2003

TYPE GROUT _____ QUANTITY _____ MIX _____ DRILLING START DATE 5/1/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED _____ DRILLING COMP. DATE 5/1/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2		Augered through coal mine spoils 0 - 25'					
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10		Moist around 10'.					
	.							
	.							
	25		Original ground around 25'.					
	.		Refusal @ 28'. Cored through rock 28'-45' - Gray Sandstone with weathered layers					
	.							
	.							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
45.0	45	382.00	Boring Terminated @ 45'. Set Piezometer 40-45'					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-8

Sheet 1 of 1

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **50'** SURF.ELEV. 456

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N E

ANGLE BEARING CONTRACTOR SCS DRILL NO.

OVERBURDEN DEPTH NO. SAMPLES NO. U.D. SAMPLES

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH dry ELEV. TIME AFTER COMP. tod DATE TAKEN 5/2/2003

TYPE GROUT Backfilled QUANTITY MIX DRILLING START DATE 5/1/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED DRILLING COMP. DATE 5/1/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
1.0	1	455.00	Coal Mine Spoils (1')					
	2							
	3		1' - 30' Gray gravely silt - weathered SS with intermediate soft Sandstone layers					
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	.							
	.							
	30		Tan to brown back to gray around 30'					
	.							
	.							
	.							
	43							
	44							
	45		Rock encountered - Auger refusal					
	46		45-50' Cored gray SS					
	47							
	48							
	49							
50.0	50	406.00	Boring terminated @ 50'. No water. Hole Backfilled.					

Form GS9901 4/10/2003

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-9

Sheet 1 of 3

SITE **Plant Gorgas Gypsum Disposal Area** HOLE DEPTH **61.5'** SURF.ELEV. 338

LOCATION North of Plant Gorgas in Coal Mine Spoil Storage Area COORDINATES N _____ E _____

ANGLE _____ BEARING _____ CONTRACTOR SCS DRILL NO. _____

OVERBURDEN DEPTH _____ NO. SAMPLES 12 NO. U.D. SAMPLES _____

CASING SIZE _____ LENGTH _____ CORE SIZE _____ TOTAL % REC. _____

WATER TABLE DEPTH 41 ELEV. 297 TIME AFTER COMP. tod DATE TAKEN 5/2/2003

TYPE GROUT Auger Spoils QUANTITY _____ MIX _____ DRILLING START DATE 5/2/2003

DRILLER B. Filipovich RECORDER H. Hill APPROVED _____ DRILLING COMP. DATE 5/2/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	0							
	1							
	2							
	3							
	4							
	5							
	6		Road base Mine Spoils	5.0-6.5	18-8-8	16	1	
	7							
	8							
	9							
	10							
	11		Coal mine spoils	10.0-11.5	7-4-3	7	2	
	12							
	13							
	14							
	15							
	16		SAA	15.0-16.5	10-4-3	7	3	
	17							
	18							
	19							
	20							
	21			20.0-21.5	7-4-3	7	4	
	22		SAA					
	23							
	24							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-9

Sheet 2 of 3

SITE **Plant Gorgas Gypsum Disposal Area** TOTAL DEPTH **61.5'** SURF.ELEV. 338

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	25							
	26		Coal Mine Spoils	25.0-26.5	3-3-3	6	5	
	27							
	28							
	29							
	30							
	31		SAA	30.0-31.5	4-3-3	6	6	
	32							
	33							
	34							
	35							
	36		SAA	35.0-36.5	2-3-4	7	7	
	37							
	38							
	39							
	40							
	41		SAA - Wet @ 41'	40.0-41.5	2-3-4	7	8	
	42							
	43							
	44							
	45							
	46		Wet Coal Mine Spoils	45.0-46.5	1-1-5	6	9	
	47							
	48							
	49							
	50							
	51		SAA	50.0-51.5	woh-3-5	8	10	
	52							
	53							
	54							
	55							
	56		SAA	55.0-56.5	2-4-6	10	11	

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-9

Sheet 3 of 3

SITE **Plant Gorgas Gypsum Disposal Area** TOTAL DEPTH **61.5'** SURF.ELEV. 338

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Penetration Test From To	Blows	N	Sample No.	Comments
	57							
	58							
	59							
	60							
	61		Coal Mine Spoils	60.0-61.5	1-2-4	6	12	
61.5		276.5	Boring terminated @ 61.5'. Piezometer set.					
	62							
	63							
	64							
	65							
	66							
	67							
	68							
	69							
	70							
	71							
	72							
	73							
	74							
	75							
	76							
	77							
	78							
	79							
	80							
	81							
	82							
	83							
	84							
	85							
	86							
	87							
	88							

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-10

Sheet 1 of 2

SITE **GORGAS STEAM PLANT** HOLE DEPTH **56.5'** SURF.ELEV. 487.87

LOCATION GYPSUM STORAGE COORDINATES N 1330680.47 E 585426.44

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 12 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/28/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/28/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0 0	487.87								
1		Coal Mine spoils (0-45')	SS-1	0-1.5	4-5-5	10			
2									
3									
4									
5									
6		SAA	SS-2	5-6.5	3-7-9	16			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	7-17-21	38			
12									
13									
14									
15									
16		SAA	SS-4	15-16.5	5-5-7	12			
17									
18									
19									
20									
21		SAA	SS-5	20-21.5	10-10-8	18			
22									
23									
24									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-10

Sheet 2 of 2

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **56.5'** SURF.ELEV. 487.87

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25									
26		SAA	SS-6	25-26.5	6-6-7	13			
27									
28									
29									
30									
31		SAA	SS-7	30-31.5	6-6-7	13			
32									
33									
34									
35									
36		SAA	SS-8	35-36.5	6-4-3	7			
37									
38									
39									
40									
41		SAA	SS-9	40-41.5	6-9-11	20			
42									
43									
44									
45.0 45	442.87								
46		Tan to gray, moist, stiff, silty CLAY (CL) with SANDSTONE and SHALE fragments, FILL	SS-10	45-46.5	4-5-6	11			
47									
48									
49									
50.0 50	437.87								
51		Tan to gray, moist, very stiff to very hard, silty CLAY (CL) with weathered SANDSTONE residuum	SS-11	50-51.5	4-7-14	21			
52									
53									
54									
55									
56		SAA	SS-12	55-56.5	50/3"	50+			
56.5		Boring Terminated @ 56.5'							

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-11

Sheet 1 of 3

SITE **GORGAS STEAM PLANT** HOLE DEPTH **76.5** SURF.ELEV. 473.36

LOCATION GYPSUM STORAGE COORDINATES N 1329499.75 E 585740.85

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 16 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/24/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/24/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0 0	473.36								
1		Coal Mine spoils (0-63')	SS-1	0-1.5	2-2-7	9			
2									
3									
4									
5									
6		SAA	SS-2	5-6.5	6-6-13	19			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	6-6-8	14			
12									
13									
14									
15									
16		SAA	SS-4	15-16.5	3-8-19	27			
17									
18									
19									
20									
21		SAA	SS-5	20-21.5	10-12-13	25			
22									
23									
24									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-11

Sheet 2 of 3

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **76.5** SURF.ELEV. 473.36

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25									
26		SAA	SS-6	25-26.5	2-6-13	19			
27									
28									
29									
30									
31		SAA	SS-7	30-31.5	10-14-12	26			
32									
33									
34									
35									
36		SAA	SS-8	35-36.5	8-17-32	49			
37									
38									
39									
40									
41		SAA	SS-9	40-41.5	5-9-10	19			
42									
43									
44									
45									
46		SAA	SS-10	45-46.5	4-8-10	18			
47									
48									
49									
50									
51		SAA	SS-11	50-51.5	2-8-9	17			
52									
53									
54									
55									
56		SAA	SS-12	55-56.5	7-13-14	27			

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-11

Sheet 3 of 3

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **76.5** SURF.ELEV. 473.36

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
57									
58									
59									
60									
61		SAA	SS-13	60-61.5	14-19-17	36			
62									
63.0 63	410.36								
64									
65									
66		Tan to gray, moist, very stiff, clayey SILT (ML) with highly weathered SHALE residuum	SS-14	65-66.5	11-15-14	29			
67									
68									
69									
70.0 70	403.36								
71		Tan, soft to medium hard, weathered SANDSTONE	SS-15	70-71.5	9-13-14	27			
72									
73									
74									
75									
76		SAA	SS-16	75-76.5	9-14-16	30			
76.5 77	396.86	Boring Terminated @ 76.5' (Not Auger Refusal)							
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-12

Sheet 1 of 1

SITE **GORGAS STEAM PLANT** HOLE DEPTH 24 SURF.ELEV. 421.61

LOCATION GYPSUM STORAGE COORDINATES N 1330213.32 E 585619.97

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 5 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/28/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/28/2005

	Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0	0	421.61								
	1		Coal Mine spoils (0-15')	SS-1	0-1.5	2-3-2	5			
	2									
	3									
	4									
	5									
	6		SAA	SS-2	5-6.5	2-2-2	4			
	7									
	8									
	9									
	10									
	11		SAA	SS-3	10-11.5	2-3-3	6			
	12									
	13									
	14									
15.0	15	406.61								
	16		Tan to gray, moist, very hard, silty CLAY (CL)	SS-4	15-16.5	10-12-50/3'	50+			
	17		to clayey SILT (ML) with weathered SANDSTONE							
	18		residuum							
	19									
20.0	20	401.61								
	21		SAA	SS-5	20-21.5	50/2"	50+			
	22									
	23									
	24		Auger Refusal @ 24'							

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-13

Sheet 1 of 1

SITE **GORGAS STEAM PLANT** HOLE DEPTH **15** SURF.ELEV. 402.64

LOCATION GYPSUM STORAGE COORDINATES N 1329692.8 E 586131.45

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 4 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/28/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/28/2005

	Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0	0	402.64								
	1		Coal Mine spoils (0-5')	SS-1	0-1.5	2-3-2	5			
	2									
	3									
	4									
5.0	5	397.64								
	6		Red, Coal Mine spoils (5-10')	SS-2	5-6.5	9-10-8	18			
	7									
	8									
	9									
10.0	10	392.64								
	11		Tan to gray, moist to wet, stiff, silty CLAY (CL) with weathered SANDSTONE residuum	SS-3	10-11.5	2-5-5	10			
	12									
	13									
	14									
15.0	15	387.64								
	16		Auger Refusal @ 15'	SS-4	15-16.5	50/2"	50+			
	17									
	18									
	19									
	20									
	21									
	22									
	23									
	24									

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-14

Sheet 1 of 2

SITE **GORGAS STEAM PLANT** HOLE DEPTH **35** SURF.ELEV. 394.93

LOCATION GYPSUM STORAGE COORDINATES N 1329416.45 E 586268.34

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 8 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/28/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/28/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0 0	394.93								
1		Gray, moist, medium stiff to stiff, silty CLAY (CL) with SANDSTONE fragments, FILL	SS-1	0-1.5	4-3-5	8			
2									
3									
4									
5									
6		SAA	SS-2	5-6.5	6-6-5	11			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	6-7-5	12			
12									
13.0 13	381.93								
14		Gray to tan, moist, stiff, silty CLAY (CL) with SANDSTONE and SHALE fragments, FILL							
15									
16			SS-4	15-16.5	3-4-6	10			
17									
18									
19									
20									
21		SAA	SS-5	20-21.5	4-5-6	11			
22									
23									
24									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-14

Sheet 2 of 2

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **35** SURF.ELEV. 394.93

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25									
26		SAA	SS-6	25-26.5	5-8-6	14			
27									
28									
29									
30.0 30	364.93								
31		Gray, moist, stiff, silty CLAY (CL/CH) with highly weathered SANDSTONE residuum	SS-7	30-31.5	4-5-8	13			
32									
33									
34									
35.0 35	359.93								
36		Auger Refusal @ 35'	SS-8	35-36.5	10-50/2"	50+			
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-15

Sheet 1 of 4

SITE **GORGAS STEAM PLANT** HOLE DEPTH **101.5** SURF.ELEV. 411.18

LOCATION GYPSUM STORAGE COORDINATES N 1329179.05 E 586236.28

ANGLE 90 BEARING CONTRACTOR SCS DRILL NO. CME-550

DRILLING METHOD NO. SAMPLES 21 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/29/2005

DRILLER B. Filipovich RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/30/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0	411.18								
1		Coal Mine spoils (0-101')	SS-1	0-1.5	4-11-10	21			
2									
3									
4									
5									
6		SAA	SS-2	5-6.5	21-22-19	41			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	7-11-25	36			
12									
13									
14									
15									
16		SAA	SS-4	15-16.5	4-9-12	21			
17									
18									
19									
20									
21		SAA	SS-5	20-21.5	7-16-13	29			
22									
23									
24									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-15

Sheet 2 of 4

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **101.5** SURF.ELEV. 411.18

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25									
26		SAA	SS-6	25-26.5	4-16-33	49			
27									
28									
29									
30									
31		SAA	SS-7	30-31.5	11-13-17	30			
32									
33									
34									
35									
36		SAA	SS-8	35-36.5	6-5-6	11			
37									
38									
39									
40									
41		SAA	SS-9	40-41.5	3-4-5	9			
42									
43									
44									
45									
46		SAA	SS-10	45-46.5	3-5-6	11			
47									
48									
49									
50									
51		SAA	SS-11	50-51.5	2-5-5	10			
52									
53									
54									
55									
56		SAA	SS-12	55-56.5	3-4-7	11			

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-15
Sheet 3 of 4

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **101.5** SURF.ELEV. 411.18

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
57									
58									
59									
60									
61		SAA	SS-13	60-61.5	5-5-6	11			
62									
63									
64									
65									
66		SAA	SS-14	65-66.5	5-6-6	12			
67									
68									
69									
70									
71		SAA	SS-15	70-71.5	5-6-9	15			
72									
73									
74									
75									
76		SAA	SS-16	75-76.5	WOR-3-7	10			
77									
78									
79									
80									
81		SAA	SS-17	80-81.5	6-8-15	23			
82									
83									
84									
85									
86		SAA	SS-18	85-86.5	6-8-13	21			
87									
88									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-15

Sheet 4 of 4

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **101.5** SURF.ELEV. 411.18

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
89									
90									
91		SAA	SS-19	90-91.5	5-8-9	17			
92									
93									
94									
95									
96		SAA	SS-20	95-96.5	WOR	WOR			
97									
98									
99									
100									
101.0 101	310.18		SS-21	100-101.5	6-9-12	21			
101.5	309.68	Tan, moist, stiff, sandy SILT (ML)							
102		Boring Terminated @ 101.5'							
103									
104									
105									

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-16

Sheet 1 of 2

SITE **GORGAS STEAM PLANT** HOLE DEPTH **55.5** SURF.ELEV. 440.65

LOCATION GYPSUM STORAGE COORDINATES N 1329035.86 E 585813.17

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 12 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/24/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/24/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0 0	440.65								
1		Coal Mine spoils (0-43')	SS-1	0-1.5	6-10-12	22			
2									
3									
4									
5									
6		SAA	SS-2	5-6.5	22-25-33	58			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	4-6-10	16			
12									
13									
14									
15									
16		SAA	SS-4	15-16.5	3-7-7	14			
17									
18									
19									
20									
21		SAA	SS-5	20-21.5	4-9-10	19			
22									
23									
24									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-16

Sheet 2 of 2

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **55.5** SURF.ELEV. 440.65

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25									
26		SAA	SS-6	25-26.5	4-9-11	20			
27									
28									
29									
30									
31		SAA	SS-7	30-31.5	5-6-12	18			
32									
33									
34									
35									
36		SAA	SS-8	35-36.5	9-14-19	33			
37									
38									
39									
40									
41		SAA	SS-9	40-41.5	10-11-23	34			
42									
43.0 43	397.65								
44									
45									
46		Gray, soft, weathered SHALE residuum	SS-10	45-46.5	18-50/4"	50+			
47									
48									
49									
50.0 50	390.65								
51		Tan, soft to medium hard, weathered SANDSTONE	SS-11	50-51.5	50/3"	50+			
52									
53									
54									
55									
55.5	385.15								
56		Boring Terminated @ 55.5' (Not Auger refusal)	SS-12	55-55.5'	50/3"	50+			

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-17

Sheet 1 of 2

SITE **GORGAS STEAM PLANT** HOLE DEPTH **30.5** SURF.ELEV. 414.27

LOCATION GYPSUM STORAGE COORDINATES N 1328770.35 E 585853.67

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 7 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/23/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/23/2005

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0.0 0	414.27								
1		Coal Mine spoils (0-5')	SS-1	0-1.5	8-8-9	17			
2									
3									
4									
5.0 5	409.27								
6		Tan to gray, moist, very stiff to very hard, clayey SILT (ML) with highly weathered SHALE and SANDSTONE residuum	SS-2	5-6.5	26-26-36	62			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	9-9-14	23			
12									
13									
14									
15.0 15	399.27								
16		Tan, dry to moist, very hard, clayey SILT (ML) with weathered SANDSTONE	SS-4	15-16.5	25-50/3"	50+			
17									
18									
19									
20									
21		Tan, soft, weathered SANDSTONE	SS-5	20-21.5	27-29-50	79			
22									
23									
24									

Form GS9901 7-26-2004

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. GPZ-17
Sheet 2 of 2

SITE **GORGAS STEAM PLANT** TOTAL DEPTH **30.5** SURF.ELEV. 414.27

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
25.0	389.27								
26		Gray, soft, weathered SHALE	SS-6	25-26.5	19-50/4"	50+			
27									
28									
29									
30									
30.5	383.77	SAA							
31		Boring Terminated @ 30.5' (not auger refusal)	SS-7	30-31.5	50/3"	50+			
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG

GEOLOGICAL SERVICES

Hole No. GPZ-18

Sheet 1 of 1

SITE **GORGAS STEAM PLANT** HOLE DEPTH **15.5** SURF.ELEV. 338.02

LOCATION GYPSUM STORAGE COORDINATES N 1328283.18 E 586290.18

ANGLE 90 BEARING CONTRACTOR Christian Testing Lab. DRILL NO. CME-850

DRILLING METHOD NO. SAMPLES 4 NO. U.D. SAMPLES 0

CASING SIZE LENGTH CORE SIZE TOTAL % REC.

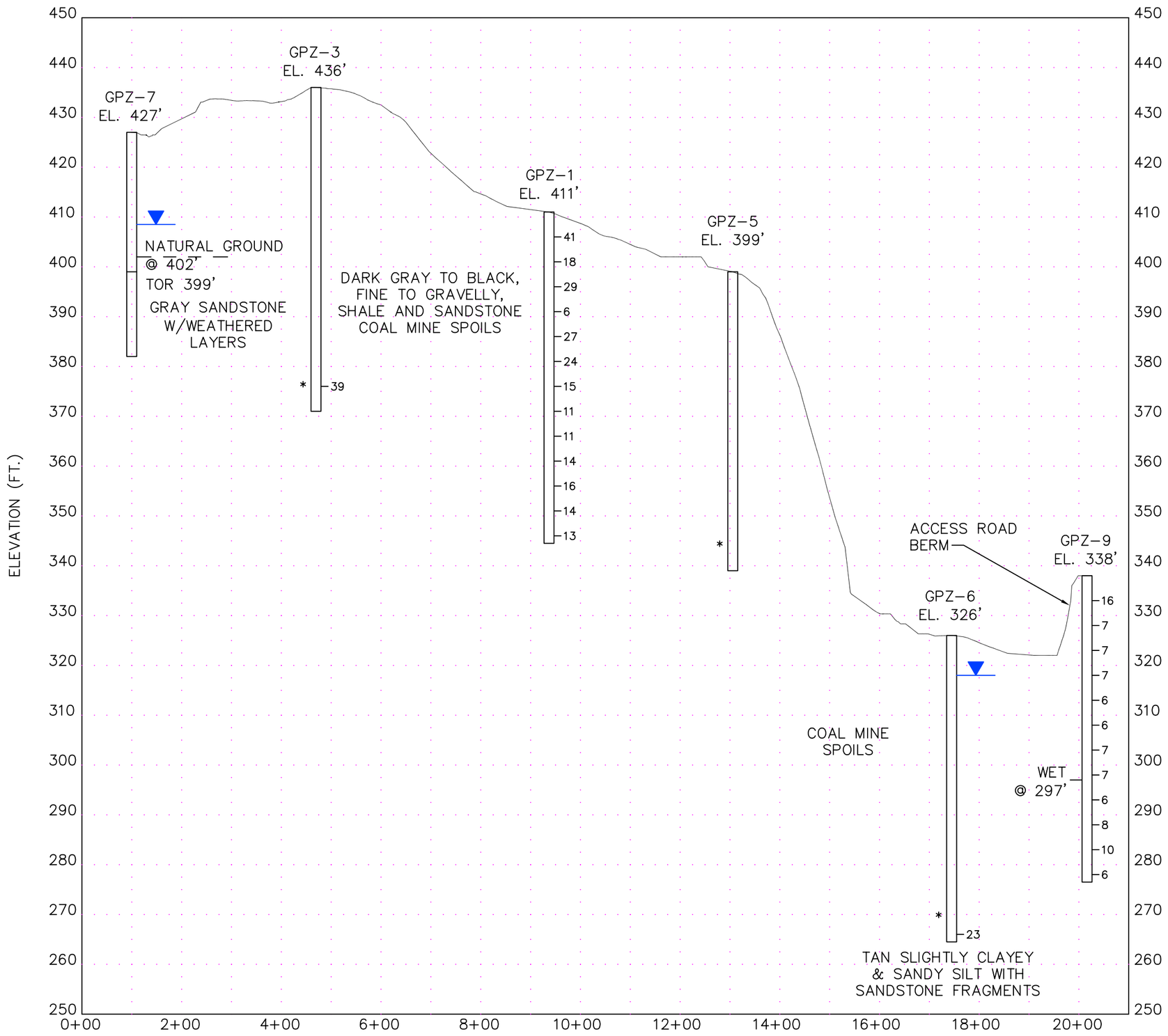
WATER TABLE DEPTH NA ELEV. TIME AFTER COMP. DATE TAKEN

TYPE GROUT QUANTITY MIX DRILLING START DATE 3/23/2005

DRILLER Billy Spivey RECORDER S. Sprayberry APPROVED DRILLING COMP. DATE 3/23/2005

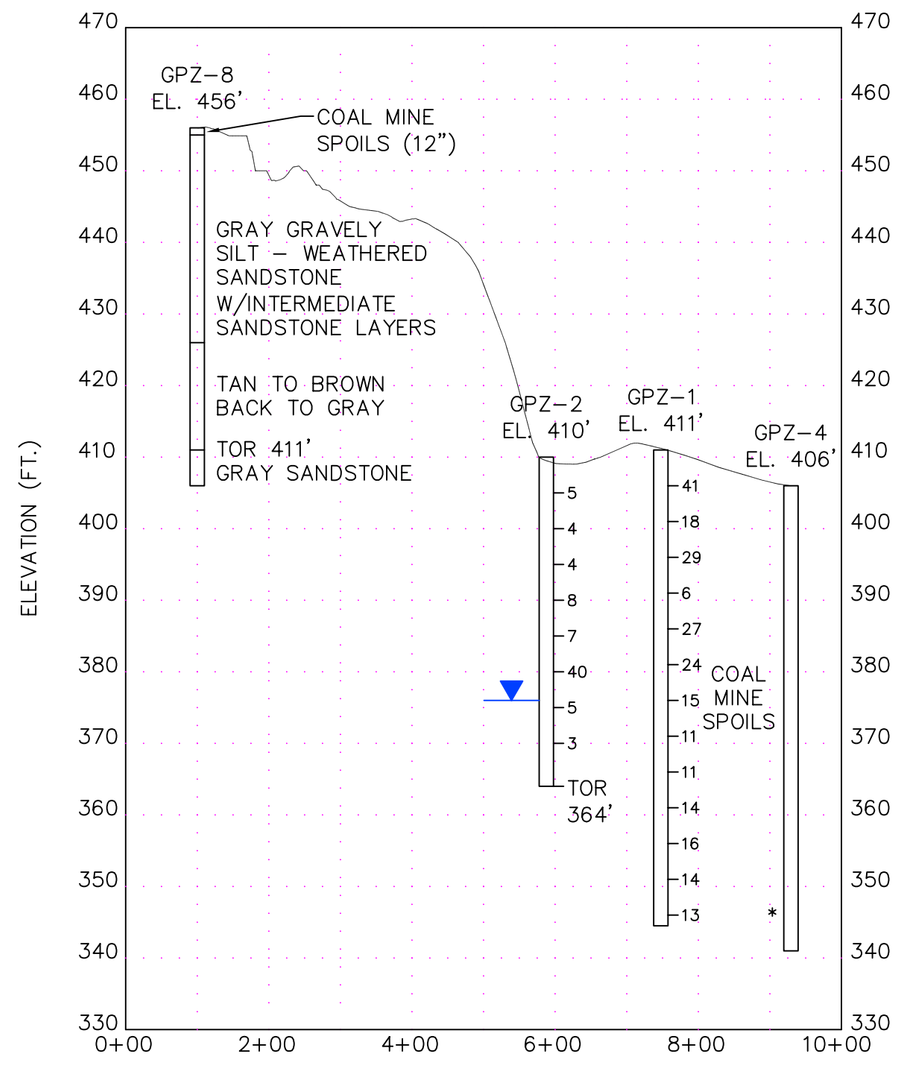
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	%Rec	RQD
0	338.02								
1		Coal Mine spoils (0-1')	SS-1	0-1.5	5-5-8	13			
2		Tan to brown, moist, stiff, clayey SILT (ML)							
3									
4									
5.0 5	333.02								
6		Tan to gray, moist, very hard, clayey SILT (ML) with highly weathered SHALE residuum	SS-2	5-6.5	30-26-50	76			
7									
8									
9									
10									
11		SAA	SS-3	10-11.5	31-50/5"	50+			
12									
13									
14									
15									
15.5 16	322.52	Auger Refusal @ 15.5'	SS-4	15-16.5	50+/6"	50+			
17									
18									
19									
20									
21									
22									
23									
24									

Form GS9901 7-26-2004



NORTH - SOUTH CROSS SECTION

HORIZONTAL SCALE: 1"= 200'
VERTICAL SCALE: 1"= 20'



WEST - EAST CROSS SECTION

HORIZONTAL SCALE: 1"= 200'
VERTICAL SCALE: 1"= 20'

* GPZ-4&5 WERE DRILLED WITH NO STANDARD PENETRATION VALUES TAKEN. GPZ-3&6 WERE DRILLED WITH SPT VALUES TAKEN AT 60' - 61.5' BELOW GROUND SURFACE.

NOTE:
INTERPRETATIONS OF RESIDUAL SOILS, ROCK TYPES, ROCK CHARACTERISTICS, AND DEGREE OF WEATHERING ARE TRUE ONLY AT THE BORING LOCATION. PROFESSIONAL JUDGEMENT HAS BEEN USED TO EVALUATE THE DATA COLLECTED. HOWEVER, ANY INTERPOLATION OF CONDITIONS BETWEEN BORINGS IS CONJECTURE AND THE ACCURACY OF SUCH INTERPOLATION IS NOT GUARANTEED. THE LINES DESIGNATING THE INTERFACES BETWEEN VARIOUS STRATA ARE APPROXIMATE ONLY, AS TRANSITIONS BETWEEN MATERIALS MAY BE GRADUAL.

Southern Company Services, Inc.

FIGURE 8
PLANT GORGAS
PROPOSED GYPSUM STORAGE AREA
GEOLOGICAL CROSS SECTIONS
NORTH - SOUTH & WEST - EAST

SCALE: AS SHOWN ES1218S8

Attachment C - Laboratory Analyses

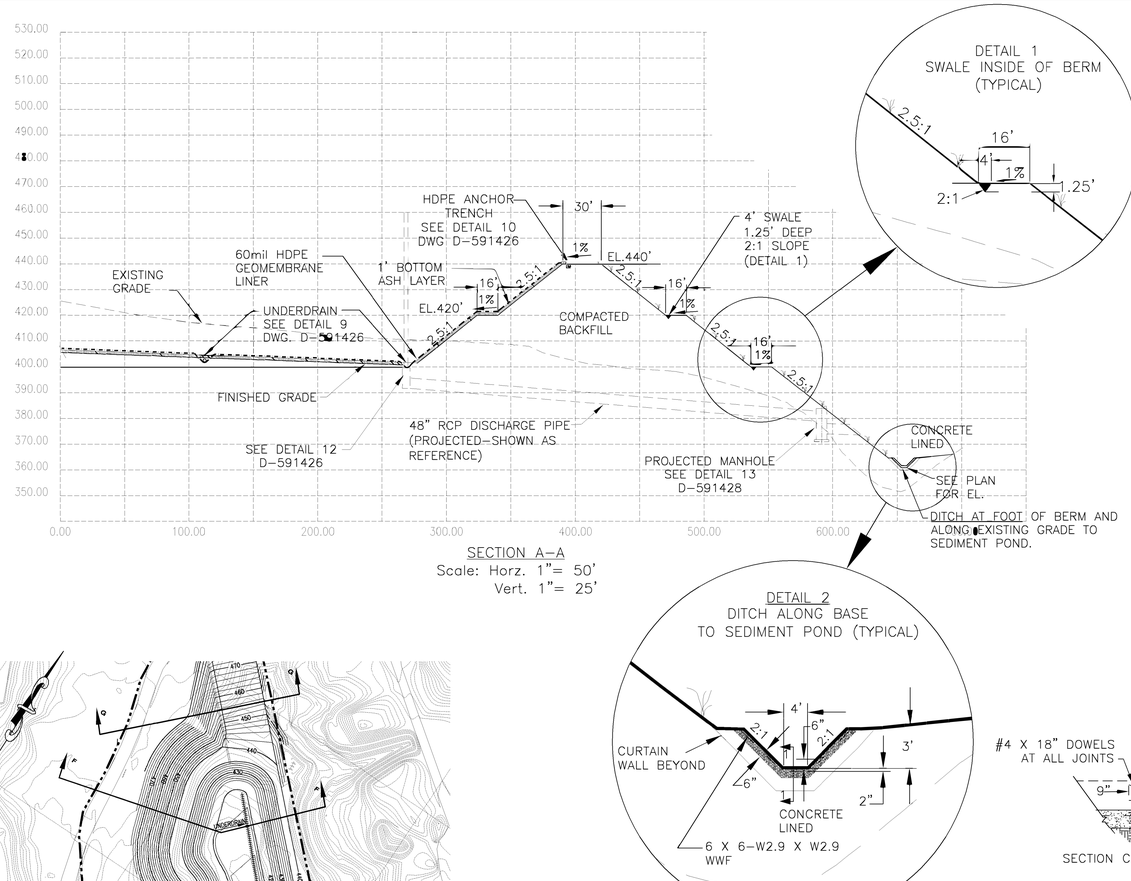
Testing results of the coal mine spoil samples are summarized below.

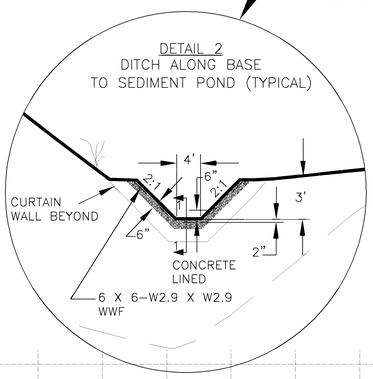
Table 1
Laboratory Results for Coal Mine Spoils

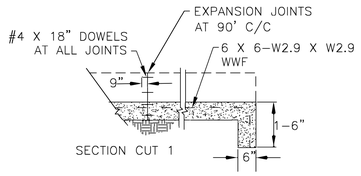
Sample	*Grain Size*			*Max Dry Density*	*Optimum Moisture*
	% Gravel	*% Sand*	*% Fines*	*(pcf)*	*(%)*
Mine Spoil #1	45.3	31.8	22.9	105.8	13.0
Mine Spoil #2	37.5	31.7	30.8	103.3	12.6
Mine Spoil #3	39.0	34.2	26.8	103.9	14.0
#3 Recompacted*	21.0	40.6	38.4	103.9	14.0

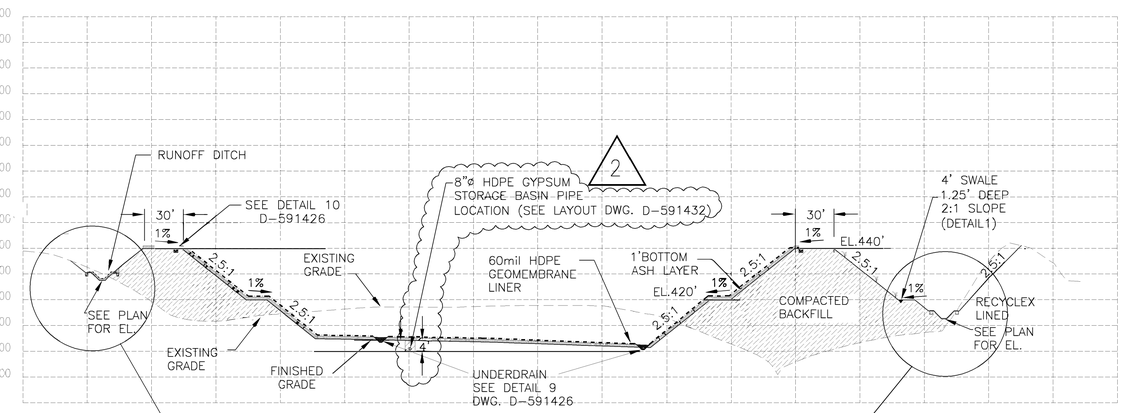
* Mine Spoil #3 was retested after the proctor test to determine how much the material would break down in the compacting and placement process.

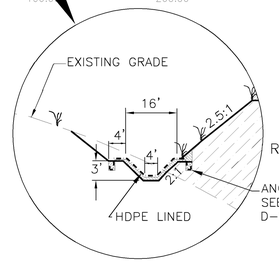
Attachment D – Drawing Used to Develop Critical Section Profile

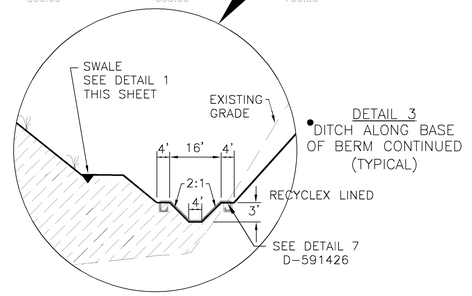


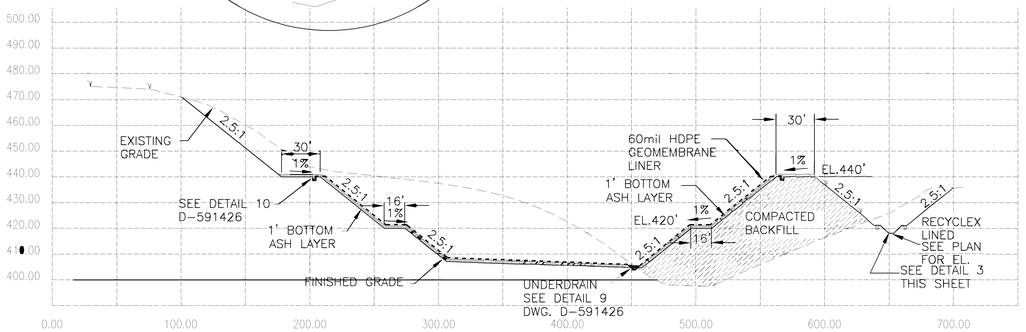


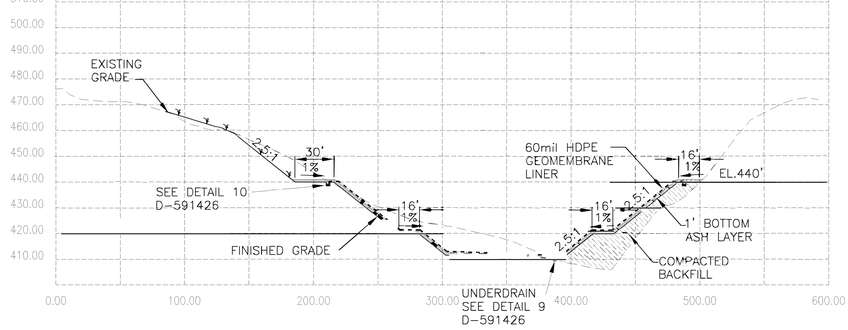


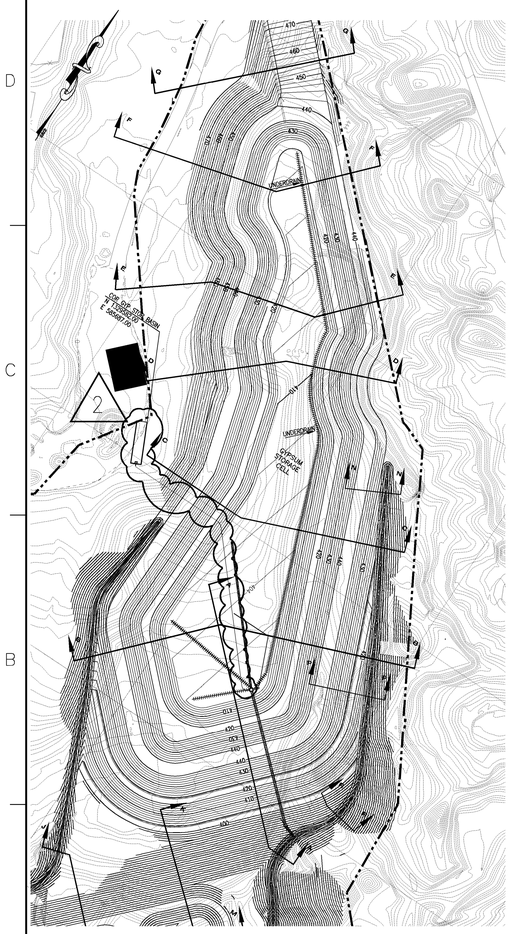












SECTION A–A
Scale: Horz. 1"= 50'
Vert. 1"= 25'

SECTION CUT 1

SECTION C–C
Scale: Horz. 1"= 50'
Vert. 1"= 25'

SECTION D–D
Scale: Horz. 1"= 50'
Vert. 1"= 25'

LEGEND

▨	1' BOTTOM ASH
▨	COMPACTED BACKFILL
— — —	EXISTING GRADE CONTOURS
———	FINAL GRADE CONTOURS
⋎ ⋎	FINAL GRADE CONTOUR AREAS TO RECEIVE TOPSOIL AND GRASSING
▨	RECYCLEX DITCH LINING
▭	CONCRETE DITCH LINING
– – –	HDPE LINING

LEGEND:

▭	RECYCLEX DITCH LINING
▨	CONCRETE DITCH LINING
▨	HDPE DITCH LINING

NOTES:

1) DATE OF AERIAL PHOTOGRAPHY 04/02/2003
2) PHOTOGRAMMETRIC DATA COLLECTED 05/13/2003
3) CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL
4) CONTOUR INTERVAL 2 FEET
5) CONTOURS APPROXIMATE IN AREAS OF DENSE VEGETATION
6) RASTER OVERLAY OF GOODSPRINGS 7 1/2 Min. USGS QUAD SHEET
7) DRAWING IS ACCURATE ONLY AT ORIGINAL SCALE.
8) FOR REFERENCE DRAWINGS AND GENERAL NOTES SEE DRAWING NUMBER D-591420.
9) FINISHED GRADE CONTOURS REPRESENT BOTTOM OF 1' ASH LAYER WHEN ASH LAYER IS SHOWN ON SECTIONS.
10) FINISHED GRADE CONTOURS REPRESENT TOP OF TOPSOIL WHERE TOPSOIL IS REQUIRED AND NO ASH IS PRESENT.

Southern Company Services, Inc.
FOR
Alabama Power Company
Plant Gorgas Units 8, 9 & 10 FGD Project
GYPSUM STORAGE AREA
GRADING PLAN
INITIAL SITE DEVELOPMENT
CELL SECTIONS & DETAILS SHEET 1

REVISION	DATE	REVISION	DATE	REVISION	DATE
2	03/15/2007	1	09/21/2006	0	05/12/2006
ADDED GYPSUM STORAGE BASIN AND PIPE LOCATIONS		NO REVISION THIS SHEET		ISSUED FOR CONSTRUCTION	
EWO 2119	GO–05001	EWO 2119	GO–05001	EWO 2119	GO–05001

	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	MGR APPR
Rev 2	ASF	SSS	AMW RCB	JPS	RDP	DEK	KaM
Rev 1	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS
Rev 0	ASF	SSS HLH	KaM RCB	JPS	RDP	DEK	MDS

SCALE	PROJ I.D.	DRAWING NUMBER	SH	CONT'D	REV
AS SHOWN	210100	**D-591423**	1	FINAL	2

ANSI F: 28x40 ES1341 – LandDesktop

APPENDIX 7

ON-SITE CONTROL POINTS

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720323)

STATE PLANE
NAD27 WEST ZONE

NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330.

BP ℄ DITCH
N 1330306.66
E 585651.93
EL 419.50

BP ℄ DITCH
N 1330314.15
E 585598.07
EL 422.42

BP ℄ DITCH
N 1330262.66
E 585588.77
EL 419.53

BP ℄ DITCH
N 1330235.89
E 585513.18
EL 439.44

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

PC ℄ DITCH
N 1330149.00
E 585630.70
EL 418.31

PC ℄ DITCH
N 1330123.79
E 585554.61
EL 438.25

℄ 8' WIDE GRASSED BENCH

PC ℄ DITCH
N 1330033.02
E 585831.38
EL 411.17

PC ℄ DITCH
N 1330133.78
E 585653.65
EL 417.95

PT ℄ DITCH
N 1330135.91
E 585645.24
EL 418.03

℄ 8' WIDE GRASSED BENCH

PC ℄ DITCH
N 1330058.94
E 585632.16
EL 437.11

PT ℄ DITCH
N 1330061.01
E 585624.13
EL 437.20

℄ 8' WIDE GRASSED BENCH

EP ℄ DITCH
N 1329969.59
E 585801.31
EL 413.00

PC ℄ DITCH
N 1329896.07
E 585799.90
EL 416.55

PI ℄ DITCH
N 1329965.92
E 585784.69
EL 415.84

PT ℄ DITCH
N 1330021.38
E 585769.06
EL 416.37

℄ 8' WIDE FLUME

PC ℄ DITCH
N 1329880.28
E 585807.77
EL 416.79

PC ℄ DITCH
N 1329882.36
E 585720.47
EL 436.51

PI ℄ DITCH
N 1329948.55
E 585706.08
EL 435.84

PT ℄ DITCH
N 1330001.03
E 585691.33
EL 436.37

4' WIDE DIVERSION DITCH

GRAVEL ROAD

BLDG.

30X18

N 1330500

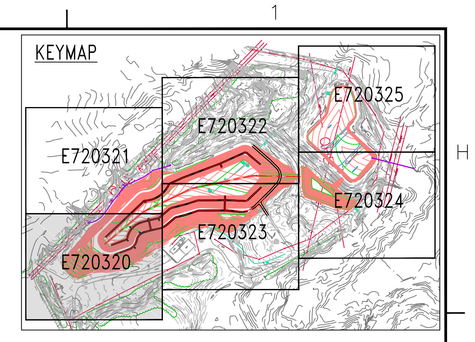
N 1330000

E 585500

E 585000

OHE

KEYMAP



LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND
DRAINAGE PLAN SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720320	1	FINAL	B

ANSI E: 44x34

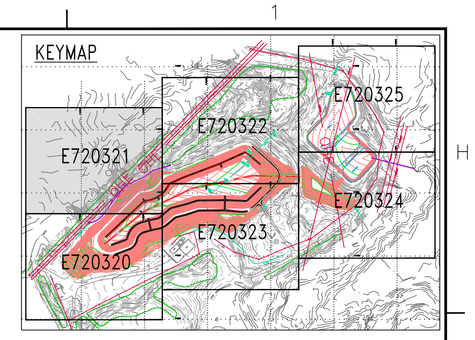
STATE PLANE
NAD27 WEST ZONE

N 1330500

N 1330000

E 586500

E 586000



MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720323)

MATCH LINE (SEE DWG. E720320)

NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330.

NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330.

PT ℄ DITCH
N 1329996.23
E 585939.93
EL 415.38

PC ℄ DITCH
N 1329992.43
E 585940.19
EL 415.38

PC ℄ DITCH
N 1330006.14
E 585935.60
EL 415.38

℄ 8' WIDE FLUME

℄ 8' WIDE GRASSED BENCH

EP ℄ DITCH
N 1329990.99
E 585921.87
EL 412.20

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

PT ℄ DITCH
N 1329971.24
E 585870.99
EL 409.88

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE
PLAN SHEET 2

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002 GYPSUM POND CLOSURE

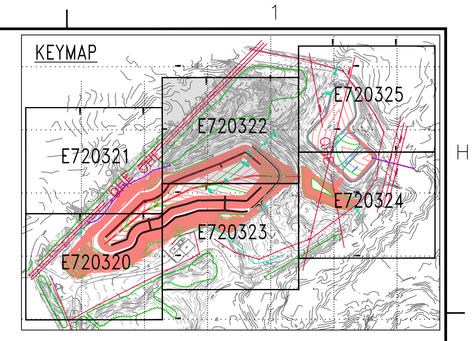
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720321	1	FINAL	B

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

KEYMAP



N 1329500

N 1329000

E 586500

E 586500

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720325)

MATCH LINE (SEE DWG. E720323)

MATCH LINE (SEE DWG. E720324)

OHE

TRANSMISSION LINE (161KV)

GRAVEL ROAD

NEW STORM PIPE.
SEE DWG E720330.

PT ℄ DITCH
N 1329796.45
E 586077.55
EL 417.84

PI ℄ DITCH
N 1329694.14
E 586123.54
EL 418.89

PI ℄ DITCH
N 1329400.45
E 586234.89
EL 415.77

℄ 8' WIDE FLUME

EP ℄ DITCH
N 1329387.62
E 586203.89
EL 406.30

℄ 8' WIDE
GRASSED BENCH

PC ℄ DITCH
N 1329211.20
E 586319.97
EL 417.84

PT ℄ DITCH
N 1329187.91
E 586316.65
EL 418.19

DROP INLET

45° HDPE PIPE

JUNCT BOX

℄ 20' WIDE
GRASSED V-BOTTOM
DITCH WITH 15% SS

PC ℄ DITCH
N 1329179.86
E 586131.27
EL 400.84

PT ℄ DITCH
N 1329111.96
E 586137.60
EL 400.16

45° RCP

EP ℄ DITCH
N 1329082.63
E 586227.01
EL 419.57

LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND
DRAINAGE PLAN SHEET 3

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	**E720322**	1	FINAL	B

ANSI E: 44x34

MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720320)

MATCH LINE (SEE DWG. E720324)

PC ℄ DITCH
N 1329807.58
E 586066.88
EL 417.61

PT ℄ DITCH
N 1329810.48
E 586061.10
EL 417.55

℄ 8' WIDE GRASSED BENCH

PT ℄ DITCH
N 1329586.86
E 586045.88
EL 405.01

PC ℄ DITCH
N 1329655.08
E 586022.74
EL 405.73

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

5x4" ø HDPE RISER

RISER TO BE PLUGGED

EP ℄ DITCH
N 1329361.99
E 585979.69
EL 406.46

PC ℄ DITCH
N 1329205.75
E 585938.43
EL 417.73

PT ℄ DITCH
N 1329179.28
E 585948.41
EL 418.10

EP ℄ DITCH
N 1329076.16
E 586047.32
EL 419.53

PT ℄ DITCH
N 1329775.99
E 585885.53
EL 418.05

PC ℄ DITCH
N 1329811.22
E 585867.06
EL 417.69

PC ℄ DITCH
N 1329594.67
E 585937.32
EL 418.46

PT ℄ DITCH
N 1329566.33
E 585942.01
EL 418.19

PI ℄ DITCH
N 1329664.62
E 585914.69
EL 419.19

PI ℄ DITCH
N 1329362.79
E 585945.17
EL 416.17

℄ 8' WIDE FLUME

PT ℄ DITCH
N 1329562.20
E 585862.16
EL 437.81

PC ℄ DITCH
N 1329578.81
E 585859.49
EL 437.95

PI ℄ DITCH
N 1329364.70
E 585863.09
EL 435.84

PC ℄ DITCH
N 1329246.57
E 585853.01
EL 438.20

EP ℄ DITCH
N 1329186.30
E 585857.01
EL 439.53

PT ℄ DITCH
N 1329186.59
E 585856.95
EL 439.44

56.0 L.F. 60"ø HDPE PIPE, ADS N12 WATERTIGHT, S=4.3%

PT ℄ DITCH
N 1329742.24
E 585810.85
EL 438.23

PC ℄ DITCH
N 1329765.34
E 585798.80
EL 438.00

PI ℄ DITCH
N 1329672.77
E 585828.92
EL 438.93

PT ℄ DITCH
N 1329821.77
E 585750.55
EL 437.25

4' WIDE DIVERSION DITCH

BUILDING

BUILDING

GRAVEL ROAD

GRAVEL ROAD

GRAVEL ROAD

PIPE

PIPE

OHE

ST

E 586000

E 585500

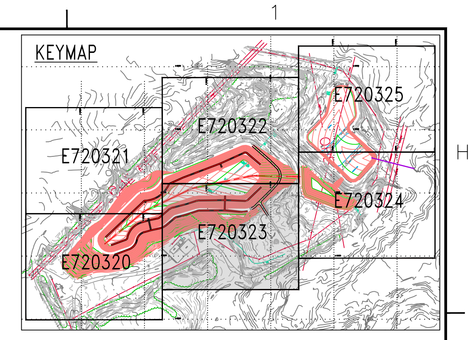
E 585000

N 1329500

N 1329000

STATE PLANE
NAD27 WEST ZONE

KEYMAP



LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

REVISION B DATE 6/29/2018
60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002
GYPSUM POND CLOSURE

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE
PLAN SHEET 4

REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720323	1	FINAL	B

ANSI E: 44x34

MATCH LINE (SEE DWG. E720325)

MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720323)

STATE PLANE
NAD27 WEST ZONE

48"ø OUTLET CONTROL STRUCTURE
N 1328197.6
E 586279.0
6" ORIFICE EL 326.00
INV. EL. 326.00
TOP EL. 336.00

342.0 L.F. 24"ø HDPE
PIPE, DR32.5, S=3.2%

EXACT OUTFALL LOCATION
TO BE DETERMINED

EMERGENCY STORAGE CELL

CLEARING LIMIT

GRAVEL ROAD

230kV TRANSMISSION LINE

115kV TRANSMISSION LINE

OHE

60" RCP

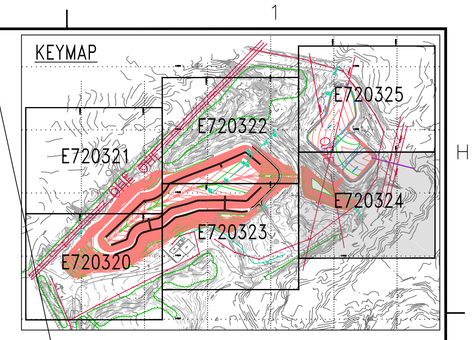
N 1328500

N 1328000

E 586000

E 585500

KEYMAP



LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND
DRAINAGE PLAN SHEET 5

REVISION	DATE
B	6/29/2018
60% REVIEW DRAWINGS	
NOT FOR CONSTRUCTION	

APC590792
PROJECT ID: GOR18002
GYPSUM POND CLOSURE

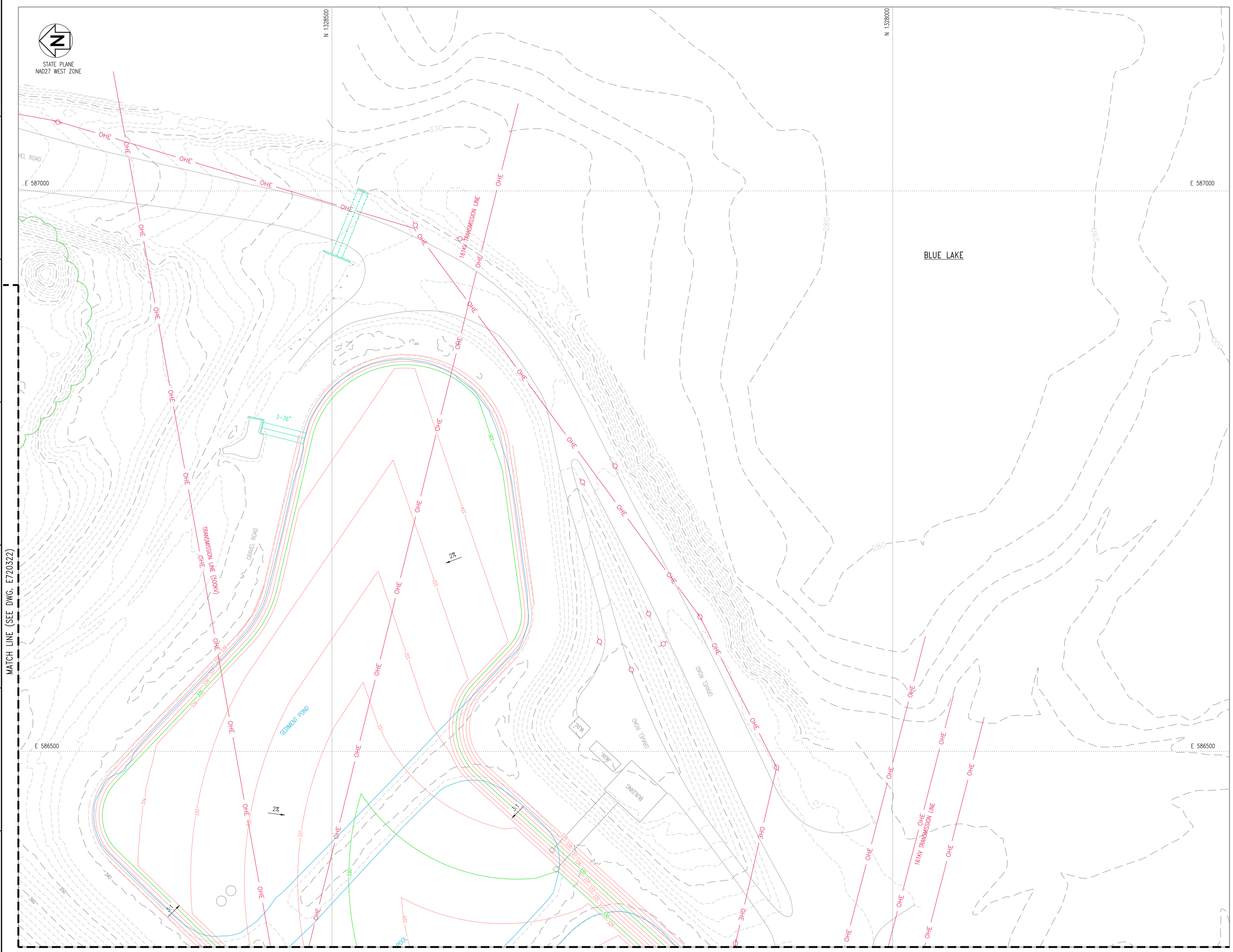
REVISION	DATE

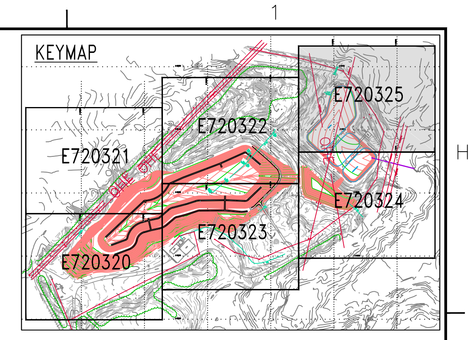
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720324	1	FINAL	B

ANSI E: 44x34





LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND
DRAINAGE PLAN SHEET 6

REVISION	DATE
B	6/29/2018
60% REVIEW DRAWINGS	
NOT FOR CONSTRUCTION	

APC590792
PROJECT ID: GOR18002 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720325	1	FINAL	B

ANSI E: 44x34

APPENDIX 8

TOPOGRAPHICAL MAPS, GRADING PLANS AND CROSS SECTIONS

STATE PLANE
NAD27 WEST ZONE

N 1331000
N 1330500
N 1330000
N 1329500

E 586500
E 586000
E 585500
E 585000

MATCH LINE (SEE DWG. E720311)

OHE
GRAVEL ROAD
FENCE
16" HDPE PIPE
30" HDPE PIPE
36" HDPE PIPE
5'-0" ø HDPE RISER
PIPE
BUILDING
CONCRETE SLURRY FLUME
CBLDG.
CBLDG. BLDG.
520
510
500

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002

GYPSUM POND CLOSURE

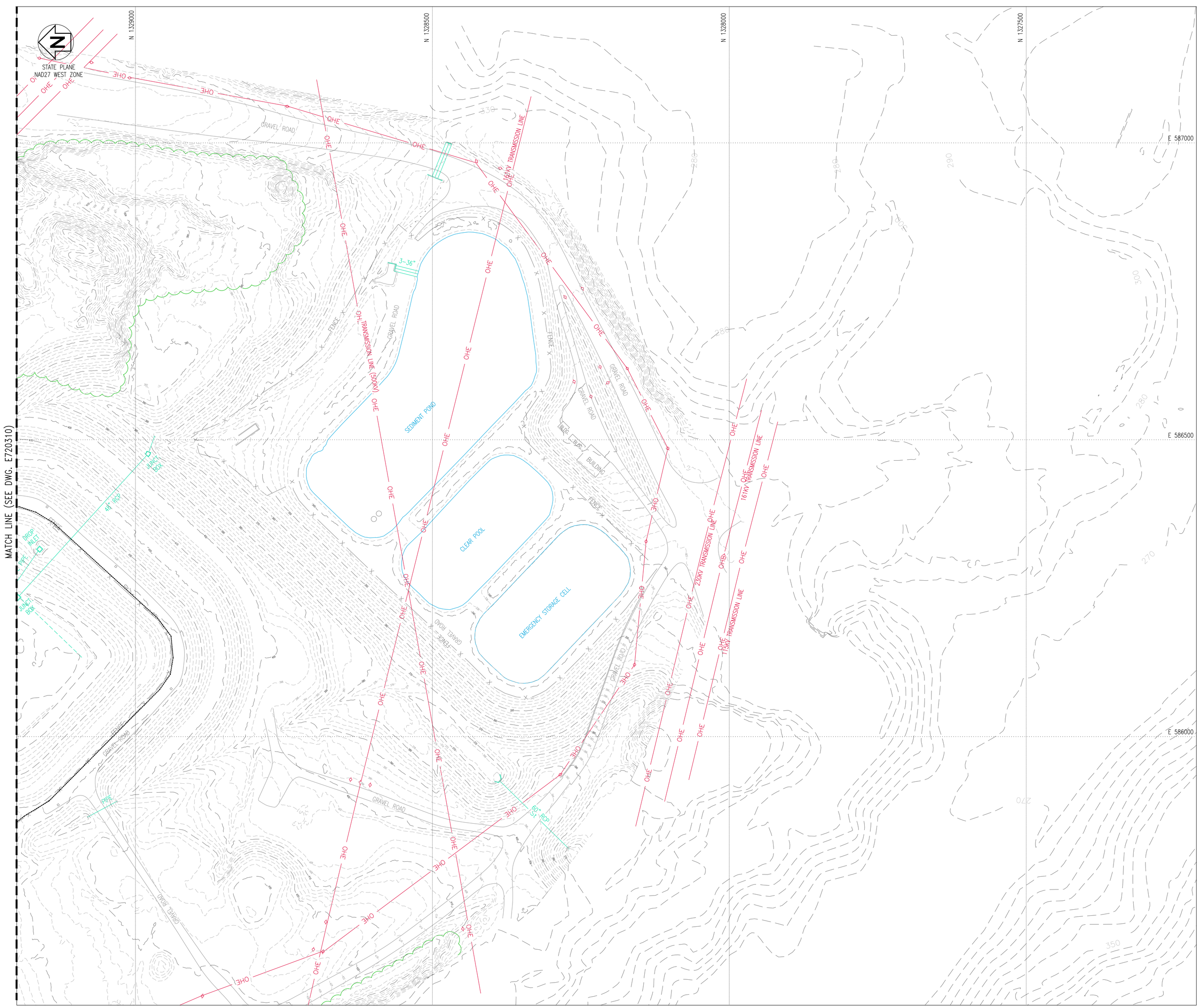
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
EXISTING CONDITIONS
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720310	1	FINAL	B

ANSI E: 44x34



GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)

1 inch = 60 ft.

REFERENCES:

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
EXISTING CONDITIONS
SHEET 2

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720311	1	FINAL	B

ANSI E: 44x34

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

LEGEND:

NOTES:

REFERENCES:

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002

GYPSUM POND CLOSURE

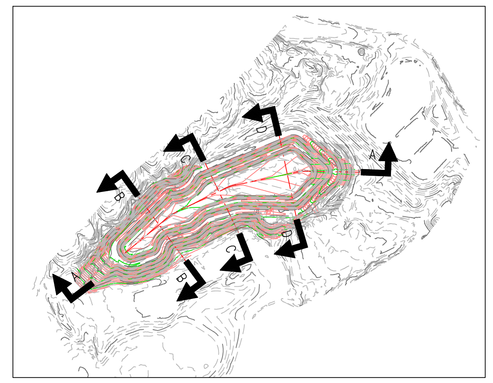
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

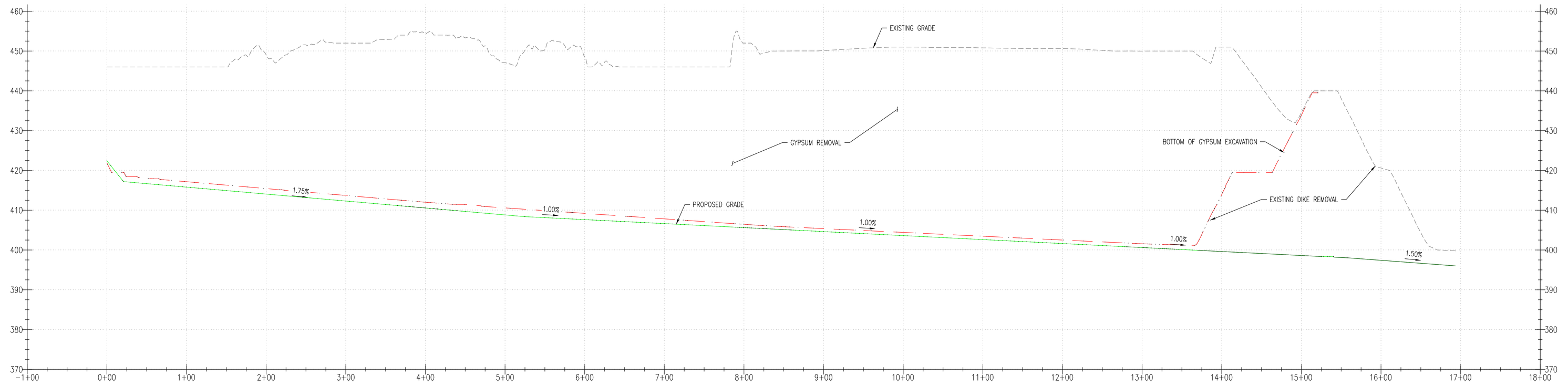
PLANT GORGAS
SITEWORK
OVERALL PHASE 1 SITE GRADING PLAN

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	**E720312**	1	FINAL	B

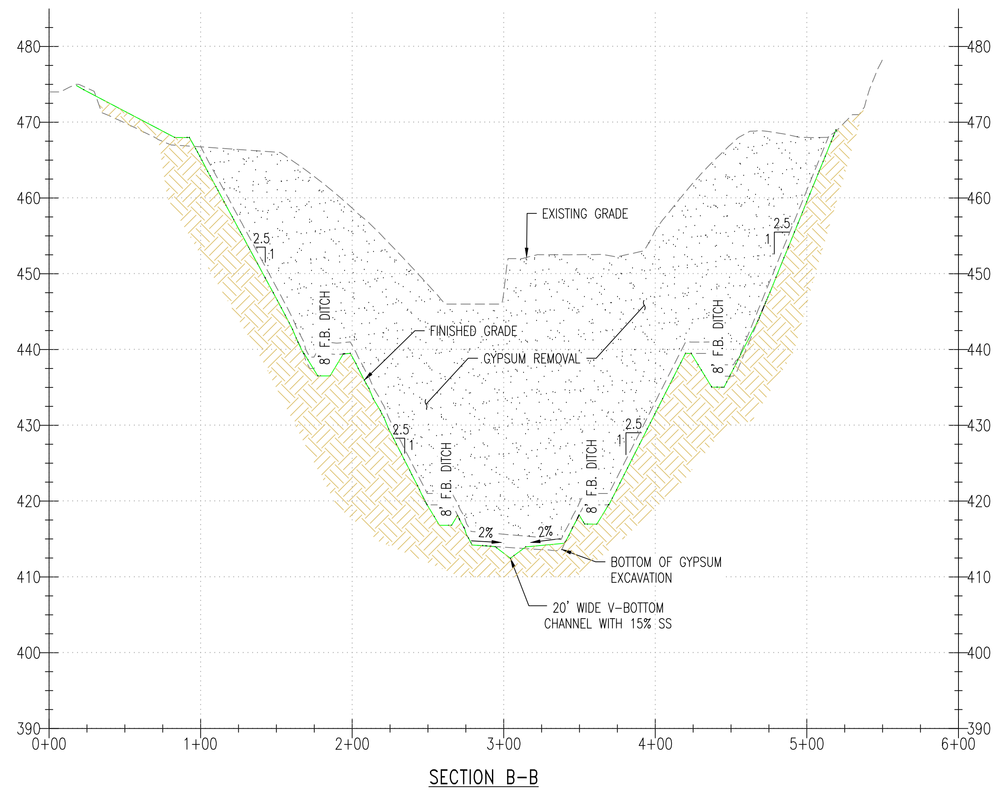
ANSI E: 44x34



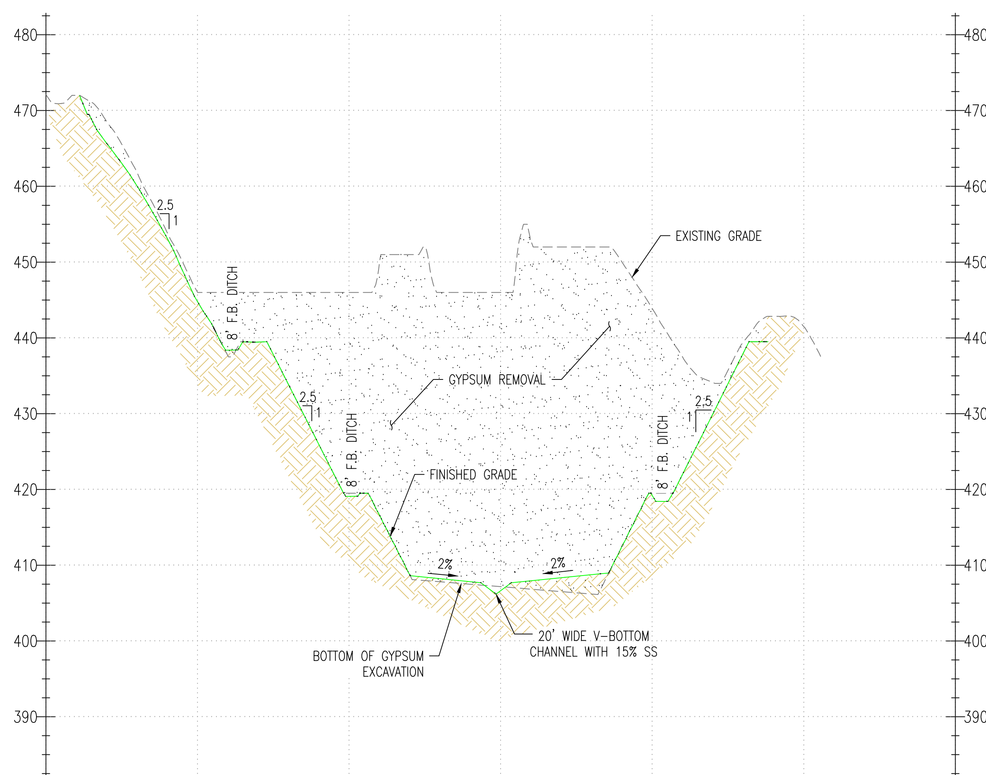
KEY PLAN
SCALE: 1"=500'



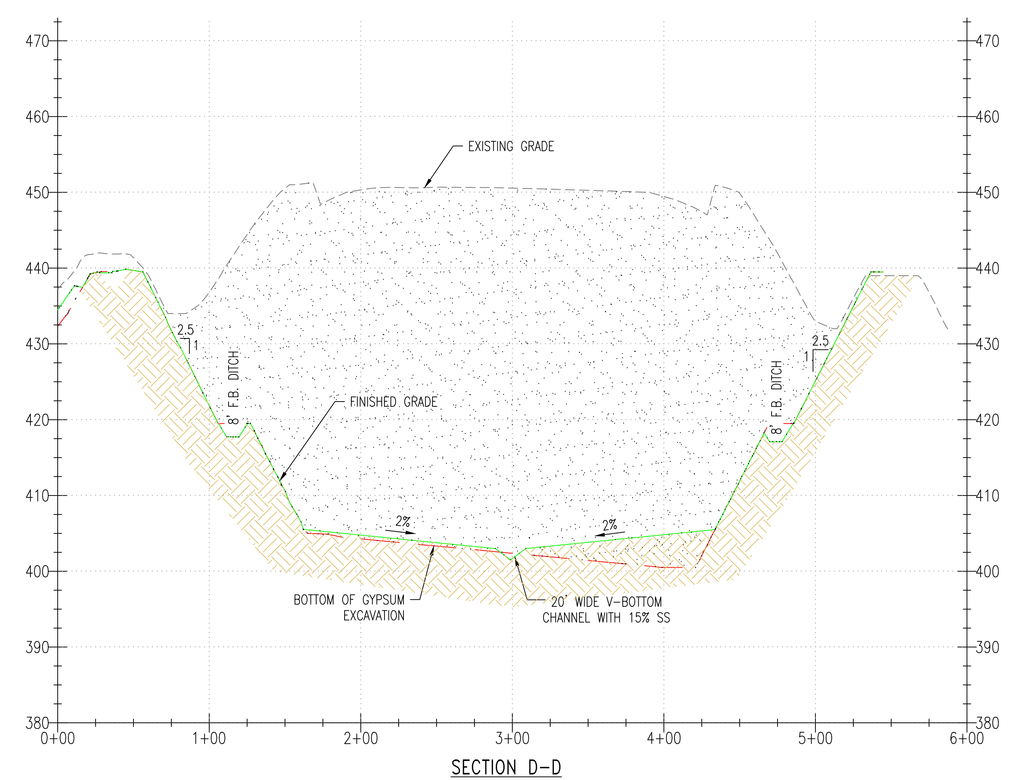
SECTION A-A
SCALE: 1"=50' HORIZ.
1"=10' VERT.



SECTION B-B
SCALE: 1"=50' HORIZ.
1"=10' VERT.



SECTION C-C
SCALE: 1"=50' HORIZ.
1"=10' VERT.



SECTION D-D
SCALE: 1"=50' HORIZ.
1"=10' VERT.

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
CLOSURE SECTIONS AND DETAILS
SHEET 1

REVISION	DATE
B	6/29/2018

60% REVIEW DRAWINGS
NOT FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720328	1	FINAL	B

ANSI E: 44x34

APPENDIX 9

OPERATION PLAN

OPERATION PLAN
PLANT GORGAS GYPSUM POND
ALABAMA POWER COMPANY
PARRISH, ALABAMA

This document serves as an operation plan for the Plant Gorgas Gypsum Pond. The Gypsum Pond, located in Parrish, Alabama, is owned and operated by Alabama Power Company. This Operation Plan includes a Fugitive Dust Control Plan, an Inflow Design Flood System, a description of the Groundwater Monitoring and Analysis program, a discussion of Recordkeeping and Notification Compliance Procedures, and a discussion of the procedures for updating the plans and assessments required by the Alabama Department of Environmental Management (Department) regulations.

Fugitive Dust Control Plans

The Fugitive Dust Control Plan prepared for the Plant Gorgas Gypsum Pond can be found in Appendix A of this Operation Plan.

Inflow Design Flood Control Plan

The Inflow Design Flood Control Plan prepared for the Plant Gorgas Gypsum Pond can be found in Appendix B of this Operation Plan.

Groundwater Monitoring Plan

The Groundwater Monitoring Plan for the Plant Gorgas Gypsum Pond can be found in Appendix C of this Operation Plan.

Recordkeeping and Notification Compliance Procedures

As outlined in r. 335-13-15-.08(1), each Owner or Operator of a CCR unit subject to the Department regulations must maintain files of certain information in an operating record at the facility. Each file is to be retained for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record or study. Electronic storage of the records is acceptable. These records are to be made available to the Department upon request.

Certain notifications are to be made in accordance with the requirements of r. 335-13-15-.08(2). In many instances, such notifications are to be placed in the facility's Operating Record. In certain instances, further notifications are to be made to the Department Director within 30 days of placement of a notification into the Operating Records. Furthermore, a publicly accessible internet site must be established for posting of certain notifications and compliance information within 30 days of it being placed in the Operating Record.

Alabama Power and Plant Gorgas maintain an electronic Operating Record for the facility. In addition, a publicly accessible internet site has already been established for compliance with EPA's CCR Rule.

Required notifications and compliance data, as outlined in r. 335-13-15-.08 and as applicable to the Plant Gorgas Gypsum Pond, will be maintained in the electronic Operating Record, and as required, made available on the publicly accessible internet site within 30 days of placement in the Operating Record. Furthermore, required notifications will be made to the Department Director within 30 days of placement in the Operating Record.

Procedures for Updating Plans and Assessments

Certain plans and assessments are required to be updated at specified intervals and/or upon modification of certain components of the facility. If, and when applicable, updates will be made to the respective plans and assessments, and notifications placed in the Operating Record, posted to the publicly accessible internet site, and communicated in writing to the Department Director in accordance with the Department rules.

APPENDIX A

FUGITIVE DUST CONTROL PLAN

The Fugitive Dust Plan for the Plant Gorgas Gypsum Pond was initially prepared to satisfy federal standards. It also satisfies 335-13-15-.05(1) and 335-13-15-.09(1)(a)11.(i) and is included for that purpose.

COAL COMBUSTION RESIDUAL (CCR)
FUGITIVE DUST CONTROL PLAN

Plant Gorgas
October 2015

Professional Engineer Certification:

Based upon my knowledge, information, and belief that the content in the attached Fugitive Dust Control Plan is accurate, I hereby certify that this Fugitive Dust Control Plan meets the requirements of 40 CFR § 257.80(b)(1)-(7) (Coal Combustion Residuals Rule).

Wyman Turner, PE No. 30102, 12-31-15 Date: 10-08-15

Name, P.E. License No., Expiration Date

Wyman Turner
Signature

AMENDMENT SUMMARY

Date	Amendment #	Comments / Notes

1.0 PURPOSE

The purpose of this guideline is to demonstrate compliance with the fugitive dust requirements in 40 CFR § 257.80(a) and 257.80 (b)(1) through (7).

2.0 SCOPE

This fugitive dust plan identifies and describes the Coal Combustion Residuals (CCR) fugitive dust control measures that Gorgas Plant will use to minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR units, roads, and other CCR management and material handling activities. Coal combustion residuals are generated from the burning of coal to produce electricity and are defined as fly ash, bottom ash, boiler slag, and flue gas desulfurization (FGD) materials.

3.0 REFERENCES

40 CFR §§ 257.53, 257.80, 257.105(g)(2)

4.0 GENERAL INFORMATION

EPA defines “fugitive dust” as “solid airborne particulate matter that contains or is derived from CCR, emitted from any source other than through a stack, or chimney.” 40 CFR § 257.53.

5.0 PROCESSES

1) Identify the CCR units on plant site that are subject to the requirements in §257.80 to minimize CCR from becoming airborne.

CCR units include:
- Bottom Ash Landfill
- CCB Landfill
- Gypsum Pond
- Gypsum Landfill
- Ash Pond

2) Identify and describe the fugitive dust control measures that are applicable and appropriate to minimize CCR from becoming airborne at the units listed in Section 5.0 (1) of this plan.

Bottom Ash Landfill

Fugitive dust control measures include:

1. Bottom ash is transported wet to the landfill.
2. Active working areas are wetted with a water truck or other methods.
3. Vehicle speed through active working areas is reduced.
4. Water is applied to the landfill when routine inspections indicate that additional dust control is necessary.

CCB Landfill

Fugitive dust control measures include:

1. The baghouse area is washed or vacuumed as necessary to prevent the accumulation and emission of fugitive dust.
2. Water is applied to ash as needed during placement, spreading and compaction .
3. The exposed ash in the cells will be periodically covered with inert material.
4. Access to the landfill is restricted.
5. Speed of vehicles through active work areas is reduced.
6. Water is applied to the landfill when routine inspections indicate that additional dust control is necessary.

Gypsum Pond

Fugitive dust control measures include:

1. Gypsum is handled wet or moist. Water is sprayed on areas as needed .
2. Trucks used to transport gypsum are covered.
3. Vehicle speed of heavy equipment through the gypsum handling area is reduced.

Gypsum Landfill

Fugitive dust control measures include:

1. Gypsum is handled wet or moist.
2. Water is sprayed on areas as needed .
3. Trucks used to transport gypsum are covered.
4. Vehicle speed of heavy equipment through the landfill active work areas is reduced.

Ash Pond

The Ash Pond is maintained in a wet condition and does not require other dust control measures.

3) Explain how the control measures described in Section 5.0 (1) of this plan are applicable and appropriate for site conditions related to each CCR unit.

The fugitive dust control measures described in this plan were adopted and are implemented based upon an evaluation of site-specific conditions, engineering site visits, and subject matter expert input. Handling CCR wet or moist, applying water as needed, reducing speed limits, and routine inspections were determined to be applicable and appropriate for the listed CCR units. The evaluation included assessing the effectiveness of the fugitive dust control measures for each CCR unit over time, while taking into consideration various factors such as site conditions, weather conditions, moisture content

4) Describe the process to emplace CCR as conditioned CCR for any CCR landfill listed in Section 5.0 (1) of this plan.

CCR is conditioned using water as needed for placement, spreading and compaction at the CCR landfills – Bottom Ash Landfill, CCB Landfill, and Gypsum Landfill. Wetting is also employed as needed to control dust in areas of the landfills or work areas as indicated by routine inspections. Plant personnel may use other approved dust suppression agents to prevent dust generation if needed.

5) Describe the fugitive dust control measures to minimize CCR from becoming airborne on roads and at other CCR management and material handling activities.

CCR material is not allowed to accumulate in CCR management areas. Dust accumulation and generation is prevented by washing down or vacuuming work areas, employing closed systems and covered trucks, wetting areas with vehicle traffic, and reducing speed of vehicles in active work areas.

See discussion of CCR units in Section 5.0 item 2) of this plan.

6) Describe the process to periodically assess the effectiveness of the fugitive dust control measures described in this plan.

Plant personnel will perform periodic CCR fugitive dust inspections. Based on these observations, the frequency, location and amount of dust suppression activities and processes discussed in this Plan will be adjusted to prevent dust emissions. Plant personnel understand the importance of minimizing CCR fugitive dust generation and the requirement that any CCR fugitive dust observations should be promptly addressed.

7) Describe the process to log citizen complaints received involving CCR fugitive dust events at the facility.

When a complaint is received regarding a CCR fugitive dust event at the facility, the complaint is documented and investigated. Appropriate steps are taken including any appropriate action, if needed.

APPENDIX B

INFLOW DESIGN FLOOD CONTROL PLAN

The Inflow Design Flood Control Plan for the Plant Gorgas Gypsum Pond was initially prepared to satisfy federal standards. It also satisfies 335-13-15-.05(3) and 335-13-15-.09(1)(a)11.(ii) and is included for that purpose.

INFLOW DESIGN FLOOD CONTROL PLAN
PLANT GORGAS GYPSUM POND
ALABAMA POWER COMPANY

Section 257.82 of EPA's regulations requires the owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment to design, construct, operate and maintain an inflow design flood control system capable of safely managing flow during and following the peak discharge of the specified inflow design flood. The owner or operator also has to prepare a written plan documenting how the inflow flood control system has been designed and constructed to meet the requirements of this section of the rule.

The existing CCR surface impoundment referred to as the Plant Gorgas Gypsum Pond is located at Alabama Power Company's Plant Gorgas. The facility consists of an 18 acre CCR storage area, two sedimentation ponds, and a recycle pond. The inflow design flood consists of the rainfall that falls within the limits of the surface impoundment as well as runoff from approximately 12 acres of adjoining watershed. Process flows into the Gypsum Pond were determined to be negligible. Stormwater is temporarily stored within the limits of the surface impoundment and discharged through spillway structures that consist of a 48-inch HDPE riser structure and a 36" HDPE pipe that serves to dewater the perimeter ditches. These two structures combine into a 36" outlet pipe that serves to discharge water to the sedimentation ponds. There are no other spillways or discharge structures serving the Plant Gorgas Gypsum Pond.

The inflow design flood has been calculated using the Natural Resources Conservation Service method (also known as the Soil Conservation Service (SCS) method) using the 1000-yr storm event required for a Significant hazard potential facility. Runoff curve number data was determined using Table 2-2A from the Urban Hydrology for Small Watersheds (TR-55). Appendix A and B from the TR-55 were used to determine the rainfall distribution methodology. Precipitation values were determined from NOAA's Precipitation Frequency Data Server (Atlas-14).

The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that the hydrological groups A, B, and D should be used to best reflect the characteristics of the soils on site. Curve numbers values for each land use (determined from aerial photography) and soil combination were taken from the National Engineering Handbook Part 630,

Chapter 9. This information was placed into Hydrologic Engineering Center - Hydrologic Modeling System and used to generate appropriate precipitation curves, storm basin routing information, and rating curves to evaluate surface impoundment capacity.

The facility is operated subject to and in accordance with § 257.3-3 of EPA's regulations.

Calculations indicate the unit can safely store and pass the inflow design storm. Supporting calculations are attached for reference.

I hereby certify that the inflow design flood control system plan meets the requirements of 40 C.F.R. Part 257.82.

10/17/16

James C. Pegues, P.E.

Licensed State of Alabama, PE No. 16516

Inflow Design Control System Plan:
Hydrologic and Hydraulic Calculation Summary

for

Plant Gorgas Gypsum Pond

Prepared by:

Southern Company Services
Technical Services

Originator: Golder Associates

Reviewer: _____ 10/11/16
Jason S. Wilson Date

Approval: _____ 10/12/16
James C. Pagues Date

1.0 Purpose of Calculation

The purpose of this report is to demonstrate the hydraulic capacity of the subject CCR impoundment in order to prepare an inflow design flood control plan as required by the United States Environmental Protection Agency's (EPA) final rule for Disposal of CCR from Electric Utilities (EPA 40 CFR 257).

2.0 Summary of Conclusions

A hydrologic and hydraulic model was developed for the Plant Gorgas Gypsum Pond to determine the hydraulic capacity of the impoundment. The design storm for the Plant Gorgas Gypsum Pond is a 1000-year rainfall event. Southern Company has selected a storm length of 24-hours for all inflow design flood control plans. The results of routing a 1000-year, 24-hour rainfall event through the impoundment are presented in Table 1 below:

Table 1-Flood Routing Results for Plant Gorgas Gypsum Pond

Plant Gorgas	Normal Pool El (ft)	Top of embankment El (ft)	Emergency Spillway Crest El (ft)	Peak Water Surface Elevation (ft	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Gypsum Pond	428.0	440.0	N/A	439.0	1.0	332.5	98.3

*Freeboard is measured from the top of embankment to the peak water surface elevation

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The Plant Gorgas Gypsum Pond is classified as a significant hazard structure. The design storm for a significant hazard structure is a 1000-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 2.

Table 2. Plant Gorgas Gypsum Pond Storm Distribution

Hazard Classification	Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
Significant	1000	24	14.3	NOAA Atlas 14	SCS Type III

The drainage area for the Plant Gorgas Gypsum Pond was delineated based on LiDAR data acquired for the Plant in 2016. Runoff characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. An overall SCS curve number for the drainage area was developed based on the National Engineering

Handbook Part 630, Chapter 9 which provides a breakdown of curve numbers for each soil type and land use combination. Soil types were obtained from the USGS online soils database. Land use areas were delineated based on aerial photography. Time of Concentration and Lag Time calculations were developed based on the overland flow method as described in the National Engineering Handbook Part 630, Chapter 15.

A table of the pertinent basin characteristics of the Gypsum Pond is provided below in Table 3.

Table 3—Gypsum Pond Hydrologic Information

Drainage Basin Area (acres)	30
Hydrologic Curve Number, CN	92
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	12.6
Lag Time (minutes)	7.6
Hydrologic Software	USACE HEC-HMS

Runoff values were determined by importing the characteristics developed above into a hydrologic model with the US Army Corps of Engineers HEC-HMS program.

Process flows from Plant Gorgas were not considered in this analysis as they were determined to be negligible when compared to the 1000-year rainfall event.

3.2 HYDRAULIC ANALYSES

Storage values for the Gypsum Pond were determined by developing a stage-storage relationship utilizing contour data. The spillway system at the Plant Gorgas Gypsum Pond consists of a primary spillway that discharges to a sedimentation pond. There is a headwall with an elevation of 428.0’ along the perimeter that connects with a riser box with an invert of 392.0’. At the junction of the riser to the outlet there is a 48-inch discharge pipe with an invert of 378.0’. A summary of spillway information is presented below in Table 4.

Table 4—Spillway Attribute Table

Spillway Component	US Invert El (feet)	DS Invert El (feet)	Dimension (ft)	Slope (ft/ft)	Spillway Capacity (cfs)
Perimeter Ditch Pipe	428.0	392.0	3	14.0%	98.3
Discharge Pipe	392.0	378.0	4	4.3	98.3*

*controlled by perimeter ditch pipe capacity

Based on the spillway attributes listed above, a rating curve was developed within HEC-HMS to determine the pond performance during the design storm. Results are shown in Table 1.

4.0 SUPPORTING INFORMATION

4.1 CURVE NUMBER

	Soil	Area (acres)	Curve Number
Forest	A	0.2	45
	B	0.5	66
	D	6.8	83
Roadway	A	0.2	83
	B	0.0	89
	D	0.6	93
Graded Area	A	2.0	77
	B	0.0	86
	D	1.7	94
Surface Water/Liner		18.1	98
	Total	**30.0**	**92**

4.2 STAGE-STORAGE TABLE

Stage	Area (acre)	Volume (acre-ft)
428	0.01	0.00
430	0.01	0.02
432	0.11	0.14
434	0.57	0.82
436	1.00	2.38
438	1.37	4.75
439	1.58	6.23
440	1.72	7.87

4.3 TIME OF CONCENTRATION

Sheet Flow

**Mannings coefficient*	*n*	*0.4*	
Sheet Flow Length	*l*	*55*	*ft*
2 yr, 24 hr Rainfall	P_2	*4.11*	*in*
***Slope of Land Surface*	*S*	*0.04*	*ft/ft*
Travel Time	T_{t1}	*0.09*	*hr*

Shallow Concentrated Flow

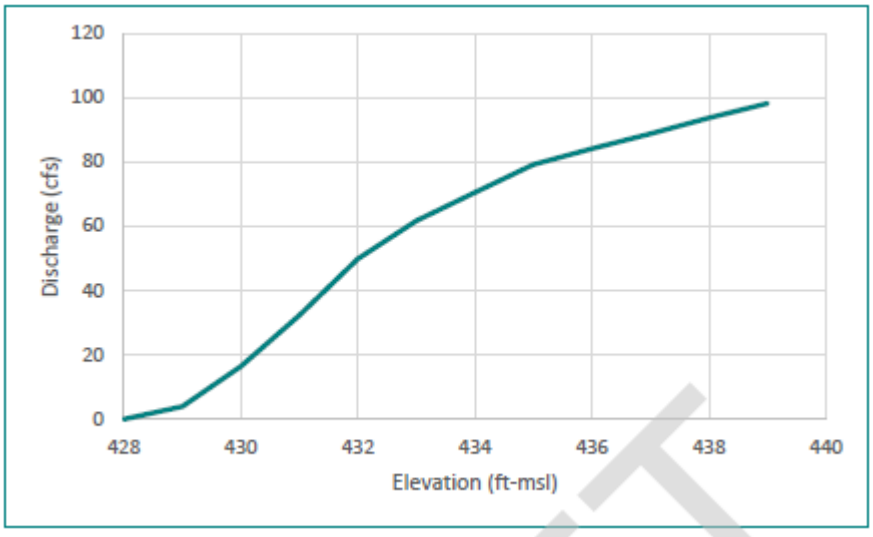
Segment Length	*l*	*587*	*ft*
Slope of Land Surface	*S*	*0.10*	*ft/ft*
Woodland Landuse			
**Flow Velocity*	*V*	*1.5*	*ft/s*
Travel Time	T_{t2}	*0.10*	*hr*

Lake Flow 1

Mean Lake Depth	*Dm*	*5*	*ft*
Flow Length	*L*	*1194*	*ft*
Wave Velocity	*V*	*12.7*	*ft/s*
Travel Time	T_{t3}	*0.03*	*hr*

Total TOC	*0.21*	*hr*
Lag Time	*7.6*	*mins*

4.4 RATING CURVE



4.5 DRAINAGE BASIN

APPENDIX C

GROUNDWATER MONITOR PLAN

Alabama Power

Dustin G. Brooks
Environmental Affairs Supervisor
Environmental Compliance

600 North 18th Street
Post Office Box 2641
12N-0830
Birmingham, Alabama 35291

Tel 205.257.4194
Fax 205.257.4349
dgbrooks@southernco.com

March 8, 2021

Received: 3/8/21

Via email to SSS@adem.alabama.gov

Mr. S. Scott Story, Chief
Solid Waste Branch
Land Division
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

Re: ADEM Letter of January 20, 2021
Response to Groundwater Monitoring Plans Submitted to the Department
William C. Gorgas Electric Generating Plant

Dear Mr. Story:

The following provides responses to comments received in a letter from the Alabama Department of Environmental Management (ADEM) Land Division dated January 20, 2021. The letter pertains to the revised groundwater monitoring plans (GWMPs) submitted to the Department on August 24, 2020, for the (1) Ash Pond, (2) Bottom Ash Landfill, (3) CCR and Gypsum Landfill, and (4) Gypsum Pond at the Alabama Power Company (APC) William C. Gorgas Electric Generating Plant. The following presents the full text of the comments provided by ADEM in italics followed by our response indented in plain text.

As discussed in telephone call with ADEM on February 22, 2021, in lieu of providing responses in a revised GWMP as requested in the Department's letter, many of the responses are provided as a *Supplemental Site Hydrogeologic Characterization Report*, attached to this letter. A revised GWMP will be submitted to the Department under separate cover no later than March 15, 2021.

General Comments:

A table of all historical ground water, pore water, and surface water data is needed to aid in the review of statistical background. In addition to the GWMP a historical groundwater data table should be included in all groundwater monitoring reports.

The GWMP will be amended to identify this information as an item that will be included in semi-annual Groundwater Monitoring Reports (GWMR). Currently, historical

groundwater quality data is tabulated and included in routine GWMRs and the requested historical data table will be included in all subsequent groundwater monitoring reports.

Plant Gorgas Ash Pond:

1. *The GWMP describes a process for using intrawell analysis. Because no compliance monitoring wells were installed prior to the placement of waste at the facility, it does not appear that intrawell analysis will accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit required by ADEM Admin. Code r. 335-13-15-.06 (2)(a)1. It is recommended that intrawell analysis procedures be removed from the GWMP and SAP.*

   Section 8 of the GWMP and Section 5 of the site-specific statistical analysis plan (SAP) provide details regarding statistical methods used during detection and assessment monitoring. These sections explicitly describe the interwell approach used at the site and the rationale for the approach. Intrawell methods are not mentioned in the GWMP and are only mentioned in the SAP for 2 reasons: (1) to describe the other statistical approach provided for in the CCR rules and USEPA guidance as a means of supporting the interwell statistical method selected for use at the site, and (2) to outline when it may be appropriate to propose for the use of intrawell methods at the site due to a change in site conditions. Both the GWMP and the SAP note that any change to the statistical method requires Department approval.

2. *Figure 7 indicates that monitoring wells GS-AP-MW-5, GS-AP-MW-9, GS-AP-MW-10, GS-AP- MW-11, GS-AP-MW-13, and GS-AP-MW-14 have been abandoned. Section 4.3 of the GWMP indicates that a plan for replacing downgradient monitoring wells GS-AP-MW-9, GS-AP-MW-11, and GS-AP-MW-14 will be submitted to the department in the future. Section 4.3 lists GS-AP-MW-13 as a downgradient location. Please clarify the designation of monitoring well GS-AP-MW-13. The replacement of monitoring wells GS-AP-MW-5 and GS-AP-MW-10, and GS-AP-MW-13 should be addressed. The GWMP should specify that an adequate set of replacement wells will be installed to monitor the site.*

   GS-AP-MW-13 was abandoned in July 2019 as shown on Figure 7. It was erroneously listed in Section 4.3 as a downgradient location when in fact it is an upgradient background well as identified on Table 2 of the GWMP and in the SAP. Although the well was abandoned, the data from the well remains in the database for statistical analysis.

As requested by the Department, the figures and tables of the GWMP will identify current and planned wells so the monitoring network is sufficiently described for permitting purposes. The figures and tables in the GWMP will be updated to clearly identify (1) existing upgradient and downgradient locations, (2) anticipated additional or replacement wells, (3) current and anticipated well abandonments, and (4) a general description of the timing of future proposed well installation and removal sequencing.

3. *It appears that monitoring wells should be installed to monitor the (deep) Pratt Aquifer downgradient of the waste management unit between GS-AP-MW-15 and GS-AP-MW-25H in topographic low areas of the drainage feature depicted west of the site on Figure 6A.*

   As requested by the Department, the figures and tables of the GWMP will be updated to identify current and planned wells so the monitoring network is sufficiently described for permitting purposes. Since submission of the GWMP to the Department, additional wells have been installed within the (deep) Pratt Aquifer. As presented on Figure 5 in the *2020 Annual Groundwater Monitoring and Corrective Action Report*, dated January 31, 2021, wells GS-AP-MW-37H and GS-AP-MW-39H were installed as part of delineation efforts at the site. However, as often occurs in the Pratt Aquifer, significant groundwater-bearing zones were not encountered, and the wells yielded insufficient groundwater for sampling. Also shown on Figure 5 are the locations of 4 wells that were abandoned pursuant to Department approval to facilitate pond closure work. These 4 wells are to be reinstalled when construction permits. A workplan and proposed replacement locations will be submitted to the Department by March 31, 2021. Well GS-AP-MW-12 remains in that area and is sampled semi-annually. Arsenic concentrations have steadily decreased in well GS-AP-MW-12 from 0.11 milligram per liter in August 2016 (mg/L) to 0.00616 mg/L during the most recent sampling event in September 2020. Concentrations have been below the GWPS during the last two sampling events. This steady decrease from the initial sampling event fits the description of chemical equilibrium restoring after the initial disturbance generated from the boring and well installation process.

4. *The screened interval for proposed background monitoring well GS-AP-MW-8 is located from 370.02 to 390.02 feet MSL. The screened interval for proposed background well GS-AP-MW-13 is located from 350.63 to 370.63 feet MSL. The elevation of the ash pond appears to be approximately 380 feet MSL. It appears that there may be potential for impacts to proposed background monitoring wells GS-AP-MW-8 and GS-AP-MW-13 from the waste management unit because a portion of the screened interval/the screened interval of these wells were installed*

below the elevation of the ash pond unit. It is recommended that the GWMP justify that these wells will produce background that meets the requirement s of ADEM Admin Code R. 335-13-15-.06(2)(a)1.

Section 4.2.1 of the GWMP describes the rationale for including wells GS-AP-MW-8 and GS-AP-MW-13 as upgradient wells. Although the well screens for these wells are lower than the ash pond, groundwater elevations within these wells are typically at least 7 feet greater than the pond elevation, resulting in a hydraulic gradient toward the ash pond. The geology and hydrogeology at the site are complex; however, the hydraulic pressure within different stratigraphic zones and surface water will govern water flow potential. Despite stratigraphic complexity, groundwater will migrate from zones of higher pressure (higher elevation) to those of lower pressure (elevation). Therefore, we are confident that that wells GS-AP-MW-8 and GS-AP-MW-13 represent background water quality that is present at a greater pressure and migrates toward the former ash pond, which occurs at a lower pressure potential. We note that well GS-AP-MW-13 has been abandoned and will be reinstalled when feasible in the near future. This replacement will be addressed in the forthcoming revised GWMP.

5. *Two cross sections are included as Figures 5A and 5B to characterize the site. Additional detailed geologic cross sections across the Northern and Eastern portions of the site are requested to be included as part of the pending assessment of corrective measures plan to thoroughly characterize site conditions.*

The requested cross sections are included in the attached *Supplemental Site Hydrogeologic Characterization Report*. In addition, these cross sections presenting site stratigraphy and groundwater quality data were provided in the report titled *Semi-Annual Progress and Groundwater Delineation Report*, dated September 30, 2020. Figure 4D in the report presents a cross section along the eastern portion of the site. Figures 4F and 4H provide additional geologic interpretations along the northern and north-central parts of the site, respectively. Slight variability in groundwater quality is expected between monitoring events. These cross sections depicting groundwater quality data will be updated in subsequent semi-annual reports if groundwater quality changes and substantively alters interpretations of delineation.

6. *The faults depicted on figures 5A and 5b should be indicated on Figure 4.*

A revised figure including the faults is included in the attached *Supplemental Site Hydrogeologic Characterization Report*. Fault locations are included on Figures 3a and 3b of this report.

7. *It is recommended that Table 1 in the GWMP, Groundwater Monitoring Well Network Details and Table 1 in the SAP, Groundwater Monitoring Well Network Details identify the same monitoring well network. It is recommended that the GWMP clearly note the designation of monitoring well GS-AP-MW-l7V.*

   The figures and tables of the GWMP will be updated to identify current and planned wells so the monitoring network is sufficiently described for permitting purposes. Well GS-AP-MW- l7V was originally installed as a vertical delineation well, but groundwater elevations at GS-AP-MW-17V indicate that this location is upgradient of the ash pond. Data from the well is being evaluated for a period to support a recommendation regarding inclusion of the well in the compliance monitoring network. The GWMP and SAP will be updated to assure that tables identifying the groundwater monitoring network details are consistent and the designation of well GS-AP-MW- l7V clearly identified.

Plant Gorgas Bottom Ash Landfill:

1. *The GWMP describes a process for using intrawell analysis. Because no compliance monitoring wells were installed prior to the placement of waste at the facility, it does not appear that intrawell analysis will accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit required by ADEM Admin. Code r. 335-13-15-.06 (2)(a)1. It is recommended that intrawell analysis procedures be removed from the GWMP and SAP.*

   Section 8 of the GWMP and Section 5 of the SAP provide details regarding statistical methods used during detection and assessment monitoring. These sections explicitly describe the interwell approach used at the site and the rationale for the approach. Intrawell methods are not mentioned in the GWMP and are only mentioned in the SAP for 2 reasons: (1) to describe the other statistical approach provided for in the CCR rules and USEPA guidance as a means of supporting the interwell statistical method selected for use at the site, and (2) to outline when it may be appropriate to propose for the use of intrawell methods at the site due to a change in site conditions. Both the GWMP and SAP note that any change to the statistical method requires Department approval.

2. *Monitoring wells MW-10, MW-11, and MW-12 appear to be located approximately 400 feet downgradient of the waste unit boundary. ADEM Admin. Code r. 335-13-15-(2)(a)2 requires that the downgradient monitoring system be installed at the waste boundary that ensures detection of groundwater contamination in the*

uppermost aquifer. It is recommended that justification for the locations of these site wells be included in the GWMP.

These wells were installed downgradient of the Bottom Ash Landfill in 2012 and 2014 prior to publication of the CCR rule and in accordance with ADEM Admin. Code r. 335-13-4-.27(2)(a)3 identifying the compliance boundary as no more than 150 meters (492 feet) of the waste boundary. The hydrogeology at the site is complex and groundwater producing zones are often unable to be located: several wells have been installed at the site that cannot be used for groundwater monitoring because of insufficient yield and recharge. These wells have been installed at locations that yield sufficient water for sampling and have a substantial background data set for statistical analysis. Attempts to install additional wells may not be successful and will forfeit the use of data trends established in the current monitoring wells. In addition, these wells are located at least 1,500 feet from the downgradient property boundary, providing sufficient room for future delineation if necessary. Therefore, these wells were installed in accordance with Department regulations at the time, are representative of groundwater migrating from the Bottom Ash Landfill area that will detect impacts, and have substantial buffer from the downgradient property line should exceedances require further investigation.

Plant Gorgas CCR and Gypsum Landfill:

1. *Monitoring wells MW-6, MW-7, and MW- 17R appear to be located approximately 400 feet downgradient of respective waste unit boundaries. ADEM Admin. Code r. 335-13-15-(2)(a)2 requires that the downgradient monitoring system be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. It is recommended that justification for the locations of these site wells be included in the GWMP.*

   Due to the steep downward slopes at the site and construction activities, wells MW-6 and MW-7 were installed as close as practical to the CCR Landfill. In addition, they were installed in 2014 prior to publication of the CCR rule and at Department-approved locations. Since construction has been completed, it may be feasible to install a replacement well closer to the unit between wells MW-5 and MW-7. The GWMP will be updated to reflect the proposed addition but will account for the possibility that a replacement location may provide insufficient water for monitoring.

   Well MW-17 was originally located near the Gypsum Landfill waste boundary; however, the well yielded insufficient water for monitoring. Replacement well MW-17R was installed at the present location and it yields sufficient water for sampling.

Plant Gorgas Gypsum Pond:

1. *The background monitoring wells proposed for the Gorgas Gypsum pond are the same background monitoring wells proposed for the CCR landfill. Tables 1 and 2 in the GWMP and Table 1 in the SAP should note that proposed background monitoring wells MW-1 through MW-4 are located at the CCR landfill site because wells with the same names were installed at the Plant Gorgas Gypsum Pond.*

   The background monitoring wells proposed for the Gorgas Gypsum Pond are the same background monitoring wells that are proposed for the CCR Landfill. The report titled *Semi-Annual Progress and Groundwater Delineation Report*, dated September 30, 2020, includes all current well designations for the Gorgas Gypsum Pond. Tables 1 and 2 in the revised GWMP and Table 1 in the revised SAP will include a note clarifying that the background wells for the Gypsum Pond are the same as those for the CCR Landfill.

2. *One cross section is included as Figure 5 to characterize the site. Additional detailed geologic cross sections across the Southern and Eastern portions of the site are requested to be included to thoroughly characterize site conditions.*

   Additional cross sections are included in the attached *Supplemental Site Hydrogeologic Characterization Report*. In addition, these 5 cross sections presenting site stratigraphy and groundwater quality data were provided in the report titled *Semi-Annual Progress and Groundwater Delineation Report*, dated September 30, 2020. Reliable geologic data is not available on the east side of the site because boreholes conducted in that area for wells were dry and thus, not surveyed. Therefore, a geologic profile was not produced for that area.

We appreciate the opportunity to provide these clarifications. I will be pleased to discuss these items if that is helpful to you. If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Dustin Brooks

Dustin G. Brooks
Environmental Affairs Supervisor

Cc: Eric Wallis – Southern Company Services

Attachment

Alabama Power

Dustin G. Brooks
Environmental Affairs Supervisor
Environmental Compliance

600 North 18th Street
Post Office Box 2641
12N-0830
Birmingham, Alabama 35291

Tel 205.257.4194
Fax 205.257.4349
dgbrooks@southernco.com

August 24, 2020

Via email to sss@adem.alabama.gov

Received: 8/24/20

Mr. S. Scott Story, Chief
Solid Waste Branch
Land Division
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

Re: Response to ADEM Letter of August 14, 2020 -- Groundwater Monitoring Plan Comments

Dear Mr. Story:

The following provides responses to comments received in a letter received from the Alabama Department of Environmental Management (ADEM or Department) Land Division dated August 14, 2020. The following presents the full text of the letter provided by ADEM followed by our response in italics.

General Comments

1) Additional information is requested to be included as part of the pending Assessment of Corrective Measures Plan to thoroughly characterize site conditions. The information should include the following:
   a) Additional historical potentiometric figures. This is requested to aid in the assessment of the groundwater flow at the site.
   b) Additional detailed geologic cross sections. Cross sections aid the hydrogeologic interpretation of groundwater flow direction and are crucial for assessing the monitoring well network.
   c) A table of all historical groundwater, pore water, and surface water data is needed to aid in the review of statistical background. In addition to the GWMP, a historical groundwater data table should be included in all groundwater monitoring repo1ts.
   d) Please provide the data associated with the advanced geophysical methods that were used for the Plant Gaston Ash Pond Monitoring Wells.

This information will be provided for each plant in the subsequent Delineation Reports to be submitted to the Department on or before September 30, 2020.

2) Section 4.5 of the Groundwater Monitoring Plan (GWMP) states "If an upgradient well is abandoned due to pond closure activities or by an unforeseen circumstance, the historical data from that well will remain in the upgradient data pool and, therefore, the well remains part of the upgradient network by legacy." Data from a background well that is abandoned may remain relevant for use as statistical background. However, it is recommended that background data for each background well proposed for abandonment be evaluated and included in statistical background upon Department approval prior to submiss ion of the monitoring well abandonment plan.

This has been addressed by modifications to Section 2.2.2 of the SAP and Section 4.5 of the monitoring plans consistent with this request. Background data for each upgradient well proposed for abandonment (or otherwise removed from the background network) will be statistically evaluated with respect to the background data pool. Based on the evaluation, a proposal will be submitted to the Department for approval detailing the evaluation of the data and proposing the continued use (or disuse) of the data in the background data set. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

3) Section 2.2.2 of the Statistical Analysis Plan (SAP) should clearly specify how background will be evaluated, and eliminated or included. lt is recommended that Section 2.2.2 of the SAP indicate that modifications to background will occur with Department approval.

This has been addressed by modifications to Section 2.2.2 of the SAP. Language has been added to Sections 1.0, 2.0, and 2.2 that clearly state that any changes to the statistical analysis plan (including background wells and the background data set) require Department approval. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

4) Section 6.3 of the GWMP states that the analytical "method used will be able to reach a suitable practical quantification limit to detect natural background conditions at the facility." It is recommended that the GWMP be revised to reflect the requirements of ADEM Admin. Code r. 335-13-15-.06(4)(g)5.

Section 6.3 of the GWMPs have been modified consistent with this request using language consistent with ADEM Admin. Code r. 335-13-15-.06(4)(g)5. The plans clearly state "that any practical quantitation limit that is used will be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility." See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

5) The GWMPs for Plant Barry, Plant Gadsden, Plant Greene, and Plant Miller describe a process for using intrawell analysis. Because no compliance monitoring wells were installed prior to the placement of waste at the facility, it does not appear that intrawell analysis will accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit as require d by ADEM Admin. code r. 335-13-15-.06(2)(a)1. Intrawell analysis procedures should be removed from all Ash Pond GWMPs and SAPs. Intrawell analysis may be justifiable for the lined Barry Gypsum and Gaston Gypsum ponds.

Intrawell analysis has been used on a very limited basis for select few parameters during detection monitoring. Each of these sites is in assessment monitoring and proceeding with groundwater remedy selection. Nonetheless, intrawell statistical analysis of Appendix III detection constituents will be discontinued. Section 8.1 of the GWMPs for Plant Barry, Plant Gadsden, Plant Greene, and Plant Miller have been amended to remove the option of intrawell statistical analysis for Appendix III detection monitoring constituents. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

6) The proposed use of tolerance intervals to set Groundwater Protection Standard s (GWPSs) using pooled data from multiple wells screened in different hydrostratigraphic positions, without explicit checks for spatial variation, does not comply with requirements listed in Section 17.2 .1 of the March 2009 Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (Unified Guidance) to set adequate tolerance limits. It is recommended that the GWMP comply with recommendations stated in the Unified Guidance.

Section 5.2 of the SAP has been modified to address this request. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

7) Sections 7.5 and 21.0 of the Unified Guidance present GWPS testing as an either/or decision using either a multi-sample approach (using detection monitoring tests listed in Part III of the Unified Guidance), or a single-sample approach (using assessment and corrective action tests listed in Part IV of the Unified Guidance). The GWMP includes a combined approach using both tolerance limits to set an elevated GWPS and confidence intervals that require the entire interval to exceed the GWPS before corrective action is indicated. Section 7.5 and Example 7-1 of the Unified Guidance couch multi-sample tests to provide a reasonable GWPS for concentrations of constituents that "are occasionally found at uncontaminated background well concentrations exceeding the irrespective MCLs. The regulations then provide that a GWPS based on background levels is appropriate. "It appears that the multi- sample approach should only be applied to constituents with observed concentrations that

occasionally exceed relative MCLs and health-based standards in uncontaminated background rather than applied universally to all Appendix IV constituents.

Section 5.2 of the SAP has been modified to address this request. Additional documentation provided by Dr. Kirk Cameron, primary author of the Unified Guidance, explains the intended use of interwell tolerance limits (a detection monitoring test) when applied to Assessment Monitoring programs to establish an alternate GWPS when concentrations upgradient naturally exceed MCLs. The documentation supports the use of parametric and nonparametric tolerance limits (depending on the distribution of a given constituent) using pooled upgradient well data regardless of the presence of spatial variation. The resulting statistical limit establishes the threshold of all anticipated unimpacted average concentrations at downgradient wells when compared to a GWPS through the use of confidence intervals. Parametric tolerance limits will be used with Department approval when data sets follow a normal distribution. In the event that a data transformation or high degree of variability establishes a background limit that is less than conservative from a regulatory perspective, a nonparametric tolerance limit will be constructed. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

8) Section 4.1 of the SAP indicates that parametric confidence intervals will be constructed at the 99% confidence level, which is the highest confidence level in the guidance. Because statistical confidence is not the same as power, Section 7.4.1 of " the Unified Guidance recommends reversing the usual sequence: first select the desired level of power for the test, (I-B), and then compute the associated (maximum) false positive rate (a). In this way a pre-specified power can be maintained even if the sample size is too low to simultaneously minimize the risks of both Type I and Type II errors (i.e., false positives and false negatives)." Section 7.4.1 of the Unified Guidance indicates "statistical confidence is not the same as power. The confidence level merely indicates how often - in repeated applications - the population will contain the true population parameter (0); not how often the test will indicate an exceedance of a fixed standard. "It appears that parametric confidence intervals should be constructed at a confidence level based on power to minimize the risk of missing contamination above the GWPS. Justification for the use of confidence intervals set at the 99% confidence level should include calculations demonstrating that the true population coefficient of variation is no greater than 0.5.

Section 4.1 of the SAP has been modified to address this request. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

9) Section 4.2 of the SAP states that "In Corrective Action, a well/parameter pair is declared to no longer be an SSI over the GWPS when the entire interval falls below a specified limit (i.e., the Upper Confidence Limit [UCL] falls below the limit), or when the LCL of the Append ix IV parameters does not exceed the GWPS for a period of three consecutive years." Section 7.5 of the Unified Guidance indicates that the proposed combined single-sample and multi-sample approach "based on both background sample size and sample variability is recommended for identifying the background GWPS at a suitably high enough level above current background to allow for reversal of the test hypotheses. ... a GWPS based on this method allows for a variety of confidence interval tests (e.g., a one-way normal mean confidence interval identified in [7.3] and [7.4])." The statistical methods referenced in ADEM Adm in. code r. 335-13- l 5-.06(9)(d)2 are applicable to detection monitoring tests referenced in ADEM Adm in. code r. 335-13- 15-.06(4)(f) and (g). Confidence intervals require justification for use under ADEM Admin. code r. 335- 13-15-.06(4)(f)5. Hypothesis test structures using confidence intervals should be consistent with equations [7.1] and [7.2] of the Unified Guidance when us in g the proposed method. It is recommended that the portion of the GWMP stating "or when the LCL of the Appendix IV parameters does not exceed the GWPS for a period of three consecutive years." be removed.

Section 4.2 of the SAP has been modified to address this request by striking the phrase "or when the LCL of the Appendix IV parameters does not exceed the GWPS for a period of three consecutive years." The removed language does not appear in the GWMPs. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

10) The term "statistical limit " appears to be used twice in Section 5.2 of the SAP to describe the GWPS in assessment monitoring comparisons described in ADEM Admin. Code r. 335-13-15-.06(e), (f), and (g). It is recommended that the terminology used in the SAP be consistent with terminology used in Solid Waste regulations.

We presume that the intended reference in this comment was to ADEM Admin. Code r. 335-13-15-.06(6)(e), (f), and (g). *Section 5.2 of the SAP has been modified to address this request by using terminology consistent with Solid Waste regulations (i.e. groundwater protection standard or GWPS). See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.*

Individual CCR Unit Comments

Plant Barry Ash Pond

1) Table 2 provides a comparison of constituents between background and downgradient wells to demonstrate that proposed background wells are not impacted. Boron is listed as ND, however time series graphs included in the background update indicate that there are detections (not J values for boron) in proposed background monitoring wells at the Plant Barry Ash Pond. The footnote indicates that the detection was below the MDL, and thus considered ND. However, Table 3 shows the RL for boron as 0.05 mg/L, the detections are at minimum greater than 0.1 mg/L. Time series graphs are not included for other key indicator parameters (time series graphs were not constructed for this purpose, but they provide the only reference to historical data in the GWMP). It is recommended that the GWMP be revise d to accurately represent monitoring data.

Table 2 has been updated to use average boron concentrations, using ½ the reporting limit where not detected. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

Plant Barry Gypsum Pond

1) Table 2 provides a comparison of constituents between background and downgradient wells to demonstrate that proposed background wells are not impacted. Boron is listed as ND, however time series graphs included in the background update indicate that there are detections (not J values for boron) in proposed background monitoring wells at the Plant Barry Gypsum Pond. The footnote indicates that the detection was below the MDL, and thus considered ND. However, Table 3 shows the RL for boron as 0.05 mg/L, the detections are at minimum greater than 0.1 mg/L. Time series graphs are not included for other key indicator parameters (time series graphs were not constructed for this purpose, but they provide the only reference to historical data in the GWMP). It is recommended that the GWMP be revise d to accurately represent monitoring data.

Table 2 has been updated to use average boron concentrations, using ½ the reporting limit where not detected. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

Plant Gadsden Ash Pond

1) The Table of contents in the SAP indicates that Appendix A is "Background Screening and Compliance Evaluation" however no such document is attached, as was provided for the other CCR units. Please provide this in formation.

Appendix A was inadvertently omitted from the SAP and is now included. See the Revised Statistical Analysis Plans and the updated Groundwater Monitoring Plans submitted to the Department on August 24, 2020.

Plant Miller Ash Pond

1) Section 5 .2 of the GWMP states that " Screen length will not exceed 10 feet without justification as to why a longer screen is necessary (e.g. significant variation in groundwater level)." Table 1 indicates that monitoring wells GS-AP-MW-8, GS-AP-MW-13, GS-AP-MW- 17V, MR-AP-MW- 19 HA, MR-AP-M W-28H, MR-AP-MW-30H, MR-AP-MW-31H, MR-AP-MW-33H, MR-AP- MW -36 H, and MR-AP-MW-2V were installed with 20 feet of well screen. It is recommended that the GWMP include information to explain the reason these wells were installed with longer screens.

Section 5.2 of the GWMPs for Plants Miller and Gorgas have been modified to explain the reasoning for installing certain wells with screen lengths greater than 10 feet. As previously discussed with the Department, because of the nature of the geology at Plants Miller and Gorgas locating water-bearing fractures and zones is difficult, as evidenced by numerous dry holes drilled at the site. Additional well screen length is often necessary at fractured rock sites such as Plant Miller and Gorgas: groundwater yield is so low that wells are not able to be developed or sampled using conventional methods. The additional footage of well screen assists well development and sampling by providing a greater volume of groundwater and can provide more fracture and groundwater flow zone intersection. See the updated Groundwater Monitoring Plan submitted to the Department on August 24, 2020.

2) Monitoring wells MR-AP-MW-21 and MR-AP-MW-23 are screened 95 feet in elevation apart. Groundwater elevations appear to indicate that these wells are screened in an unconfined aquifer. Additional information should be provided to identify the geology at MR-AP-MW-23 and provide rationale for installing the well screens such a distance apart. Figure 6C should identify the aquifer in which these wells are screened.

A revised Figure 6C including the requested information has been included in the updated Groundwater Monitoring Plan submitted to the Department on August 21, 2020. Additional geologic information will be submitted in the upcoming Plant Miller groundwater delineation report due on or before September 30th, 2020.

At Plant Miller compliance wells vary in depth from approximately 40 feet below ground surface (ft BGS) to 291 ft BGS and are screened across multiple discrete flow zones. This variability in well screen depth and flow zone(s) can lead to natural variability in groundwater quality. These proposed upgradient locations were chosen based upon similar position on the Sequatchie Anticline and APC land ownership. These locations sit on the opposite limb of the Sequatchie Anticline, but at similar elevation, structural, and stratigraphic setting. Staggered depth

intervals are an attempt to capture depth dependent variation in groundwater quality which can differ based upon age of groundwater and groundwater-rock interactions along heterogenous Pottsville Strata.

3) The boring log for monitoring well MR-AP-MW-21 indicates that at 175 feet BGS the "Driller lost all water circulation at the beginning of Run 19 and never got it back. Mud tub drained out." It appears that the drilling fluid may have been los t down the borehole. Please clarify what occurred during the installation of proposed background monitoring well MR-AP-MW-21.

As evidenced by the caliper log provided in the GWMP, the bore intersected a fracture between 174.5 ft BGS and 175.3 ft BGS. The loss of water circulation occurred across this interval indicating relatively high permeability and ability for the fracture to take drilling water. The use of the description "Mud tub" was not meant to imply that drilling mud was utilized in the boring advancement process. Sonic drilling relies on water as drilling lubricant and only water was utilized at this location. Groundwater quality samples collected from this location do not exhibit unusual physical appearance or a geochemical signature indicating drilling-induced bias.

4) The monitoring well installation process described in Section 5.2 of the GWMP does not adequately describe the process indicated on provided boring logs. In many cases monitoring wells constructed at the site were installed after boring hundreds of feet to bedrock, conducting geophysical methods on the borehole, and abandoning the boring below the interval selected for monitoring with bentonite chips. The process of inserting bentonite chips into the borehole requires a specific process to ensure that bridging does not occur, resulting in an inadequate seal. It is recommended that the process used to install monitoring wells above abandoned bore holes be thoroughly described in the GWMP.

Section 5.2 of the revised GWMP has been updated to include the requested information, including the use of bentonite and the process used to install monitoring wells over abandoned boreholes. See the updated Groundwater Monitoring Plan submitted to the Department on August 24, 2020.

5) The elevation of the screened interval for monito ring well MR-AP-PZ-5 is incorrectly listed in Table 1. It is recommended that the table be corrected.

Table 1 has been corrected and included in the updated Groundwater Monitoring Plan submitted to the Department on August 24, 2020.

We appreciate the opportunity to provide these clarifications. I will be pleased to discuss these items if that is helpful to you. If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Dustin G. Brooks
Environmental Affairs Supervisor

cc: Eric Wallis – Southern Company Services

PLANT GORGAS GYPSUM POND GROUNDWATER MONITORING PLAN

Revised August 21, 2020

PREPARED FOR:

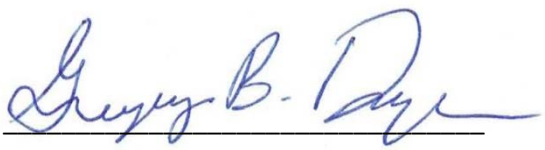
Southern Company Services
Earth Sciences and Environmental Engineering

REVISED GROUNDWATER MONITORING PLAN

ALABAMA POWER COMPANY - PLANT GORGAS

This *Revised Groundwater Monitoring Plan, Alabama Power Company - Plant Gorgas Gypsum Pond*, has been prepared to document that the Site groundwater monitoring network and monitoring plan meets the requirements described by ADEM Admin Code r. 335-13-15-.06(2). It has been completed under the supervision of a licensed Professional Geologist with Southern Company Services.

Report Prepared by:



Gregory B. Dyer, P.G.
Alabama Professional Geologist No. 1471

8/21/2020
Date

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1. INTRODUCTION

The Gorgas Gypsum Pond Groundwater Monitoring Plan (GMP or plan) has been updated to include additional information regarding the hydrogeological evaluation for the site, the background groundwater monitoring network, procedures for updating the background data set, and statistical methods used to evaluate groundwater quality data.

Groundwater monitoring at the Plant Gorgas Gypsum Pond is required by the Alabama Department of Environmental Management (ADEM or the Department), ADEM Admin Code r. 335-13-15-.06, to detect potential downgradient changes in groundwater quality. This GMP meets the requirements set forth for groundwater monitoring networks as described by ADEM Admin Code r. 335-13-15-.06(2). The plan describes the groundwater monitoring program for the site, including the following key components: description of subsurface hydrogeology and uppermost aquifer, monitoring well network design, sampling and analyses program, and statistical analyses program.

Groundwater monitoring has occurred since 2016 and results reported to ADEM. Upon initiating detection groundwater monitoring at the site in 2017, statistically significant increases (SSIs) of Appendix III monitoring parameters were detected above background levels. Pursuant to State and Federal regulations assessment monitoring was implemented. During assessment monitoring, Appendix IV monitoring parameters were detected at statistically significant levels (SSLs) above groundwater protection standards (GWPS). Consequently, an Assessment of Corrective Measures (ACM) was prepared and submitted to ADEM in June 2019. The site performs semi-annual assessment monitoring as additional site investigation work continues and a final remedy is developed.

The purpose of this plan is to present the groundwater monitoring network, field and lab procedures, and site-specific statistical analysis plan for Departmental review and approval. This plan also seeks to establish procedures or mechanisms for managing changes to the monitoring network and statistical analyses.

2. SITE LOCATION AND DESCRIPTION

Alabama Power Company's (APC) Plant Gorgas is located in southeastern Walker County, Alabama, approximately fifteen miles south of Jasper, at 460 Gorgas Road, Parrish, Alabama 35580. Plant Gorgas lies in portions of Sections 7, 8, 9, 16, 17, 18, 19, 20, 21, 28, and 29, Township 16 South, Range 6 West and Section 12, 13, and 24, Township 16 South, Range 7 West. Section/Township/Range data are based on visual inspection of USGS topographic quadrangle maps and GIS maps (USGS, 1975; USGS, 1983).

The Plant Gorgas Gypsum Pond is located northwest of the main power generation facility and is bordered to the north by Goodsprings Road and to the south by the Mulberry Fork of the Black Warrior River. **Figure 1, Site Location Map,** depicts the location of the site referenced to roadways and geographic features. **Figure 2, Site Plan Map,** depicts the configuration of the Gypsum Pond. **Figure 3A, Site Topographic Map** and **Figure 3B, Site Elevation Model**, depict the topography of the Site.

3. GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Plant Gorgas lies in the Warrior Basin physiographic region (Sapp and Emplaincourt, 1975), a late Paleozoic basin formed as a result of flexure and sediment loading associated with Appalachian and Ouachita orogenies. The bedrock geology is dominated by clastic sedimentary rocks of the Lower Pottsville Formation as shown on **Figure 4, Site Geologic Map** (GSA, 2010b). Deeper stratigraphy is marked by carbonates, shales, chert, and sandstones of Mississippian to Cambrian in age (Raymond et al., 1988). Plant Gorgas is directly underlain by rocks belonging to the Pratt Coal Group (Ward II et al., 1989). In general, the Pratt Group consists of mudstone, shale, fine-grained sandstone, and interbedded coal.

Strip and underground mining was conducted over a large portion of the area down to the American Seam. Much of the narrow valley that the Plant Gorgas Gypsum Pond occupies was strip mined for the Pratt Coal Seam and some of this area has seen the American Coal Seam underground mined. As a result, the overburden beneath the disposal facilities is dominated by backfilled mine overburden and is characterized by weathered shale and sandstone boulders with lenses of fine sediments and small amounts of coal fragments and coarse sediments. This backfilled mine overburden overlays mudstones and sandstones of the Pratt Coal Group which separate the mine overburden from underground mines of the American Coal Seam by tens of feet of “intraburden” rock. Borings conducted to the north and south of the facility indicate that mining did not occur everywhere. Where mining did not occur, there may be a shallow layer of mine overburden overlying natural overburden materials before transitioning into Pratt Coal Group strata. **Figure 5, Geologic Cross-Section A-A’**, illustrates the geologic layering beneath the site.

Groundwater flow at the Site is a subdued replica of the natural topography where gravity is the dominant force driving flow. As shown on **Figure 6A, Potentiometric Surface Contour Map (February 3, 2020)** and **Figure 6B, Potentiometric Surface Contour Map – Vertical Delineation Wells (February 3, 2020)**, potentiometric surface contours are interpreted to parallel Site topography presented on **Figure 3A** and **Figure 3B**. Groundwater is interpreted to flow towards the gypsum pond and the valley that it occupies from higher elevations to the west, north, and east. Groundwater then exits the Gypsum Pond/valley flowing mostly due south towards the Mulberry Fork of the Black Warrior River (**Figure 6A**). This pattern also seems to appear in deeper vertical delineation wells (**Figure 6B**).

Beneath the Site, groundwater producing zones are sparse. In total, seventeen (17) exploratory borings or well locations were attempted around the perimeter of the Plant Gorgas Gypsum Pond to depths between 50 and 307 feet below ground surface. Only three (3) locations provided sufficient groundwater and recharge rates to develop and sample via low-flow sampling methods. Geophysical and hydrogeophysical logging were employed in select rock borings to further assess hydrogeological conditions and identify water-bearing zones. Attempts at installing upgradient well locations west, north, and east of the facility were unsuccessful; and therefore, four (4) locations upgradient of the nearby Plant Gorgas CCR Landfill were selected for upgradient locations on the basis of similar geology. The limited recharge area created by the narrow valley and topographic divides surrounding the facility combined

with historic mining and now, developed land reduces groundwater recharge and occurrence at the site, especially for potential upgradient locations closer to the topographic divides. Clay-rich overburden and the liner system installed beneath the gypsum pond likely play a factor in reducing recharge to the local system. The mined out American Coal Seam may also underdrain the area. Groundwater occurring south of the facility is likely more prominent due to lower elevations and upwelling of groundwater from deep, regional Pottsville aquifers as they discharge to Mulberry Fork.

Based on published data, groundwater quality produced from the Pottsville Formation can be characterized by high concentrations of sulfate, iron, and other trace metals (Jennings and Cook, 2010). Trace metals in Pottsville Formation groundwater are associated with sulfide minerals contained in organic-rich strata (e.g., Mudstones and Coal Seams) and siliceous/carbonate healed fractures and joints. Trace element enrichment is likely the result of migrating hydrothermal fluids generated during the late Paleozoic Allegheny orogeny (Diehl et al., 2005). Arsenic, antimony, molybdenum, selenium, copper, thallium, and mercury are elevated in Warrior Basin coal strata (Goldhaber et al., 2002). Borehole geophysical logs, boring logs, and well construction data for each compliance and delineation well are presented in **Appendix A, Well Installation and Field Logs.**

4. SELECTION OF WELL LOCATIONS

According to ADEM Admin Code r. 335-13-15-.06(2)(a), the groundwater monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that:

1. Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit; and
2. Accurately represent the quality of groundwater passing the waste boundary of the CCR unit.

ADEM Admin Code r. 335-13-15-.06(2)(b) states that the number, spacing, and depths of groundwater monitoring system wells must be determined based upon site-specific technical information that must include a characterization of:

1. Aquifer thickness, groundwater flow rate, groundwater flow direction, including seasonal and temporal fluctuations in groundwater flow; and
2. Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.

ADEM Admin Code r. 335-13-15-.06(2)(c) requires the groundwater monitoring system to include the number of monitoring wells necessary to meet the performance standard set forth in the rules. The monitoring system must contain a minimum of one upgradient and three downgradient monitoring wells but consist of additional monitoring wells as necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit and the quality of groundwater passing the waste boundary of the CCR unit.

4.1 COMPLIANCE MONITORING NETWORK

Groundwater monitoring wells are installed to monitor the uppermost occurrence of groundwater beneath the site which accurately represent the quality of groundwater passing the waste boundary of the CCR unit. Locations are selected based on facility layout and site geologic and hydrogeologic considerations. The proposed groundwater monitoring network at Plant Gorgas Gypsum Pond is subdivided into background and compliance locations as based upon potentiometric contours and interpretations by a qualified groundwater scientist. Background wells represent the quality of background water that has not been or would not be affected by leakage from a unit. Compliance wells are screened within the uppermost aquifer and are used to assess potential impacts to the first “aquifer” in the event of a release. Groundwater monitoring wells are designed and constructed using “Design and Installation of Groundwater Monitoring Wells in Aquifers”, ASTM Subcommittee D18.21 on Groundwater Monitoring, as a guide. **Table 1, Groundwater Monitoring Well Network Details,** and **Figure 7,**

Groundwater Monitoring Network Map, present the designed purpose and locations of monitoring wells with respect to the facility. Groundwater monitoring wells will be screened across the mine spoil overburden – top of rock interface as this corresponds to the first zone of saturation beneath the site. If groundwater saturation is not present, deeper Pottsville intervals will be targeted for well screens.

4.2 BACKGROUND MONITORING WELLS

Background groundwater is the baseline quality of groundwater that is representative of the aquifer being monitored, and that has not been affected by CCR material. A background groundwater monitoring network has been identified at the Site based on groundwater flow conditions, groundwater quality, and statistical screening of the data in accordance with the Unified Guidance (*Statistical Analysis of Groundwater Data at RCRA Facilities, Unified Guidance*, March 2009, USEPA 530/R-09-007). The following describes the selected background network based on these criteria.

As presented on **Table 1** and **Figure 7**, wells MW-1 through 4, located upgradient of the Gypsum Pond and CCR Landfill to the east of the Gypsum Pond serve as background monitoring wells. As described in **Section 3**, 17 borings and well locations were attempted around the perimeter of the Gypsum Pond but were largely unsuccessful in finding sufficient groundwater yield for well development and low-flow sampling. Three successful monitoring well locations were installed immediately downgradient of the facility: (GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8). These locations were installed near the mine spoil overburden – top of rock interface. Upgradient attempts within these intervals as described were unsuccessful. The two largely unsuccessful phases of groundwater well exploration efforts are shown on **Figure 8, Historic Field Investigation**.

Sparsity of groundwater at the Site is likely attributed to three factors: (1) the Gypsum Pond occupies a narrow valley with topographic/groundwater divides located very close to the western, northern, and eastern boundary, (2) this valley is now largely occupied by the constructed Gypsum Pond which is lined and likely limits recharge further, and (3) historic mining activities could contribute to underdrainage at the Site.

However, existing upgradient wells located to the north of the CCR Landfill just to the east of the Gypsum Pond (MW-1, MW-2, MW-3, and MW-4) provide adequate upgradient/background groundwater quality data for the Gypsum Pond for the following reasons:

1. These wells are installed within a mine-spoil – top of rock setting.
2. The geologic layering and coals mined are the same (Pratt Group – Pratt through American Coal Seams).
3. They represent the variability and range of groundwater quality in Site groundwater that has had interaction with mine spoil and Pottsville formation materials.

Groundwater geochemistry and quality within mine spoil settings can vary significantly due to the extreme physical heterogeneity of mine spoil backfill layering (mixed soil and rock), complex heterogeneity of

stratigraphy excavated and backfilled (mix of shale, organic mudstones, and coal), and variability of groundwater flow rate and residence time. Therefore, for statistical comparison to downgradient wells installed or monitoring water that has migrated through mine spoils, upgradient monitoring wells are most appropriately installed in a mine spoil setting or environment. As documented in this plan, that could not be achieved directly adjacent to the Site.

Additional potential upgradient piezometers were recently proposed in a semi-annual progress report for the Plant Gorgas Gypsum Pond facility. These locations are proposed further to the west of the Gypsum Pond. These locations are illustrated in **Figure 9, Proposed Additional Monitoring Well and Piezometer Locations** and will target the mine spoil – rock interface to determine if additional upgradient locations in these areas are feasible. Historically, at the Site, locations further north and away from the Mulberry Fork of the Black Warrior River have not been successful. However, these proposed piezometer locations will be installed on the opposite side of the groundwater flow divide, interpreted to reside just west of the gypsum pond.

Upon Departmental approval and installation, and if successful, the analyses of geologic, hydrogeologic, and geochemistry data will be utilized to determine for upgradient potential. For the purposes of this groundwater monitoring plan, these locations are designated as planned, potential upgradient locations. After data has been screened for upgradient potential, documentation and justification requesting the addition of these locations as upgradient wells may be submitted to the Department for review and approval along with an updated groundwater monitoring plan.

If a background well is abandoned or use is discontinued, the historical data from that well will remain in the upgradient data pool unless there is a technical basis for removing the data. A plan for installing additional upgradient locations will be submitted to the Department in the future along with supporting information to justify locations as upgradient. The following provides further detail regarding background well selection.

4.2.1 Groundwater Geochemistry

A comparison of the concentrations of key Appendix III and Appendix IV indicator parameters can be a useful tool for demonstrating that proposed upgradient well locations have not been impacted by a release from a CCR facility. These comparisons have been made in **Table 2, Upgradient Comparisons – Key Indicator Parameters** and show that the proposed upgradient locations have not been impacted by the CCR unit and provide representative water quality in mine spoil settings. It should be noted that calcium can be naturally elevated in the Pottsville lithology due to the prevalence of calcium carbonate in vein and fracture filling and as well as micritic cement. Sulfate is naturally elevated due to the prevalence of pyritic intervals. The low concentrations of other indicator parameters coupled with the upgradient orientation further demonstrate that these wells have not been affected by the Gypsum Pond or the CCR Landfill.

4.2.2 Statistical Screening

Details regarding screening of the background is presented in **Appendix B, Statistical Analysis Plan**. Groundwater quality was determined to be representative of a statistical background following screening in accordance with the Unified Guidance (*Statistical Analysis of Groundwater Data at RCRA Facilities, Unified Guidance*, March 2009, USEPA 530/R-09-007).

4.3 DOWNGRADIENT COMPLIANCE WELLS

Adequately locating and screening downgradient monitoring wells are essential to being able to detect potential impacts to groundwater from the CCR Unit. Two initial phases of field investigation were conducted to install a groundwater monitoring network at the Plant Gorgas Gypsum Pond (**Figure 8**). As described in preceding sections, locations north of the Gypsum Pond did not yield groundwater (no free water) or did not yield sufficient groundwater for development and low-flow sampling. **Section 4.2** details the primary factors likely contributing to no or low-yielding wells to the north.

Consequently, field investigation efforts transitioned southward to finding downgradient compliance network wells and, as presented on potentiometric surface contour maps in **Figure 6A** and **Figure 6B**, successful well locations GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8 are located immediately downgradient of the Gypsum Pond and along the axis of the narrow valley that the Gypsum Pond occupies. This valley likely serves as a preferential or focused flow path for groundwater migration as potentiometric surface maps (**Figure 6A** and **6B**) indicate that groundwater flows toward the valley from the west, north, and east proximal to the lined Gypsum Pond and then south towards the Mulberry Fork of the Black Warrior River. Well locations GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8 capture this convergence of flow or southward flow in the valley.

These downgradient well locations are also screened near the mine spoil – top of rock interface or just below and monitor intervals that would detect CCR impacts to groundwater as the base of the lined Gypsum Pond occupies the remnant strip mined valley.

4.4 DELINEATION WELL NETWORK

Pursuant to ADEM Admin. Code r. 335-13-15-.06(6)(g)2., if assessment monitoring is implemented and exceedances of GWPS are observed, wells may be required to delineate the nature and extent of exceedances. A site-specific well delineation plan will be submitted to the Department for approval. Any newly-installed delineation well(s) will be sampled for Appendix III and IV constituents as part of the assessment groundwater monitoring program until the Department approves a change to the monitoring program. Existing delineation well locations and details are presented on **Table 1** and **Figure 7**. Proposed additional delineation locations are presented in **Figure 9**. **Table 1** will be updated if additional delineation wells are required.

Delineation wells, when installed, will be sampled initially after development and following this initial sampling event, sampling of delineation wells will be transitioned to the semi-annual compliance sampling

event schedule. Occasionally, due to the remote nature or location along surface water bodies, delineation wells may not be accessible due to unavoidable circumstances (flooding, impassable access, etc). In this event, delineation wells will be sampled at a later date or during the next scheduled semi-annual sampling event.

4.5 UPDATING THE BACKGROUND WELL NETWORK

The intention of this groundwater monitoring plan is to present the final groundwater monitoring network and designation of monitoring wells for permitting. However, in the future and over time the upgradient or background well network may be updated by adding or removing wells, updating background periods, re-designating existing wells, or modifying the background data set.

Changes to the background well network and data set will be made after receipt of Departmental approval.

If an update or modification to the permitted background network is recommended in the future, APC will complete the following:

- A notice will be submitted to the Department describing the proposed change(s) and the rationale for the change. The notice will contain statistical screening of the background data set and include sufficient information to evaluate and approve the request.
- Upon approval by the Department, the background network and data set will be adjusted pursuant to the proposal and used for future analyses.
- A revised groundwater monitoring plan and minor modification will be submitted to the Department.

The Statistical Analysis Plan in Appendix B provides details regarding requesting Department approval for updates and changes to the background well network and data set.

When well re-designations are approved by the Department, new statistical limits will be calculated based upon the resulting monitoring well network. When background data is updated, historical reports and exceedance lists will not be updated unless approved by the Department. Changes will apply to future analysis unless an immediate change is warranted. If delineation or groundwater corrective action is underway, the new background may be applied to those actions as appropriate with Department approval.

When background data is updated changes will apply to future analysis unless an immediate change is warranted. If delineation or groundwater corrective action is underway, the new background will be applied to those actions as appropriate with Department approval.

As described in **Section 4.2** and **Figure 9**, a plan has been provided to evaluate additional potential upgradient locations to the west/northwest. These locations will be evaluated and pending results, justification may be submitted to the Department following the procedures outlined in this Section.

5. MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT & REPORTING

The following describes monitoring system performance standards that have been applied to monitoring well activities subsequent to this monitoring plan and that will be applicable to all work performed in the future.

5.1 DRILLING

Drilling methodology may include hollow stem augers, direct push, air rotary/hammer, mud rotary, or rotosonic techniques. The drilling method will minimize the disturbance of subsurface materials and will 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 will 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 or coring may be used to help determine the stratigraphy and geology. Samples will be logged by a qualified groundwater scientist. Screen depths will be chosen based on the depth of the uppermost aquifer. Logging will be performed by a geologist or geotechnical engineer registered in the State of Alabama or working under the direction of a geologist or engineer registered in Alabama.

5.2 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. Groundwater monitoring wells are designed and constructed in accordance with ADEM Admin Code r. 335-13-15-.06(2)(e) using “Design and Installation of Groundwater Monitoring Wells in Aquifers”, ASTM Subcommittee D18.21 on Groundwater Monitoring as a guide. Well installations will generally follow the procedures outlined below.

The minimum boring diameter will be four inches larger than the outside diameter of the well casing, and a minimum well casing diameter of two inches will be used. Up to ten feet of ASTM NSF-rated Schedule 40 PVC with 0.010- in. slots will be set at an approximate depth of 10-20 ft below the typical water table depth. ASTM NSF-rated Schedule 40 PVC flush-threaded riser casing with will be used to finish the well approximately 3 feet of above-ground surface. A filter pack consisting of well-rounded and chemically inert materials (e.g., clean quartz) will be packed around the screen from the bottom of the borehole to a minimum 2 feet above the top of the screen. Sodium bentonite pellets will be placed to create a seal above the screen in the annulus for a minimum of 2-ft above the filter pack by dropping or washing down with potable water, or by tremie method. The annular space above the seal will be filled via tremie injection with a high-solids bentonite slurry, neat cement, or cement-bentonite grout mixture to the ground surface.

The design and construction of the intake of the groundwater wells will: (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 lengths are site and conditions dependent but are typically 10 feet. In some cases, screen lengths of 20 feet are utilized if the water table may undergo large fluctuations in elevation, particularly seasonally, or to capture a sufficient volume of water to adequately sample the groundwater well.

Additional well screen length is a tool utilized at fractured rock sites such as Plant Miller and Gorgas where groundwater yield is low and often is below the threshold for development and subsequent low-flow sampling. The additional footage of well screen assists well development and sampling by providing a greater volume of groundwater and can offer a technical advantage by providing more fracture/discrete flow zone intersection with the screened interval. Successful wells, that do not intersect groundwater yielding coal seams or well-connected fracture zones, are often predicated on encountering numerous, discrete low-yield fractures or bedding planes (where individual contributions may be sub 25 mL/min). In these instances, additional screen length can be a deciding factor in the success of a monitoring well installation.

If the above 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.

The placement of well screens at fractured rock sites such as Plant Miller and Gorgas is dependent upon sound borehole characterization to identify fracture networks and water bearing units. Groundwater is found chiefly in fractures and coal seams and is commonly confined by sharp permeability contrasts within the aquifer. Previously conducted conceptual site models are utilized to select target depths of well screen intervals during installation of monitor wells. In some instances, rising head tests are conducted at field dependent intervals while the borehole is being advanced to provide a preliminary characterization of borehole yield across intervals. Borehole geophysics and hydrophysical logging suites are utilized upon completion of the borehole. These logs will be utilized to determine borehole lithology and potential groundwater yielding zones. A combination of gamma, 3-arm, caliper, acoustic/optical televiewer combined with fluid resistivity/temperature logging will provide the principal points of comparison. Upon completion of the borehole geophysics, it may be necessary to backfill the boring to the well design depth. Boring are backfilled with bentonite chips to the design depth by slowly pouring the chips down the drill casing at a target pour rate of 3 minutes per 50-pound bag to prevent bridging. Additionally, periodically

a weighted tape is used to check for bridging and the depth of the backfill. A target thickness of 5-ft of filter pack sand will separate the base of sand from bentonite chip backfill and to complete the backfill process.

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.

The monitoring wells will be completed with concrete pads approximately 6-inches thick extending approximately 3 feet around the well and sloping away from the well. Each well will be capped and enclosed in a lockable above-ground protective cover with weep holes to prevent build-up of water within the protective casing. Wells located in areas with potential traffic will require a minimum of three surface protection bumper guards (bollards). All wells will have proper identification including the well identification number, total depth, and installation date.

5.3 WELLS WITH INCONSISTENT WATER LEVELS

The following procedures should be followed when field observations suggest that saturated conditions may exist at the target borehole depth at temporary and permanent well locations, but only minor amounts of free water (i.e., water capable of being sampled from a well casing) are observed in the well boreholes during drilling. These procedures should not be followed when “dry” (i.e., no free water) conditions are observed in the well boreholes at the target borehole depth. The field geologist will communicate with the project manager to determine if the boring should then be properly abandoned.

The decision to install a permanent well will be based on measurement of a target water column length. The target water column length for permanent wells is five (5) feet based on placement of the pump intake at least one (1) foot above the base of the screen and the well yielding sufficient sample volume to collect a complete sample set with quality assurance/quality control samples within one (1) day.

The following summarizes the procedure that will be followed:

- Prepare a workplan describing, at a minimum, well location(s), purpose, drilling method, target depth, and water level performance standards outlined below and submit to the Department per ADEM Admin Code r. 35-13-15-.06(2)(e).
- Drill the monitoring well borehole to the target depth.

- If sonic or core drilling, and a significant volume of drilling lubricant (drilling water) is used in tight formations (low permeability), the purging of 1 borehole volume and subsequent monitoring of water level recovery may be utilized to evaluate recharge rate.
- If the target water column length is not observed in the borehole after drilling, allow the water level in the borehole to equilibrate for 24 hours. The area around the borehole will be prepared to prevent surface water infiltration into the borehole.
- If a minimum of 5 feet of water is present in the borehole (or 4 feet of water will be present above the planned pump intake depth) after 24 hours, install the monitoring well at the target depth.
- If the above water column criteria are not present in the borehole after 24 hours, then terminate drilling at the location and grout the borehole following the appropriate Department standards.
- If a well is not installed, the Department will be notified, and an alternative well installation plan developed if necessary, to meet Department requirements.

5.4 WELL DEVELOPMENT

Upon completion of well construction, the monitoring wells will be developed using a combination of surging and purging to remove excess fines and sediments and to promote good hydraulic communication with the aquifer. Development will continue until the purged water is free of visible fines, and water quality field parameters (turbidity, pH, temperature, and conductivity) have stabilized. In cases of slow recharge and slow turbidity reduction, potable water may be injected and purged as needed to remove fines. If this approach is used, a minimum of three times the volume of water introduced must be purged from the well.

5.5 ABANDONMENT

If a permitted monitoring well should be abandoned, procedures will be followed in accordance with ADEM Admin Code r. 335-13-15-.06(2)(g). If practical, the entire well casing and screen will be removed. Removal can be accomplished by over-drilling the well with hollow stem augers and removing the grout and filter pack material from the well, followed by removal of the casing and the well screen. The clean borehole will then be backfilled with neat Portland cement from bottom to top by pressure grouting using the positive displacement (tremie) method. If the casing cannot be removed the well will be tremie grouted from the bottom of the well upwards with a neat cement. Additionally, a concrete seal will be placed at the ground surface. In either case, the top two feet of the borehole will be poured with concrete to insure a secure surface seal (plug).

Records of well abandonment activities will be kept for each well abandoned. The records will include the depth of emplacement and volume of all abandonment materials, methods of casing removal, and depth to water and well bottom prior to abandonment. A copy of these records will be provided to ADEM and a copy placed in the operating record.

If a replacement well is required, a plan and justification will be submitted to support replacement location(s) and screened intervals along with the proposal to abandon wells.

5.6 DOCUMENTATION

Pursuant to ADEM Admin. Code r. 335-13-15-.06(2)(e)4., APC will document and include in the operating record the design, installation, development, and decommissioning of any monitoring wells, piezometers and other measurement, sampling, and analytical devices.

6. GROUNDWATER SAMPLING AND ANALYSIS PLAN

Pursuant to ADEM Admin. Code r. 335-13-15-.06(4), the following section describes groundwater sampling requirements with respect to parameters for analysis, sampling frequency, sample preservation and shipment, analytical methods, chain of custody control, and quality assurance and quality control. Groundwater samples used to provide compliance monitoring data will not be filtered prior to collection.

6.1 SAMPLE COLLECTION

Groundwater samples will be collected from the monitoring well network as part of the Detection Monitoring Program, and potentially as part of the Assessment Monitoring Program, in accordance with the APC Low-Flow Groundwater Sampling Technical Standard Operating Procedures (TSOP) included as **Appendix C**. Samples will be collected using low-volume purge, or "low-flow" sampling methods with peristaltic or bladder pumps. Depth to water readings at each well location will be taken prior to sampling. Water quality parameters (pH, redox potential, conductivity, etc.) will be measured during purging and recorded on a field sampling form. Samples will be collected after field parameter stabilization criteria are met.

Low-flow (minimal drawdown) groundwater sampling procedures will be used for purging and sampling monitoring wells that will sustain a pumping rate of at least 100 milliliters per minute (mL/min) without significant water-level drawdown. Flow rates should not exceed 500 mL/min. Field water quality parameters recorded during purging will be used as criteria to determine when purging has been completed.

Where non-dedicated pumps are used, the sampling equipment must be slowly lowered into the well to avoid agitation of the water column. Sampling equipment and pump intakes must not extend below the midpoint of any well screen unless the well is known to drawdown and is a threat to go dry even with low flow rates or the water level in the well does not extend above the screened interval.

Most wells are screened with the top-of-screen below the static water level in the well. In these wells (1) the water level in the well must not be drawn down below the top of screen, and (2) stabilization of the water column will be considered achieved when three consecutive water level measurements vary by 0.33 feet or less at a pumping rate of no less than 100 mL/min.

If the static (pre-pumping) water level is below the top-of-screen, the water level must not be drawn down below the top of pump where it can be accurately measured.

Field water quality parameters (temperature, pH, turbidity, conductivity, dissolved oxygen and oxidation-reduction potential) will be measured but not all will be used for determining

stabilization. Stabilization will be considered achieved and purging will be considered complete when three consecutive measurements of each field parameter vary within the following limits:

- 0.2 standard units for pH,
- 5% for specific conductance,
- 0.2 mg/L or 10% for DO > 0.5 mg/L (whichever is greater),
- IF DO < 0.5 mg/L there is no stabilization criteria for DO,
- Turbidity (see the following section for more detail), and
- Temperature and ORP – record only, no stabilization criteria.

The goal when sampling is to attain a turbidity of less than 5 nephelometric turbidity units (NTU); however however, samples may be collected where turbidity is less than 10 NTU and the stabilization criteria described above are met. If sample turbidity is greater than 10 NTU and all other stabilization criteria have been met, samplers must take reasonable steps (i.e., Additional purging) to reduce the turbidity to 10 NTU or less.

- If turbidity is less than 10 NTU, and all other parameters are stabilized, the well should be sampled.
- Where turbidity remains above 10 NTU and turbidity has stabilized within 10% for 3 consecutive readings, the well has been pumped for at least 2 hours and the water quality indicator parameters have stabilized, a complete sample set using the appropriate, pre-preserved containers will be collected followed by an additional sample set using unpreserved containers to be lab filtered and analyzed for the dissolved portion of target constituents.

If necessary, and pursuant to industry-accepted guidance, stabilization criteria may be adjusted to accommodate Site-specific or well-specific conditions (USEPA, 1996).

6.2 SAMPLE PRESERVATION AND SHIPMENT

Groundwater samples will be collected in the designated size and type of containers required for specific parameters and laboratory methods. Sample bottles will be pre-preserved and do not require field preservation. Where temperature control is required, field personnel will place samples in a cooler with ice immediately after sample collection. Dry ice, blue ice, and other cooling packs may not be used. Samples will be cooled to less than 6°C and maintained until receipt by the analytical laboratory.

Samples will be delivered to the APC General Testing Laboratory within 48 hours of collection following appropriate temperature control and chain-of-custody procedures. At no time will samples be analyzed after the method-prescribed hold time has expired. If using commercial shipping methods and relinquishing control of the samples to a third-party courier, the shipping cooler will be sealed using a custody seal to identify samples which may have been tampered with during transport to the laboratory. The seal must be labeled with instructions for the laboratory to notify the shipper if the seal is broken when the samples arrive at the laboratory.

6.3 ANALYTICAL METHODS

As shown on **Table 3, Monitoring Parameters and Reporting Limits**, 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 ADEM. Any practical quantitation limit (reporting limit) that is used will be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility. Field instruments used to measure pH must be accurate and reproducible to within 0.2 Standard Units (S.U.)

6.4 CHAIN OF CUSTODY CONTROL

The COC record is required for tracing sample possession from time of collection to time of receipt at the laboratory. The National Enforcement Investigations Center (NEIC) of USEPA considers a sample to be in custody under any of the following conditions:

- It is in the individual's possession
- It is in the individual's view after being in his/her possession
- It was in the individual's possession and (s)he locked it up (e.g. locked in a vehicle)
- It is in a designated secure area

All samples will be handled under COC procedures beginning in the field. The field team leader will be the field sample custodian and will be responsible for ensuring that COC procedures are followed. The use of electronic COCs are encouraged and utilized by APC Water Field Services. The record will contain the following information:

- Sample destination and transporter
- Sample identification numbers
- Signature of collector
- Date and time of collection
- Sample type
- Identification of monitoring well
- Number of sample containers
- Parameters requested for analysis
- Signature of person(s) involved in the chain of possession
- Inclusive dates of possession

The samples must be 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 must be signed and enclosed within the shipping container in a watertight bag. Shipping agents such as Federal Express do not sign the chain-of-custody form. The shipping receipt must be retained by the samplers as part of the record documenting sample transfer.

6.5 SAMPLING PARAMETERS AND FREQUENCY

Table 4, Groundwater Monitoring Parameters and Frequency presents the groundwater monitoring parameters and sampling frequency.

DETECTION MONITORING

After background has been established, detection monitoring will be performed in accordance with ADEM Admin Code r. 335-13-15-.06(5)(b). The detection monitoring frequency for the Appendix III parameters will be at least semi-annual during the active life of the facility and the post-closure care period.

ASSESSMENT MONITORING

If required, assessment monitoring will be performed per ADEM Admin Code r. 335-13-15-.06(6). Assessment monitoring is required whenever a SSI over background levels has been detected for one or more of the constituents listed in 40 CFR 257, Subpart D, Appendix III test parameters.

For assessment sampling at the Site, two semi-annual sampling events will be performed. As shown on **Table 4**, the full suite of Appendix III and IV constituents will be sampled and statistically analyzed semiannually. During these events all compliance monitoring wells and any newly-installed delineation well(s) will be sampled for Appendix III and IV constituents.

A proposal may be made to the Department to modify the subset of delineation wells sampled during assessment monitoring, or the sampling frequency. Proposed changes will be implemented following Department approval.

6.6 QUALITY ASSURANCE AND 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

In cases where sampling equipment is not new or dedicated, an equipment rinsate blank will be collected at a rate of one blank per 10 samples. The equipment rinsate blanks are prepared in the field using the same distilled or deionized water used for decontamination. The water is poured over and through each type of sampling equipment and submitted to the laboratory for analysis of target constituents. If the equipment is dedicated or new for each monitoring well, equipment rinsate blanks will be collected at a

rate of 1 blank per CCR unit. If a plant has multiple CCR storage units, an equipment rinsate blank should be collected at each unit (e.g. ash pond, Ash storage, etc.)

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 field duplicate will be collected for every group of 10 samples.

FIELD BLANKS

Field blanks are collected in the field using the same distilled or deionized 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 group of 10 samples.

The groundwater samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Program (NELAP). Lab data reports will include the records of standard laboratory QA/QC reports.

7. REPORTING RESULTS

The following subsections outline reportable results and delivery.

7.1 14-DAY NOTIFICATION

Pursuant to ADEM Admin. Code r. 335-13-15-.06(4)(h)3., the Department will be notified of any new statistical exceedances identified during detection or assessment monitoring within 14 days. Since the exceedance will also be described in subsequent monitoring reports and addressed pursuant to the rules, the initial notification will not be repeated for the same exceedance in subsequent monitoring events.

7.2 SEMI-ANNUAL GROUNDWATER MONITORING REPORTS

Pursuant to ADEM Admin. Code R. 335-13-15-.06(1)(f), an annual groundwater monitoring and corrective action report documenting the results of sampling and analysis will be submitted to ADEM by January 31st of each year. Pursuant to ADEM Admin. Code r. 335-13-15-.06(5)(g), a semi-annual report to coincide with the semi-annual groundwater sampling will also be submitted. The semi-annual report will be submitted to ADEM by July 31st of each year. At a minimum, semi-annual and 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. If applicable, analytical results for samples collected from each delineation well during the semi-annual period.
4. Discussion of results.
5. Recommendations for future monitoring consistent with ADEM's CCR rules.
6. Potentiometric surface contour map for the aquifer(s) being monitored, signed and sealed by an Alabama-registered P.G. or P.E.
7. 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.
8. Groundwater flow rate and direction calculations.
9. 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.

10. 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.

11. If applicable, assessment monitoring results.

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

13. Laboratory Reports and 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 and underdrain sampling locations.

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

17. Statistical analyses.

18. Certification by a qualified groundwater scientist.

8. 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 ADEM Admin Code r. 335-13-15-.06(4)(f), which incorporates the statistical analysis requirements of 40 CFR 257.93, the Site must specify in the operating record the statistical methods to be used in evaluating groundwater monitoring data for each constituent.

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 ADEM Admin Code r. 335-13-15-.06(4)(f). **Appendix B, Statistical Analysis Plan**, provides the Site-specific plan.

The Sanitas Groundwater statistical software is used to perform the statistical analyses. Sanitas is a decision support software package that incorporates the statistical tests required of RCRA Subtitle C and D facilities by EPA regulations. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals from Electric Utilities as well as with the USEPA Unified Guidance (2009).

The following subsections provide a high-level summary of the statistical analyses plan as broken down by monitoring program status.

8.1 DETECTION MONITORING

As discussed in **Appendix B**, Intrawell prediction limits, combined with a 1-of-2 verification strategy, are used for pH, sulfate, and TDS to determine whether there has been a statistically significant increase (SSI) over background groundwater quality. Interwell prediction limits, combined with a 1-of-2 verification strategy, are used to evaluate boron, calcium, chloride, and fluoride. Intrawell prediction limits use screened historical data within a given well to establish limits for parameters at that well. The most recent sample from the same well is compared to its respective background to identify SSIs over background. Interwell prediction limits pool upgradient well data to establish a background limit for an individual constituent. The most recent sample from each downgradient well is compared to the background limit to identify SSIs.

Groundwater Stats Consulting demonstrated that these test methods were appropriate in the attached Statistical Analysis Plan, which was updated in April 2020 with additional data screening and evaluation. Time series plots were used to screen proposed background data for suspected outliers, or extreme values that would result in limits that are not conservative from a regulatory perspective. Suspected outliers at all wells for Appendix III parameters are formally tested using Tukey's box plot method and, when identified, flagged in the computer database.

The following adjustments are also applicable to the statistical analysis per the Unified Guidance:

- No statistical analyses are required on wells and analytes containing 100% non-detects (EPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% nondetects in the background, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for non-detects is the practical quantitation limit (PQL) as reported by the laboratory.
- When data contain between 15-50% non-detects the Kaplan-Meier non-detect adjustment is applied to the background data.
- Non-parametric prediction limits are used on data containing greater than 50% non-detects.

8.2 ASSESSMENT MONITORING

When in assessment monitoring, Appendix IV constituent concentrations are compared to a GWPS. Appendix IV analysis uses the pooled results from the individual downgradient well to develop a well-specific Confidence Interval that is compared to the statistical limit (GWPS). The statistical limit is either the Inter-well Tolerance Limit (i.e. background) calculated using the pool of all available upgradient well data (see Chapter 7 of the Unified Guidance), or an applicable GWPS published in the regulations such as the Maximum Contaminant Level (MCL). As discussed in the Statistical Analysis Plan, Appendix IV background data are screened for outliers and extreme trending patterns that would lead to artificially elevated statistical limits.

Interwell Tolerance Limits (background) were calculated using pooled upgradient well data for Appendix IV parameters. When the Lower Confidence Limit (LCL), or the entire interval, exceeds the GWPS as discussed in the USEPA Unified Guidance (2009), the result is recorded as an SSL.

As described in 40 CFR § 257.95(h)(1)-(3) and specified by ADEM Variance dated April 15, 2019, the GWPS is:

(1) The maximum contaminant level (MCL) established under 40 CFR §141.62 and 141.66.
(2) Where an MCL has not been established:
    (i) Cobalt 0.006 mg/L;
    (ii) Lead 0.015 mg/L;
    (iii) Lithium 0.040 mg/L; and
    (iv) Molybdenum 0.100 mg/L.
(3) Background levels for constituents where the background level is higher than the MCL or rule-specified GWPS.

Details regarding the statistical analysis of assessment monitoring results are included in the Statistical Analysis Plan in **Appendix B**.

8.2.1 Delineation Wells

During assessment monitoring, any newly-installed delineation wells will be sampled for Appendix III and IV constituents on the same schedule as the compliance monitoring well network. A proposal may be made to the Department to modify the subset of delineation wells sampled during assessment monitoring, or the sampling frequency. Data obtained from delineation wells will be compared to the GWPS numerically until sufficient data is obtained to prepare well-specific Confidence Intervals.

9. REFERENCES

ASTM Standard D5092, 2004(2010)e1, Standard Practice for Design and Installation of Groundwater Monitoring Wells, ASTM International, West Conshohocken, PA, DOI 10.1520/D5092-04R10E01, www.astm.org

Alabama Department of Environmental Management (ADEM), 2012, Solid Waste Program, Division 13, ADEM Admin. Code r. 335-13-4

Diehl, S.F., Goldhaber, M.B., and Hatch, J.R., 2004, Modes of occurrence of mercury and other trace-elements in coals from the warrior field, Black Warrior Basin, Northwestern Alabama, International Journal of Coal Geology, v. 59, p. 193-208

Geological Survey of Alabama (GSA), 2010b, Digital Geologic Map of Alabama, URL: http://www.gsa.state.al.us/index.html, accessed November, 2010.

Goldhaber, M.B., Lee, R.C., Hatch, J.R., Pashin, J.C., and Treworgy, J., 2000, Distribution of a suite of elements including arsenic and mercury in Alabama coal, U.S. Geological Survey Miscellaneous Field Study Map MF-223

Goldhaber, M.B., Lee, R.C., Hatch, J.R., Pashin, J.C., and Treworgy, J., 2002, The role of large-scale fluid flow in subsurface arsenic enrichment, In: Welch, A., Stollenwerk, K (Eds.), Arsenic in Ground Water: Occurrence and Geochemistry, v. 5, p. 127-176

Jennings, S.P., and Cook, M.R., 2010, A Report to the Hanceville Water Works and Sewer Board, Open File Report 1001

Pashin, J.C., and Raymond, D.E., 2004, Glacial-eustatic control of coalbed methane reservoir distribution (Pottsville Formation; Lower Pennsylvanian) in the Black Warrior Basin of Alabama: Tuscaloosa, Alabama, University of Alabama College of Continuing Studies, 2004 International Coalbed Methane Symposium Proceedings, Paper 0413, 15 p.

Pashin, J.C., 2007, Hydrodynamics of Coalbed Methane Reservoirs in the Black Warrior Basin: Key to Understanding Reservoir Performance and Environmental Issues, Applied Geochemistry, v. 22, I. 10, p. 2257-2272

Raymond, D.E., Osborne, W.E., Copeland, C.W. Jr, and Neathery, T.L., 1988, Alabama Stratigraphy: Alabama Geological Survey Circular, v. 140, p. 1-97 Sapp, C.D., and Emplaincourt, J., 1975, Physiographic regions of Alabama, Special Map 168, Geological Survey of Alabama

Stricklin, V.E., 1989, Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama: Area 3, U.S. Geological Survey, Water-Resources Investigations Report 88-4120 State Waste Management Board. 2016. State Solid Waste Management Regulations – (9VAC20-81 et seq.). January.

USEPA, 1986 RCRA Groundwater Monitoring Technical Enforcement Guidance Document.

USEPA, 1993. Subpart E, Groundwater Monitoring and Corrective Action, in Chapter 5, Solid Waste Disposal Facility Criteria Technical Manual. EA530-R-93-017.

U.S. Environmental Protection Agency (EPA), 2004, Evaluation of Sampling and Field-Filtration Methods for the Analysis of Trace Metals In Groundwater Project Summary, EPA/600/SR-94/119

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Resource Conservation and Recovery – Program Implementation and Information Division. March.

USEPA. 2015. Federal Register. Volume 80. No. 74. Friday April 17, 2015. Part II. Environmental Protection Agency. 40 CFR Parts 257and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. [EPA-HQ-RCRA–2009– 0640; FRL–9919–44–OSWER]. RIN–2050–AE81. April

Unites States Environmental Protection Agency (USEPA), 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA/540/S-95/504.

Ward II, W.E., Barnett, R.L., Rheams, L.J., 1989, Coal Resources of Walker County, Alabama, Geological Survey of Alabama, Special Map 205

Tables

Well Name	Purpose	Installation Date	Northing [1]	Easting [1]	Ground Elevation [2]	Top of Casing Elevation [2]	Well Depth (ft.) Below Top of Casing	Top of Screen Elevation [2,3]	Bottom of Screen Elevation [2,3]	Screen Length (ft.)
MW-1 [4]	Upgradient	1/15/2014	1330794.064	594082.361	499.19	502.25	107.56	405.09	395.09	10
MW-2 [4]	Upgradient	10/23/2014	1331053.309	593548.802	498.54	502.12	94.58	417.94	407.94	10
MW-3 [4]	Upgradient	10/23/2014	1330842.402	593025.397	522.23	525.9	119.07	417.23	407.23	10
MW-4 [4]	Upgradient	2/19/2012	1330289.727	592896.414	516.67	518.63	128.66	400.37	390.37	10
GS-GSA-MW-3	Downgradient	12/8/2015	1329120.128	2054772.316	439.75	442.63	129.68	323.35	313.35	10
GS-GSA-MW-4	Downgradient	12/9/2015	1329235.421	2054872.732	439.44	442.10	107.86	344.64	334.64	10
GS-GSA-MW-8	Downgradient	12/20/2015	1328959.796	2054804.925	401.33	404.38	128.45	286.33	276.33	10
GS-GSA-MW-3V	Vertical Delineation	2/25/2019	1329100.49	2054755.12	439.60	442.68	191.58	261.60	251.60	10
GS-GSA-MW-4V	Vertical Delineation	2/25/2019	1329256.83	2054882.74	439.29	442.18	154.39	308.29	288.29	20
GS-GSA-MW-9H	Horizontal Delineation	2/3/2019	1328157.96	2054972.56	333.04	335.83	60.29	286.04	276.04	10
GS-GSA-MW-10H[5]	WL Only Piezometer	2/4/2019	1328612.73	2055441.67	336.56	339.52	29.46	320.56	310.56	10
GS-GSA-MW-11H	Horizontal Delineation	2/6/2019	1327162.44	2056243.5	260.13	263.02	49.39	224.13	214.13	10
GS-GSA-MW-12H	Horizontal Delineation	10/28/2019	1328654.77	2054387.54	396.73	399.73	67.50	322.23	332.23	10
GS-GSA-MW-13H	Horizontal Delineation	10/29/2019	1327186.88	2055007.85	263.63	266.46	34.90	221.80	231.80	10

Notes:

1. Northing and easting are in feet relative to the State Plane Alabama West North America Datum of 1983.
2. Elevations are in feet relative to the North American Vertical Datum of 1988.
3. Top of screen and bottom of screen depths are calculated relative Top of Casing elevation and less the well sump length of 0.4'.
4. Upgradient monitor wells MW-1 through MW-4 are located at the Gorgas CCR Landfill East of the Gypsum Pond.
5. Location GS-GSA-MW-10H was originally intended to be a horizontal delineation well but did not produce sufficient groundwater flow and is being re-designated as a piezometer.

Table 2. Plant Gorgas GP Upgradient Comparisons – Key Indicator Parameters													
Well Designation	**Well ID**	**DO** (mg/L)	**pH** (SU)	**ORP** (mV)	**Conductivity** (uS/cm)	**Boron** (mg/L)	**Calcium** (mg/L)	**Sulfate** (mg/L)	**Chloride** (mg/L)	**Arsenic** (mg/L)	**Cobalt** (mg/L)	**Lithium** (mg/L)	**Molybdenum** (mg/L)
Upgradient	MW-1	0.50	5.17	197.3	2326.29	0.0218	149.23	1500.00	2.31	Non-Detect [2]	0.0555	0.0244	Non-Detect [2]
Upgradient	MW-2	0.20	5.93	59.4	1957.84	0.0283	171.85	1039.00	3.39	Non-Detect	0.0585	0.0551	Non-Detect
Upgradient	MW-3	0.68	5.08	159.5	3600.49	0.0404	301.38	2490.77	1.61	Non-Detect	0.3105	0.188	Non-Detect
Upgradient	MW-4	1.62	6.15	151.8	3791.49	0.0427	301.38	2597.69	1.95	Non-Detect	Non-Detect	0.0495	Non-Detect
Compliance [1]	Average Concentrations from Wells	0.23	5.61	100.46	3056.0	2.653	389.83	1947.00	164.70	0.004	0.107	0.310	Non-Detect [2]

Notes:

1. Compliance wells with SSL's include GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8.

2. Non-Detect indicates the result was not detected above the MDL and is considered a non-detect.

3. Upgradient monitor wells MW-1 through MW-4 are located at the Gorgas CCR Landfill East of the Gypsum Pond.

Appendix III Parameters		
Parameter	**Analytical Method**	**Reporting Limit (mg/L) [1]**
Boron	EPA 200.7/200.8	0.05
Calcium	EPA 200.7/200.8	0.25
Chloride	EPA 300.0	2
Fluoride	EPA 300.0	0.1
pH	None	None
Sulfate	EPA 300.0	5
Total Dissolved Solids (TDS)	SM 2540C	5
Appendix IV Parameters		
Parameter	**Analytical Method**	**Reporting Limit (mg/L)**
Antimony	EPA 200.7/200.8	0.0025
Arsenic	EPA 200.7/200.8	0.00125
Barium	EPA 200.7/200.8	0.0025
Beryllium	EPA 200.7/200.8	0.0025
Cadmium	EPA 200.7/200.8	0.0025
Chromium	EPA 200.7/200.8	0.0025
Cobalt	EPA 200.7/200.8	0.0025
Fluoride	EPA 300.0	0.1
Lead	EPA 200.7/200.8	0.00125
Lithium	EPA 200.7/200.8	0.0025
Mercury	EPA 7470A	0.0002
Molybdenum	EPA 200.7/200.8	0.015
Selenium	EPA 200.7/200.8	0.00125
Thallium	EPA 200.7/200.8	0.0005
Radium 226 & 228 combined [2]	EPA 9315/9320	1 pCi/L

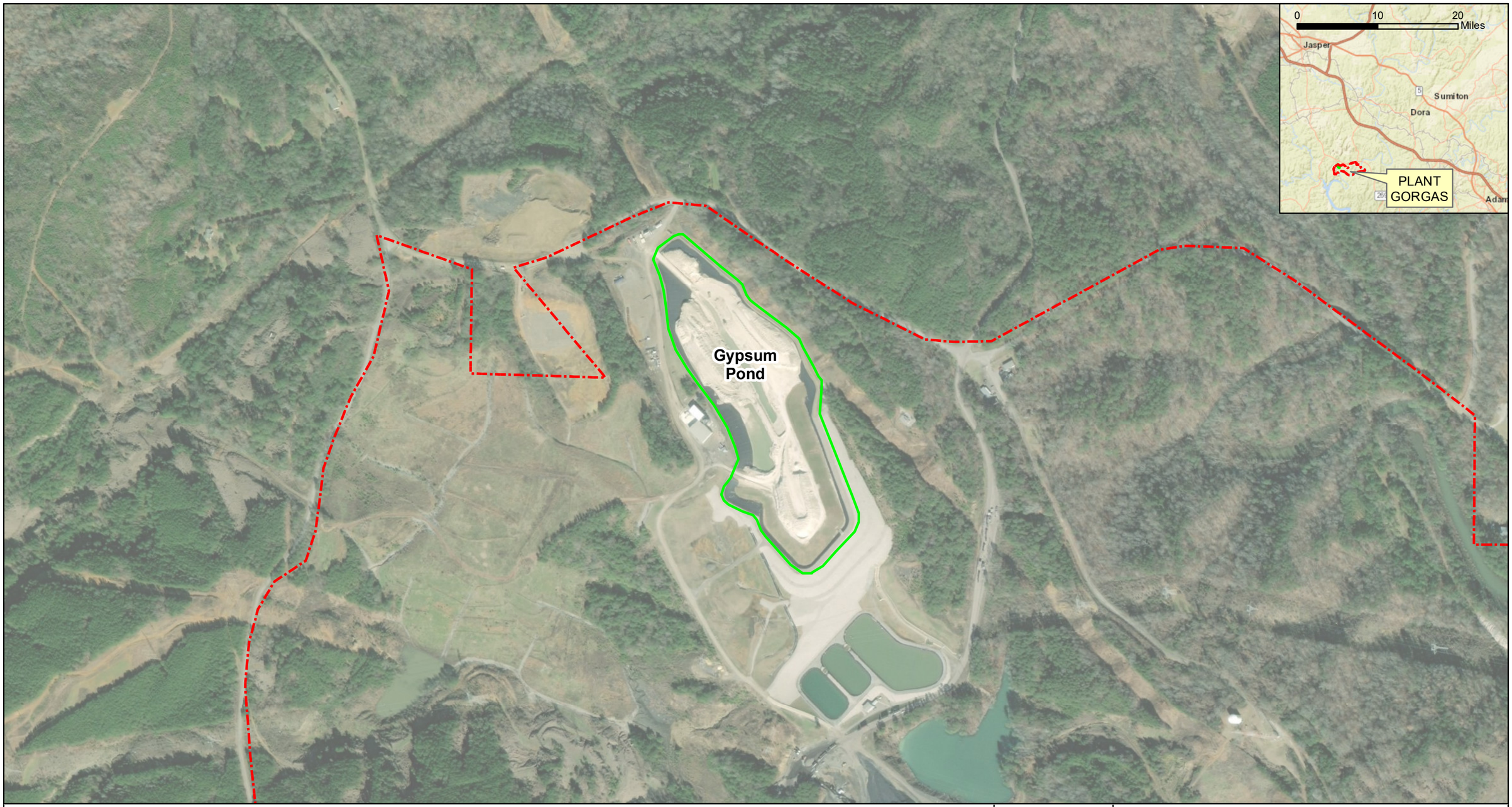
Notes:

1. mg/L - Milligrams per liter

2. Combined Radium 226 + 228 reported in pCi/L - Picocuries per liter

Monitoring Parameters		Groundwater Sampling Schedule	
		Semi-Annual Event 1	Semi-Annual Event 2
		(Jan-June)	(July-Dec)
Field Parameters	Temperature	x	x
	pH	x	x
	Specific Conductance	x	x
	Oxidation Reduction Potential	x	x
	Turbidity	x	x
	Dissolved Oxygen	x	x
Appendix III	Boron	x	x
	Calcium	x	x
	Chloride	x	x
	Fluoride	x	x
	pH	x	x
	Sulfate	x	x
	Total Dissolved Solids	x	x
Appendix IV	Antimony	x	x
	Arsenic	x	x
	Barium	x	x
	Beryllium	x	x
	Cadmium	x	x
	Chromium	x	x
	Cobalt	x	x
	Fluoride	x	x
	Lead	x	x
	Lithium	x	x
	Mercury	x	x
	Molybdenum	x	x
	Selenium	x	x
	Thallium	x	x
	Radium 226 & 228	x	x

Figures



Legend

- Gypsum Pond Boundary
- Property Boundary (Approximate)

N

0 500 1,000 2,000 Feet

SCALE	1:6,000
DATE	3/23/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

SITE LOCATION MAP
PLANT GORGAS GYPSUM POND

FIGURE NO

FIGURE 1

Southern Company

Legend

- Phase II Horizontal Delineation Well
- Phase II Vertical Delineation Well
- Phase I Horizontal Delineation Well
- Phase I Vertical Delineation Well
- Downgradient Monitoring Well
- Existing Piezometer
- Gypsum Pond Boundary
- Property Boundary (Approximate)
- 20-Foot Topographic Contour

N

0 250 500 1,000 1,500 Feet

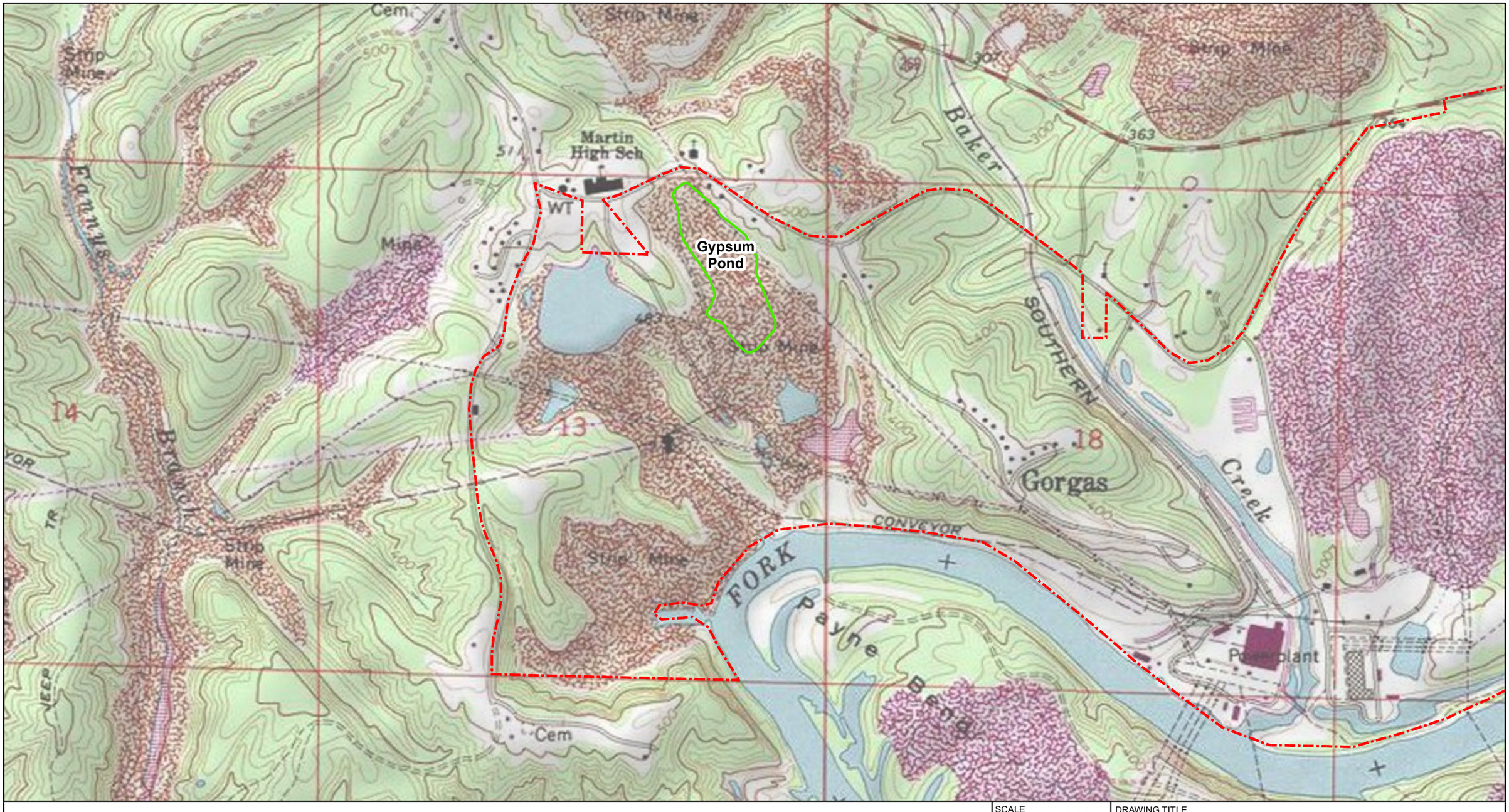
SCALE	1:6,000
DATE	4/14/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

SITE PLAN MAP
PLANT GORGAS GYPSUM POND

FIGURE NO **FIGURE 2**

Southern Company



Legend

- Gypsum Storage Area Boundary
- Property Boundary (Approximate)

N

0 1,000 2,000 4,000 Feet

SCALE	1:12,000
DATE	4/9/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

SITE TOPOGRAPHIC MAP
PLANT GORGAS GYPSUM POND

FIGURE NO

FIGURE 3A

Southern Company

Legend

- Gypsum Storage Area Boundary
- Property Boundary (Approximate)
- 20-ft Elevation Contour
- 100-ft Elevation Contour

Elevation (ft NAVD88)
High : 561.79
Low : 252.025

N

0 500 1,000 2,000 3,000 Feet

NOTE: ft NAVD88 indicates feet above North American Vertical Datum of 1988.

SCALE	1:9,000
DATE	4/9/2020
DRAWN BY	KAR
CHECKED BY	GBD

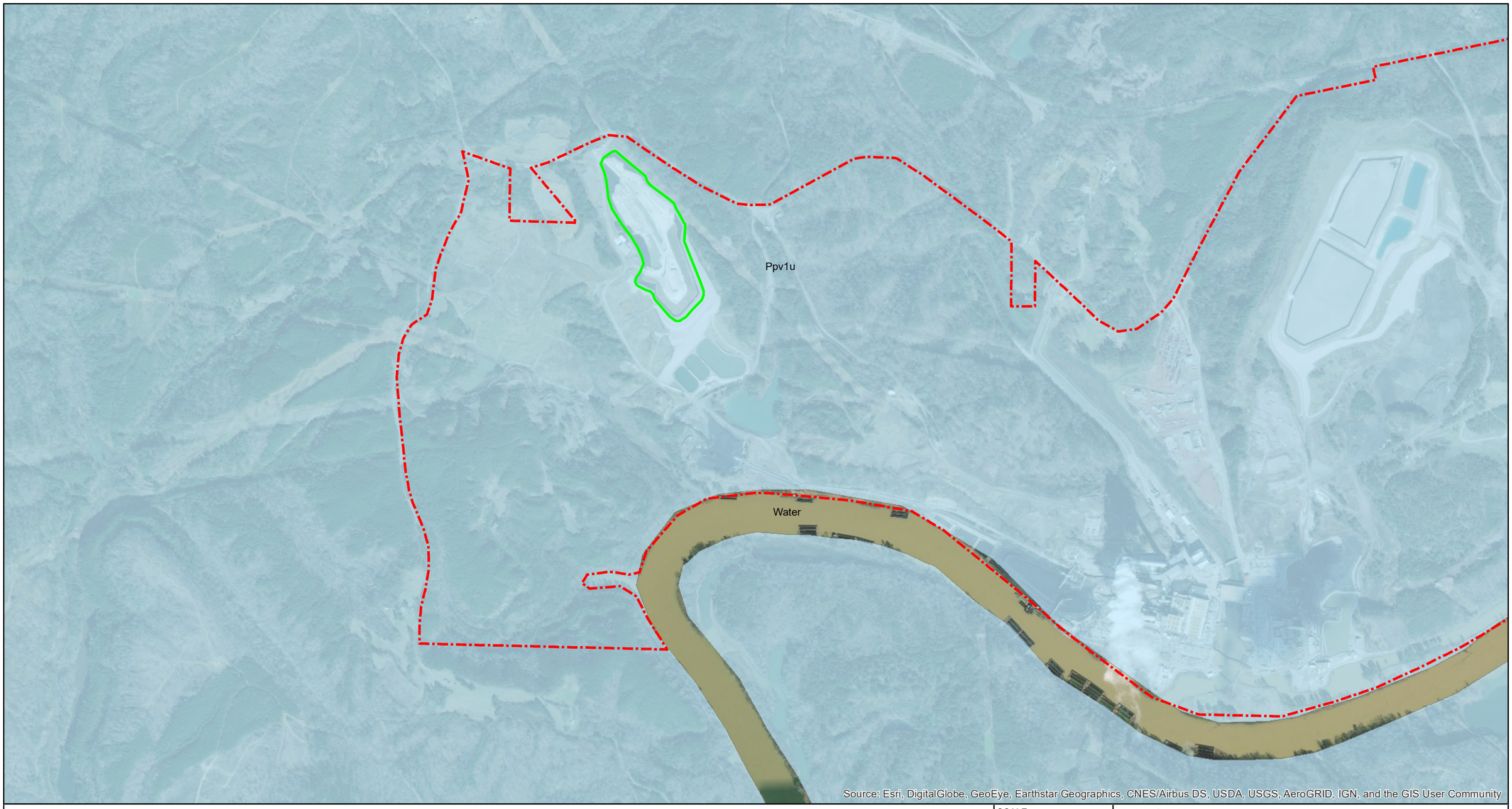
DRAWING TITLE

SITE ELEVATION MODEL
PLANT GORGAS GYPSUM POND

FIGURE NO

FIGURE 3B

Southern Company



Legend

- Gypsum Pond Boundary
- Property Boundary (Approximate)

Geologic Units

- Pottsville Formation (upper part), Appalachian Plateaus (Ppv1u)

N

0 500 1,000 2,000 3,000 4,000 Feet

SCALE	1:12,000
DATE	4/14/2020
DRAWN BY	KAR
CHECKED BY	GBD

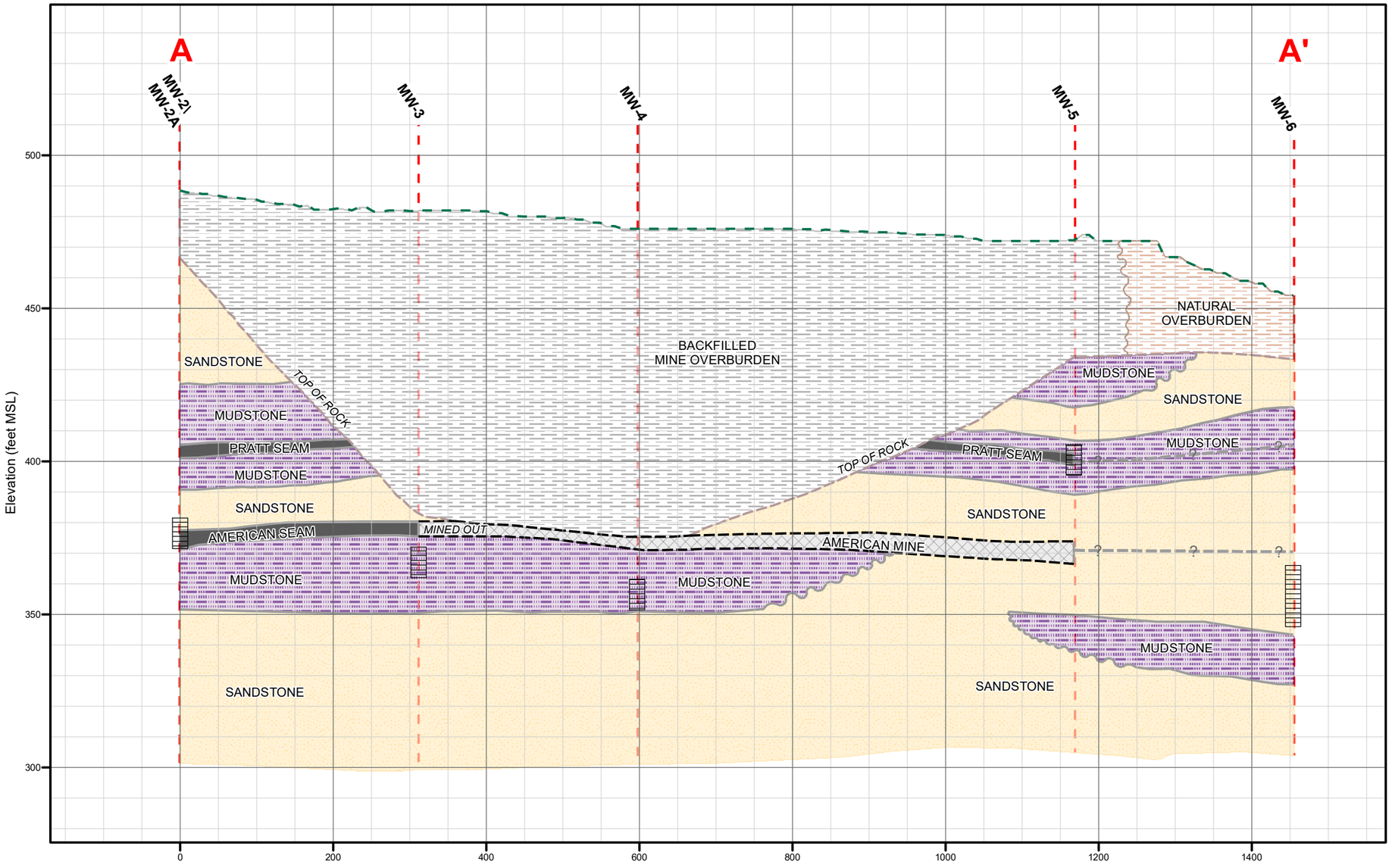
DRAWING TITLE

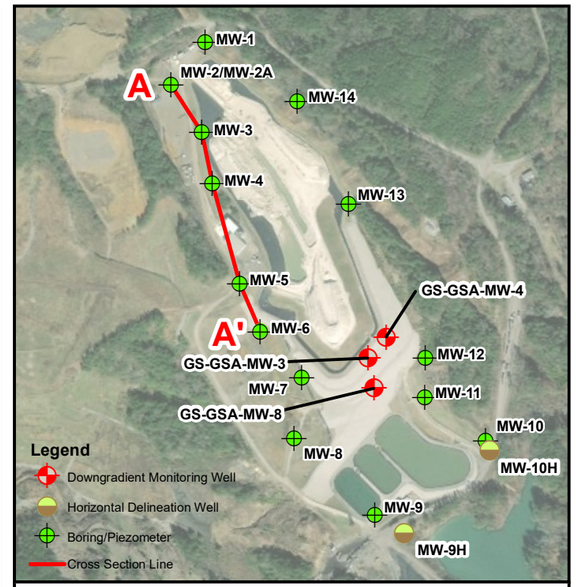
SITE GEOLOGIC MAP
PLANT GORGAS GYPSUM POND

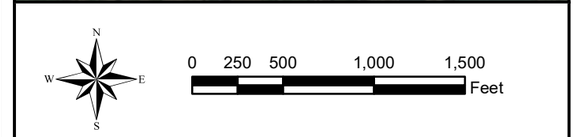
FIGURE NO

FIGURE 4

Southern Company







Legend

- Screen Interval
- Ground Surface Elevation
- Monitoring Well Location
- Top of Rock
- Strata Boundary
- Inferred Strata
- Mine

Geologic Units

- Backfilled Mine Overburden
- Natural Overburden
- Mudstone
- Sandstone
- Mine
- Coal

Notes: 1. Stratagraphic layers were correlated using a combination of boring data and gamma logs.

SCALE	1:1,800
DATE	3/23/2020
DRAWN BY	KAR
CHECKED BY	GBD

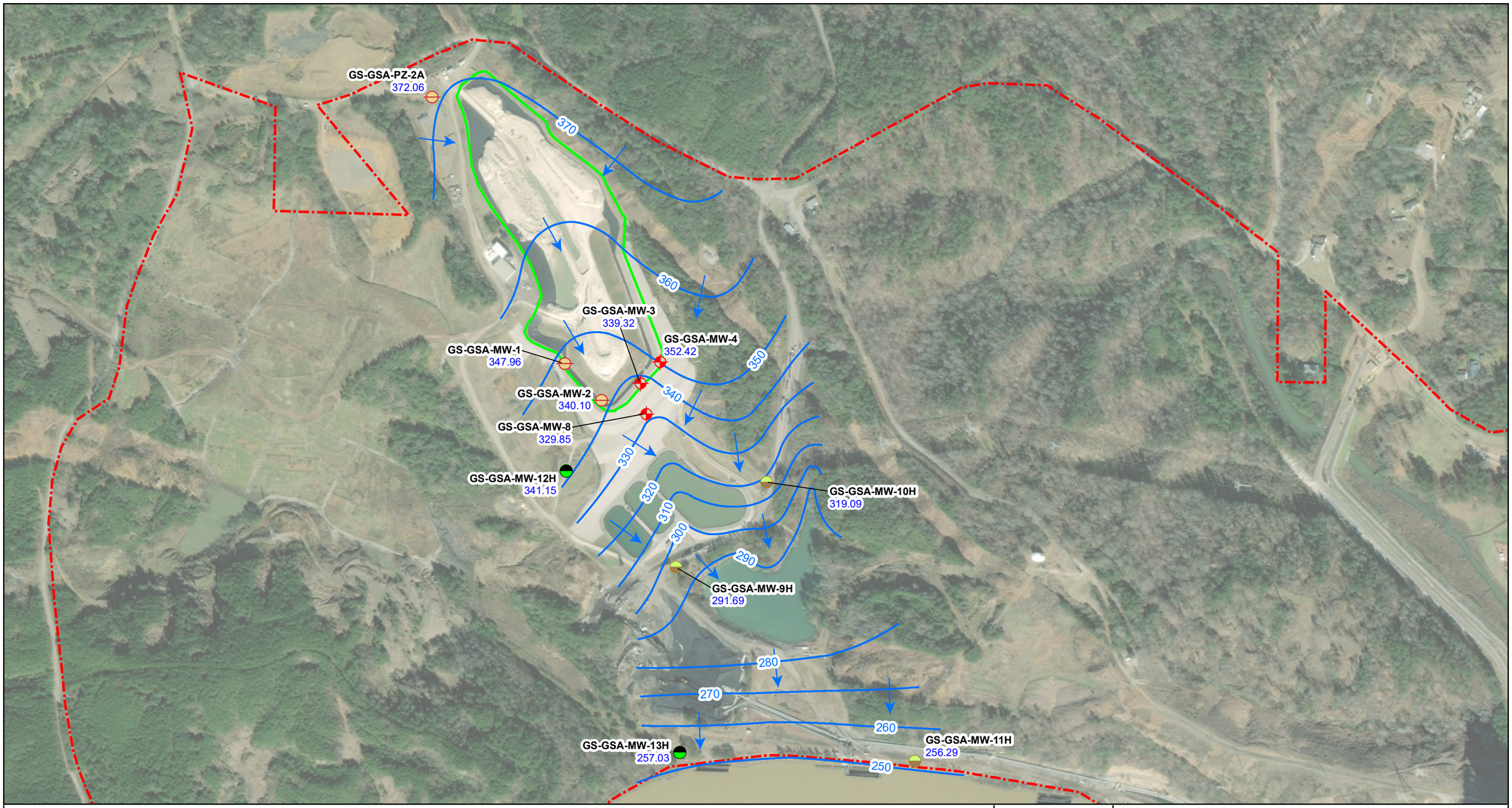
DRAWING TITLE

GEOLOGIC CROSS SECTION A - A'
PLANT GORGAS GYPSUM POND

FIGURE NO

FIGURE 5

Southern Company



Legend

- Downgradient Monitoring Well
- Phase I Horizontal Delineation Well
- Phase II Horizontal Delineation Well
- Piezometer

GS-GSA-MW-3 Well ID
339.32 Groundwater Elevation

- Potentiometric Surface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Property Boundary (Approximiate)
- Gypsum Pond Boundary

N

0 250 500 1,000 1,500 Feet

NOTES:
1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Vertical delineation wells were not factored into potentiometric surface contouring.
3. GS-GSA-MW-1 and GS-GSA-MW-2 are shown as piezometers, since they are not included in the monitoring well network for this site.

SCALE	1:6,000
DATE	4/9/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP FEBRUARY 3, 2020 PLANT GORGAS GYPSUM POND

FIGURE NO

FIGURE 6A

Southern Company

Legend

- Phase I Vertical Delineation Well
- Phase II Vertical Delineation Well
- Potentiometric Surface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Property Boundary (Approximiate)
- Gypsum Pond Boundary

GS-GSA-MW-3V Well ID
321.66 Groundwater Elevation

N

0 250 500 1,000 1,500 Feet

NOTES:
1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.

SCALE	1:6,000
DATE	4/9/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
VERTICAL DELINEATION WELLS
FEBRUARY 3, 2020
PLANT GORGAS GYPSUM POND

FIGURE NO
FIGURE 6B

Southern Company

Legend

- Existing Piezometer
- Phase II Horizontal Delineation Well
- Phase II Vertical Delineation Well
- Upgradient Monitoring Well
- Phase I Horizontal Delineation Well
- Phase I Vertical Delineation Well
- Downgradient Monitoring Well
- Property Boundary (Approximiate)
- Gypsum Pond Boundary
- Gypsum CCR Landfill Boundary

N

0 250 500 1,000 1,500 Feet

SCALE	1:6,000
DATE	4/13/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

MONITORING WELL LOCATION MAP
PLANT GORGAS GYPSUM POND

FIGURE NO **FIGURE 7**

Southern Company

Legend

- Wells Installed in October-November 2015
- Wells Installed in December 2015
- Property Boundary (Approximiate)
- Gypsum Pond Boundary
- Gypsum CCR Landfill Boundary

N

0 250 500 1,000 1,500 Feet

NOTES:
1. Wells installed in October to November 2015 did not produce enough groundwater to develop and sample.
2. Of the revised well locations drilled in December 2015, only wells GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8 (underlined in blue) provided enough groundwater to develop and sample.

SCALE	1:4,800
DATE	4/13/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

HISTORIC FIELD INVESTIGATION PLANT GORGAS GYPSUM POND

FIGURE NO **FIGURE 8**

Southern Company

Legend

- Proposed Phase III Horizontal Delineation Well
- Proposed Phase III Vertical Delineation Well
- Proposed Piezometer
- Phase II Horizontal Delineation Well
- Phase II Vertical Delineation Well
- Property Boundary (Approximiate)
- Gypsum Pond Boundary
- Phase I Horizontal Delineation Well
- Phase I Vertical Delineation Well
- Downgradient Monitoring Well
- Upgradient Monitoring Well
- Gypsum CCR Landfill Boundary

N

0 250 500 1,000 1,500 Feet

NOTE: Proposed piezometers are going to be utilized to better understand groundwater elevations to the west of the Gypsum Pond and could be converted to monitoring wells upon review of data.

SCALE	1:6,000
DATE	4/10/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

PROPOSED ADDITIONAL MONITORING LOCATIONS AND PIEZOMETERS PLANT GORGAS GYPSUM POND

FIGURE NO **FIGURE 9**

Southern Company

Appendix A

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DATE STARTED 11/12/2015 **COMPLETED** **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Sonic
DRILLED BY L. Yancey **LOGGED BY** S. Baxter **CHECKED BY** B. Coates
BORING DEPTH 118 ft. **GROUND WATER DEPTH: DURING** **COMP.** 118 ft. **DELAYED** 116.5 ft. after 0 hrs.
NOTES Completed as a temporary piezometer Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. =)
		Well-graded Gravel with Silt (GW-GM) mottled black (10YR 2/1) fill moist, silty clayey — Not Surveyed		**Surface Seal**
10		**Silty Gravel (GM)** mottled very dark brown / dusky yellowish brown (10YR 2/2) saprolite dry, well graded, angular		
20				
		SANDSTONE mottled with red / moderate reddish brown (10R 4/6) and very dusky red (10R 2/2) fine grain, medium hard to hard, moderately to completely weathered, silty, completely fractured, indeterminant bedding		
30		**SANDSTONE** medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly weathered, horizontal, moderately to intensely fractured		**Annular Fill**
40		shaly, interbedded mudstone		
50				
		SANDSTONE medium dark gray (N4) coarse grain, medium hard to hard, slightly weathered, horizontal, moderately fractured		
60				

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS

LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA
		SANDSTONES medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly to moderately weathered, horizontal, intensly fractured along shaly partings	Not Surveyed	Top of casing Elev. = (CONTINUED)
		MUDSTONE medium dark gray (N4) medium hard to hard, slightly weathered, completely fractured		
		SANDSTONES medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly to moderately weathered, horizontal, intensly fractured along shaly partings		
70				
80				**Annular Fill**
		COAL black (N1) Pratt coal seam		
		SANDSTONES medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly to moderately weathered, horizontal, intensly fractured along shaly partings		
90		**MUDSTONE** medium dark gray (N4) medium hard to hard, slightly weathered, shaly		
		SANDSTONES medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly to moderately weathered, horizontal, intensly fractured along shaly partings		
100				
		SANDSTONE medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly weathered, horizontal, moderately to intensely fractured along shaly partings		**Annular Seal**
				Filter Pack
		SANDSTONES medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly to moderately weathered, horizontal, intensly fractured along shaly partings		
110				
		COAL black (N1) American coal seam		
				Screen Tip Elevation

Bottom of borehole at 118.0 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DATE STARTED 12/16/2015 **COMPLETED** 12/17/2015 **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Coates
BORING DEPTH 97 ft. **GROUND WATER DEPTH: DURING** 91 ft. **COMP.** **DELAYED** 71.9 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. =)
		Well-graded Gravel with Clay (GW-GC) Not Surveyed		
		Hand auger to 4 ft.		
		very dark grayish brown (2.5Y 3/2) and brownish yellow (10YR 6/8) fill		
		gray (2.5Y 6/1) with sand		
10		black (5Y 2.5/1)		
20				
		Well-graded Sand with Clay (SW-SC)		**Annular Fill**
30		light olive brown (2.5Y 5/4) and dark grayish brown (2.5Y 4/2) fill		
		Well-graded Sandy Gravel (GW)		
		gray (2.5Y 5/1) fill pulverized gravel		
		brownish yellow (10YR 6/8)		
		Well-graded Gravel with Clay (GW-GC)		
40		very dark gray (5Y 3/1) fill		
		Well-graded Sand with Clay (SW-SC)		
		brownish yellow (10YR 6/8)		
		Sandy Fat Clay (CH)		
50		brownish yellow / dark yellowish orange (10YR 6/6) and gray (10YR 5/1) damp, high		

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA
		Not Surveyed		Top of casing Elev. =
		Sandy Fat Clay (CH) *(Con't)*		(CONTINUED)
60		**Well-graded Sand with Clay (SW-SC)**		
		strong brown (7.5YR 5/6) and very dark gray (7.5YR 3/1) damp, with wood debris, gravel		**Annular Fill**
70		▼		
		dark yellowish brown (10YR 4/4) damp		
80		very dark gray (10YR 3/1) saturated, very loose, sticky		**Annular Seal**
		gray (2.5Y 5/1) and light gray (2.5Y 7/1) pulverized rock, sandy gravel		**Filter Pack**
90		▽		
		wet		
		gray (2.5Y 5/1), light gray (2.5Y 7/1) and very dark gray (2.5Y 3/1) wet		**Screen Tip Elevation**
		highly to not weathered, thin to thick bedding, wet		

Bottom of borehole at 97.0 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DATE STARTED 12/14/2015 **COMPLETED** 12/16/2015 **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Coates
BORING DEPTH 117 ft. **GROUND WATER DEPTH: DURING** 105 ft. **COMP.** **DELAYED** 89.2 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA
		Well-graded Gravel with Clay (GW-GC) Not Surveyed		Top of casing Elev. =
		Hand auger to 4 ft.		
		black (N1) and light olive brown (2.5Y 5/4) fill dry		
		black (N1) and medium dark gray (N4)		
10				
		olive brown (2.5Y 4/4)		
20		dark gray (2.5Y 4/1)		
		yellowish brown (10YR 5/8)		
		black (10YR 2/1)		**Annular Fill**
30				
40				
50				

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS

LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (Not Surveyed; 75 / 150 / 225)	WELL DATA
		Top of casing Elev. =		
		(CONTINUED)		
		Well-graded Gravel with Clay (GW-GC) *(Con't)*		
60				
70		black (10YR 2/1) and dark gray (10YR 4/1)		
				Annular Fill
80		black (10YR 2/1) shale gravel (soft)		
		Lean Clay (CL)		
90		mottled brownish yellow / dark yellowish orange (10YR 6/6) and light gray (10YR 7/2) saprolite dry		
		Peat (PT)		
		grayish black (N2) damp, 4 inch seam of weathered coal		
		Lean Clay (CL)		
		light gray (10YR 7/1) dry		
		mottled very pale brown (10YR 7/3) and light gray (10YR 7/1) damp		
100		**Sandy Lean Clay (CL)**		
		mottled dark grayish brown (2.5Y 4/2) and dark yellowish brown (10YR 4/4) moist		**Annular Seal**
		very dark gray (5YR 3/1) and gray (5YR 5/1) fine grain, very soft to hard, not to completely weathered, horizontal, transition zone, shaley mudstone		**Filter Pack**
		free water present		
110		very dark gray (5YR 3/1) and gray (5YR 5/1) fine grain, hard to very hard, not weathered, thin bedding		
		completely weathered		
		not weathered, thick bedding		
		thin bedding		**Screen Tip Elevation**
		completely weathered, free water present		

Bottom of borehole at 117.0 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DATE STARTED 12/8/2015 **COMPLETED** **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Sonic
DRILLED BY L. Yancey **LOGGED BY** S. Baxter **CHECKED BY** B. Coates
BORING DEPTH 157 ft. **GROUND WATER DEPTH: DURING** 107 ft. **COMP.** 106.5 ft. **DELAYED** 106.5 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (Not Surveyed; 75, 150, 225)	WELL DATA (Top of casing Elev. =)
		Well-graded Gravel with Silt (GW-GM) mottled black (10YR 2/1), dark greenish gray (10Y 4/1) and dusky red / dark reddish brown (10R 3/4) fill moist, mine spoil		**Surface Seal**
10		light brown and yellow, clayey		
20		gray and gravelly		
30		black with trace wood pulp, larger gravel (cobble size) 27 - 34'		
40		trace pulp wood		**Annular Fill**
50		no pulp, trace coal fragments		
60				
70				
80				

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS

LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA
		Not Surveyed		Top of casing Elev. = (CONTINUED)
90		**Well-graded Gravel with Silt (GW-GM)** mottled black (10YR 2/1), dark greenish gray (10Y 4/1) and dusky red / dark reddish brown (10R 3/4) fill moist, mine spoil *(Con't)*		**Annular Fill**
100				
110		saturated		**Annular Seal**
				Filter Pack
120				
				Screen Tip Elevation
130		brown, 8.0 in boulder at 135', more native mix		
140		**Well-graded Gravel with Silt (GW-GM)** brown (10YR 4/3) saprolite moist, well graded, angular gravel, silty		
150		**SANDSTINE** medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly weathered, horizontal, shaly, thinly bedded, moderately fractured		

Bottom of borehole at 157.0 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DATE STARTED 12/9/2015 **COMPLETED** **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Sonic
DRILLED BY M. Pope **LOGGED BY** S. Baxter **CHECKED BY** B. Coates
BORING DEPTH 117 ft. **GROUND WATER DEPTH: DURING** **COMP.** 87.5 ft. **DELAYED** 87.7 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. =)
		Well-graded Gravel with Silt (GW-GM) mottled black (10YR 2/1), dark greenish gray (10Y 4/1) and dusky red / dark reddish brown (10R 3/4) fill moist, mine spoil. trace coal	Not Surveyed	**Surface Seal**
10		with local native mix		
20				
30		5.0in boulder		**Annular Fill**
40		soild black		
50		mix of spoil and native		
60		more gravelly, mine spoil		

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT GORGAS
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Natural Gamma (75 / 150 / 225)	WELL DATA
		Well-graded Gravel with Silt (GW-GM) mottled black (10YR 2/1), dark greenish gray (10Y 4/1) and dusky red / dark reddish brown (10R 3/4) fill moist, mine spoil. trace coal *(Con't)*	Not Surveyed	Top of casing Elev. = (CONTINUED)
70				**Annular Fill**
		trace wood pulp		
80				
		Silty Gravel (GM) mottled dusky red / dark reddish brown (10R 3/4) and light red / moderate reddish orange (10R 6/6) saprolite moist, well graded, angular gravel		**Annular Seal**
90				**Filter Pack**
		Coal (COAL) black (10YR 2/1) American Coal seam		
100				
		Partially Weathered Rock (GM) mottled dusky red / dark reddish brown (10R 3/4) and light red / moderate reddish orange (10R 6/6) saprolite moist, well graded, angular gravel		**Screen Tip Elevation**
		SANDSTONE medium dark gray (N4) fine to coarse grain, medium hard to hard, slightly weathered, horizontal, moderately to completely fractured, thinly bedded, some oxidation in upper contact		
110				

Bottom of borehole at 117.0 feet.

BORING GS-GSA-MW-08

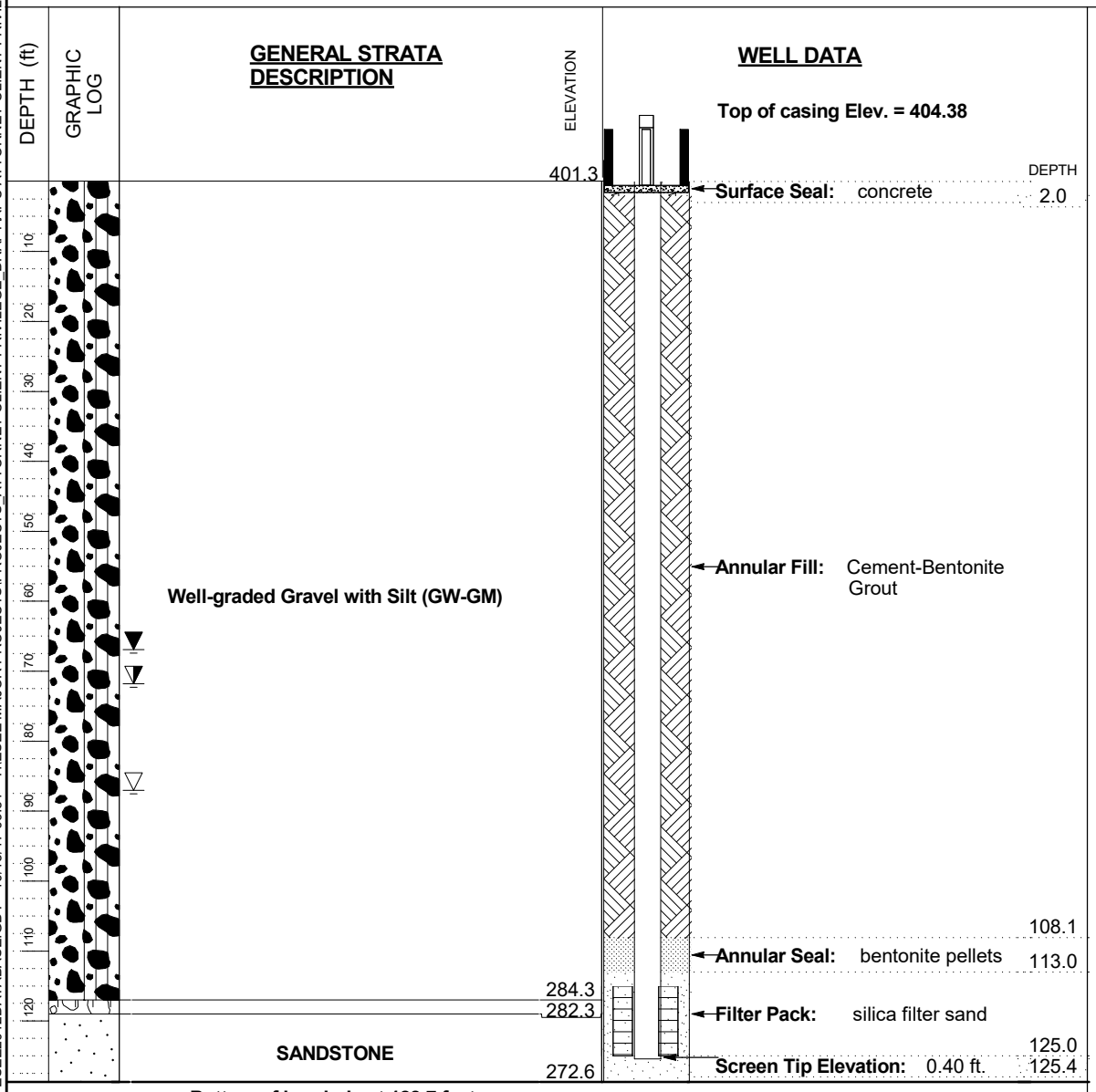
SOUTHERN COMPANY

LOG OF WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas
LOCATION

DATE STARTED 12/20/2015 **COMPLETED** **SURF. ELEV.** 401.3 **COORDINATES:** N:1,328,959.80 E:2,054,804.93
CONTRACTOR Cascade Drilling **EQUIPMENT** Prosonic **METHOD** Sonic
DRILLED BY M. Pope **LOGGED BY** S. Baxter **CHECKED BY** B. Coates
BORING DEPTH 128.69 ft. **GROUND WATER DEPTH: DURING** 87 ft. **COMP.** 66.9 ft. **DELAYED** 71.8 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.



WELL SPECIFICATIONS

Casing Diameter: 2 inches
Casing Material: Schedule 40 PVC
Casing Length: 128.45 feet
Screen Diameter: 2 inches
Screen Length: 10 feet
Screen Mesh: 0.010
Screen Material: PVC
PrePack Screen: Yes

RECORD OF BOREHOLE GS-GSA-MW-9H

SHEET 1 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/2/19
DATE COMPLETED: 2/3/19

NORTHING: 1,328,157.96
EASTING: 2,054,972.56
GS ELEVATION: 333.04
TOC ELEVATION: 335.83 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
0		0.00 - 7.50 (SP), gravelly SAND, fine to coarse sand, fine to coarse gravel; non-cohesive, dry. [RESIDUUM]	SP			1		10.00 / 10.00
	330				325.54 / 7.50			
5		7.50 - 16.00 Highly to moderately weathered; medium strong to strong; brown and gray; iron staining; SANDSTONE with interbeds of SILTSTONE crossbedded.						
	325							
10						2		8.50 / 10.00
	320				317.04 / 16.00			
15		16.00 - 20.00 Moderately weathered; weak to medium strong; gray; SHALE with thin interbeds of SILTSTONE/SANDSTONE.						
	315				313.04 / 20.00			
20		20.00 - 50.00 Moderately weathered; medium strong; interbedded SHALE, SANDSTONE, and SILTSTONE.				3		10.00 / 10.00
	310							
25								
	305							
30						4		8.50 / 10.00
	300	32.80 - 33.20 Crushed zone + 1x4 " vertical fracture.			299.84			
35								
	295							
40		Log continued on next page						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

Grout (Aquaguard _ Bentonite Grout)

Bentonite Pel-Plug _

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 47'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 47' - 57'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 44.5' - 60'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 39' - 44.5'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 39'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-9H

SHEET 2 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/2/19
DATE COMPLETED: 2/3/19

NORTHING: 1,328,157.96
EASTING: 2,054,972.56
GS ELEVATION: 333.04
TOC ELEVATION: 335.83 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	TYPE	REC	MONITORING WELL / PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
40		20.00 - 50.00 Moderately weathered; medium strong; interbedded SHALE, SANDSTONE, and SILTSTONE. *(Continued)* 40.00 - 43.00 SHALE more prominant.			290.04				Time Release Pellets	**WELL CASING** Interval: 0' - 47' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush
290										
45						5		9.00 / 10.00	Filter Media _ #10 Sand	**WELL SCREEN** Interval: 47' - 57' Material: Schedule 40 PVC U-Pack Diameter: 2" Slot Size: 0.010" End Cap: 6", 2"-diameter, Sump
		46.60 - 50.00 Iron staining.							2" PVC Sch 40 0.010 Slot U-Pack _ Screw Fit with Rubber Seal Screen	**FILTER PACK** Interval: 44.5' - 60' Type: Filter Media #10 Sand
285										**FILTER PACK SEAL** Interval: 39' - 44.5' Type: Bentonite Pellets
50					283.04					**ANNULUS SEAL** Interval: 0' - 39' Type: Grout (Aquaguard Bentonite Grout)
		50.00 - 60.00 Moderately weathered; dark gray to gray; iron staining; interbedded SHALE, SANDSTONE, and SILTSTONE.			50.00					
		52.40 - 52.90 Crushed zone.			280.14					**WELL COMPLETION** Pad: 4'x4' Concrete Pad Protective Casing: 3' Stick-Ups
280		53.10 - 53.60 Vertical fracture. Iron staining on fracture.			279.44					
55						6		8.00 / 10.00		**DRILLING METHODS** Soil Drill: Sonic Rock Drill: Sonic
		56.80 - 57.00 Crushed zone.							Sand Filter _ Pack	
275										
60		Boring completed at 60.00 ft			273.04					
270										
65										
265										
70										
260										
75										
255										
80										

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

GEOPHYSICAL RECORD OF BOREHOLE: GS-GSA-MW-9H

PLANT GORGAS GYPSUM POND DELINEATION WELLS

GOLDER

Project Number: 18114896

Client: Southern Company Services

Southern Company

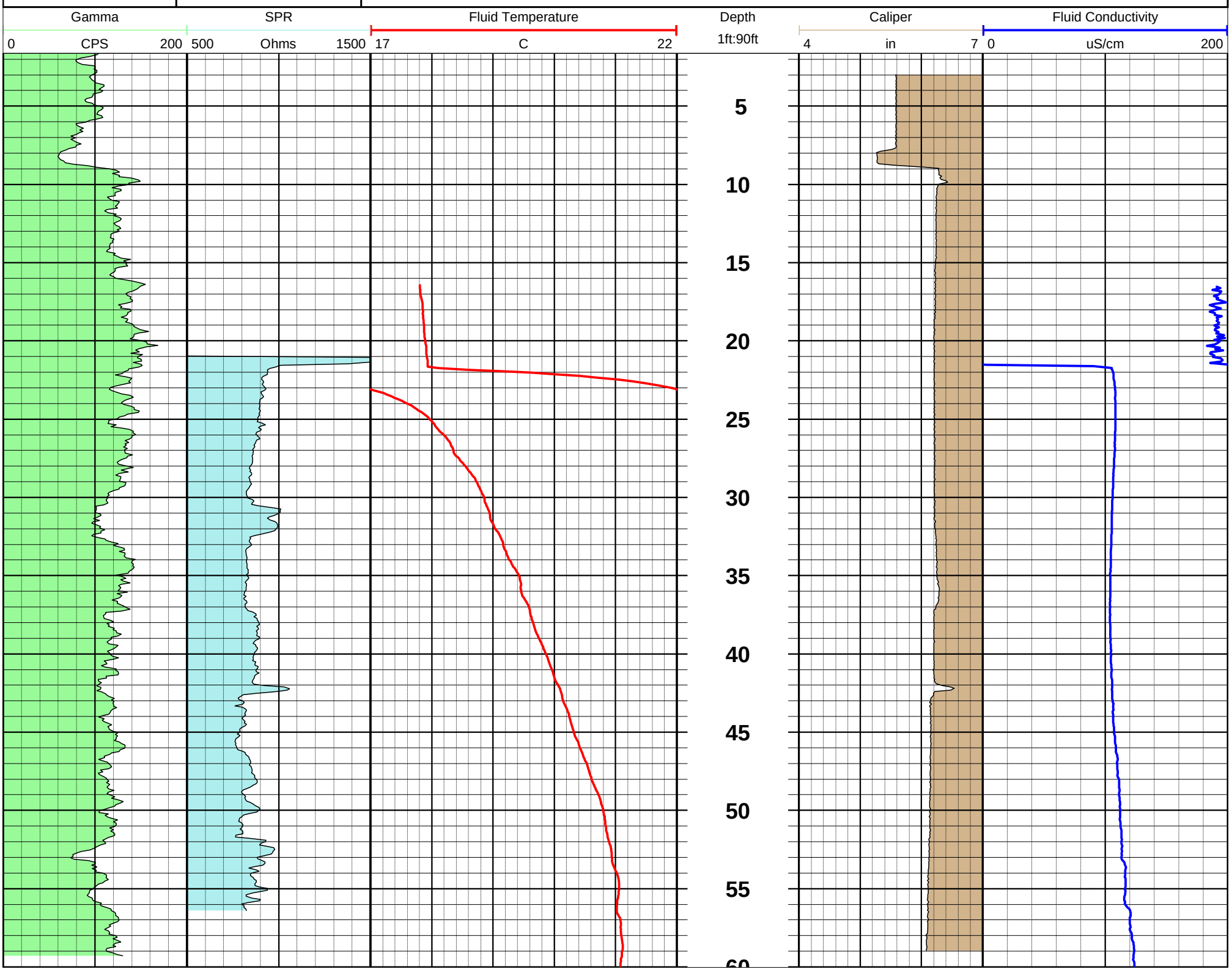
Date: 2-3-2019

Location: Parrish, Al	TOC Elev msl: na
Easting: na	Casing Stick-up: 1.7 ft ags
Northing: na	Casing Diameter: 5.4 in ID
Ground Elev msl: na	Casing Material: Steel
Borehole Dip: vertical	Water Level: 21.6 ft bgs
Borehole Az: na	Logged By: BA
Borehole Size: 6" Sonic	Log Depth Ref: Ground
Drilled Depth: 60 ft	Log Date: 2-3-19
Drill Comp Date: 2-3-19	Image Plot(s) Ref: MN
Casing Depth: 9 ft bgs	Dip Referenced to Horizontal

Notes: The FTC run was made under static conditions.

Deviation data recorded with MSI rental QL40-DEV sn182909.
Tilt at BOH = 0.4 deg

Tools used were:
FTC sn6103 MSI rental
Caliper 2PCA-1000 sn4824 MSI rental
Gamma + SPR 40-LGR sn5809



RECORD OF BOREHOLE GS-GSA-MW-10H

SHEET 1 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/4/19
DATE COMPLETED: 2/4/19

NORTHING: 1,328,612.73
EASTING: 2,055,441.67
GS ELEVATION: 336.56
TOC ELEVATION: 339.52 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
0	335	0.00 - 2.00 (GP), coarse GRAVEL of shale; highly weathered; non-cohesive, moist. [FILL]	GP	334.56 2.00			
		2.00 - 10.00 (SP), gravelly SAND, some silt, fine to coarse; dark gray to light gray; non-cohesive, dry. [FILL] 2.50 - 5.00 Trace COAL.	SP	331.56	1		9.00 10.00
10	325	10.00 - 15.00 (SM), gravelly silty SAND; light gray; non-cohesive, dry; possible concrete. [FILL]		326.56 10.00			
15	320	15.00 - 20.00 Moderately weathered; very weak to weak; gray; thinly laminated SHALE with interbeds of SILTSTONE. 19-20: Vertical fracture		321.56 15.00	2		9.50 10.00
20	315	20.00 - 30.00 Slightly weathered; weak to medium strong; gray to dark gray; interbedded SHALE and SILTSTONE. 20.10 - 25.00 Trace COAL. Iron staining.		316.56 20.00			
25	310			311.56	3		6.00 10.00
30	305	30.00 - 40.00 Medium strong; gray to dark gray; crossbedded and bedding structures; interbedded SILTSTONE, SHALE, and SANDSTONE. 0 degree fractures along interbedding planes.		306.56 30.00			
35	300				4		9.50 10.00
40		Log continued on next page		296.56			

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

Grout (Aquaguard Bentonite Grout)
Bentonite Pel-Plug Time Release Pellets
Filter Media #10 Sand
2" PVC Sch 40 0.010 Slot U-Pack Screw Fit with Rubber Seal Screen
Sand Filter Pack
3/8" Holeplug Bentonite Chips

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 16'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 16' - 26'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 13.5' - 27'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 9.5' - 13.5'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 9.5'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-10H

SHEET 2 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/4/19
DATE COMPLETED: 2/4/19

NORTHING: 1,328,612.73
EASTING: 2,055,441.67
GS ELEVATION: 336.56
TOC ELEVATION: 339.52 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	TYPE	REC	MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
40	295	40.00 - 60.00 Medium strong; gray to dark gray; interbedded SHALE, SILTSTONE, and SANDSTONE.			40.00	5		10.00 / 10.00		**WELL CASING** Interval: 0' - 16' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush **WELL SCREEN** Interval: 16' - 26' Material: Schedule 40 PVC U-Pack Diameter: 2" Slot Size: 0.010" End Cap: 6", 2"-diameter, Sump **FILTER PACK** Interval: 13.5' - 27' Type: Filter Media #10 Sand **FILTER PACK SEAL** Interval: 9.5' - 13.5' Type: Bentonite Pellets **ANNULUS SEAL** Interval: 0' - 9.5' Type: Grout (Aquaguard Bentonite Grout) **WELL COMPLETION** Pad: 4'x4' Concrete Pad Protective Casing: 3' Stick-Ups **DRILLING METHODS** Soil Drill: Sonic Rock Drill: Sonic
45	290									
50	285					6		9.50 / 10.00		
55	280									
60	275	Boring completed at 60.00 ft			276.56					
65	270									
70	265									
75	260									
80										

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

GEOPHYSICAL RECORD OF BOREHOLE: GS-GSA-MW-10H

PLANT GORGAS GYPSUM POND DELINEATION WELLS

GOLDER

Project Number: 18114896

Client: Southern Company Services

Southern Company

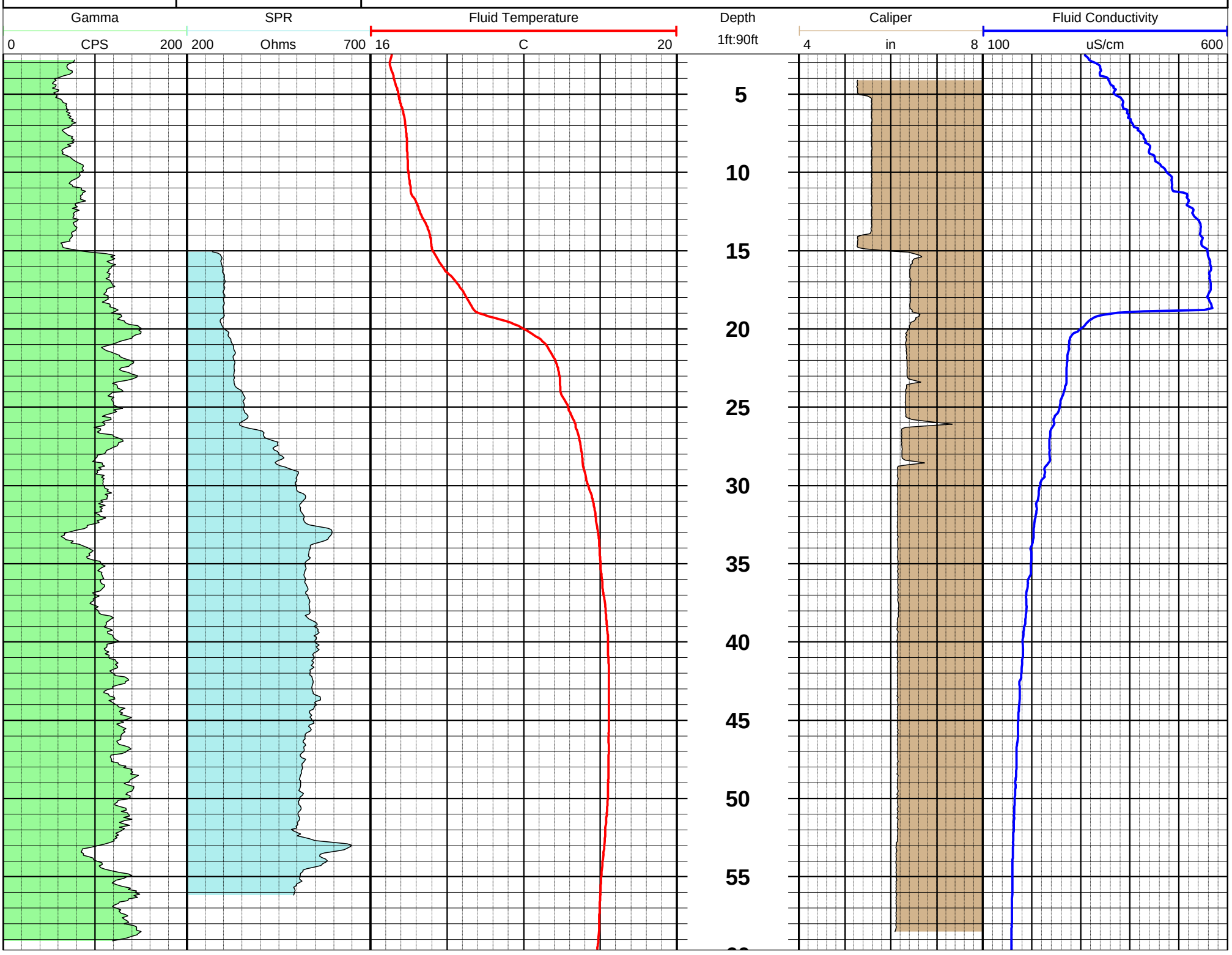
Date: 2-4-2019

Location: Parrish, Al	TOC Elev msl: na
Easting: na	Casing Stick-up: 0.5 ft ags
Northing: na	Casing Diameter: 5.4 in ID
Ground Elev msl: na	Casing Material: Steel
Borehole Dip: vertical	Water Level: 0.78 ft bgs
Borehole Az: na	Logged By: BA & CM
Borehole Size: 6" Sonic	Log Depth Ref: Ground
Drilled Depth: 60 ft	Log Date: 2-4-19
Drill Comp Date: 2-4-19	Image Plot(s) Ref: MN
Casing Depth: 15 ft bgs	Dip Referenced to Horizontal

Notes: The FTC run was made under static conditions.

Deviation data recorded with OBI sn163404, Tilt at BOH = 1 deg

Tools used were:
FTC sn6103 MSI rental
Caliper 2PCA-1000 sn4824 MSI rental
Gamma + SPR 40-LGR sn5809



RECORD OF BOREHOLE GS-GSA-MW-11H

SHEET 1 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/5/19
DATE COMPLETED: 2/6/19

NORTHING: 1,327,162.44
EASTING: 2,056,243.50
GS ELEVATION: 260.13
TOC ELEVATION: 263.02 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
0	260	0.00 - 5.00 (ML), gravelly sandy SILT, trace organics, gravels of weathered shale/siltstone/sandstone; dark brown to black. Low Recovery. [ALLUVIUM]	ML					
					255.13 / 5.00	1		3.00 / 10.00
5	255	5.00 - 10.00 Weak to medium strong, fine grained, SANDSTONE with interbedded SHALE and SILTSTONE. Poor recovery.						
					250.13 / 10.00			
10	250	10.00 - 20.00 Weight of rod pushed through. Sample not recorded.						
						2		0.00 / 10.00
15	245							
					240.13 / 20.00			
20	240	20.00 - 25.00 (CL), CLAY, some silt; brown-gray; cohesive, wet, w > PL, soft to firm. [ALLUVIUM]	CL					
					235.13 / 25.00	3		7.50 / 10.00
25	235	25.00 - 28.90 (CL), gravelly CLAY, trace COAL fragments, fine to coarse gravels; brown with orange streaks; cohesive, w <~ PL, stiff. [ALLUVIUM]	CL					
					231.23			
		28.90 - 30.00 (GC), clayey GRAVEL, gravels of weathered shale; brown with orange mottling; non-cohesive, dry. [ALLUVIUM]	GC		28.90 / 230.13			
30	230	30.00 - 40.00 (CL), sandy CLAY, some rounded gravels of weathered shale, trace COAL fragments; light brown-orange with orange mottling; cohesive, w ~ PL, soft. [ALLUVIUM]			30.00			
			CL			4		10.00 / 10.00
35	225							
					220.13			
40		Log continued on next page						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

Grout (Aquaguard Bentonite Grout)

Bentonite Pel-Plug Time Release Pellets

Filter Media #10 Sand

2" PVC Sch 40 0.010 Slot U-Pack Screw Fit with Rubber Seal Screen

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 36'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 36' - 46'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 33.5' - 46.5'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 29' - 33.5'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 29'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-11H

SHEET 2 of 2

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 60.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/5/19
DATE COMPLETED: 2/6/19

NORTHING: 1,327,162.44
EASTING: 2,056,243.50
GS ELEVATION: 260.13
TOC ELEVATION: 263.02 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	SAMPLES: TYPE	SAMPLES: REC	MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
40	220	40.00 - 50.00 Medium strong; dark gray to gray; burrow structures; interbedded SHALE, SILTSTONE, and SANDSTONE.			40.00					
45	215					5		7.50 / 10.00	Sand Filter Pack 3/8" Holeplug Bentonite Chips	
50	210				210.13					
		50.00 - 60.00 Medium strong; dark gray-black to gray; SHALE with interbedded SILTSTONE and SANDSTONE.			50.00					
55	205					6		9.00 / 10.00		
60	200	Boring completed at 60.00 ft			200.13					
65	195									
70	190									
75	185									
80										

WELL CASING
Interval: 0' - 36'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 36' - 46'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 33.5' - 46.5'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 29' - 33.5'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 29'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: T. Vanardo

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells
LOCATION Parrish, AL

DATE STARTED 10/27/2019 **COMPLETED** 10/28/2019 **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Taylor **LOGGED BY** T. Trieu **CHECKED BY** K. RIch **ANGLE** **BEARING**
BORING DEPTH 64 ft. **GROUND WATER DEPTH: DURING** **COMP.** 44.4 ft. **DELAYED** 60.9 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
		(TOPSOIL) - Wet TOPSOIL and contains rootlets		Completion: protective steel cover; 3-foot square concrete pad
		Gravelly Silt (MLG) - Wet to dry, dark gray and black mine spoil with mudstones - recovered as gravelly SILT		Backfill:
5		**Well-graded Gravel with Silt (GW-GM)** - Dry, dark gray, brown, and brownish red, well-graded GRAVEL with mudstone fragments and clay		
		Gravelly Silt (MLG) - Wet to moist, black and dark gray mine spoil with mudstone fragments - recovered as gravelly SILT		
10		**Well-graded Gravel with Silt (GW-GM)** - Dry, black and dark gray, well-graded GRAVEL with mudstone fragments and trace of clay		
		(SANDSTONE) - Highly weathered to decomposed, moist, brown, gray, and light brown SANDSTONE - recovered as clayey sand		
15		**Lean Clay (CL)** - Moist, brown, orange, gray, and reddish orange, lean CLAY		
		Well-graded Gravel with Silt (GW-GM) - Dry, black, gray, and dark gray, well-graded GRAVEL with mudstone fragments and contains weathered shale fragments and interbedded mine spoils (recovered as gravelly silt)		
20				Annular Fill: 3 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
25				
30				
		Fat Clay (CH) - Wet to moist, brown, brownish red, gray, and olive brown, fat CLAY with sand and contains weathered shale fragments		
35		**(SANDSTONE)** - Highly weathered to decomposed, dry, brown, light brown, and dark brown SANDSTONE interbedded weathered shale		
40				

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
				Completion: protective steel cover; 3-foot square concrete pad
		(CONTINUED)		
		(SANDSTONE) - Highly weathered to decomposed, dry, brown, light brown, and dark brown SANDSTONE interbedded weathered shale*(Con't)*		Annular Fill: 3 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
45		**(SANDSTONE)** - Highly weathered to decomposed, moist to dry, brown, light brown, and gray SANDSTONE interbedded with moderately to highly weathered shale		Annular Seal: 1 Bucket of 3/8" TR30 bentonite pellets and 1/2 bag of hole plug (50 lbs)
50				Filter: 4 Bags (20/40) silica filter sand; 50 lbs each
55		**(SHALE)** - Highly weathered to decomposed, wet to moist, gray, light brown, and light gray SHALE interbedded with highly weathered sandstone		**Standpipe: 4" OD PVC (SCH 40)** Screen: 10 ft; slotted
60		**(SANDSTONE)** - Highly weathered to decomposed, wet to moist, light brown, brown and light gray SANDSTONE interbedded with highly weathered shale		
		(SHALE) - Highly weathered, wet, olive gray SHALE		
		(SHALE) - Powdered to very broken, gray and dark gray SHALE with layer of sandstone (4" thick)		Sump:0.3 ft.
65		Bottom of borehole at 64.0 feet.		
70				
75				
80				
85				

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells
LOCATION Parrish, AL

DATE STARTED 10/29/2019 **COMPLETED** 10/29/2019 **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Taylor **LOGGED BY** T. Trieu **CHECKED BY** K. RIch **ANGLE** **BEARING**
BORING DEPTH 44 ft. **GROUND WATER DEPTH: DURING** **COMP.** 6.9 ft. **DELAYED**
NOTES Well was set at 44' but later abandoned. Driller removed well and all material and drilled down to 64' to reset well. Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
		Utility Clearance (HYDROEXCAVATION) - HYDROEXCAVATED from 0 to 4.50 ft.		Completion: protective steel cover; 3-foot square concrete pad
5		**Gravelly Silt (MLG)** - Wet, black mine spoil - recovered as gravelly SILT		Annular Fill: 1 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
10		**Fat Clay (CH)** - Wet to moist, olive brown and black, fat CLAY and contains mine spoils, weathered shale, and organic odor (recovered as gravelly silt) - Trace of rootlets		
15				Annular Seal: 1 Bucket of 3/8" TR30 bentonite pellets and 1/2 bag of hole plug (50 lbs)
20				Filter: 4.75 Bags (20/40) silica filter sand; 50 lbs each
25		**(SANDSTONE)** - Highly weathered to decomposed, wet, brown and light brown SANDSTONE interbedded with highly weathered shale		**Standpipe:** **4" OD PVC (SCH 40)** Screen: 10 ft; slotted
30		**(SHALE)** - Highly weathered to decomposed, wet to moist, olive brown and gray SHALE with trace of highly weathered sandstone		Sump:0.3 ft.
35		**(SHALE)** - Moderately to highly weathered, shattered to very broken, dark gray and gray SHALE		Backfill:hole plug

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
				Completion: protective steel cover; 3-foot square concrete pad
				(CONTINUED)
40		**(SHALE)** - Unweathered to moderately weathered, very broken to broken, dark gray and gray SHALE and contained decomposed shale (towards the bottom of the borehole)*(Con't)*		Backfill:hole plug
		Bottom of borehole at 44.0 feet.		
45				
50				
55				
60				
65				
70				
75				

SIMPLE GEOLOGY WITH WELL 2019 (WOOD 3) - ESEE DATABASE.GDT - 11/7/19 15:29 - L:\GINT8\GINT8 - AMEC\PROJECTS\2019 PROJECTS\7630191633 - SCS GORGAS CCR DELINEATION WELLS.GPJ

RECORD OF BOREHOLE GS-GSA-MW-3V

SHEET 1 of 6

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
0		0.00 - 10.00 (GP), sandy GRAVEL, trace clay/silt; fine to coarse; black-brown with some orange; non-cohesive, moist. [FILL]	GP		429.6 10.00	1		5.00 10.00
10	430	10.00 - 40.00 (GC), sandy clayey GRAVEL, some silt; fine to coarse; black/brown/orange; non-cohesive, moist to wet. [FILL]	GC			2		8.50 10.00
20	420					3		6.50 10.00
30	410					4		4.50 10.00
40	400	Log continued on next page			399.6			

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

Grout (Aquaguard _ Bentonite Grout)

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-3V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
40		40.00 - 50.00 (GP), sandy GRAVEL, trace clay, trace silt; fine to coarse; brown-black. [FILL]			40.00			
45	395		GP			5		5.50 / 10.00
50	390				389.6			
		50.00 - 60.00 (GP), GRAVEL, trace sand, trace silt, trace clay; fine to coarse; black to brown-black. [FILL]			50.00			
55	385		GP			6		6.50 / 10.00
60	380				379.6			
		60.00 - 69.00 (GC), clayey GRAVEL, trace sand, some silt; fine to coarse; black; non-cohesive, moist to wet; trace COAL. [FILL]			60.00			
65	375		GC			7		6.00 / 10.00
					370.6			
		69.00 - 70.00 (GP), GRAVEL, trace sand; fine to coarse; black to black/gray; non-cohesive, moist to dry; trace COAL. [FILL]	GP		69.00 369.6			
70	370				70.00			
		70.00 - 120.00 (GP), GRAVEL, trace sand, trace silt, trace clay; fine to coarse; black to brown-black; non-cohesive, moist to wet; trace COAL. [FILL]						
75	365		GP			8		5.00 / 10.00
80	360							

Log continued on next page

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-3V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
80		70.00 - 120.00 (GP), GRAVEL, trace sand, trace silt, trace clay; fine to coarse; black to brown-black; non-cohesive, moist to wet; trace COAL. [FILL] *(Continued)*						
85	355					9		3.00 / 10.00
90	350							
95	345					10		6.00 / 10.00
100	340	100.00 - 120.00 Ash, recovered as: GRAVEL with some sand, some silt, black to black brown, trace coal	GP					
105	335					11		8.00 / 10.00
110	330							
115	325					12		3.00 / 10.00
120	320	Log continued on next page			319.6			

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-3V

SHEET 4 of 6

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
120		120.00 - 142.50 (SM), Ash recovered as: SILT and SAND with some gravel; black; non-cohesive, w < PL, soft to firm. ASH. [FILL]			120.00			
125	315					13		7.50 / 10.00
130	310		SM					
135	305					14		10.00 / 10.00
140	300				297.1			
		142.50 - 161.00 (ML/CL), sandy SILT/CLAY, trace to some gravel; gray-brown with orange mottling; cohesive, w < PL, soft to firm. [FILL]			142.50			
145	295	143.00 - 150.00 Trace organic material (wood).				15		10.00 / 10.00
150	290		ML		289.6			
155	285					16		10.00 / 10.00
160	280	Log continued on next page						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-3V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	TYPE	REC	MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES
160			ML		278.6				
		161.00 - 166.00 (GP), GRAVEL, some silt; fine to coarse; light gray gravels of weathered shale.	GP		161.00				
165	275				273.6	17		7.00/10.00	
		166.00 - 170.00 Highly weathered; medium strong; thinly laminated; SHALE.			166.00				
170	270				269.6				
		170.00 - 182.00 Moderately weathered; medium strong; gray to light gray; bioturbation; SHALE interbedded with SILTSTONE.			170.00				Bentonite Pel-Plug Time Release Pellets
175	265					18		6.50/10.00	Filter Media #10 Sand
180	260								2" PVC Sch 80 0.010 Slot U-Pack
		182.00 - 220.00 Moderately weathered to fresh; strong; gray to light gray; fossiliferous, bioturbated; interbedded SANDSTONE and SILTSTONE with small interbeds of SHALE.			257.6 182.00				
185	255					19		7.00/10.00	
									Sand Filter Pack
190	250								3/8" Holeplug Bentonite Chips
195	245					20		6.00/10.00	
200	240	Log continued on next page							

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-3V

SHEET 6 of 6

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 230.00 ft
LOCATION:

DRILL RIG: TSI 150CC
DATE STARTED: 2/18/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,100.49
EASTING: 2,054,755.12
GS ELEVATION: 439.60
TOC ELEVATION: 442.68 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
200		182.00 - 220.00 Moderately weathered to fresh; strong; gray to light gray; fossiliferous, bioturbated; interbedded SANDSTONE and SILTSTONE with small interbeds of SHALE. *(Continued)*						
205	235					21		8.00 / 10.00
210	230							
215	225					22		9.50 / 10.00
220	220				219.6			
		220.00 - 230.00 Fresh; strong; light gray; SANDSTONE.			220.00			
		223.50 - 227.00 Vertical ~90 degree fracture, possibly drilling induced.				23		10.00 / 10.00
225	215				212.6			
230	210				209.6			
		Boring completed at 230.00 ft						
235	205							
240	200							

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 178'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 178' - 188'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 175' - 189'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 170' - 175'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 170'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

GEOPHYSICAL RECORD OF BOREHOLE: GS-GSA-MW-3V

PLANT GORGAS GYPSUM POND DELINEATION WELLS

GOLDER

Project Number: 18114896

Client: Southern Company Services

Southern Company

Date: 2-26-2019

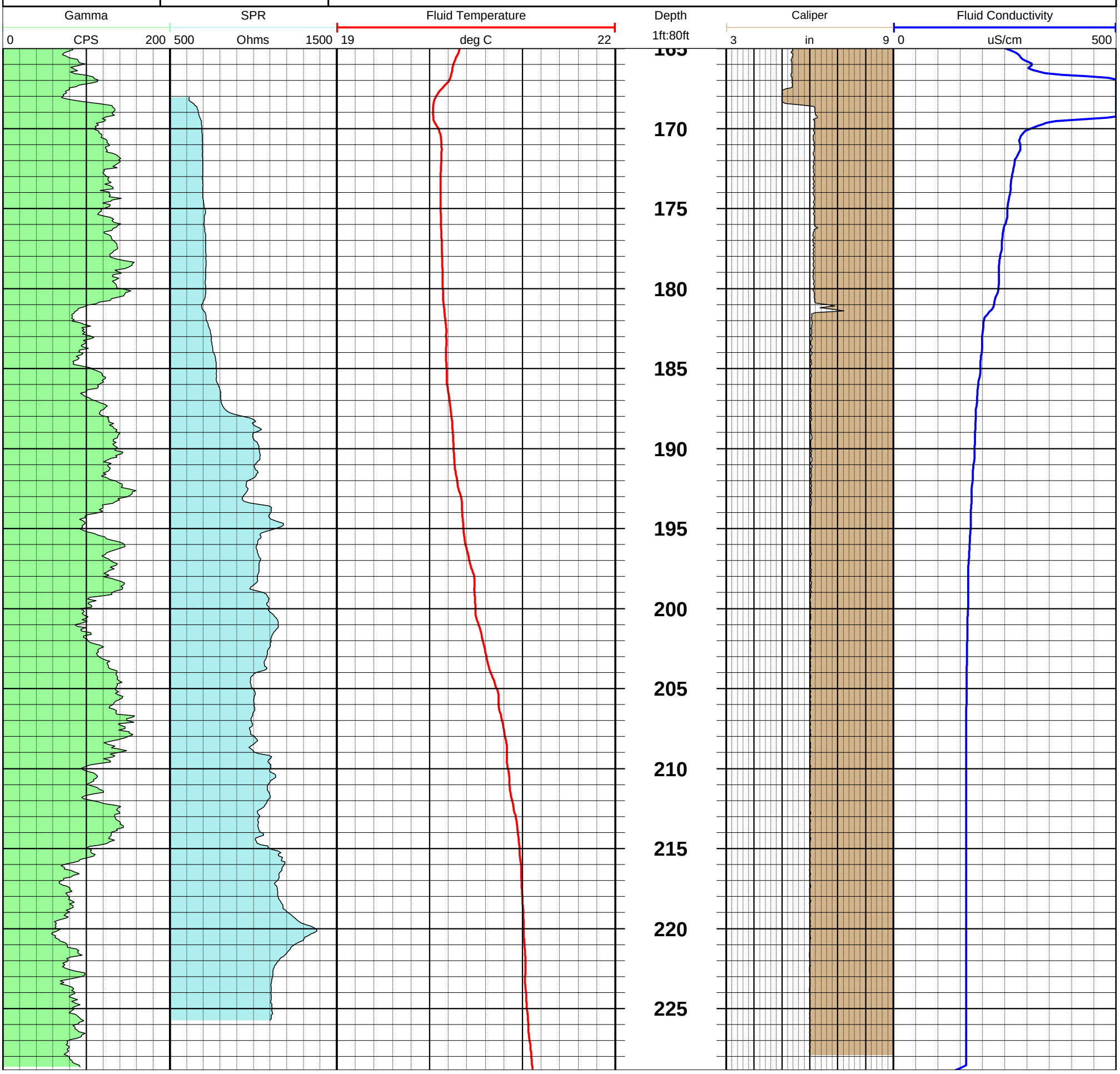
Location: Parrish, Al	TOC Elev msl: na
Easting: na	Casing Stick-up: 2 ft ags
Northing: na	Casing Diameter: 5.4 in ID
Ground Elev msl: na	Casing Material: Steel
Borehole Dip: vertical	Water Level: 109.7 ft bgs
Borehole Az: na	Logged By: CM
Borehole Size: 6" Sonic	Log Depth Ref: Ground
Drilled Depth: 230 ft	Log Date: 2/25-26/19
Drill Comp Date: 2-25-19	Image Plot(s) Ref: MN
Casing Depth: 168.5 ft bgs	Dip Referenced to Horizontal

Notes:

WL = 116.90-15:00/115.35 -16:00

Deviation data recorded with MSI rental QL40-DEV sn182909.
Tilt at BOH = 1.3 deg

Tools used were:
QL40 FTC sn5518
QL40 Caliper sn5521
Gamma + SPR 40-LGR sn5809



RECORD OF BOREHOLE GS-GSA-MW-4V

SHEET 1 of 4

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 158.50 ft
LOCATION: Gypsum Pond

DRILL RIG: TSI 150CC
DATE STARTED: 2/14/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,256.83
EASTING: 2,054,882.74
GS ELEVATION: 439.29
TOC ELEVATION: 442.18 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	TYPE	REC	MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
0		0.00 - 37.00 (GP), sandy GRAVEL, fine to coarse gravel, fine to coarse sand; brown to black; non-cohesive, moist to wet. [FILL]							Grout (Aquaguard _ Bentonite Grout)	**WELL CASING** Interval: 0' - 131' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush **WELL SCREEN** Interval: 131' - 151' Material: Schedule 40 PVC U-Pack Diameter: 2" Slot Size: 0.010" End Cap: 6", 2"-diameter, Sump **FILTER PACK** Interval: 129' - 153' Type: Filter Media #10 Sand **FILTER PACK SEAL** Interval: 124.5' - 129' Type: Bentonite Pellets **ANNULUS SEAL** Interval: 0' - 124.5' Type: Grout (Aquaguard Bentonite Grout) **WELL COMPLETION** Pad: 4'x4' Concrete Pad Protective Casing: 3' Stick-Ups **DRILLING METHODS** Soil Drill: Sonic Rock Drill: Sonic
5	435					1		4.00 / 10.00		
10	430	10.00 - 37.00 Trace clay, trace silt, trace COAL fragments.								
15	425					2		5.00 / 10.00		
20	420		GP							
25	415					3		7.00 / 10.00		
30	410									
35	405					4		6.00 / 10.00		
					402.29 / 37.00					
		37.00 - 38.60 (GP), sandy GRAVEL, fine to coarse; light brown orange; non-cohesive. [FILL]	GP		400.69 / 38.60					
40	400	39.00 - 40.00 Trace COAL fragments.	GP		399.29					
		Log continued on next page								

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-4V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 158.50 ft
LOCATION: Gypsum Pond

DRILL RIG: TSI 150CC
DATE STARTED: 2/14/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,256.83
EASTING: 2,054,882.74
GS ELEVATION: 439.29
TOC ELEVATION: 442.18 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
40		38.60 - 50.00 (GP), GRAVEL, fine to coarse, some fine to coarse sand, trace to some clay/silt; brown to dark gray to black; non-cohesive, moist to wet. [FILL] *(Continued)*						
45	395		GP			5		2.50 / 10.00
50	390				389.29			
		50.00 - 60.00 (GC), clayey GRAVEL, fine to coarse, some COAL fragments; dark gray to black with some orange mottling; non-cohesive, moist to wet. [FILL]			50.00			
55	385		GC			6		2.00 / 10.00
60	380				379.29			
		60.00 - 95.00 (GP), GRAVEL, fine to coarse, trace sand to sandy, trace silt, trace clay; dark brown to gray-black mottled orange; non-cohesive, moist to wet. [FILL]			60.00			
65	375					7		3.50 / 10.00
70	370		GP					
75	365					8		4.50 / 10.00
80	360							

Log continued on next page

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 131'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 131' - 151'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 129' - 153'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 124.5' - 129'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 124.5'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-4V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 158.50 ft
LOCATION: Gypsum Pond

DRILL RIG: TSI 150CC
DATE STARTED: 2/14/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,256.83
EASTING: 2,054,882.74
GS ELEVATION: 439.29
TOC ELEVATION: 442.18 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE NO.	TYPE	REC
80		60.00 - 95.00 (GP), GRAVEL, fine to coarse, trace sand to sandy, trace silt, trace clay; dark brown to gray-black mottled orange; non-cohesive, moist to wet. [FILL] *(Continued)*						
85	355		GP			9		3.00 10.00
90	350							
95	345				344.29	10		9.00 10.00
		95.00 - 97.60 (GC/GM), clayey/silty GRAVEL, some sand, gravels of weathered shale and sandstone, trace COAL fragments; gray-brown with some orange mottling; non-cohesive, moist. [FILL]	GC/GM		95.00 341.69			
		97.60 - 100.00 (GP), GRAVEL; dark gray to black; non-cohesive, dry, possible mine spoilings, possible ash. [FILL]	GP		97.60 339.29			
100	340	100.00 - 105.00 Fresh; medium strong; gray; fossiliferous, mineralization; thinly laminated SANDSTONE with thin interbeds of SHALE.			100.00	11		10.00
105	335	105.00 - 110.00 Fresh; medium strong; gray; fossiliferous; thinly laminated SHALE with interbeds of SANDSTONE.			334.29 105.00			
110	330	110.00 - 111.00 Weak to medium strong; dark gray to black; SHALE with thinly interbedded SANDSTONE.			329.29 110.00 328.29			
		111.00 - 120.00 Medium strong; dark gray to black; iron staining; interbedded SANDSTONE, SHALE, and SILTSTONE.			111.00			
115	325					12		9.00 10.00
120	320				319.29			

Log continued on next page

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES

WELL CONSTRUCTION DETAILS

WELL CASING
Interval: 0' - 131'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 131' - 151'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 129' - 153'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 124.5' - 129'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 124.5'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

RECORD OF BOREHOLE GS-GSA-MW-4V

PROJECT: Gorgas Ash Pond
PROJECT NUMBER: 18114896
DRILLED DEPTH: 158.50 ft
LOCATION: Gypsum Pond

DRILL RIG: TSI 150CC
DATE STARTED: 2/14/19
DATE COMPLETED: 2/25/19

NORTHING: 1,329,256.83
EASTING: 2,054,882.74
GS ELEVATION: 439.29
TOC ELEVATION: 442.18 ft

DEPTH W.L.:
DATE W.L.:
TIME W.L.:
GW ELEVATION:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: SAMPLE NO.	TYPE	REC	MONITORING WELL / PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
120		120.00 - 123.10 Medium strong; SANDSTONE with interbeds of SHALE and SILTSTONE.			120.00					
					316.19					
		123.10 - 128.00 Weak to medium strong; SHALE with interbeds of SILTSTONE and SANDSTONE.			123.10					
	315									
125						13		6.50 / 10.00	Bentonite Pel-Plug _ Time Release Pellets	
					311.29					
		128.00 - 130.00 Medium strong; iron staining; SANDSTONE with interbeds of SHALE and SILTSTONE.			128.00					
	310									
130					309.29				Filter Media _ #10 Sand	
		130.00 - 140.00 Medium strong; dark gray to gray; burrow structures; interbedded SILTSTONE and SHALE with thin interbeds of SANDSTONE.			130.00					
						14A		0.00 / 5.00	2" PVC Sch 40 0.010 Slot U-Pack _ Screw Fit with Rubber Seal Screen	
	305									
135						14B		5.00 / 5.00		
	300				299.29					
140		140.00 - 150.00 Weak to medium strong; dark gray to gray; SHALE with interbedded SILTSTONE/SANDSTONE.			140.00					
	295									
145						15		8.50 / 10.00		
	290				289.29					
150		150.00 - 158.50 Medium strong; dark gray to gray; burrow structures; crossbedding; interbedded SILTSTONE, SANDSTONE, and SHALE.			150.00				Sand Filter _ Pack	
									3/8" Hole-Plug _ Bentonite Chips	
	285					16		7.65 / 8.50		
155					280.79					
		Boring completed at 158.50 ft								
	280									
160										

WELL CASING
Interval: 0' - 131'
Material: Schedule 40 PVC
Diameter: 2"
Joint Type: Flush

WELL SCREEN
Interval: 131' - 151'
Material: Schedule 40 PVC U-Pack
Diameter: 2"
Slot Size: 0.010"
End Cap: 6", 2"-diameter, Sump

FILTER PACK
Interval: 129' - 153'
Type: Filter Media #10 Sand

FILTER PACK SEAL
Interval: 124.5' - 129'
Type: Bentonite Pellets

ANNULUS SEAL
Interval: 0' - 124.5'
Type: Grout (Aquaguard Bentonite Grout)

WELL COMPLETION
Pad: 4'x4' Concrete Pad
Protective Casing: 3' Stick-Ups

DRILLING METHODS
Soil Drill: Sonic
Rock Drill: Sonic

LOG SCALE: 1 in = 5 ft
DRILLING COMPANY: Cascade Drilling, L.P.
DRILLER: J. Asua

GA INSPECTOR: Chris Tidwell
CHECKED BY: David Hannam
DATE: 4/5/19

Golder Associates

GEOPHYSICAL RECORD OF BOREHOLE: GS-GSA-MW-4V

PLANT GORGAS GYPSUM POND DELINEATION WELLS

GOLDER

Project Number: 18114896

Client: Southern Company Services

Southern Company

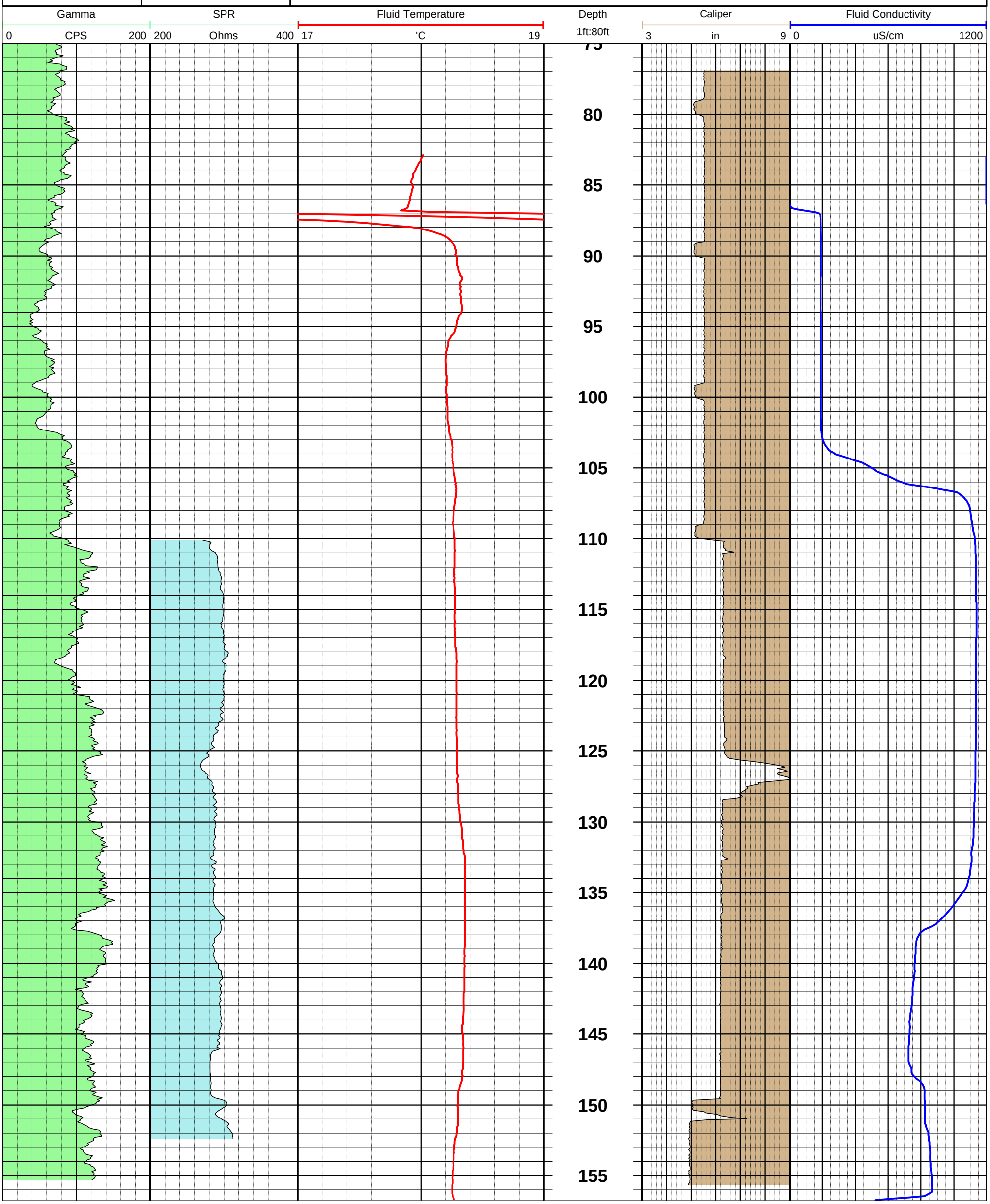
Date: 2-16-2019

Location: Parrish, Al	TOC Elev msl: na
Easting: na	Casing Stick-up: 2 ft ags
Northing: na	Casing Diameter: 5.4 in ID
Ground Elev msl: na	Casing Material: Steel
Borehole Dip: vertical	Water Level: 87.1 ft bgs
Borehole Az: na	Logged By: BA
Borehole Size: 6" Sonic	Log Depth Ref: Ground
Drilled Depth: 158.5 ft	Log Date: 2-16-19
Drill Comp Date: 2-15-19	Image Plot(s) Ref: MN
Casing Depth: 110 ft bgs	Dip Referenced to Horizontal

Notes:

Deviation data recorded with MSI rental QL40-DEV sn182909.
Tilt at BOH = 0.3 deg

Tools used were:
QL40 FTC sn5518
QL40 Caliper sn5521
Gamma + SPR 40-LGR sn5809



SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells
LOCATION Parrish, AL

DATE STARTED 10/22/2019 **COMPLETED** 10/25/2019 **SURF. ELEV.** Not Surveyed **COORDINATES:**
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Taylor **LOGGED BY** T. Trieu **CHECKED BY** K. RIch **ANGLE** **BEARING**
BORING DEPTH 184 ft. **GROUND WATER DEPTH: DURING** **COMP.** 77.8 ft. **DELAYED** 90.7 ft. after 72 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
		Well-graded Gravel with Silt (GW-GM) - Wet to dry, gray and brown, well-graded GRAVEL with silt, trace of liner material and contains organic odor		Completion: protective steel cover; 3-foot square concrete pad
5		**Fat Clay (CH)** - Wet, olive brown, gravelly, fat CLAY with organic odor		
		Well-graded Gravel with Silt (GW-GM) - Dry, black and dark gray, well-graded GRAVEL with silt and contains organic odor		
10				
15		**Gravelly Silt (MLG)** - Wet, dark gray, gravelly SILT with mudstone fragments and contains organic odor		
		Well-graded Gravel with Silt (GW-GM) - Moist to dry, black, dark gray, gray, and brown mine spoil with mudstone fragments and contains organic odor - recovered as well-graded GRAVEL with silt		Annular Fill: 6 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
20				
25		**Gravelly Silt (MLG)** - Wet, black and dark gray mine spoil and contains organic odor- recovered as gravelly SILT with mudstone fragments		
		Well-graded Gravel with Silt (GW-GM) - Wet to dry, black, dark gray, and gray, well-graded GRAVEL with silt and contains organic odor		
30				
35				

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
				Completion: protective steel cover; 3-foot square concrete pad
		(CONTINUED)		
40		**Well-graded Gravel with Silt (GW-GM)** - Wet to dry, black, dark gray, and gray, well-graded GRAVEL with silt and contains organic odor*(Con't)*		
45		**Gravelly Silt (MLG)** - Wet, black and dark gray mine spoil and contains organic odor - recovered as gravelly SILT		
50		**Well-graded Gravel with Silt (GW-GM)** - Moist to dry, black and dark gray, well-graded GRAVEL with silt and contains organic smell		
55		**Gravelly Silt (MLG)** - Wet, black and dark gray mine spoil with mudstone fragments - recovered as gravelly SILT		Annular Fill: 6 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
60		**Well-graded Gravel with Silt (GW-GM)** - Moist to dry, black and dark gray, well-graded GRAVEL with silt and contains mudstone fragments and black oxidized nodules		
65		**Well-graded Gravel with Silt (GW-GM)** - Dry, gray, dark gray, and black shale with silt - recovered as well-graded GRAVEL with silt		
		Gravelly Silt (MLG) - Wet to moist, black and dark gray mine spoil - recovered as gravelly SILT		
70		**Well-graded Gravel with Silt (GW-GM)** - Dry, black and dark gray, well-graded GRAVEL with silt		
75		**Gravelly Silt (MLG)** - Wet to moist, black minespoil and contains mudstones - recovered as gravelly SILT		

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
		(CONTINUED)		Completion: protective steel cover; 3-foot square concrete pad
80		**Gravelly Silt (MLG)** - Wet to moist, black minespoil and contains mudstones - recovered as gravelly SILT*(Con't)*		
		Well-graded Gravel with Silt (GW-GM) - Dry, black and dark gray, well-graded GRAVEL with mudstones		
85		**Gravelly Silt (MLG)** - Wet to moist, black and dark gray mine spoil with mudstone fragments and trace of wood and coal and contains organic odor - recovered as gravelly SILT		
90				
95		- Moist, light brown WOOD and contains organic odor (3" thick)		
		(SHALE) - Moist to dry, gray SHALE		Annular Fill: 6 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
100		**Lean Clay (CL)** - Moist, mottled brown, black, olive, and light brown, lean CLAY with silt and contains shale fragments		
105		**Lean Clay (CL)** - Material not recovered but assumed to be lean CLAY		
		(SHALE) - Unweatered to moderately weathered, broken to shattered, gray, light brown, and red SHALE with trace of sandstone interbedded		
110		**(SANDSTONE)** - Highly weathered to decomposed, reddish brown, brown, and dark brown SANDSTONE with shale interbedded - occassional recovered as fat clay		
115				

SIMPLE GEOLOGY WITH WELL 2019 (WOOD 3) - ESEE DATABASE.GDT - 11/7/19 15:29 - L:\GINT8\GINT8 - AMEC\PROJECTS\2019 PROJECTS\7630191633 - SCS GORGAS CCR DELINEATION WELLS.GPJ

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
120		**(SANDSTONE)** - Highly weathered to decomposed, reddish brown, brown, and dark brown SANDSTONE with shale interbedded - occassional recovered as fat clay*(Con't)*		(CONTINUED) Completion: protective steel cover; 3-foot square concrete pad
125		**(SHALE)** - Unweathered to sightly weathered, broken to shattered, gray, light gray, and dark gray SHALE with trace of clay		Annular Fill: 6 Batch of Grout (Batch equal to 55 gallons potable water to 2 bags (50 lbs each) cement-bentonite grout)
130				
135				
140				Annular Seal: 1 Bucket of 3/8" TR30 bentonite pellets
145				Filter: 5 Bags (20/40) silica filter sand; 50 lbs each
150				**Standpipe:** **4" OD PVC (SCH 40)** Screen: 10 ft; slotted
155				Sump:0.3 ft.
160				Backfill:hole plug

(Continued Next Page)

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCR - Phase II - Delineation Wells

LOCATION Parrish, AL

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUNDWATER OBSERVATIONS	WELL DATA
		(SHALE) - Unweathered to sightly weathered, broken to shattered, gray, light gray, and dark gray SHALE with trace of clay*(Con't)*		(CONTINUED)
165		**(SHALE)** - Unweathered to highly weathered, broken to shattered, dark gray and gray SHALE interbedded with highly weathered rock - recovered as fat clay		
170				Backfill:hole plug
175				
180				
185		Bottom of borehole at 184.0 feet.		
190				
195				
200				

Completion:
protective steel cover; 3-foot square concrete pad

GEOPHYSICAL RECORD OF BOREHOLE: GSGSA-MW8V

Plant Gorgas - CCR Delineation Wells

GOLDER

Project Number: 19131304

Client: Southern Company Services

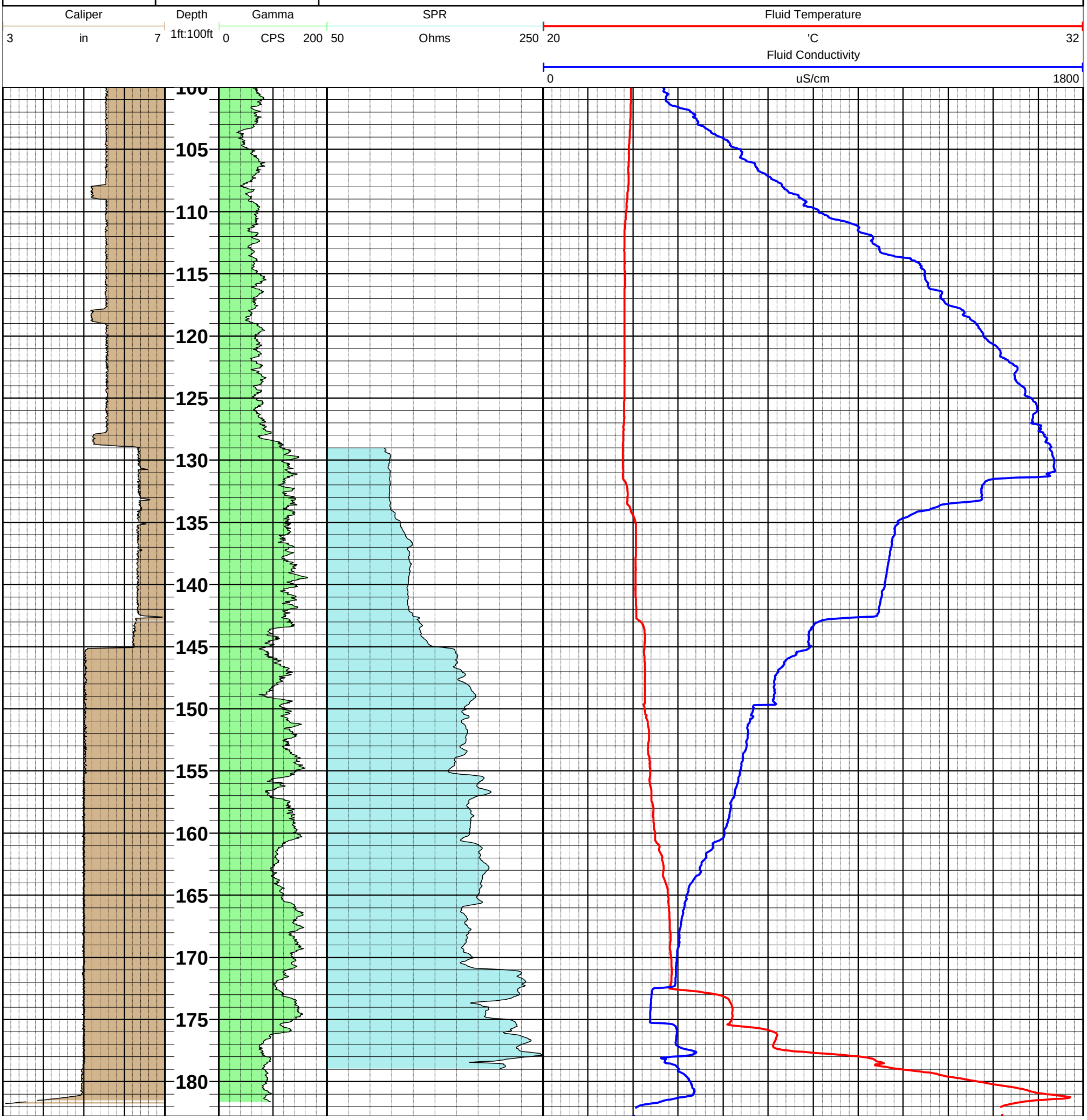
Southern Company

Date: 10-24-2019

Location: Parrish, Al	TOC Elev msl: na
Easting: na	Casing Stick-up: 6.54 ft ags
Northing: na	Casing Diameter: 6.5 in ID
Ground Elev msl: na	Casing Material: Steel
Borehole Dip: vertical	Water Level: 83.7 ft bgs rising
Borehole Az: na	Logged By: CAB
Borehole Size: 6" Sonic	Log Depth Ref: Ground Surface
Drilled Depth: 184 ft BGS	Log Date: 10-24-2019
Drill Comp Date: 10-24-19	Image Plot(s) Ref: MN
Casing Depth: 128.5 ft bgs	Dip Referenced to Horizontal

Notes: Gypsum Storage Area
90.24' toc @ 13:25

Tools used were:
QL40-FTC sn 5518
QL40 Caliper sn 5521
40-LGR-Gamma & SPR sn 5809
ATV ABI40 sn162305



SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 1/13/2014 **COMPLETED** 1/15/2014 **SURF. ELEV.** 499.2 **COORDINATES:** N:1,330,794.06 E:594,082.36
CONTRACTOR CFS **EQUIPMENT** **METHOD** CME
DRILLED BY S. Milam **LOGGED BY** G. Dyer **CHECKED BY**
BORING DEPTH 104.7 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 88.92 ft.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 502.25)
		Fill (FILL) Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments	499.2		**Surface Seal**
5					
10					
15					
20					**Annular Fill**
25					
30					
35					
40					

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA
			499.2		Top of casing Elev. = 502.25
		Fill (FILL) Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments *(Con't)*			(CONTINUED)
45					
50					
55					
60					
65					**Annular Fill**
70					
75					
80					
85					**Annular Seal**

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 502.25)
		(CONTINUED)	499.2		
90		**Fill (FILL)** Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments *(Con't)*			**Annular Seal**
95			404.0		
		Shale (mudstone) Pottsville formation			**Filter Pack**
100					
			394.5		**Screen Tip Elevation**

Bottom of borehole at 104.7 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 10/23/2014 **COMPLETED** **SURF. ELEV.** 498.5 **COORDINATES:** N:1,331,053.31 E:593,548.80
CONTRACTOR Cascade Drilling **EQUIPMENT** J-1866 **METHOD** Rotosonic
DRILLED BY M. Coleman **LOGGED BY** B. Smelser **CHECKED BY**
BORING DEPTH 91 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 81.7 ft.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 501.54)
		Fill (FILL) dark gray to medium gray mudstone/siltstone with trace sandstone, coarse sand to coarse gravel sized angular rock fragments within a dark gray to brownish gray to orangish brown sandy silt	498.5		**Surface Seal**
5		trace cobble sized rock fragments			
10					**Annular Fill**
15		trace reddish brown staining on some rock fragments			
20					
25		upper coarse sand to bolder sized (limited core recovered) dark gray to medium gray rock fragments within a dark gray silty matrix with trace layers of orangish brown clay/silt			
30					
35		trace weathered sandstone fragments with orangish brown staining			**Annular Seal**
40					
45					
50					

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA
			498.5		Top of casing Elev. = 501.54 (CONTINUED)
55		**Fill (FILL)** dark gray to medium gray mudstone/siltstone with trace sandstone, coarse sand to coarse gravel sized angular rock fragments within a dark gray to brownish gray to orangish brown sandy silt*(Con't)*			
60					
65					**Annular Seal**
70		trace zones of orangish brown silt with rusty red to light brown stained sandstone fragments, within a dark gray to medium gray silty matrix with upper coarse sand to coarse gravel sized angular to subangular dark gray to medium gray mudstone/siltstone/sa			
75					
80		▼			
			415.0		
85		**Mudstone (MUDSTONE)** mostly mechanical fracture due to sonic, brittle/friable rock			**Filter Pack**
90		core breaks easily along apparent bedding planes, trace plant fossils visible in some zones, trace interbedded siltstone			
			407.5		**Screen Tip Elevation**

Bottom of borehole at 91.0 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 10/23/2014 **COMPLETED** **SURF. ELEV.** 522.2 **COORDINATES:** N:1,330,842.40 E:593,025.40
CONTRACTOR Cascade Drilling **EQUIPMENT** J-1866 **METHOD** Rotosonic
DRILLED BY M. Coleman **LOGGED BY** B. Smelser **CHECKED BY**
BORING DEPTH 115.5 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 106.91 ft.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 525.23)
		Fill (FILL) dark gray to medium gray mudstone/siltstone fragments within dark gray silty soil matrix.	522.2		Surface Seal
		trace rock fragments with orangish brown to rusty red staining			
10					Annular Fill
20					
30		zone of subangular rock fragments within a dark gray to orangish brown silty to clayey sand, trace light brown to reddish brown siltstone/sandstone fragments			
40					Annular Seal
50		fine gravel to cobble sized angular to subangular mudstone/siltstone fragments			

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA
			522.2		Top of casing Elev. = 525.23
		(CONTINUED)			
		Fill (FILL) dark gray to medium gray mudstone/siltstone fragments within dark gray silty soil matrix.*(Con't)*			
60		increasing dark brown to orangish brown sandy silt to sandy clay matrix with dark gray to medium gray upper coarse sand to cobble sized mudstone/siltstone fragments with trace sandstone fragments			
		decrease in clayey matrix, dark gray to medium gray rock fragments/matrix			
70					
80					**Annular Seal**
		@ approx. 90' change from dark gray to light brown (overburden) siltstone/sandstone angular fine gravel to coarse gravel sized rock fragments			
90					
		increasing dark gray brittle/friable rock fragments			
100					
			414.2		
110		**Sandstone (SANDSTONE)** trace dark gray nodular inclusions			**Filter Pack**
			406.7		**Screen Tip Elevation**

Bottom of borehole at 115.5 feet.

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 2/12/2014 **COMPLETED** 2/19/2012 **SURF. ELEV.** 516.7 **COORDINATES:** N:1,330,289.73 E:592,896.41
CONTRACTOR CFS **EQUIPMENT** **METHOD** CME
DRILLED BY S. Milam **LOGGED BY** G. Dyer **CHECKED BY**
BORING DEPTH 129.5 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 116.59 ft.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA (Top of casing Elev. = 518.63)
		Fill (FILL) Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments	516.7		**Surface Seal**
5					
10					
15					
20					**Annular Fill**
25					
30					
35					
40					

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA
			516.7		Top of casing Elev. = 518.63 (CONTINUED)
		Fill (FILL) Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments *(Con't)*			
45					
50					
55					
60					
65					**Annular Fill**
70					
75					
80					
85					

(Continued Next Page)

SOUTHERN COMPANY

BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	Natural Gamma (75 / 150 / 225)	WELL DATA
			516.7		Top of casing Elev. = 518.63 (CONTINUED)
90		**Fill (FILL)** Backfilled Spoil consisting of rock fragments, silty clay, clayey silt, and lesser amounts of sand and coal fragments *(Con't)*			
95					
100					**Annular Fill**
105					
110					**Annular Seal**
115					
120			395.9		**Filter Pack**
		Shale (SHALE) Pottsville formation, lenticular bedding			
125					**Screen Tip Elevation**
			387.2		

Bottom of borehole at 129.5 feet.

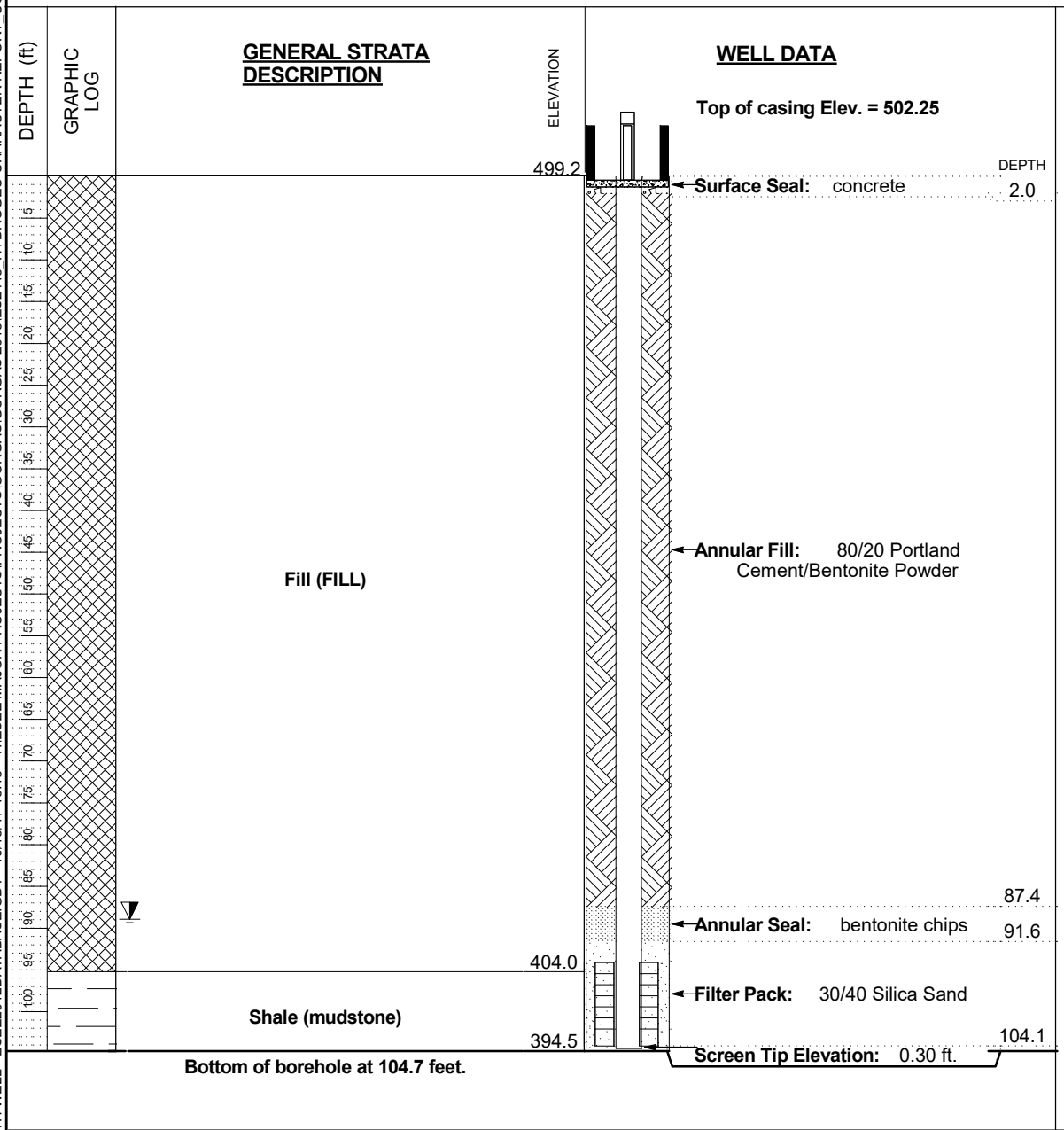
SOUTHERN COMPANY

LOG OF WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 1/13/2014 **COMPLETED** 1/15/2014 **SURF. ELEV.** 499.2 **COORDINATES:** N:1,330,794.06 E:594,082.36
CONTRACTOR CFS **EQUIPMENT** **METHOD** CME
DRILLED BY S. Milam **LOGGED BY** G. Dyer **CHECKED BY**
BORING DEPTH 104.7 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 88.92 ft.
NOTES



WELL SPECIFICATIONS

Casing Diameter: 2 inches **Screen Diameter:** 2 inches
Casing Material: Schedule 40 PVC **Screen Length:** 10 feet **Screen Material:** PVC
Casing Length: feet **Screen Mesh:** 0.010 **PrePack Screen:** Yes

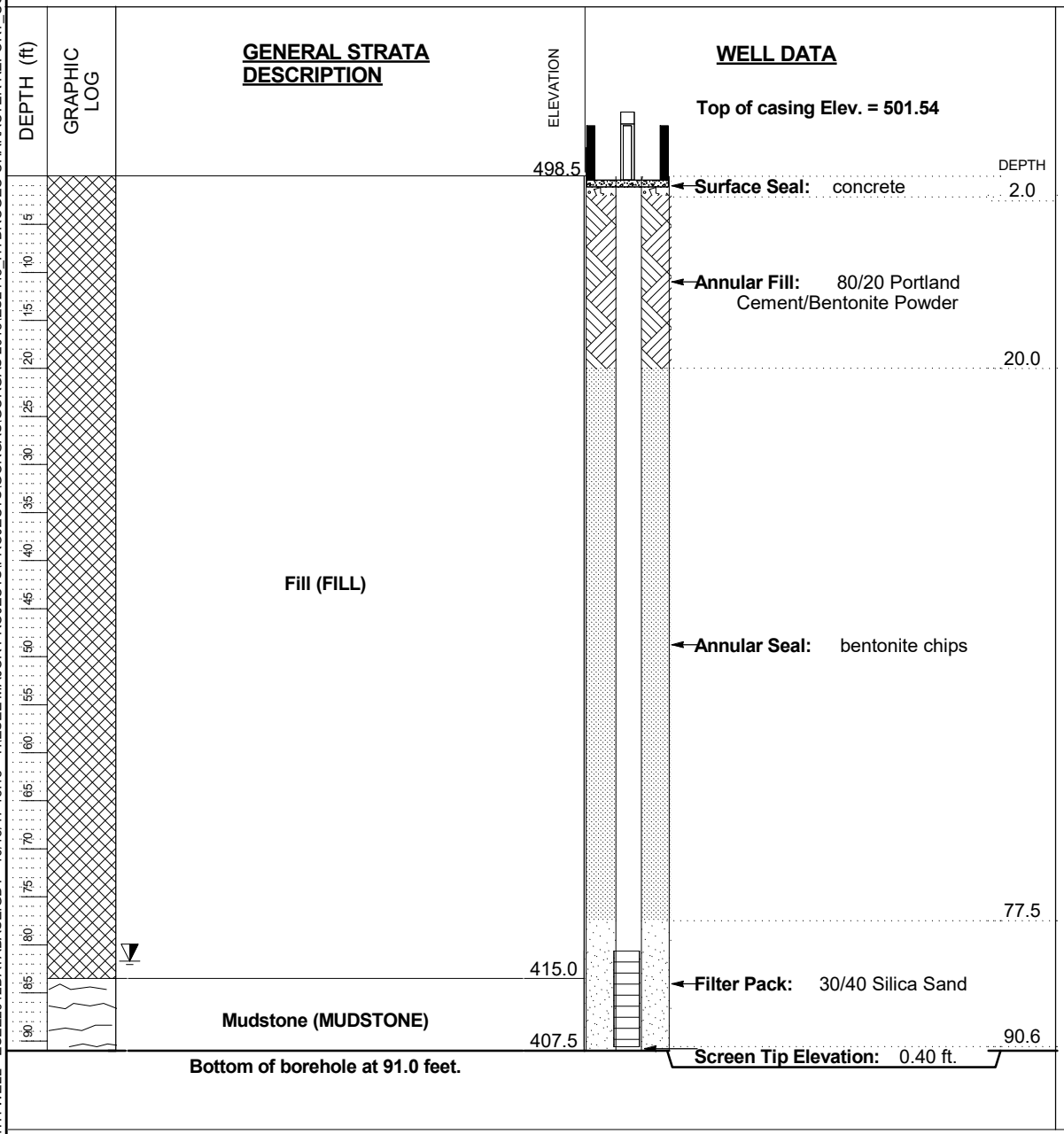
SOUTHERN COMPANY

LOG OF WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 10/23/2014 **COMPLETED** **SURF. ELEV.** 498.5 **COORDINATES:** N:1,331,053.31 E:593,548.80
CONTRACTOR Cascade Drilling **EQUIPMENT** J-1866 **METHOD** Rotosonic
DRILLED BY M. Coleman **LOGGED BY** B. Smelser **CHECKED BY**
BORING DEPTH 91 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 81.7 ft.
NOTES



WELL SPECIFICATIONS

Casing Diameter: 2 inches **Screen Diameter:** 2 inches
Casing Material: Schedule 40 PVC **Screen Length:** 10 feet **Screen Material:** PVC
Casing Length: feet **Screen Mesh:** 0.010 **PrePack Screen:** Yes

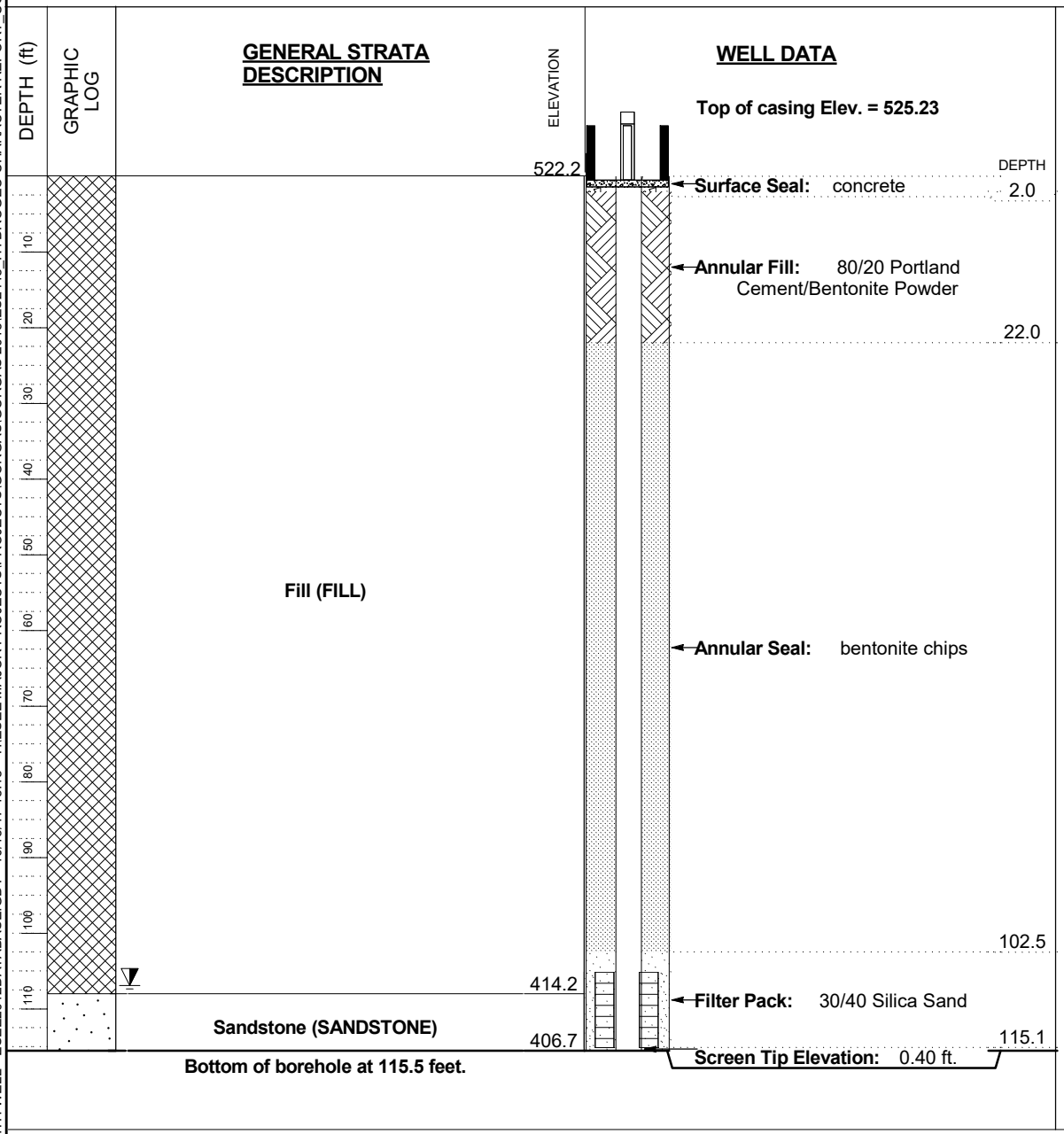
SOUTHERN COMPANY

LOG OF WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 10/23/2014 **COMPLETED** **SURF. ELEV.** 522.2 **COORDINATES:** N:1,330,842.40 E:593,025.40
CONTRACTOR Cascade Drilling **EQUIPMENT** J-1866 **METHOD** Rotosonic
DRILLED BY M. Coleman **LOGGED BY** B. Smelser **CHECKED BY**
BORING DEPTH 115.5 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 106.91 ft.
NOTES



WELL SPECIFICATIONS

Casing Diameter: 2 inches **Screen Diameter:** 2 inches
Casing Material: Schedule 40 PVC **Screen Length:** 10 feet **Screen Material:** PVC
Casing Length: feet **Screen Mesh:** 0.010 **PrePack Screen:** Yes

SOUTHERN COMPANY

LOG OF WELL INSTALLATION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Gorgas CCB
LOCATION

DATE STARTED 2/12/2014 **COMPLETED** 2/19/2012 **SURF. ELEV.** 516.7 **COORDINATES:** N:1,330,289.73 E:592,896.41
CONTRACTOR CFS **EQUIPMENT** **METHOD** CME
DRILLED BY S. Milam **LOGGED BY** G. Dyer **CHECKED BY**
BORING DEPTH 129.5 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 116.59 ft.
NOTES

DEPTH (ft)	GRAPHIC LOG	GENERAL STRATA DESCRIPTION	ELEVATION	WELL DATA	NOTES:
				Top of casing Elev. = 518.63	
			516.7	DEPTH **Surface Seal:** concrete 2.0	
		Fill (FILL)		**Annular Fill:** 80/20 Portland Cement/Bentonite Powder	
				109.0 **Annular Seal:** bentonite chips 113.1	
			395.9	**Filter Pack:** 30/40 Silica Sand	
		Shale (SHALE)		126.3	
			387.2	**Screen Tip Elevation:** 0.20 ft.	

Bottom of borehole at 129.5 feet.

WELL SPECIFICATIONS

Casing Diameter: 2 inches **Screen Diameter:** 2 inches
Casing Material: Schedule 40 PVC **Screen Length:** 10 feet **Screen Material:** PVC
Casing Length: feet **Screen Mesh:** 0.010 **PrePack Screen:** Yes

Appendix B

ALABAMA POWER COMPANY
PLANT GORGAS
GYPSUM POND
STATISTICAL ANALYSIS PLAN

Prepared for

Alabama Power Company
Birmingham, Alabama

Prepared by

Groundwater Stats Consulting
Mobile, Alabama

Revised August 2020

Alabama Power

ALABAMA POWER COMPANY
PLANT GORGAS
GYPSUM POND
STATISTICAL ANALYSIS PLAN

Kristina L. Rayner
Groundwater Stats Consulting, LLC
Originator

Gregory T. Whetstone, P.E.
Southern Company Services, Inc.
Reviewer

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This updated Statistical Analysis Plan (SAP) describes the site-specific statistical analysis approach that will be used to evaluate groundwater at Alabama Power Company's Plant Gorgas Gypsum Pond pursuant to ADEM Admin. Code r. 335-13-15-.06 and 40 CFR Part 257. 90 through 95 under detection and assessment monitoring programs.

A compliance groundwater monitoring well system was installed pursuant to requirements of 40 CFR 257.91(e)(1). A background well network is installed upgradient of the CCR unit. Downgradient monitoring wells were installed along the downgradient waste boundary pursuant to 40 CFR 257.91(a)(2). The compliance monitoring well network is described in the site-specific groundwater monitoring plan and summarized in the attached Table 1.

Alabama Power Company conducted 8 background monitoring sample events beginning in 2016. Samples were collected from the compliance monitoring wells and analyzed for CCR Appendix III and IV parameters pursuant to 40 CFR 257.91 Appendix III and IV parameters are as follows:

1) Appendix III (Detection Monitoring) - boron, calcium, chloride, fluoride, pH, sulfate, and TDS
2) Appendix IV (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

This updated SAP has been developed based upon the characteristics of the groundwater quality data collected since groundwater monitoring was implemented in 2016 following the requirements in 40 CFR 257.91[1], and the United States Environmental Protection Agency (USEPA) Unified Guidance (March 2009)[2]. The plan describes:

[1] Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities, 2015.
[2] U.S. EPA, March 2009. *Unified Guidance*, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.

1) Background data collection, management, and updates;
2) Statistical concepts applicable to detection and assessment monitoring programs;
3) Site-specific statistical analysis methods for Detection Monitoring; and
4) Statistical approach for Assessment Monitoring and Corrective Action.

As part of ongoing site activities, installation of additional wells may be necessary to characterize site conditions or supplement the assessment monitoring well network. The disposition of these additional wells will be described in the site groundwater monitoring plan. Procedures for statistically evaluating additional wells are described in this SAP.

Any change to the statistical analysis plan (e.g. statistical analysis method, background period, background data set, well network, screening method, etc.) will only be implemented upon receipt of approval from the Alabama Department of Environmental Management (Department).

2.0 BACKGROUND

This section describes the establishment, screening, update, and management of the background data sets used for detection, assessment and corrective action phases of groundwater monitoring. Included are descriptions of the tests that are used to determine whether the potential background data represent site-specific conditions and the procedures used to update (expand or truncate) the background data set. Also described are procedures that will be used to update the data set with more current monitoring data or as new background monitoring wells are installed.

Changes or updates to background updates will only be made after Department approval.

2.1 Background Screening

Background is determined based on site-specific conditions such upgradient wells, wells not in the groundwater flow path of the unit, or wells determined to not be affected by the disposal unit. Once background wells are selected based on site-specific conditions, the data are screened as follows:

2.1.1 Outlier Testing

An outlier is defined as an observation that is unlikely to have come from the same distribution as the rest of the data. A statistical outlier test, such as the 1989 EPA Outlier Test [3]or Tukey's Outlier Test as discussed in the USEPA Guidance, will be performed on the monitoring well data when time series plots or box and whiskers plots indicate the presence of extreme observations relative to other observations. The outlier test will serve as a data quality check to help identify errors from data entry and other sources.

Statistical outliers in the background data will be deselected unless it can be proven that the data point is not an anomalous value and does represent naturally occurring variation. This is conservative from a regulatory perspective in that it ensures that the background limits are not artificially elevated. When outliers are identified, they are flagged in the data set and the values excluded from background limit calculations. Re-testing for outliers will be performed when background updates are proposed.

2.1.2 Testing and Adjusting for Seasonal Effects

Testing and adjusting data for seasonal factors ensures that seasonal effects will not affect the test results. When seasonal effects are suspected, the Kruskal-Wallis seasonality test will be used to determine whether the seasonal effects are statistically significant when there are sufficient data to test for seasonality. When seasonal effects are confirmed, the data will be de-seasonalized prior to calculating a statistical limit. Data are de-seasonalized by subtracting the seasonal mean and adding back the grand mean to each observation. Background data will be re-tested when there are at least four new values available and a background update is proposed.

2.1.3 Temporal Trend Testing

The Sen's Slope/Mann-Kendall statistical analysis will be performed on all well/constituent pairs to evaluate concentrations over time. The Sen's Slope Estimator will be used to estimate the rate of change (increasing, no change, or decreasing) for each constituent at each well. The Mann Kendall statistic will be used to determine whether each of those trends is statistically significant. The Sen's Slope/Mann Kendall analysis requires at least five observations.

[3] 1953, "Processing data for outliers", *Biometrics*, Vol. 9, pp.74-89.

When a significant trend is present, older historical values may be deselected from the background data prior to computing background limits in cases where groundwater is presumed not to be impacted by the unit. The resulting limits will reflect more current conditions and will not be influenced by older, historical conditions that are no longer relevant. If upgradient concentration levels are changing over time (i.e. trending upward or downward), the prospective background data set may need to be truncated, removing older data to ensure that the resulting limits continue to represent current natural conditions.

For instance, when background concentration levels are increasing over time due to upgradient water quality changes, if the background data sets are not adjusted, the established PLs could result in increased false positive or false negative risk. In some cases, including older historical data in the background data set may result in overly sensitive limits and an increased chance of false positive readings. In other cases, using all background data when there are temporal changes in background levels may artificially elevate limits. This scenario may occur even when there is a decreasing trend in background concentration levels. An elevated limit under these circumstances is a direct result of an inflated standard deviation that is used in the computation of the parametric limit, which in turn will increase the risk of false negative test outcomes.

Well/constituent pairs that have increasing or decreasing concentration levels over time will be evaluated to determine if earlier data are no longer representative of present-day groundwater quality. In those cases, earlier data may be deselected prior to construction of limits to reduce variation as well as to provide limits that are conservative from a regulatory perspective that will detect future changes in groundwater quality.

Background limits also need to allow for random variation in groundwater concentration levels that are naturally present at a site. The availability of multiple background wells can give an indication of the natural variability in groundwater constituent levels across a site.

2.1.4 Sample Size

While a parametric prediction limit may be constructed with as little as four samples per well, the CCR Rule and the EPA Unified Guidance recommend that a minimum of at least 8 independent background observations be collected for constructing statistical limits. The reliability of the statistical results is greatly enhanced by increasing the sample size to

eight or more. An increased sample size tends to more accurately characterize the variation and typically reduce the probability of erroneous conclusions. Furthermore, if a nonparametric prediction limit is required, the confidence level associated with the test will be dependent on the number of background data available as well as the number of comparisons to the statistical limit.

2.1.5 Non-Detect Data

When data contain <15% nondetects in background, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit (RL) utilized for nondetects is the practical quantification limit (PQL) used by the laboratory.

When data contain between 15-50% nondetects, the Kaplan-Meier nondetect adjustment is applied to the background data. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit. Trace (or estimated) values which are reported above the method detection limit (MDL) and below the PQL/RL are used in the statistical analysis as reported by the laboratory. These values are flagged with "J" to distinguish between estimated values and values reported above the PQL.

If detection limits change over a period of analysis, then a statistically significant trend could be the result of increasing or decreasing laboratory precision and not an actual change in water quality. Under those circumstances, an appropriate substitution of the detection limit will be considered, such as the median or most recent detection limit.

2.2 Updating Interwell Background

The following describes the process that will be used to update interwell background data sets. Background updates described below will only be performed after Department approval.

Interwell statistical methods are constructed by pooling upgradient well data from 2 or more upgradient wells. For the Detection Monitoring program, background-derived Prediction Limits will be updated during each semi-annual event by incorporating the most recent sampling results from the existing background well network into the

background data set. New background data will be screened for any new outliers as described above.

For the Assessment and Corrective Action program, background-derived tolerance limits are used to construct background limits using pooled upgradient well data for comparison against established standards. The tolerance limits will be updated every 2 years after screening as described above.

Once background has been established, the background well network may be updated by (1) adding wells to the background well network, or (2) removing wells and data from the background well network. The following describes the additional statistical screening steps that will be taken to update the background after a site-specific determination is made that the wells meet the hydraulic and geochemical requirements of a background location.

2.2.1 Adding to the Background Well Network

The background data set may be updated or adjusted by incorporating new wells into the network or installing new background monitoring wells. When new wells are installed, the following process will be used to statistically evaluate the results and incorporate them into the background data set upon receipt of ADEM approval.

Prior to incorporating new upgradient well data for construction of statistical limits, Tukey's outlier test and visual screening are used to evaluate data. Any confirmed outliers are flagged as such in the database and deselected prior to construction of interwell prediction limits. Any flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages. A summary of Tukey's test results and flagged values will be provided with the report.

Upgradient well data will be further tested for trends as described earlier. When no statistically significant trends are identified, all new well data will be incorporated into the background. Any records with trending data will be evaluated on a case by case basis, and records may require deselection if historical data are no longer representative of present-day groundwater quality conditions. Interwell prediction limits using all upgradient well data are re-calculated as a result of this screening.

2.2.2 Removing Wells and Data from Background

As additional background data are collected, or site conditions change, a recommendation may be made to remove a well from the background network for any number of reasons (e.g. removal, change in groundwater flow conditions, change in chemistry, vandalism, etc.). If an upgradient well will no longer be part of the background network, the historical data from that well will no longer be included in the construction of interwell limits (which pool upgradient well data) without Department approval.

When wells are proposed for removal from the network, a site-specific statistical and geochemical evaluation will be made to identify the population(s) of data that may not represent background conditions. A proposal will be submitted to the Department for approval identifying the recommended use or disuse of historical data from the well(s) proposed for removal. The proposal will include statistical data screening and will explain the rationale for the proposed use of the data.

In the case where an upgradient well is no longer sampled (i.e. due to well damage, etc.), but historical data are still representative of upgradient water quality, an evaluation will be conducted as described below to determine whether data are still representative of background and should continue to be included in the background data set. When demonstration shows that groundwater quality from a well is still representative of naturally occurring groundwater quality upgradient of the facility, this data will be used in construction of statistical limits with ADEM approval. In cases where data from upgradient wells removed from the network do not represent upgradient groundwater quality, a proposal will be made for ADEM approval whereby interwell prediction limits will be re-calculated using data from only those upgradient wells in the network.

When preparing a background data evaluation for Department approval, the statistical portion of the evaluation will be accomplished by:

i. Using the ANOVA to determine whether significant variation exists among upgradient wells which would prevent the well's data from being included in construction of interwell prediction limits;
ii. Visual screening using Time Series and Box Plots to determine whether measurements are similar to neighboring upgradient wells;
iii. Screening the background data set for outliers as described above; and

iv. Performing trend tests to identify statistically significant increasing or decreasing trends which may require adjustment of the record to eliminate trending data and reduce variation.

2.3 Updating Intrawell Background

Intrawell statistical methods may be used at well locations that have not been impacted by a release from the unit being monitored. When using intrawell methods, once the background limits are established, data will not be evaluated again for updating until a minimum of 4 new samples are available, or every 2 years[4]. Data will be screened for outliers and trends as described above.

When updating an intra-well background, data are tested for suitability of updating by consolidating new sampling observations with the screened background data. Before updating the data for intrawell testing, it is necessary to verify that the most recent observations represent an unimpacted state as compared with the existing background. Data are first screened for outliers and, when confirmed, flagged as such in the database and deselected prior to constructing statistical limits. This step results in statistical limits that are conservative from a regulatory perspective.

The Mann-Whitney (Wilcoxon Rank Sum) two-sample test is then used to compare the median of the first group of background observations to the median of the more recent 4 or more observations. If the most recent data group is not found to be statistically different than the older data, the background data set may be updated and the prediction limits will be reconstructed to include the more recent background samples. When statistical differences are identified by the Mann Whitney test, statistical limits may not be eligible for updating. When more samples are available, data will be tested again for suitability of updating background data sets. In the event it is determined that the historical data are no longer representative of present-day groundwater quality in the absence of suspected impacts, only the more recent 8 or more measurements will be used to update the prediction limits.

[4] US EPA Unified Guidance, March 2009. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Section 5.3*. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.

3.0 STATISTICAL APPROACH FOR DETECTION MONITORING

The following sections describe the concepts related to developing a site-specific SAP for detection monitoring. The statistical evaluation includes screening upgradient well data to characterize groundwater upgradient of the facility and determine whether intrawell or interwell methods are recommended as the most appropriate statistical method for each Appendix III constituent.

3.1 Statistical Method

When data from multiple upgradient wells are available, a determination will be made as to whether the upgradient well data appear to come from the same population or whether there is evidence of spatial variation upgradient of the facility. Data for each constituent are plotted using box and whisker plots to assist in making this determination, providing visual representation of concentrations within and across wells. Analysis of Variance (ANOVA) may be used initially to statistically evaluate whether significant spatial variation exists at each unit.

Interwell prediction limits (PLs) pool upgradient well data to construct statistical limits which are used to evaluate data at downgradient wells. These tests are appropriate when the ANOVA determines that no significant spatial variation exists among the background wells.

In the event the ANOVA determines:

1) evidence of significant spatial variation upgradient of the facility, or
2) that there are insufficient upgradient well data, or
3) that interwell methods will not adequately address the question of a change in groundwater quality at any of the downgradient wells,

the USEPA Unified Guidance recommends switching from interwell methods to intrawell methods when it can be reasonably demonstrated that no impact from the CCR unit is present for well/constituent pairs in detection monitoring.

Intrawell PLs, which compare the most recent sample from a given well to statistical limits constructed from historical measurements at the same well, are extremely useful for rapidly detecting changes over time at a given location. Intrawell methods remove the

influence of on-site spatial variation in well-to-well concentration levels. Site monitoring data are evaluated for the appropriateness of intrawell methods, including screening of background data from within each well for trends, seasonality when sufficient data are available, and outliers.

3.2 Prediction Limits

The use of PL tests is restricted to Appendix III parameters recently sampled at groundwater monitoring wells to represent *current* conditions. Background stability will be tested using temporal and seasonal trend tests, utilizing de-seasonalizing adjustments when seasonal trends are present. Moreover, statistical conditions including background sample size requirements as specified in USEPA guidance and regulations will be verified prior to the use of each statistical approach.

3.3 Criteria for Using the Interwell Statistical Methodology

There are a number of conditions that need to be met before an interwell statistical analysis can be considered appropriate for a specific site. These conditions are described in this section.

1. Ensuring that the aquifer underlying the site is continuous and that all monitoring wells are screened in the same level;
2. Ensuring that limits will be adequately sensitive in detecting a facility release;
3. Ensuring that limits reflect current background conditions; and
4. Ensuring that confounding factors will not confuse the results.

3.3.1 Aquifer Designation and Monitoring Wells

Where the uppermost aquifer underlying a site is discontinuous, where downgradient monitoring wells are screened in differing levels, or where the upgradient monitoring well network is limited, EPA recommends performing intrawell analyses, to avoid confusing an impact caused by a release from the facility with a difference between wells caused by heterogeneous hydrogeology.

The statistical approach for constituents of concern will be based on interwell or intrawell PLs, and in some cases a combination of both methods, as a result of evaluation of spatial variation at the site. Box and whisker plots may be provided to demonstrate concentration levels within each well and across wells. When significant differences exist

in concentration levels, particularly between upgradient wells, this indicates spatial variation in the groundwater quality. Spatial variation and/or limited upgradient well data would tend to create statistical limits that are:

1) not conservative from a regulatory perspective; or
2) not representative of background water quality.

3.4 Criteria for Using an Intrawell Statistical Methodology

The following is a description of the criteria that a site must meet to use an intrawell statistical methodology if it is determined that interwell methods are not appropriate.

3.4.1 Screening of Prospective Historical Background Data

Prior to using an intrawell analysis, it will be necessary to demonstrate that there have been no potential prior impacts at downgradient wells on the prospective historical background data as a result of the current practices at the Site. In addition to an independent investigation for prior impacts, prospective background data for intrawell tests will be screened for trends, seasonality and outliers as described above. If intrawell analyses are not feasible due to elevated concentrations in downgradient wells relative to concentrations upgradient of the facility, as determined during the screening process, interwell analyses will initially be utilized until further evidence supports the use of intrawell testing.

3.4.2 Stable Naturally Occurring Concentrations

The background data screening procedure described here is designed to check for stable background conditions, and account for existing groundwater quality from past or present activities in the area. While having pre-waste data is ideal for characterization of groundwater quality prior to waste placement, these facilities do not have pre-waste data.

The Sen's Slope/Mann-Kendall test for increasing or decreasing temporal trends will be used to test prospective background data when time series plots indicate the possibility of either increasing or decreasing trends over time. In the case where significant trends are found, unrepresentative values will be deselected only when it is clear that the trend is not the result of contamination. Assuming no alternative source, if similar trends and/or concentration levels are noted upgradient of the unit for the same parameters, it will be assumed that concentration levels represent natural variation in groundwater, and thus,

earlier data will be removed so that compliance limits reflect current groundwater conditions upgradient of the unit.

3.5 Site-Wide False Positive Rates (SWFPR) and Statistical Power

The USEPA Unified Guidance recommends an annual site-wide false positive rate of 10%, which is distributed equally among the total number of sampling events. A site-wide false positive rate of 5% is targeted for each semi-annual sampling event. USEPA also requires demonstration that the statistical methodology selected for a facility will provide adequate statistical power, as discussed in Section 3.7 to detect a release, should one occur.

3.6 Determination of Future Compliance Observations Falling Within Background Limits

Intrawell or interwell upper PL are constructed with a test-specific alpha based on the overall site-wide false positive rate (SWFPR) of 5% for each sampling event. Any compliance observation that exceeds the background prediction limit will be followed with one or two independent resamples, depending on the resample plan, to determine whether the initial exceedance is verified.

The following pretests are used to ensure that the statistical test criteria are met:

1) *Data Distribution.* The distribution of the data will be tested using either the Shapiro-Wilk test (for background sample sizes of 50 or less) or the Shapiro-Francia test (for background sample sizes greater than 50). Non-normally distributed data will be transformed using the ladder of powers[5] to normalize the data prior to construction of background limits. When background data cannot be normalized, nonparametric PL will be calculated.

2) *Handling Non-Detects.* Simple substitution per USEPA Guidance[6] will be used when non-detects comprise less than or equal to 15% of the individual well data. Simple substitution refers to the practice of substituting one-half the reporting or detection limit for non-detects. When the proportion of non-detects (NDs) in

[5] 1992, *Statistical Methods In Water Resources*, Elsevier, Helsel, D. R., & Hirsch, R. M.
[6] June 1992, *Addendum to Interim Final Guidance, Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities.* Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.

background falls between 16 and 50%, a non-detect adjustment such as the Kaplan-Meier or Regression on Order Statistics (ROS) method for adjustment of the mean and standard deviation will be used prior to constructing a parametric prediction limit. When the proportion of non-detects exceeds 50%, or when the data cannot be normalized, a nonparametric prediction limit will be used.

3.7 Statistical Power

The USEPA Unified Guidance also requires that facilities achieve adequate statistical power to detect a release, even if only at one facility well and involving a single constituent. More specifically, EPA recommends power of approximately 55% when concentration levels are 3 standard deviations above the background mean, or approximately 80% power at 4 standard deviations above the background mean.

The performance of a given testing strategy is displayed in Power Curves which are based on the particular statistical method chosen combined with the resampling plan, the false positive rate associated with the statistical test, as well as the number of background samples available and the size and configuration of the monitoring network.

Power Curves for the PLs following this report demonstrate that the specified plan has the power to detect a release in downgradient wells and meet or exceed at least one of the power recommendations. As more data are collected during routine semi-annual sampling events and the background sets are expanded, the power requirements will exceed recommended power requirements.

4.0 STATISTICAL APPROACH FOR ASSESSMENT MONITORING & CORRECTIVE ACTION

The following describes the general statistical procedures that will be used if a facility enters Assessment or Corrective Action monitoring because of SSIs in the Detection monitoring program. Site-specific and event-specific SAPs may be developed at that time according to permit or regulatory requirements.

4.1 Assessment Monitoring

Assessment Monitoring may be initiated when there is a confirmed SSI over background in one or more wells for any of the Appendix III parameters. Wells are sampled for Appendix IV parameters semiannually concurrent with Appendix III constituents.

When in assessment monitoring, Appendix IV constituent concentrations are compared to Groundwater Protection Standards (GWPS), or other applicable standards, using Confidence Intervals. Upgradient well data are screened for outliers and trends as described above and tolerance limits are used to develop background limits. GWPS may be based on background limits when background concentrations are higher than the established Maximum Contaminant Levels (MCLs) or other rule-specified GWPS.

Parametric confidence intervals around the population mean will be constructed at the 99% confidence level when data follow a normal distribution, and around the geometric mean (or population median) when data follow a transformed-normal distribution.

Non-parametric confidence intervals will be constructed when data do not pass a normality test and cannot be normalized via a transformation. The confidence level associated with the non-parametric tests is dependent on the number of values used to construct the interval. Confidence intervals require a minimum of four samples; however, a minimum of eight samples are recommended. When non-parametric confidence intervals are constructed, a maximum of eight of the most recent samples will be used in the comparison. When a well/constituent pair does not have the minimum sample requirement, the well/constituent pair will continue to be reported and tracked using time series plots and/or trend tests until such time that enough data are available.

In Assessment Monitoring, when the Lower Confidence Limit (LCL), or the entire interval, exceeds the GWPS as discussed in the USEPA Unified Guidance (2009), the result is recorded as an SSI.

4.2 Corrective Action

If groundwater corrective action is triggered, semi-annual sampling of the assessment monitoring wells will continue and Confidence Intervals will monitor the progress of remediation efforts. Confidence Intervals are compared to GWPS and the entire interval must fall below a specified limit (i.e. the Upper Confidence Limit [UCL] must be below the limit) to demonstrate compliance. A site-specific monitoring program will be developed based on the final corrective action plan and points-of-compliance.

5.0 SITE-SPECIFIC STATISTICAL ANALYSIS METHODS

A site-specific statistical analysis approach was developed after applying the screening criteria described previously. Results of the site-specific screening are presented in Appendix A, Background Screening and Compliance Evaluation. The following is a detailed description of the statistical analysis methodology that will be used for groundwater quality analysis at the site when monitored constituents are present in any of the downgradient wells.

Background sampling began in February 2016. The monitoring well network is described on Table 1.

For the statistical analysis of analytical results obtained from the existing monitoring well network, (1) the number of samples collected will be consistent with the appropriate statistical procedures as recommended by the CCR Rule and the USEPA Unified Guidance; (2) the statistical method will comply with the EPA-recommended performance standards; and (3) determination of whether or not there is a statistically significant increase (SSI) over background values in the future will be completed per the above-mentioned regulations.

5.1 Detection Monitoring Program

Based on the background screening that was conducted by Groundwater Stats Consulting in the Fall 2017 and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to Groundwater Stats Consulting, interwell methods combined with a 1-of-2 resampling strategy will be used to evaluate boron, calcium, chloride and fluoride. Intrawell methods combined with a 1-of-2 resampling strategy will be used for pH, sulfate and TDS. If a statistical exceedance is found, one independent resample will be collected to determine whether the initial exceedance is verified.

If the initial finding is not verified by resampling, the resampled value will replace the initial finding. When the resample confirms the initial finding, the exceedance will be reported. The Sen's Slope/Mann Kendall trend test will be used, in addition to PL, to statistically evaluate concentration levels over time and determine whether concentrations are increasing, decreasing, or stabilizing.

The chance of false positive results increases with increasing numbers of statistical tests. The total number of statistical tests for a facility is the number of parameters tested multiplied by the number of monitoring wells. In an effort to reduce the overall number of statistical tests performed at each semi-annual sampling event, thereby lowering the chance of a false exceedance while maintaining a high degree of statistical confidence that a release will be detected, Plant Gorgas Gypsum Pond will:

1) Monitor constituents in wells with detections (i.e. excluding well/constituent pairs with 100% nondetects); and
2) Incorporate a 1-of-2 retesting strategy

The following statistical methods will be used:

5.1.1 Parametric Prediction Limits

These limits will be computed per USEPA Unified Guidance when data can be normalized, possibly via transformation. The test alpha will be calculated based on the following configuration:

Annual SWFPR = 0.10
1-of-2 resampling plan with a minimum of 8 background samples for interwell tests
1-of-2 resampling plan with a minimum of 8 background samples for intrawell tests
w= 3 (number of compliance wells)
c= 7 constituents

5.1.2 Nonparametric Prediction Limits

The highest background value will be used to set the upper nonparametric prediction limit. The associated confidence level takes into account the prospect of additional future compliance values (retests) when there is an initial exceedance. The achieved confidence level is determined based on the background sample size, the number of

monitoring wells in the network, and the number of proposed retests, using tables provided in the USEPA Unified Guidance[7].

5.1.3 Retesting Strategy

When the prediction limit analyses indicate initial exceedances, discrete verification resamples from the indicating well(s) will be collected within 90 days and prior to the next regularly scheduled sampling event. If the initial exceedance is verified, a confirmed SSI will be reported. For the test to be valid, the resample needs to be statistically independent which requires that sufficient time elapse between the initial sample and resample. A minimum time interval between samples will be established to ensure that separate volumes of groundwater are being sampled.

5.1.4 Background Data Set

Interwell tests, which compare downgradient well data to statistical limits constructed from all pooled upgradient well data after careful screening, are appropriate when average concentrations are similar across upgradient wells. Intrawell tests, which compare compliance data from a single well to screened historical data within the same well, are appropriate when upgradient wells exhibit spatial variation; when statistical limits constructed from upgradient wells would not be conservative from a regulatory perspective; and when downgradient water quality is unimpacted compared to upgradient water quality for the same parameter. Because upgradient well data represent natural groundwater quality upgradient of the facility, intrawell prediction limits are also constructed on these wells. A minimum of 8 background samples are required for both interwell and intrawell tests.

The background data set will be managed, screened and updated as described previously after receipt of Department approval.

[7] USEPA Unified Guidance, March 2009. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D.C.

5.2 Assessment Monitoring Program

Assessment monitoring will be performed following the procedures described in Section 4.0. When assessment monitoring is initiated, Appendix IV constituents are sampled semi-annually, and concentrations in downgradient wells are statistically compared as described below to GWPS. Following the Unified Guidance, the Maximum Contaminant Level (MCL) is used as the GWPS. When reported concentrations in upgradient wells are higher than the established MCLs, background limits may be developed as described below from an interwell tolerance limit using the pool of all approved upgradient well data (see Chapter 7 of the Unified Guidance).

Parametric tolerance limits, which are used when pooled upgradient well data follow a normal or transformed-normal distribution, may be constructed on upgradient well or wells with the highest average concentrations with Department approval. This step serves to reduce the effect of spatial variation on the standard deviation in the parametric case when calculating a GWPS. Non-parametric tolerance limits will be constructed when data do not follow a normal or transformed-normal distribution or when a parametric tolerance limit is not approved.

For constituents without established MCLs, the CCR-rule specified limits will be used as the GWPS unless Department-approved background is higher as calculated from interwell tolerance limit as described above. Appendix IV background data are screened for outliers and extreme trending patterns that would lead to artificially elevated statistical limits.

Confidence Intervals are then constructed using a maximum of 8 of the most recent assessment measurements from a given downgradient well for comparison to the GWPS to determine compliance.

Parametric tolerance limits (i.e. UTLs) are calculated when data follow a normal or transformed-normal distribution using pooled upgradient well data as described above for Appendix IV parameters with a target of 95% confidence and 95% coverage. When data sets contain greater than 50% nondetects or do not follow a normal or transformed-normal distribution, the confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. The UTLs are then used as background levels for establishing the GWPS under case 3 below.

As described in 40 CFR § 257.95(h)(1)-(3) the GWPS is:

1. The maximum contaminant level (MCL) established under 40 CFR § 141.62 and 141.66.
2. Where an MCL has not been established:
   (i) Cobalt 0.006 mg/L;
   (ii) Lead 0.015 mg/L;
   (iii) Lithium 0.040 mg/L; and
   (iv) Molybdenum 0.100 mg/L.
3. Background levels for constituents where the background level is higher than the MCL or rule-specified GWPS.

In assessment monitoring, when the Lower Confidence Limit (LCL), or the entire confidence interval, exceeds the GWPS as discussed in the USEPA Unified Guidance (2009), the result is recorded as an SSL.

With Department approval, the background limits will be updated and compared to the MCLs and CCR-rule specified limits for Appendix IV constituents every two years to determine whether the established limit or background will be used as the GWPS in the confidence interval comparisons, as discussed above.

5.3 Corrective Action Monitoring Program

When implemented, groundwater corrective action will include a remedy monitoring program. The remedy monitoring program will be prepared under separate cover and include details regarding statistical analysis of results.

6.0 BIBLIOGRAPHY

Cohen, A. C., Jr., 1959. Simplified Estimators for the Normal Distributed When Samples Are Singly Censored or Truncated, *Technometrics*, **1** : 217-237.

Gibbons, R. D., 1991. Some Additional Prediction Limits for Groundwater Detection Monitoring at Waste Disposal Facilities, *Groundwater,* **29** : 5.

Gilbert, R. D., 1987. *Statistical Methods for Environmental Pollution Monitoring*. Professional Book Series, Van Nos Reinhold.

Helsel, D.R. and Hirsch, R.M., 1992. *Statistical Methods in Water Resources*. Elsevier.

U.S. EPA, April 1989. *Interim Final Guidance*, Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D. C.

U.S. EPA, June 1992. *Addendum to Interim Final Guidance*, Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D. C.

U.S. EPA, March 2009. *Unified Guidance*, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Office of Solid Waste Management Division, U.S. Environmental Protection Agency, Washington, D. C.

Zar, Jerrold H., 1996. *Biostatistical Analysis*. 3rd edition (p112) Prentice Hall

Figures

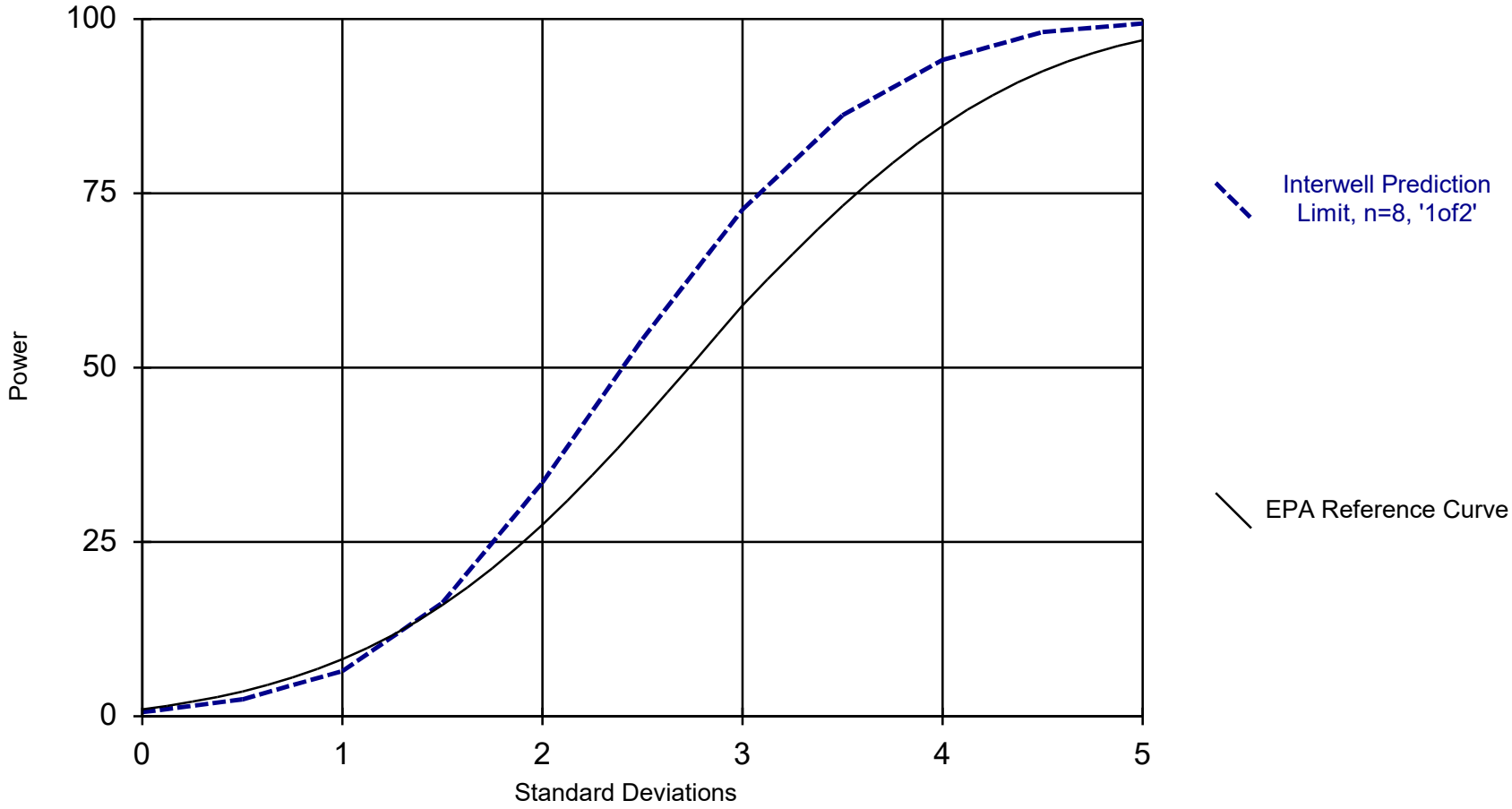
Table 1.
Groundwater Monitoring Well Network Details

Well Name	Purpose	Installation Completion Date	Northing	Easting	Ground Elevation	Top of Casing Elevation	Well Depth (ft.) Below Top of Casing	Top of Screen Elevation (ft MSL)	Bottom of Screen Elevation (ft MSL)	Screen Length
MW-1	Upgradient	1/15/2014	1330794.064	594082.361	499.19	502.25	107.56	405.09	395.09	10
MW-2	Upgradient	10/23/2014	1331053.309	593548.802	498.54	502.12	94.58	417.94	407.94	10
MW-3	Upgradient	10/23/2014	1330842.402	593025.397	522.23	525.9	119.07	417.23	407.23	10
MW-4	Upgradient	2/19/2012	1330289.727	592896.414	516.67	518.63	128.66	400.37	390.37	10
GS-GSA-MW-3	Downgradient	12/8/2015	1329120.128	2054772.316	439.75	442.63	129.68	323.35	313.35	10
GS-GSA-MW-4	Downgradient	12/9/2015	1329235.421	2054872.732	439.44	442.10	107.86	344.64	334.64	10
GS-GSA-MW-8	Downgradient	12/20/2015	1328959.796	2054804.925	401.33	404.38	128.45	286.33	276.33	10
GS-GSA-MW-3V	Vertical Delineation	2/25/2019	1329100.49	2054755.12	439.60	442.68	191.58	261.60	251.60	10
GS-GSA-MW-4V	Vertical Delineation	2/25/2019	1329256.83	2054882.74	439.29	442.18	154.39	308.29	288.29	20
GS-GSA-MW-9H	Horizontal Delineation	2/3/2019	1328157.96	2054972.56	333.04	335.83	60.29	286.04	276.04	10
GS-GSA-MW-10H	Horizontal Delineation	2/4/2019	1328612.73	2055441.67	336.56	339.52	29.46	320.56	310.56	10
GS-GSA-MW-11H	Horizontal Delineation	2/6/2019	1327162.44	2056243.5	260.13	263.02	49.39	224.13	214.13	10

Notes:

1. Northing and easting are in feet relative to the State Plane Alabama West North America Datum of 1983.
2. Elevations are in feet relative to the North American vertical Datum of 1988.
3. *Piezometers are utilized for water level readings only.
3. Top of screen and bottom of screen depths are calculated relative Top of Casing elevation .
5. MSL - Mean Sea Level

Power Curve

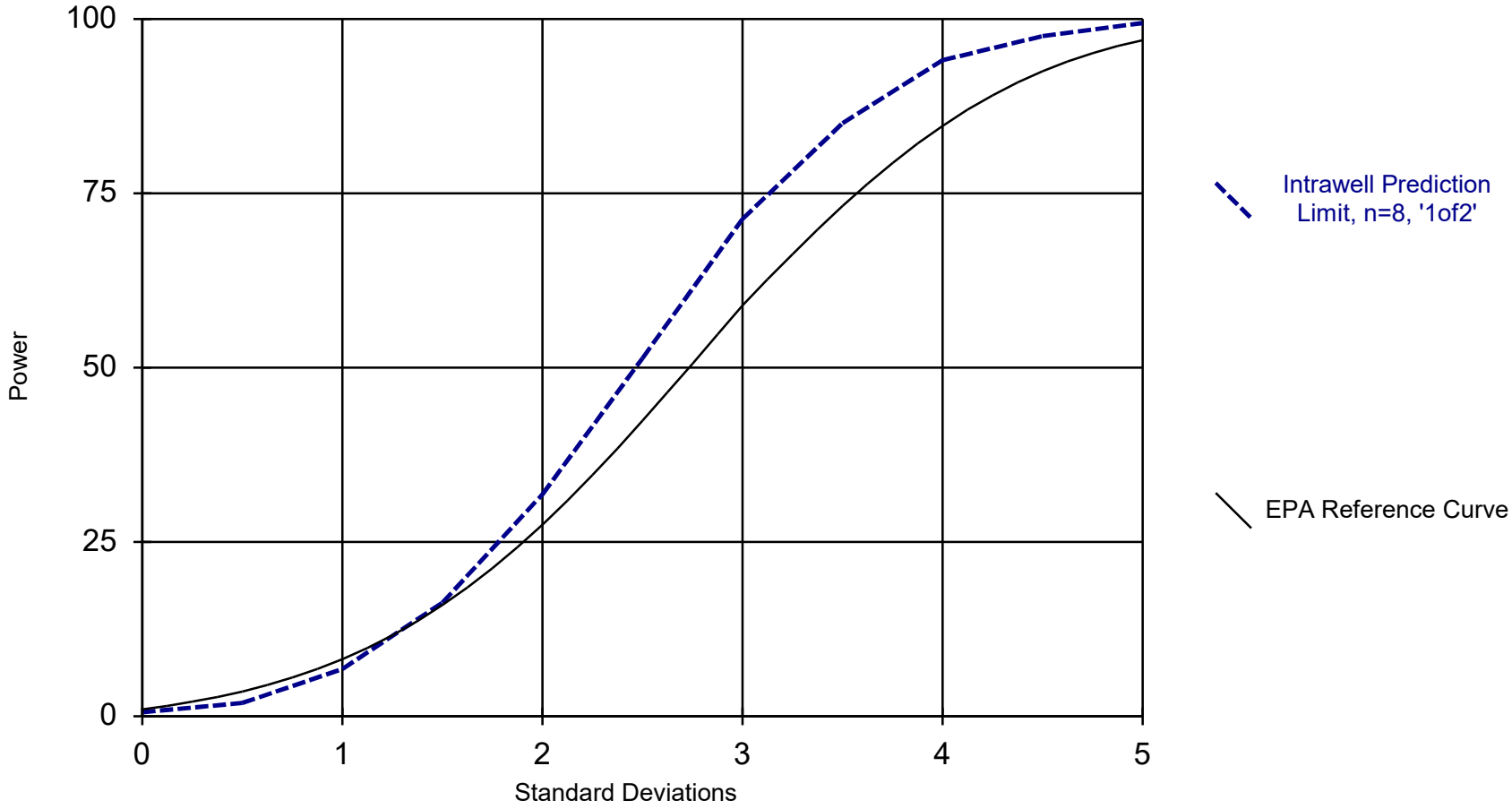


Kappa = 2.416, based on 3 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 4/9/2020 3:35 PM

Plant William C Gorgas Client: Southern Company Data: Gorgas GSA

Power Curve



Kappa = 2.458, based on 3 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 4/9/2020 3:35 PM

Plant William C Gorgas Client: Southern Company Data: Gorgas GSA

Appendix A
Background Screening and Compliance Evaluation

October 1, 2019

Southern Company Services
Attn: Mr. Greg Dyer
3535 Colonnade Parkway
Birmingham, AL 35243

Re: Plant Gorgas Gypsum Pond
Background Update – May 2019

Dear Mr. Dyer,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the screening for the proposed background update of the prediction limits with data through May 2019 for Alabama Power Company's Plant Gorgas Gypsum Pond. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule, 2015) as well as with the USEPA Unified Guidance (2009).

Sampling began at site for the CCR program in 2016. The monitoring well network, as provided by Southern Company Services, consists of the following:

- **Upgradient wells:** MW-1, MW-2, MW-3, and MW-4; and
- **Downgradient wells:** GS-GSA-MW-3, GS-GSA-MW-4, and GS-GSA-MW-8.

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was prepared according to the Statistical Analysis Plan approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to Groundwater Stats Consulting. The analysis was reviewed by Dr. Jim Loftis, Civil & Environmental Engineering professor emeritus at Colorado State University and Senior Advisor to Groundwater Stats Consulting.

The CCR program consists of the following constituents:

- **Appendix III** (Detection Monitoring) **-** boron, calcium, chloride, fluoride, pH, sulfate, and TDS;

Time series and box plots for these parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record for the purpose of updating statistical limits (Figures A and B, respectively). Values in background which have been flagged as outliers may be seen in a lighter font and as a disconnected symbol on the graphs.

Background Update Summary

Intrawell prediction limits, which compare the most recent compliance sample from a given well to historical data from the same well, are updated by testing for the appropriateness of consolidating new sampling observations with the screened background data. This process is described below and requires a minimum of four new data points. Historical data were evaluated for updating with newer data through May 2019 through the use of time series graphs to identify potential outliers when necessary, as well as the Mann Whitney test for equality of medians. As discussed in the Statistical Analysis Plan (October 2018), intrawell prediction limits are used to evaluate pH, sulfate, and TDS at all wells due to natural spatial variation for these parameters.

Interwell prediction limits, which compare the most recent sample from each downgradient well to statistical limits constructed from pooled upgradient well data, are updated during each sample event. Data from upgradient wells are periodically re-screened for newly developing trends, which may require adjustment of the background period to eliminate the trend, as well as for outliers over the entire record. Interwell prediction limits are used to evaluate boron, calcium, chloride, and fluoride.

Parametric prediction limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of data are nondetects, a nonparametric test is utilized. While the false positive rate associated with the parametric limits is based on an annual 10% as recommended by the EPA Unified Guidance (2009), the false positive rate associated with the nonparametric limits is dependent upon the available background sample size, number of future comparisons, and verification resample plan. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric prediction limits.

- No statistical analyses are required on wells and analytes containing 100% nondetects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% nondetects in background, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for nondetects is the practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% nondetects, the Kaplan-Meier nondetect adjustment is applied to the background data. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric prediction limits are used on data containing greater than 50% nondetects.

A power curve is provided in this report to demonstrate that a change from the originally proposed 1-of-3 resample plan to the 1-of-2 resample plan provides sufficient power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits and complies with the recommendations in the USEPA Unified Guidance (2009). The EPA suggests the selected statistical method should provide at least 55% power at 3 standard deviations or at least 80% power at 4 standard deviations. The power curve is based on the following:

Semi-Annual Sampling
Intrawell Prediction Limits with 1-of-2 resample plan
Constituents Detected Downgradient: 7
Downgradient wells: 3

Prior to performing prediction limits, proposed background data were through May 2019 reviewed to identify any newly suspected outliers at all wells for pH, sulfate, and TDS, and at upgradient wells for boron, calcium, chloride, and fluoride (Figure C). Both Tukey's Test and visual screening are used to identify potential outliers. When identified, values were flagged with "o" and excluded to reduce variation, better represent background conditions, and provide limits that are conservative from a regulatory perspective. Potential outliers that are identified by Tukey's test but are not greatly different from the rest of the data are not flagged. Also, outliers that are not identified as important by Tukey's test may be identified visually. As mentioned above, flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages. No data were flagged as outliers during the screening. A summary of Tukey's test results follows this letter.

For constituents requiring intrawell prediction limits, the Mann Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through May 2017 to compliance data through May 2019 to evaluate whether the groups are statistically similar at the 99% confidence level, in which case background data may be updated with compliance data (Figure D). Statistically significant differences were found between the two groups for sulfate in well GS-GSA-MW-8; and TDS in wells GS-GSA-MW-8 and MW-1. Typically, when the test concludes that the medians of the two groups are significantly different, particularly in the downgradient wells, the background are not updated to include the newer data but will be reconsidered in the future.

However, in the case of sulfate at well GS-GSA-MW-8, concentrations are lower than those reported in at least one upgradient well and were, therefore, updated. For TDS, the Mann Whitney identified differences in upgradient well MW-1 as well as at downgradient well GS-GSA-MW-8. A very similar pattern and concentrations are observed also in upgradient well MW-3, though the difference is not statistically significant. When similar patterns exist upgradient of the facility, it is an indication that groundwater quality is naturally changing and is unrelated to the landfill. Therefore, upgradient well MW-1 was updated to include all data through May 2019 for TDS. Downgradient well GS-GSA-MW-8 will use the most recent 8 samples through May 2019 for TDS, which are more stable and reflective of present-day conditions, for construction of intrawell prediction limits. A summary of these results follows this letter and the test results are included with the Mann Whitney test section at the end of this report. Additionally, a summary of well/constituent pairs using a truncated portion of the record follows this letter.

The Sen's Slope/Mann Kendall trend test was used to evaluate the entire record of data from upgradient wells for parameters utilizing interwell prediction limits (Figure E). When statistically significant increasing trends are identified in upgradient wells, the earlier portion of data is deselected prior to construction of interwell statistical limits if the trending data would result in statistical limits that are not conservative from a regulatory perspective. A few statistically significant increasing trends were noted in upgradient wells and may be seen on the Trend Test Summary Table. These trends required no adjustments at this time, however, because the period of record is short and/or the magnitudes of the trends were low relative to the average concentrations in background.

Evaluation of Appendix III Parameters

Interwell prediction limits combined with a 1-of-2 verification strategy were constructed for boron, calcium, chloride and fluoride; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for pH, sulfate and TDS (Figures F and G, respectively). Future samples will be compared against these prediction limits. In the event of an initial exceedance of compliance well data, the 1-of-2 resample plan allows for collection of one additional sample to determine whether the initial exceedance is confirmed. When the resample confirms the initial exceedance, a statistically significant increase (SSI) is identified, and further research would be required to identify the cause of the exceedance (i.e. impact from the site, natural variation, or an off-site source). If a resample falls within the statistical limit, the initial exceedance is considered to be a false positive result; therefore, no further action is necessary. A summary of the updated prediction limits may be found in the Prediction Limit Summary tables following this letter.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Gorgas Gypsum Pond. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,

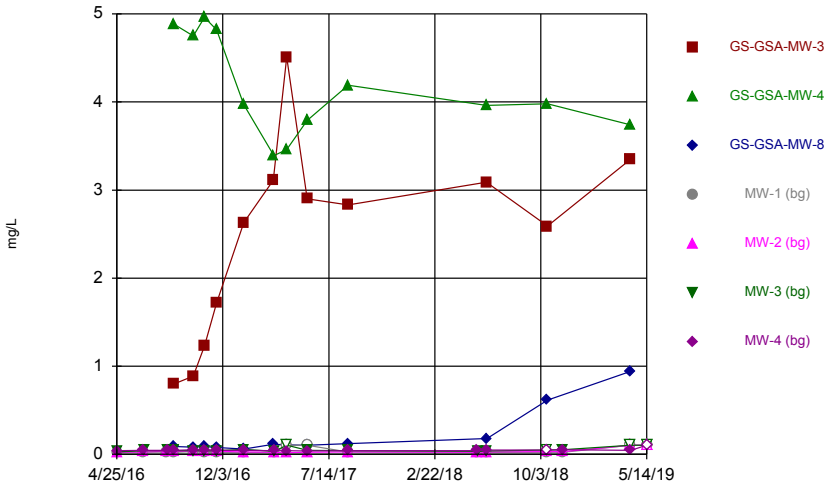
Andrew T. Collins
Groundwater Analyst

Kristina L. Rayner
Groundwater Statistician

FIGURE A.

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

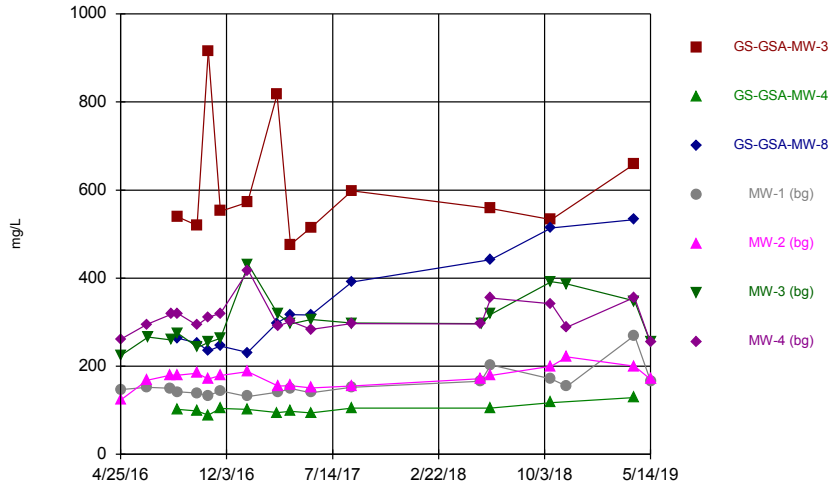
Time Series



Constituent: Boron Analysis Run 9/23/2019 9:11 AM
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

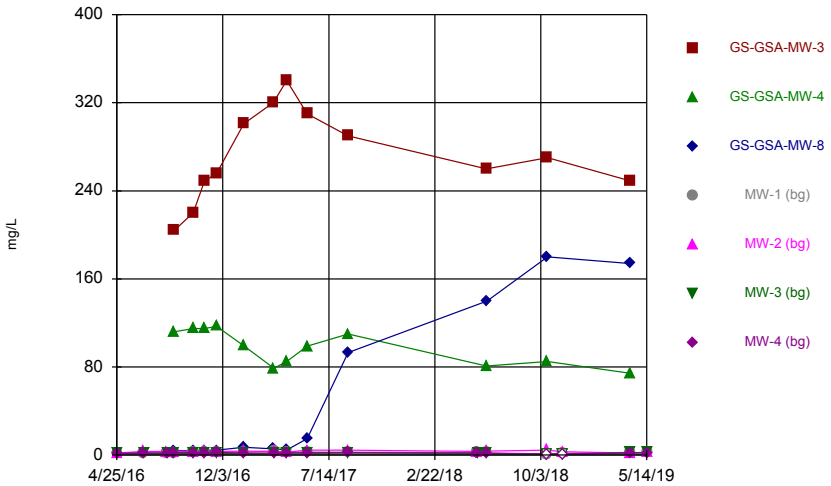
Time Series



Constituent: Calcium Analysis Run 9/23/2019 9:11 AM
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

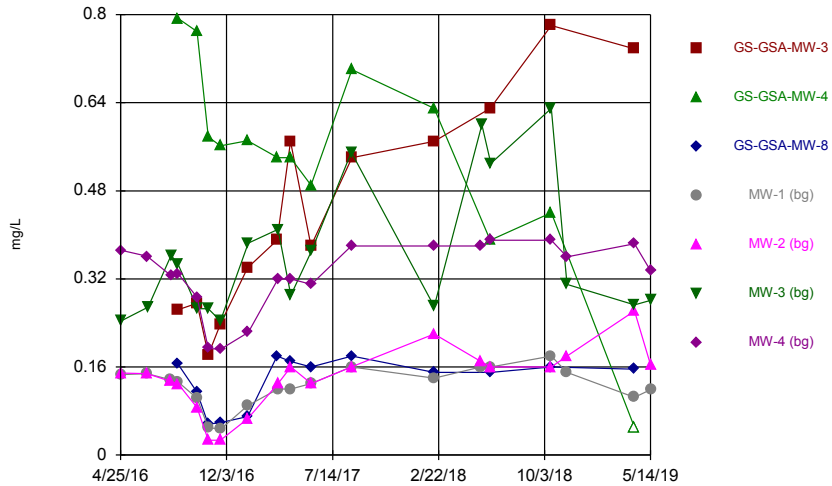
Time Series



Constituent: Chloride Analysis Run 9/23/2019 9:11 AM
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Fluoride Analysis Run 9/23/2019 9:11 AM
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Time Series

Constituent: Boron (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					0.0241 (J)	0.028 (J)	0.0414 (J)
4/26/2016				0.0231 (J)			
6/20/2016				0.0227 (J)	0.0284 (J)		0.0434 (J)
6/22/2016						0.0433 (J)	
8/8/2016				0.0278 (J)	0.034 (J)		
8/9/2016						0.0429 (J)	0.0453 (J)
8/24/2016	0.799	4.88	0.0898 (J)	0.0247 (J)	0.0316 (J)	0.0431 (J)	0.0451 (J)
10/3/2016	0.889	4.75	0.0821 (J)	0.0307 (J)	0.0367 (J)		0.0511 (J)
10/4/2016						0.04 (J)	
10/26/2016	1.23	4.96	0.0889 (J)	0.0241 (J)	0.0331 (J)	0.0375 (J)	0.0507 (J)
11/21/2016	1.72	4.82	0.0788 (J)	0.0202 (J)	0.035 (J)	0.0406 (J)	0.0458 (J)
1/17/2017	2.63	3.97	0.0607 (J)	0.0201 (J)	0.0259 (J)		
1/18/2017						0.0548 (J)	0.0445 (J)
3/20/2017	3.11		0.114				
3/21/2017		3.39					
3/22/2017				0.0224 (J)	0.0243 (J)	0.0344 (J)	0.0432 (J)
4/17/2017	4.51	3.46					
4/18/2017			0.108	<0.203	0.0206 (J)	<0.203	0.0409 (J)
5/30/2017	2.9	3.79	0.105	<0.203			
5/31/2017					0.0234 (J)	0.0454 (J)	0.0392 (J)
8/23/2017				0.0253 (J)	0.0267 (J)	0.0425 (J)	0.042 (J)
8/24/2017	2.83	4.19	0.12				
5/22/2018				0.0224 (J)	0.0251 (J)		
5/23/2018							0.0433 (J)
5/24/2018						0.0339 (J)	
6/11/2018	3.09	3.96					
6/12/2018			0.181	0.0214 (J)	0.0275 (J)	0.0371 (J)	0.0478 (J)
10/17/2018	2.59	3.98	0.616	0.0216 (J)	0.0321 (J)	<0.1 (J)	<0.1 (J)
11/19/2018				0.0237 (J)	0.0324 (J)	0.0514 (J)	0.0526 (J)
4/10/2019	3.35	3.74	0.944	<0.203	<0.203	<0.203	0.0438 (J)
5/14/2019				<0.203	<0.203	<0.203	<0.203

Time Series

Constituent: Calcium (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					123	224	261
4/26/2016				147			
6/20/2016				152	168		295
6/22/2016						266	
8/8/2016				150	180		
8/9/2016						260	318
8/24/2016	539	102	263	142	180	274	319
10/3/2016	519.7	98.4	253	139	184		293
10/4/2016						243	
10/26/2016	916	88.7	235	133	171	254	311
11/21/2016	552	104	246	144	179	263	320
1/17/2017	572	102	231	131	188		
1/18/2017						431	417
3/20/2017	817		298				
3/21/2017		94.7					
3/22/2017				141	155	318	292
4/17/2017	476	97.9					
4/18/2017			317	149	156	296	302
5/30/2017	515	93.9	316	140			
5/31/2017					151	306	284
8/23/2017				152	155	298	297
8/24/2017	598	105	391				
5/22/2018				166	172		
5/23/2018							296
5/24/2018						297	
6/11/2018	558	105					
6/12/2018			442	203	179	318	355
10/17/2018	533	117	514	171	200	392	342
11/19/2018				154	221	387	289
4/10/2019	659	129	533	270	200	348	356
5/14/2019				167	170	254	254

Time Series

Constituent: Chloride (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					1.9	1.32	1.53
4/26/2016				1.94			
6/20/2016				2.09	3.43		1.85
6/22/2016						1.46	
8/8/2016				2.18	3.31		
8/9/2016						1.35	1.95
8/24/2016	204	112	4.03	2.22	3.23	1.47	2.07
10/3/2016	220	115	3.87	2.34	3.21		2.02
10/4/2016						1.59	
10/26/2016	249	115	4.08	2.34	3.35	1.27	2.07
11/21/2016	256	117	4.39	2.5	3.34	1.38	2.39
1/17/2017	301	99.3	7.22	2.68	3.58		
1/18/2017						1.34	1.9
3/20/2017	320		5.7				
3/21/2017		79					
3/22/2017				3.7	3.4	2	1.5 (J)
4/17/2017	340	85					
4/18/2017			4.7	2.4	2.6	2.2	1.6 (J)
5/30/2017	310	99	15	2.6			
5/31/2017					4.4	1.5 (J)	2.1
8/23/2017				2.7	4.4	1.8 (J)	2.3
8/24/2017	290	110	93				
5/22/2018				2.3	3.2		
5/23/2018							2
5/24/2018						1.6 (J)	
6/11/2018	260	81					
6/12/2018			140	2.3	3.7	1.4 (J)	1.7 (J)
10/17/2018	270	85	180	<2 (J)	4.6	<2	<2 (J)
11/19/2018				1.7 (J)	3	<2	<2
4/10/2019	249	74.3	174	2.35	1.76	2.25	1.88
5/14/2019				2.28	2.87	2.28	1.82

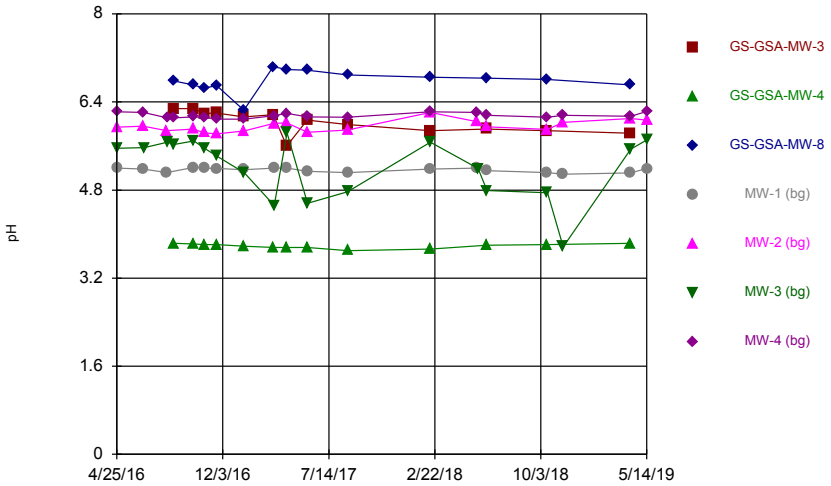
Time Series

Constituent: Fluoride (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					0.149 (J)	0.243 (J)	0.372
4/26/2016				0.146 (J)			
6/20/2016				0.148 (J)	0.148 (J)		0.361
6/22/2016						0.269 (J)	
8/8/2016				0.137 (J)	0.134 (J)		
8/9/2016						0.363	0.326
8/24/2016	0.264 (J)	0.793	0.165 (J)	0.133 (J)	0.129 (J)	0.346	0.329
10/3/2016	0.276 (J)	0.769	0.114 (J)	0.103 (J)	0.086 (J)		0.287 (J)
10/4/2016						0.266 (J)	
10/26/2016	0.182 (J)	0.578	0.056 (J)	0.05 (J)	0.027 (J)	0.266 (J)	0.194 (J)
11/21/2016	0.238 (J)	0.562	0.059 (J)	0.047 (J)	0.027 (J)	0.244 (J)	0.192 (J)
1/17/2017	0.34	0.571	0.07 (J)	0.09 (J)	0.066 (J)		
1/18/2017						0.385	0.223 (J)
3/20/2017	0.39		0.18				
3/21/2017		0.54					
3/22/2017				0.12	0.13	0.41	0.32
4/17/2017	0.57	0.54					
4/18/2017			0.17	0.12	0.16	0.29	0.32
5/30/2017	0.38	0.49	0.16	0.13			
5/31/2017					0.13	0.37	0.31
8/23/2017				0.16	0.16	0.55	0.38
8/24/2017	0.54	0.7	0.18				
2/13/2018	0.57 (D)	0.63 (D)	0.15 (D)	0.14 (D)	0.22 (D)	0.27 (D)	0.38 (D)
5/22/2018				0.16	0.17		
5/23/2018							0.38
5/24/2018						0.6	
6/11/2018	0.63	0.39					
6/12/2018			0.15	0.16	0.16	0.53	0.39
10/17/2018	0.78	0.44	0.16	0.18	0.16	0.63	0.39
11/19/2018				0.15	0.18	0.31	0.36
4/10/2019	0.738	<0.1	0.156	0.105	0.262	0.273	0.384
5/14/2019				0.119	0.164	0.281	0.335

Time Series

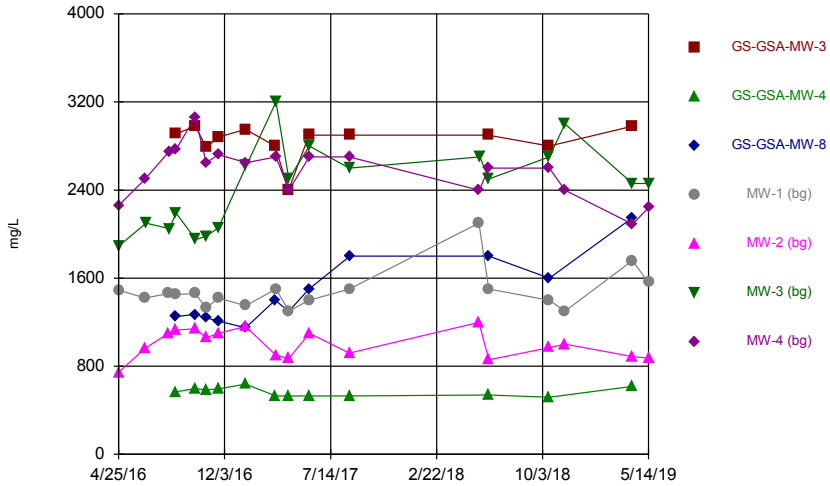


Constituent: pH Analysis Run 9/23/2019 9:11 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Time Series

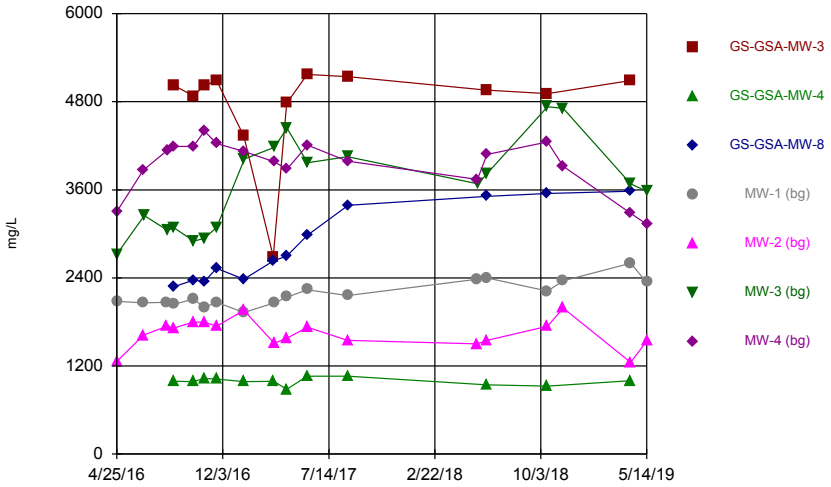


Constituent: Sulfate Analysis Run 9/23/2019 9:11 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Time Series



Constituent: TDS Analysis Run 9/23/2019 9:11 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Time Series

Constituent: pH (pH) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					5.94	5.56	6.22
4/26/2016				5.2			
6/20/2016				5.18	5.96		6.21
6/22/2016						5.57	
8/8/2016				5.12	5.88		
8/9/2016						5.67	6.11
8/24/2016	6.28	3.83 (E)	6.78			5.63	6.11
10/3/2016	6.28	3.82 (E)	6.71	5.21 (D)	5.91 (D)		6.13 (D)
10/4/2016						5.69 (D)	
10/26/2016	6.19	3.81 (E)	6.65	5.2	5.84	5.56	6.12
11/21/2016	6.2	3.81	6.7	5.19 (D)	5.82 (D)	5.42 (D)	6.09 (D)
1/17/2017	6.13	3.78	6.25	5.17 (D)	5.87 (D)		
1/18/2017						5.11 (D)	6.09 (D)
3/20/2017	6.17		7.04				
3/21/2017		3.76					
3/22/2017				5.2 (D)	6.01 (D)	4.52 (D)	6.15 (D)
4/17/2017	5.6	3.76					
4/18/2017			6.99	5.2	6.02	5.84	6.19
5/30/2017	6.07	3.76	6.98	5.14 (D)			
5/31/2017					5.85 (D)	4.56 (D)	6.13 (D)
8/23/2017				5.12 (D)	5.89 (D)	4.77 (D)	6.12 (D)
8/24/2017	5.99	3.7	6.89				
2/13/2018	5.88	3.73	6.85	5.18	6.21	5.67	6.22
5/22/2018				5.2	6.04		
5/23/2018							6.21
5/24/2018						5.19	
6/11/2018	5.91	3.8					
6/12/2018			6.83	5.15	5.95	4.79	6.16
10/17/2018	5.88	3.81	6.81	5.12	5.9	4.75	6.12
11/19/2018				5.09 (D)	6.03 (D)	3.77 (D)	6.16 (D)
4/10/2019	5.83	3.83	6.71	5.11	6.1	5.54	6.14
5/14/2019				5.19	6.07	5.71	6.23

Time Series

Constituent: Sulfate (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					745	1890	2260
4/26/2016				1490			
6/20/2016				1420	964		2500
6/22/2016						2100	
8/8/2016				1460	1100		
8/9/2016						2050	2750
8/24/2016	2910	567	1250	1450	1130	2190	2770
10/3/2016	2980	596	1270	1460	1140		3060
10/4/2016						1950	
10/26/2016	2790	585	1240	1330	1060	1980	2650
11/21/2016	2880	593	1210	1420	1100	2060	2720
1/17/2017	2950	637	1150	1350	1160		
1/18/2017						2620	2650
3/20/2017	2800		1400				
3/21/2017		530					
3/22/2017				1500	900	3200	2700
4/17/2017	2400	530					
4/18/2017			1300	1300	870	2500	2400
5/30/2017	2900	530	1500	1400			
5/31/2017					1100	2800	2700
8/23/2017				1500	920	2600	2700
8/24/2017	2900	530	1800				
5/22/2018				2100	1200		
5/23/2018							2400
5/24/2018						2700	
6/11/2018	2900	540					
6/12/2018			1800	1500	860	2500	2600
10/17/2018	2800	520	1600	1400	970	2700	2600
11/19/2018				1300	1000	3000	2400
4/10/2019	2980	616	2150	1760	889	2460	2090
5/14/2019				1560	873	2460	2240

Time Series

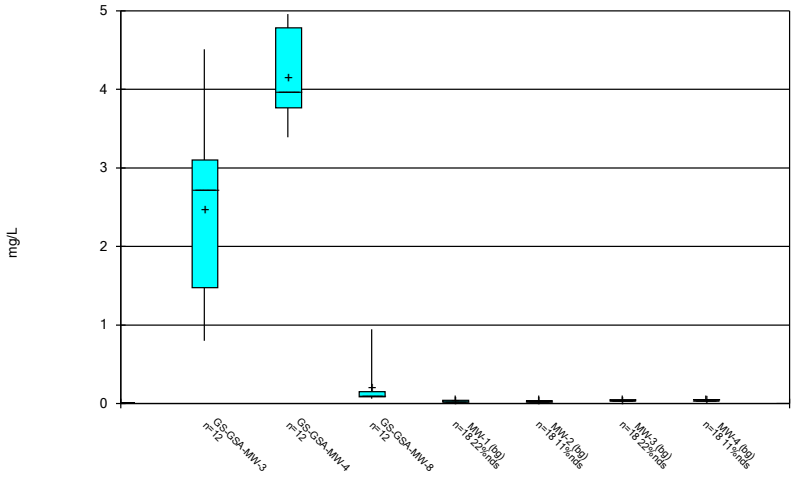
Constituent: TDS (mg/L) Analysis Run 9/23/2019 9:12 AM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3	GS-GSA-MW-4	GS-GSA-MW-8	MW-1 (bg)	MW-2 (bg)	MW-3 (bg)	MW-4 (bg)
4/25/2016					1260	2720	3300
4/26/2016				2080			
6/20/2016				2060	1620		3870
6/22/2016						3250	
8/8/2016				2070	1740		
8/9/2016						3050	4140
8/24/2016	5020	992	2280	2040	1720	3080	4190
10/3/2016	4880	988	2370	2110	1800		4190
10/4/2016						2900	
10/26/2016	5020	1030	2350	2000	1800	2940	4400
11/21/2016	5090	1020	2530	2070	1740	3090	4230
1/17/2017	4330	988	2380	1930	1960		
1/18/2017						4020	4120
3/20/2017	2690		2630				
3/21/2017		990					
3/22/2017				2060	1510	4180	3980
4/17/2017	4780	884					
4/18/2017			2700	2140	1580	4440	3880
5/30/2017	5170	1060	2980	2240			
5/31/2017					1730	3970	4210
8/23/2017				2160	1550	4050	3990
8/24/2017	5140	1060	3390				
5/22/2018				2380	1500		
5/23/2018							3740
5/24/2018						3680	
6/11/2018	4960	944					
6/12/2018			3510	2400	1550	3820	4080
10/17/2018	4910	928	3550	2220	1740	4730	4250
11/19/2018				2360	1990	4710	3920
4/10/2019	5090	1000	3580	2600	1250	3680	3280
5/14/2019				2340 (D)	1540 (D)	3580 (D)	3130 (D)

FIGURE B.

Box & Whiskers Plot

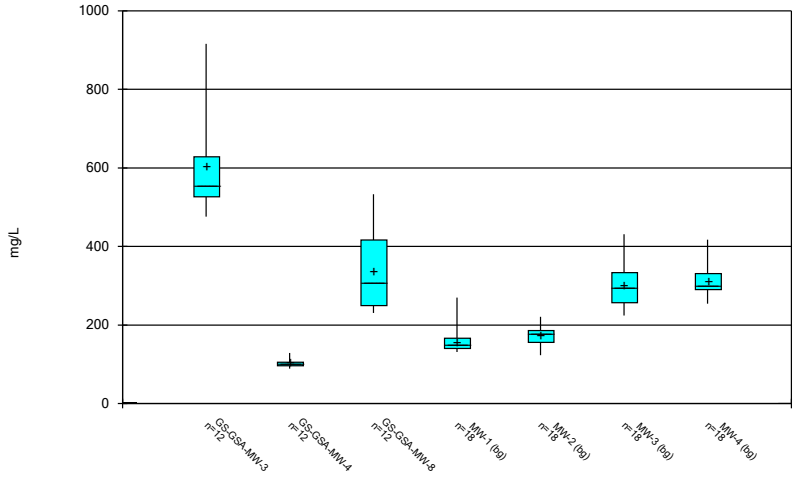


Constituent: Boron Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Box & Whiskers Plot

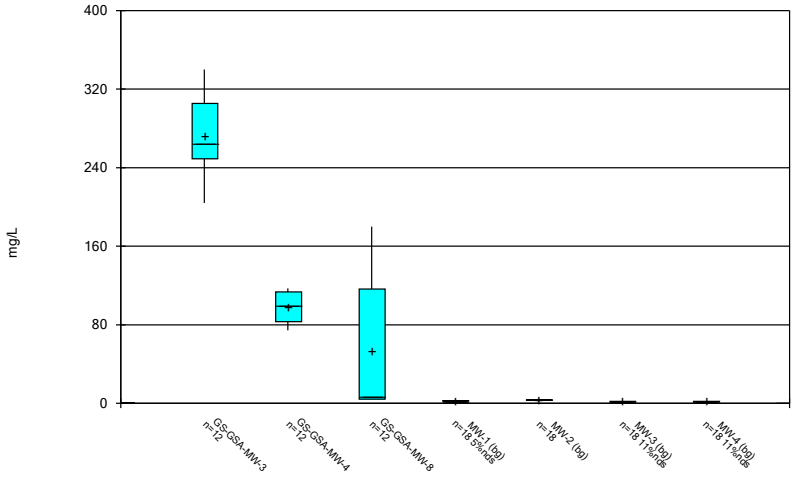


Constituent: Calcium Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Box & Whiskers Plot

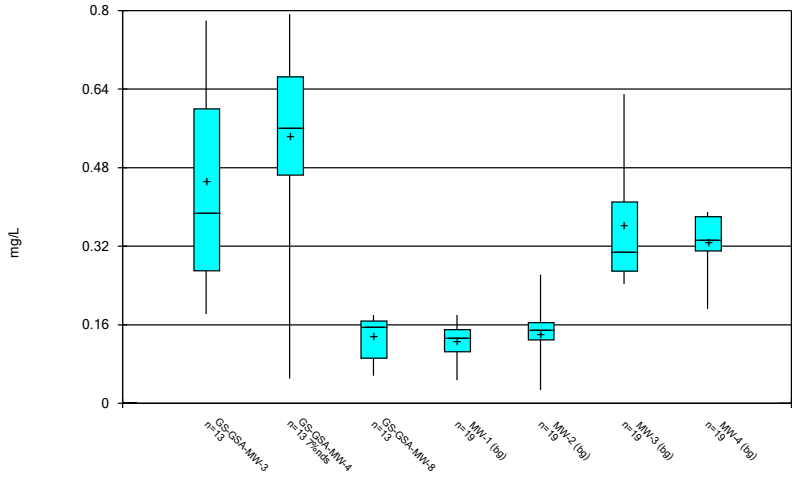


Constituent: Chloride Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

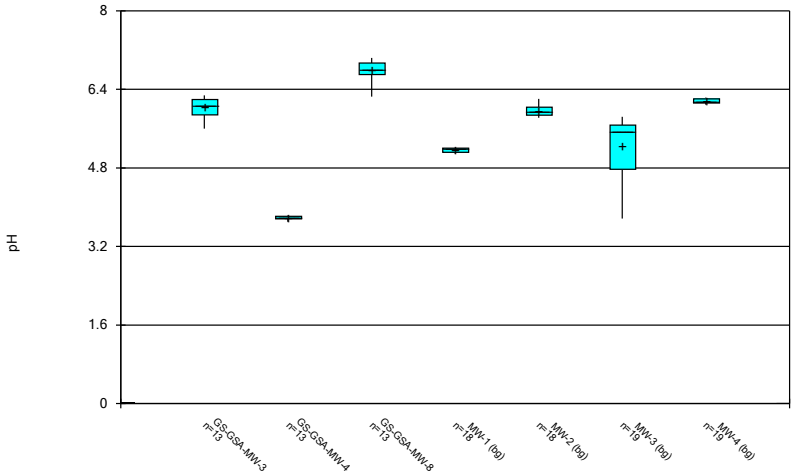
Box & Whiskers Plot



Constituent: Fluoride Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Box & Whiskers Plot

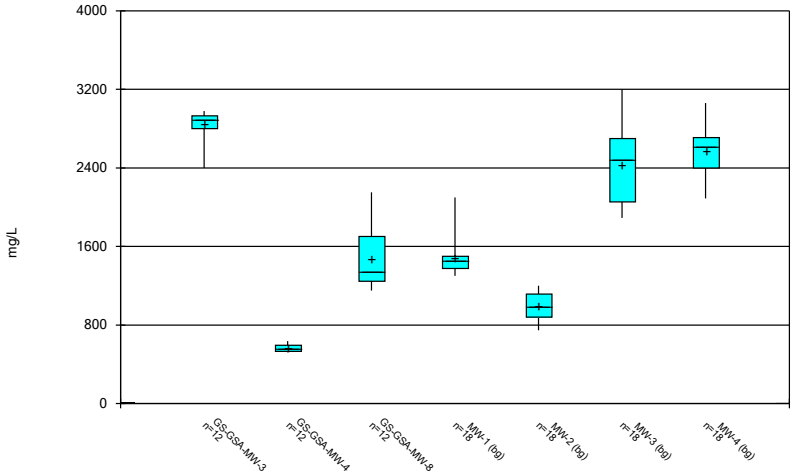


Constituent: pH Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Box & Whiskers Plot

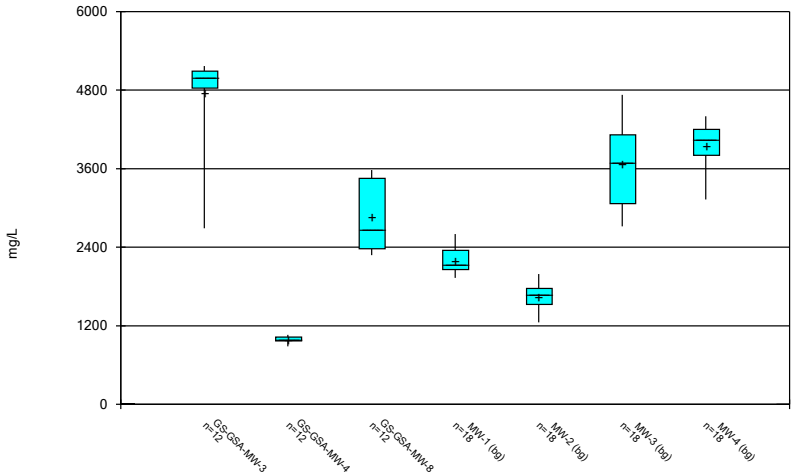


Constituent: Sulfate Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: TDS Analysis Run 9/23/2019 1:41 PM

Plant Gorgas Client: Southern Company Data: Gorgas GSA

FIGURE C.

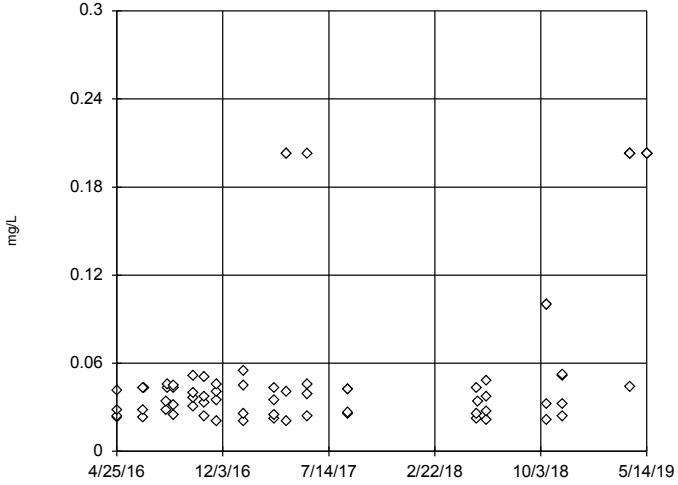
Outlier Analysis - All Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 9:11 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (mg/L)	MW-1,MW-2,MW-3,MW-4	No	n/a	n/a w/combined bg	NP	NaN	72	0.05995	0.05954	ln(x)	ShapiroFrancia
Calcium (mg/L)	MW-1,MW-2,MW-3,MW-4	No	n/a	n/a w/combined bg	NP	NaN	72	236.3	80.67	ln(x)	ShapiroFrancia
Chloride (mg/L)	MW-1,MW-2,MW-3,MW-4	No	n/a	n/a w/combined bg	NP	NaN	72	2.247	0.8446	ln(x)	ShapiroFrancia
Fluoride (mg/L)	MW-1,MW-2,MW-3,MW-4	No	n/a	n/a w/combined bg	NP	NaN	76	0.2393	0.132	sqrt(x)	ShapiroFrancia

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2,MW-3,MW-4



n = 72

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.2636, low cutoff = 0.004669, based on IQR multiplier of 3.

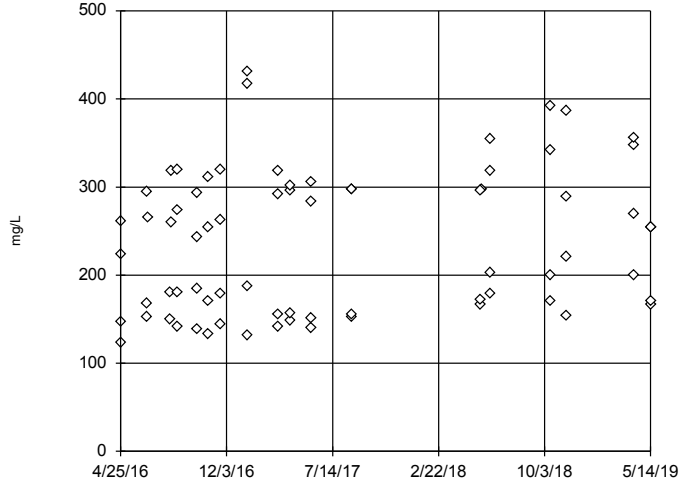
Constituent: Boron Analysis Run 9/23/2019 9:10 AM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2,MW-3,MW-4



n = 72

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 1867, low cutoff = 25.6, based on IQR multiplier of 3.

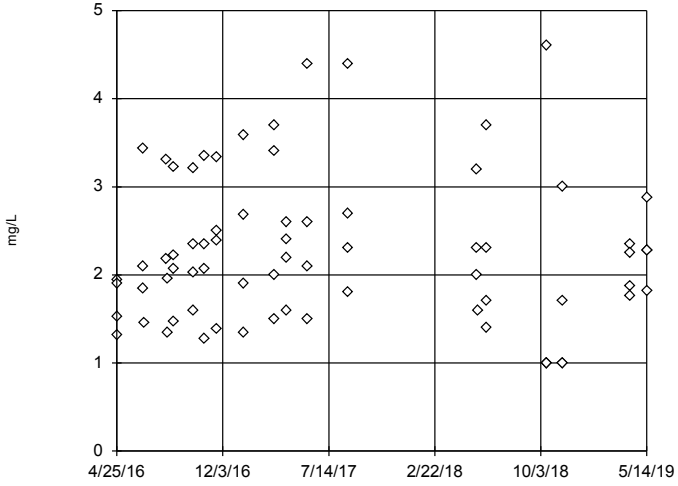
Constituent: Calcium Analysis Run 9/23/2019 9:10 AM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2,MW-3,MW-4



n = 72

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 11.85, low cutoff = 0.3563, based on IQR multiplier of 3.

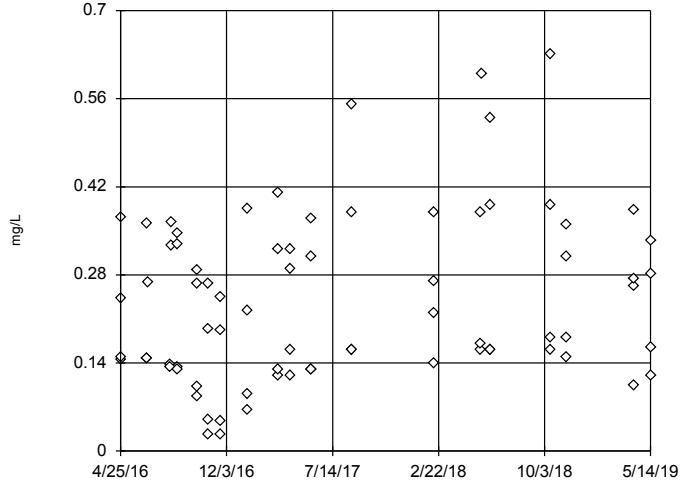
Constituent: Chloride Analysis Run 9/23/2019 9:10 AM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2,MW-3,MW-4



n = 76

No outliers found. Tukey's method selected by user.

Data were square root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 1.412, low cutoff = -0.05758, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 9/23/2019 9:10 AM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Outlier Analysis - Significant Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 9:09 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Sulfate (mg/L)	**MW-1 (bg)**	**Yes**	**2100**	**5/22/2018**	**NP**	**NaN**	**18**	**1483**	**187.3**	**ln(x)**	**ShapiroWilk**

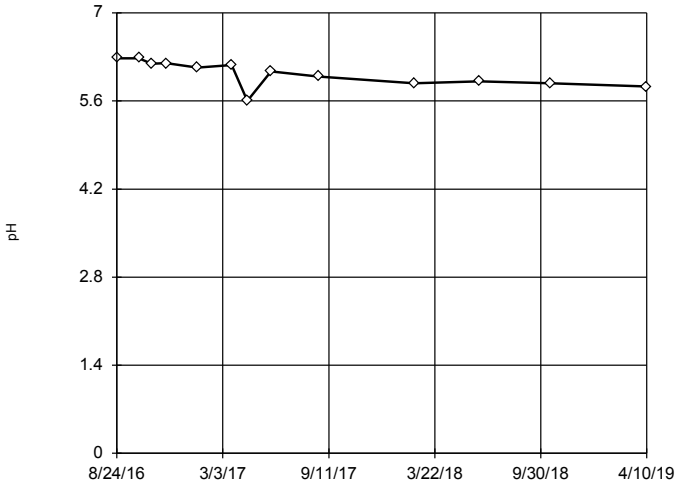
Outlier Analysis - All Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 9:09 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
pH (pH)	GS-GSA-MW-3	No	n/a	n/a	NP	NaN	13	6.032	0.2034	x^6	ShapiroWilk
pH (pH)	GS-GSA-MW-4	No	n/a	n/a	NP	NaN	13	3.785	0.04034	x^6	ShapiroWilk
pH (pH)	GS-GSA-MW-8	No	n/a	n/a	NP	NaN	13	6.784	0.2012	x^6	ShapiroWilk
pH (pH)	MW-1 (bg)	No	n/a	n/a	NP	NaN	18	5.165	0.03869	x^6	ShapiroWilk
pH (pH)	MW-2 (bg)	No	n/a	n/a	NP	NaN	18	5.961	0.1039	ln(x)	ShapiroWilk
pH (pH)	MW-3 (bg)	No	n/a	n/a	NP	NaN	19	5.227	0.5559	x^6	ShapiroWilk
pH (pH)	MW-4 (bg)	No	n/a	n/a	NP	NaN	19	6.153	0.04655	ln(x)	ShapiroWilk
Sulfate (mg/L)	GS-GSA-MW-3	No	n/a	n/a	NP	NaN	12	2849	155.8	x^6	ShapiroWilk
Sulfate (mg/L)	GS-GSA-MW-4	No	n/a	n/a	NP	NaN	12	564.5	39.86	ln(x)	ShapiroWilk
Sulfate (mg/L)	GS-GSA-MW-8	No	n/a	n/a	NP	NaN	12	1473	307.9	ln(x)	ShapiroWilk
Sulfate (mg/L)	**MW-1 (bg)**	**Yes**	**2100**	**5/22/2018**	**NP**	**NaN**	**18**	**1483**	**187.3**	**ln(x)**	**ShapiroWilk**
Sulfate (mg/L)	MW-2 (bg)	No	n/a	n/a	NP	NaN	18	998.9	129.3	normal	ShapiroWilk
Sulfate (mg/L)	MW-3 (bg)	No	n/a	n/a	NP	NaN	18	2431	379.6	sqrt(x)	ShapiroWilk
Sulfate (mg/L)	MW-4 (bg)	No	n/a	n/a	NP	NaN	18	2566	233.5	normal	ShapiroWilk
TDS (mg/L)	GS-GSA-MW-3	No	n/a	n/a	NP	NaN	12	4757	688.4	x^6	ShapiroWilk
TDS (mg/L)	GS-GSA-MW-4	No	n/a	n/a	NP	NaN	12	990.3	51.88	x^5	ShapiroWilk
TDS (mg/L)	GS-GSA-MW-8	No	n/a	n/a	NP	NaN	12	2854	519.3	ln(x)	ShapiroWilk
TDS (mg/L)	MW-1 (bg)	No	n/a	n/a	NP	NaN	18	2181	173.6	ln(x)	ShapiroWilk
TDS (mg/L)	MW-2 (bg)	No	n/a	n/a	NP	NaN	18	1643	200.5	x^2	ShapiroWilk
TDS (mg/L)	MW-3 (bg)	No	n/a	n/a	NP	NaN	18	3661	628.6	ln(x)	ShapiroWilk
TDS (mg/L)	MW-4 (bg)	No	n/a	n/a	NP	NaN	18	3939	362.7	x^6	ShapiroWilk

Tukey's Outlier Screening

GS-GSA-MW-3



n = 13

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.837, low cutoff = -4.026, based on IQR multiplier of 3.

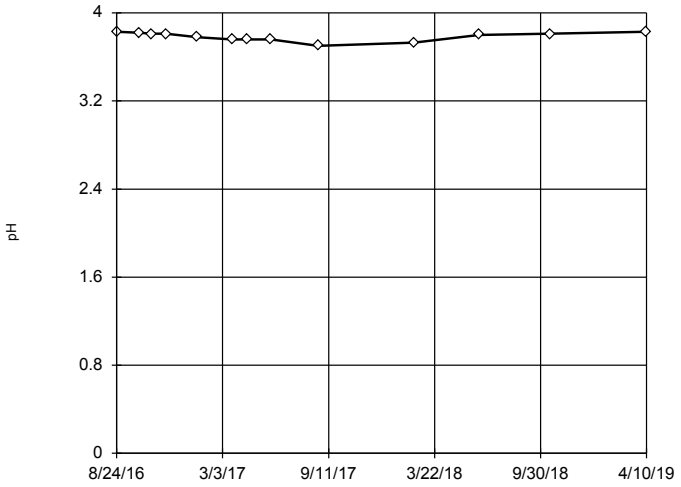
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-4



n = 13

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 3.96, low cutoff = 3.565, based on IQR multiplier of 3.

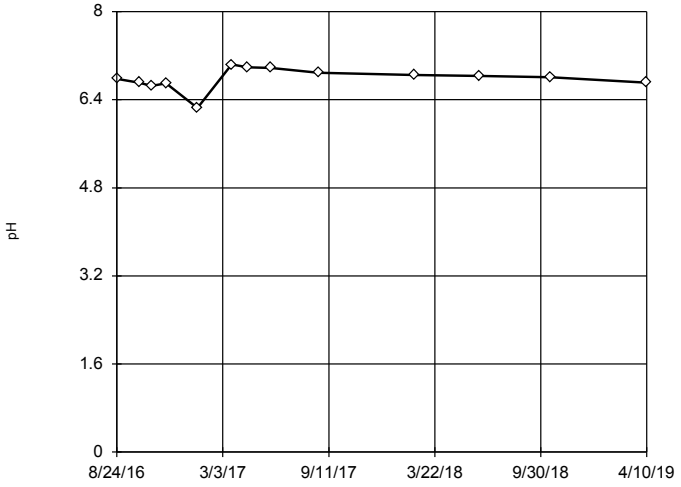
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-8



n = 13

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 7.462, low cutoff = 5.559, based on IQR multiplier of 3.

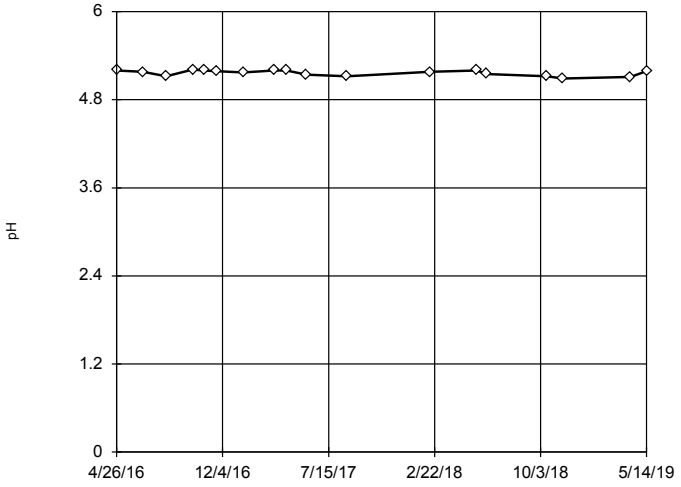
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-1 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

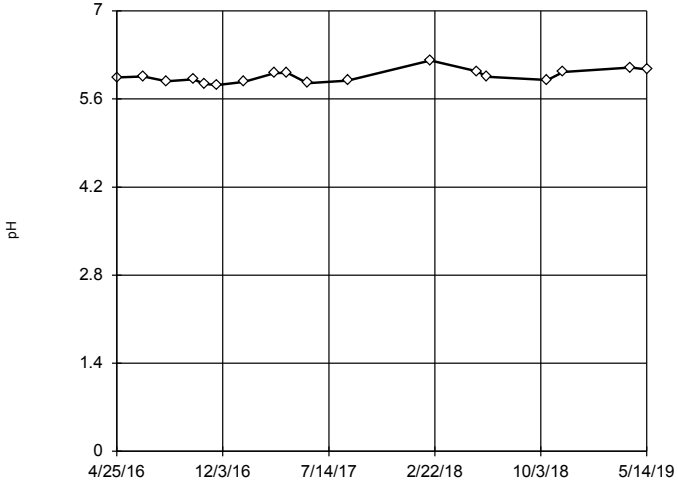
High cutoff = 5.409, low cutoff = 4.833, based on IQR multiplier of 3.

Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Tukey's Outlier Screening

MW-2 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.542, low cutoff = 5.42, based on IQR multiplier of 3.

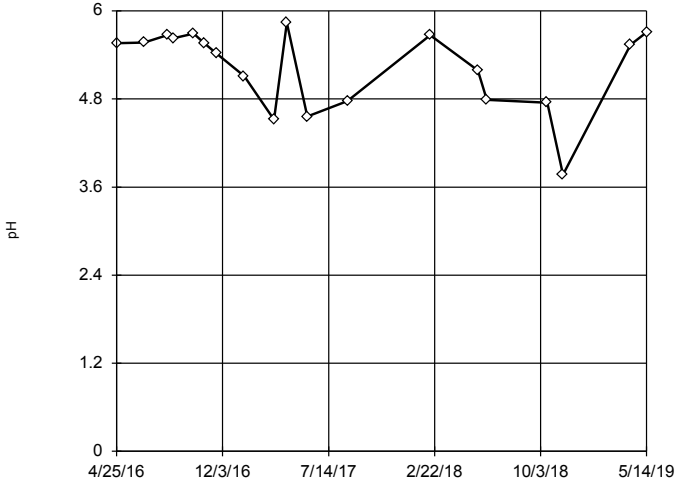
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-3 (bg)



n = 19

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.785, low cutoff = -6.12, based on IQR multiplier of 3.

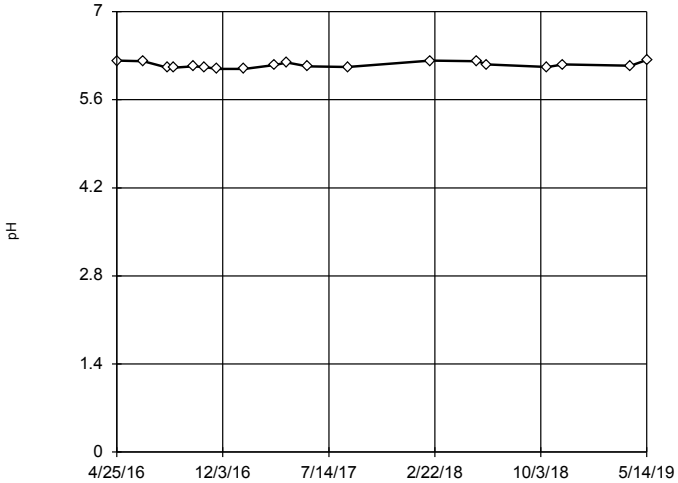
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4 (bg)



n = 19

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.488, low cutoff = 5.858, based on IQR multiplier of 3.

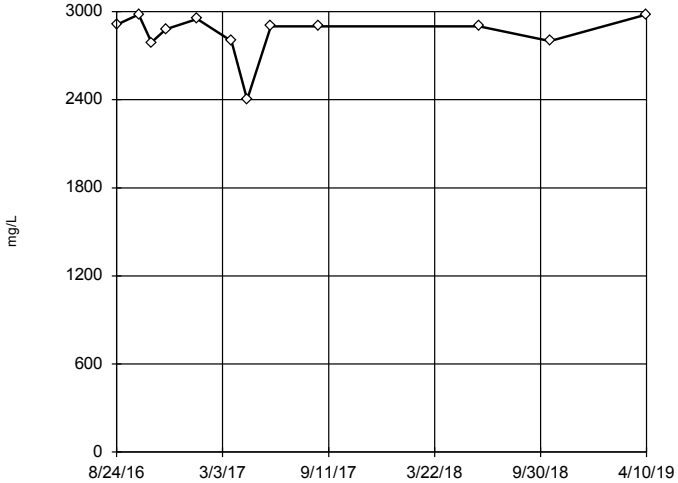
Constituent: pH Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-3



n = 12

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

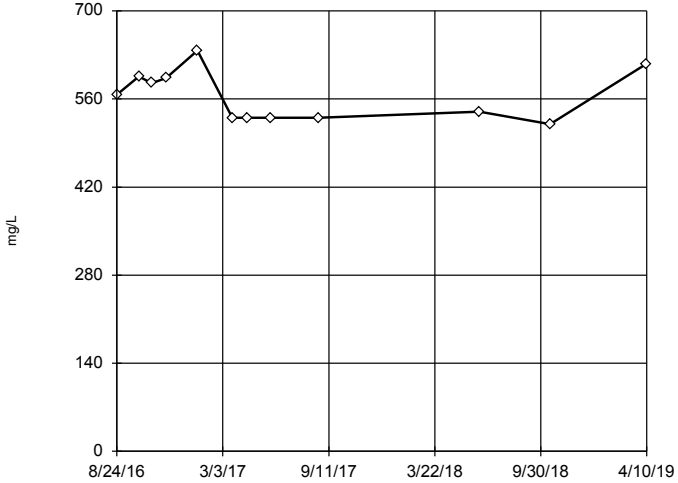
High cutoff = 3207, low cutoff = 1744, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Tukey's Outlier Screening

GS-GSA-MW-4



n = 12

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 839, low cutoff = 375.5, based on IQR multiplier of 3.

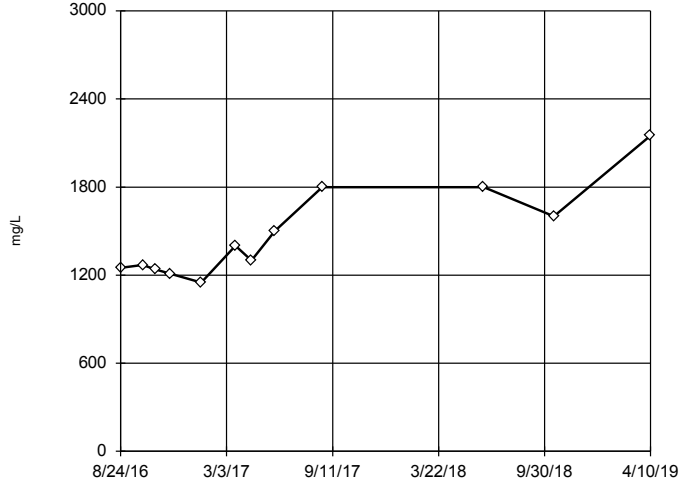
Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-8



n = 12

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 4298, low cutoff = 491.6, based on IQR multiplier of 3.

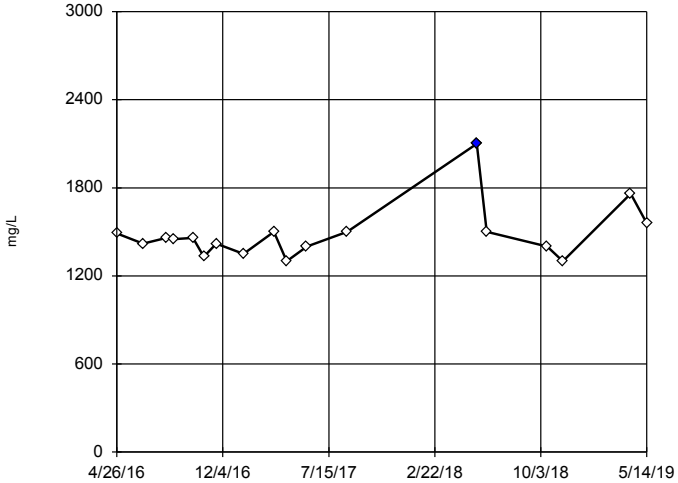
Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-1 (bg)



n = 18

Outlier is drawn as solid. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 1948, low cutoff = 1058, based on IQR multiplier of 3.

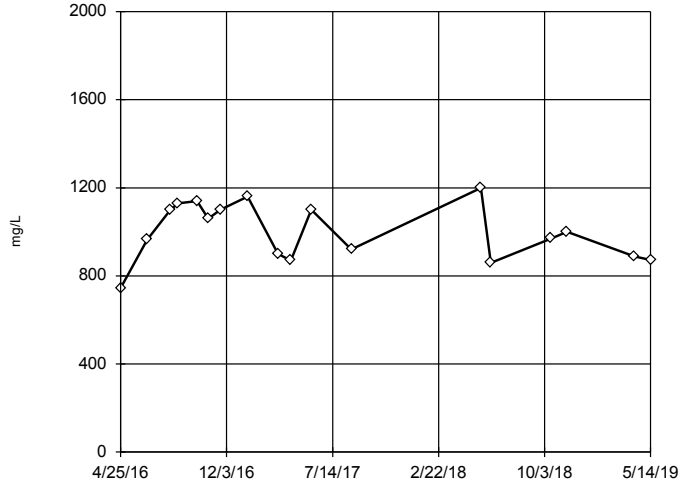
Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-2 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

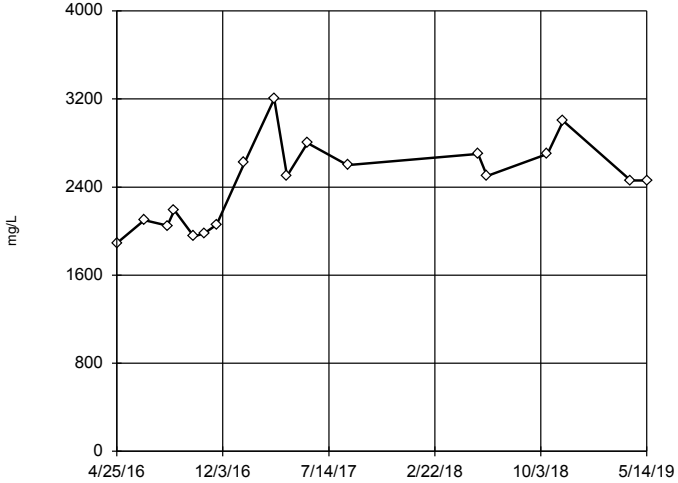
High cutoff = 1817, low cutoff = 179, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Tukey's Outlier Screening

MW-3 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were square root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 5162, low cutoff = 647.4, based on IQR multiplier of 3.

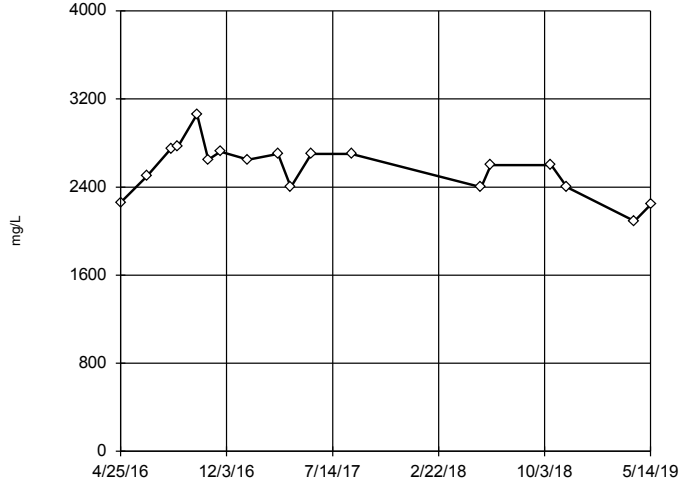
Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 3640, low cutoff = 1470, based on IQR multiplier of 3.

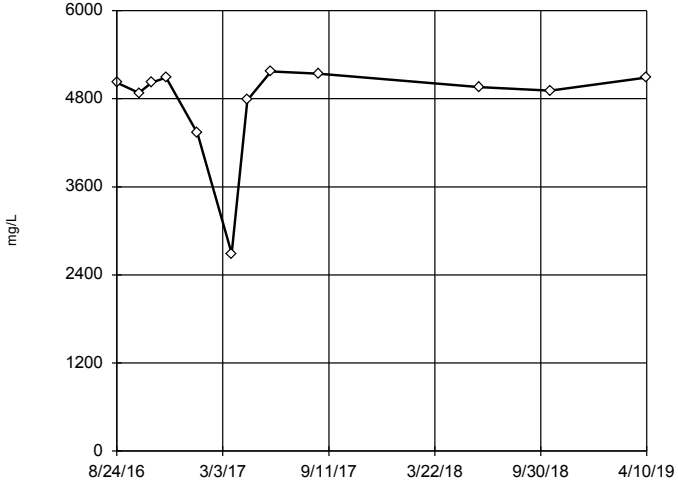
Constituent: Sulfate Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-3



n = 12

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 5617, low cutoff = -3305, based on IQR multiplier of 3.

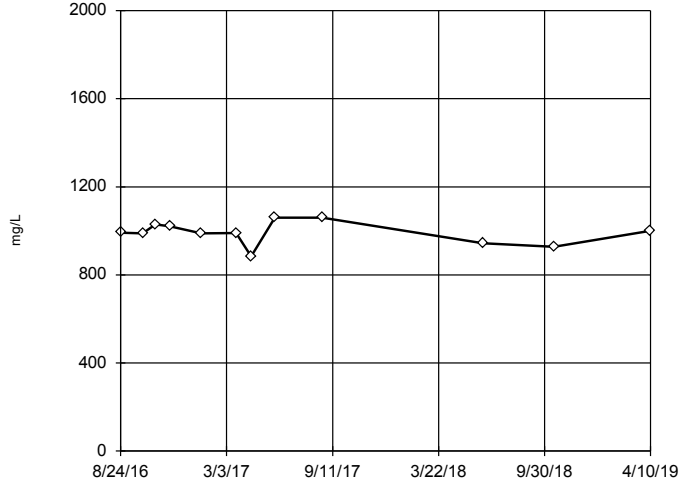
Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

GS-GSA-MW-4



n = 12

No outliers found. Tukey's method selected by user.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

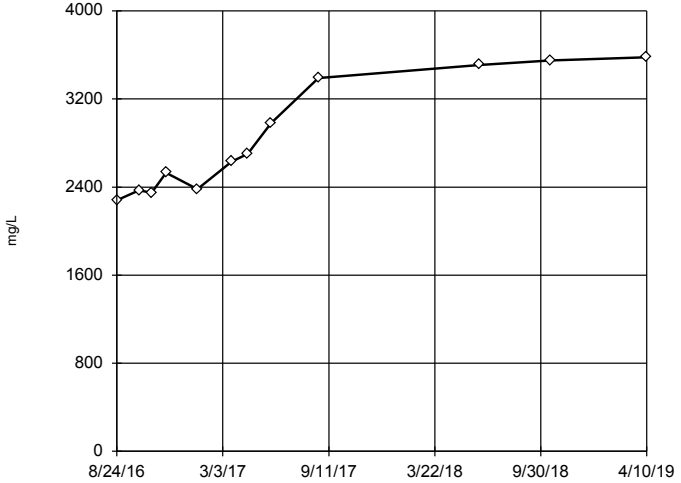
High cutoff = 1148, low cutoff = -418.8, based on IQR multiplier of 3.

Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Tukey's Outlier Screening

GS-GSA-MW-8



n = 12

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 10569, low cutoff = 775.2, based on IQR multiplier of 3.

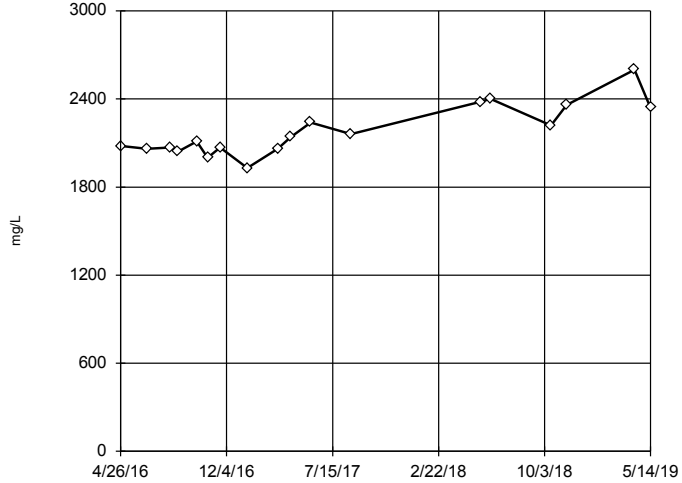
Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-1 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 3489, low cutoff = 1388, based on IQR multiplier of 3.

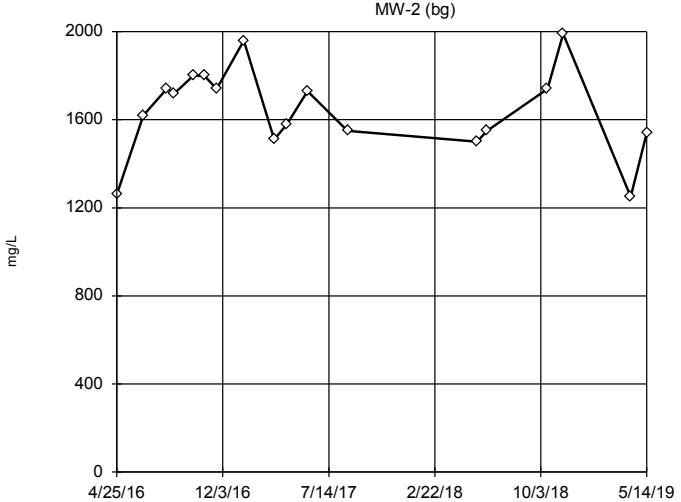
Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-2 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were square transformed to achieve best W statistic (graph shown in original units).

High cutoff = 2357, low cutoff = -313, based on IQR multiplier of 3.

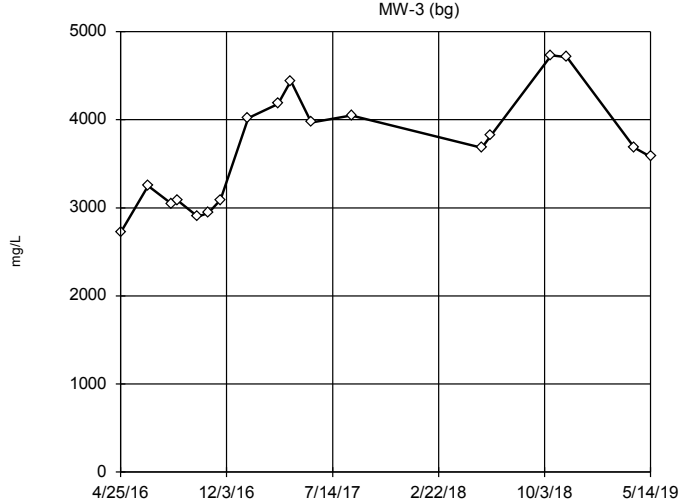
Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-3 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

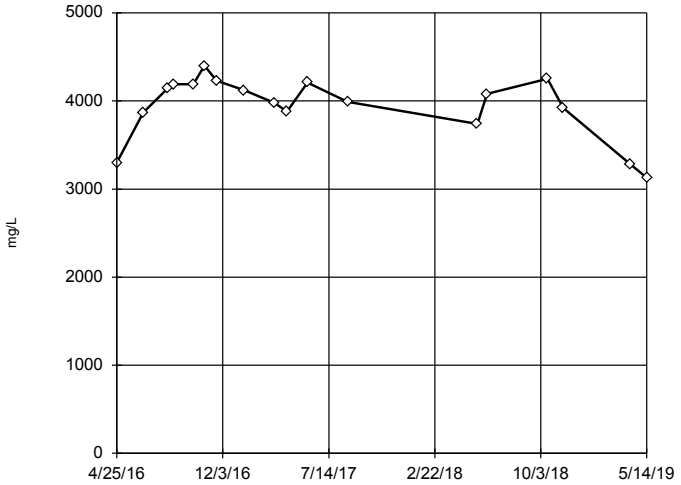
High cutoff = 9954, low cutoff = 1267, based on IQR multiplier of 3.

Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Tukey's Outlier Screening

MW-4 (bg)



n = 18

No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 4837, low cutoff = -4029, based on IQR multiplier of 3.

Constituent: TDS Analysis Run 9/23/2019 9:08 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

FIGURE D.

Welch's t-test/Mann-Whitney - Significant Results

Plant Gadsden Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 5:58 PM

Constituent	Well	Calc.	0.01	Method
Sulfate (mg/L)	**GS-GSA-MW-8**	**2.637**	**Yes**	**Mann-W**
TDS (mg/L)	**GS-GSA-MW-8**	**2.633**	**Yes**	**Mann-W**
TDS (mg/L)	**MW-1 (bg)**	**3.264**	**Yes**	**Mann-W**

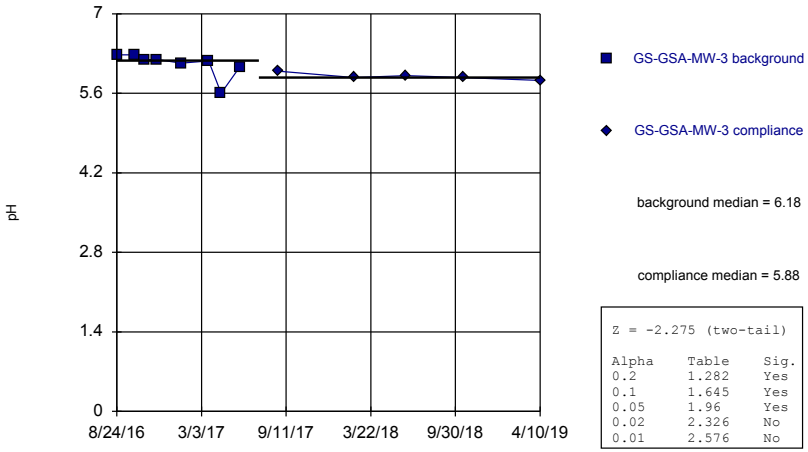
Welch's t-test/Mann-Whitney - All Results

Plant Gadsden Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 5:58 PM

Constituent	Well	Calc.	0.01	Method
pH (pH)	GS-GSA-MW-3	-2.275	No	Mann-W
pH (pH)	GS-GSA-MW-4	-0.5929	No	Mann-W
pH (pH)	GS-GSA-MW-8	0.4398	No	Mann-W
pH (pH)	MW-1 (bg)	-2.027	No	Mann-W
pH (pH)	MW-2 (bg)	2.355	No	Mann-W
pH (pH)	MW-3 (bg)	-1.074	No	Mann-W
pH (pH)	MW-4 (bg)	1.534	No	Mann-W
Sulfate (mg/L)	GS-GSA-MW-3	0.4291	No	Mann-W
Sulfate (mg/L)	GS-GSA-MW-4	-0.8645	No	Mann-W
Sulfate (mg/L)	**GS-GSA-MW-8**	**2.637**	**Yes**	**Mann-W**
Sulfate (mg/L)	MW-1 (bg)	1.728	No	Mann-W
Sulfate (mg/L)	MW-2 (bg)	-1.089	No	Mann-W
Sulfate (mg/L)	MW-3 (bg)	1.678	No	Mann-W
Sulfate (mg/L)	MW-4 (bg)	-2.185	No	Mann-W
TDS (mg/L)	GS-GSA-MW-3	0.8522	No	Mann-W
TDS (mg/L)	GS-GSA-MW-4	-0.3409	No	Mann-W
TDS (mg/L)	**GS-GSA-MW-8**	**2.633**	**Yes**	**Mann-W**
TDS (mg/L)	**MW-1 (bg)**	**3.264**	**Yes**	**Mann-W**
TDS (mg/L)	MW-2 (bg)	-1.272	No	Mann-W
TDS (mg/L)	MW-3 (bg)	1.812	No	Mann-W
TDS (mg/L)	MW-4 (bg)	-1.54	No	Mann-W

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-3

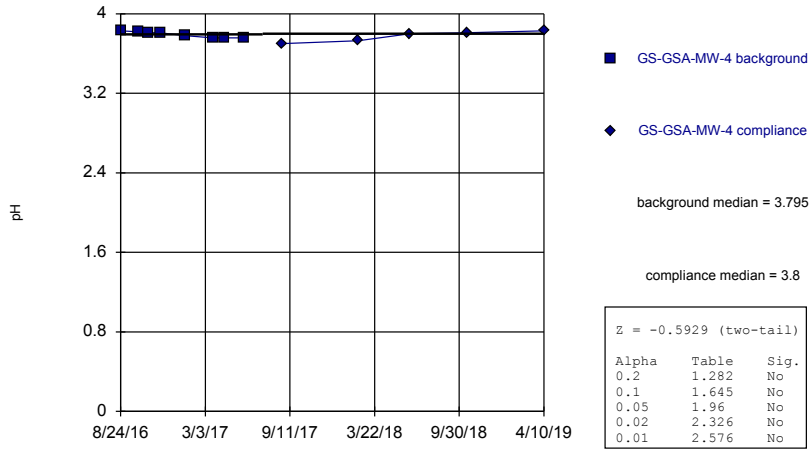


Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-4

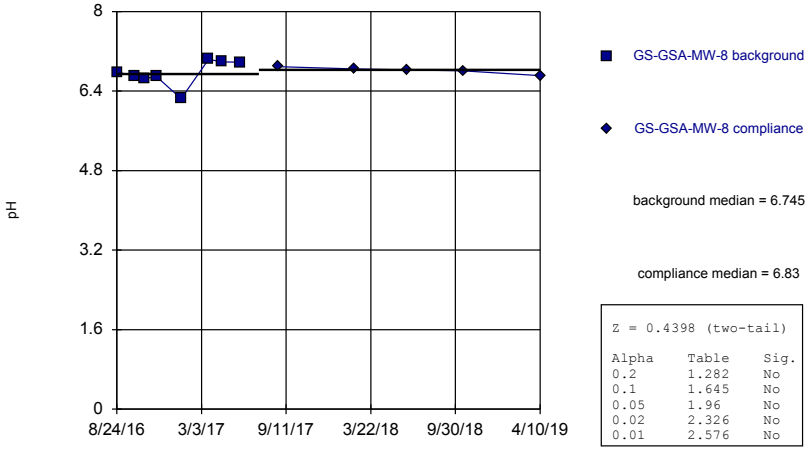


Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-8

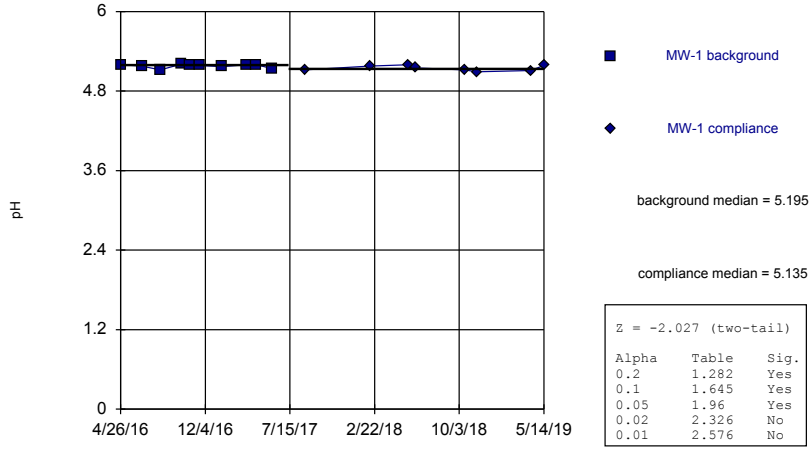


Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

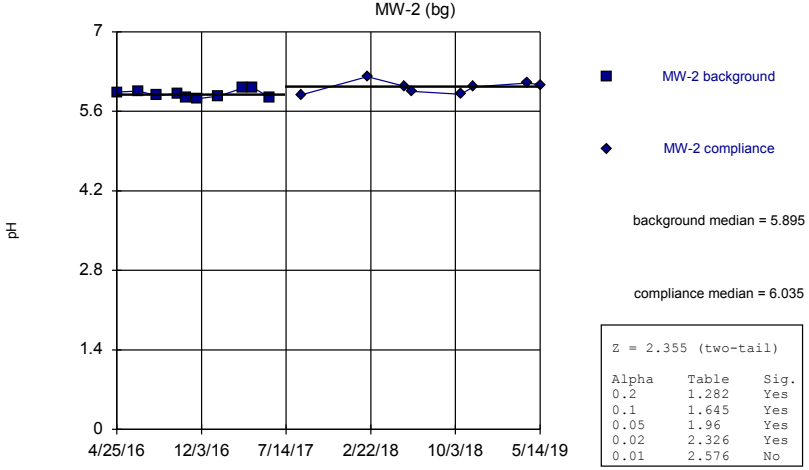
MW-1 (bg)



Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Mann-Whitney (Wilcoxon Rank Sum)

MW-2 (bg)



background median = 5.895

compliance median = 6.035

Z = 2.355 (two-tail)

Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	Yes
0.05	1.96	Yes
0.02	2.326	Yes
0.01	2.576	No

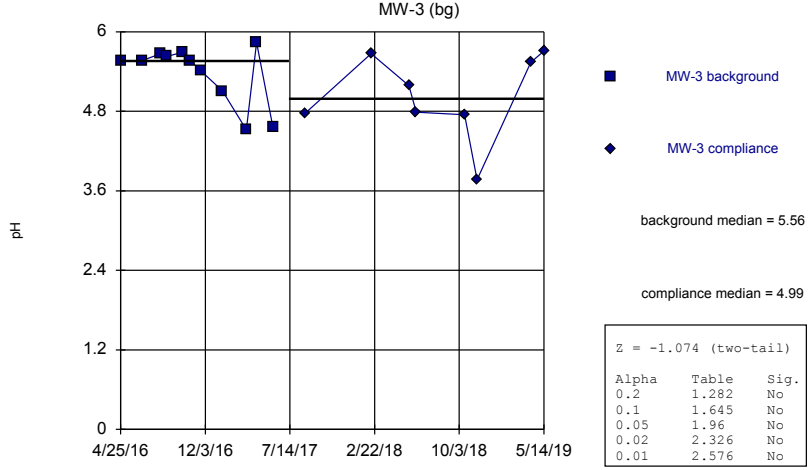
Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney

Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-3 (bg)



background median = 5.56

compliance median = 4.99

Z = -1.074 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

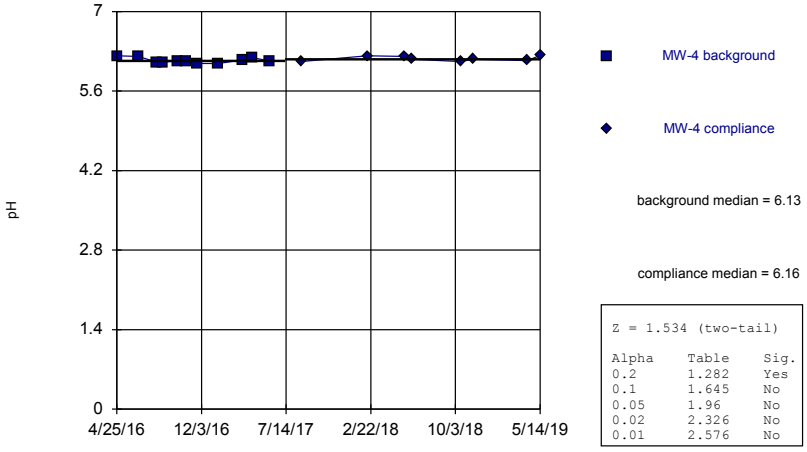
Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney

Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-4 (bg)



background median = 6.13

compliance median = 6.16

Z = 1.534 (two-tail)

Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

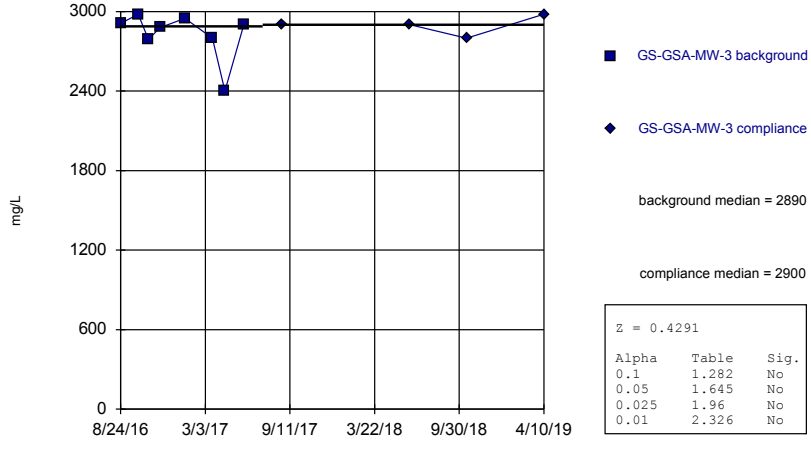
Constituent: pH Analysis Run 9/23/2019 5:56 PM View: Mann Whitney

Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-3



background median = 2890

compliance median = 2900

Z = 0.4291

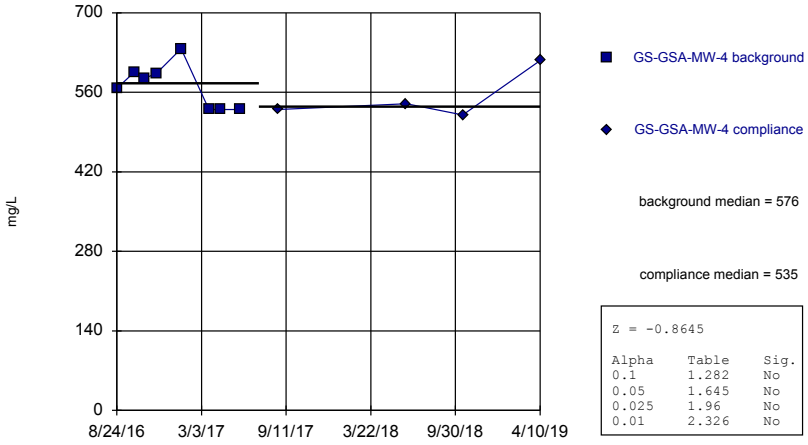
Alpha	Table	Sig.
0.1	1.282	No
0.05	1.645	No
0.025	1.96	No
0.01	2.326	No

Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney

Plant Gadsden Client: Southern Company Data: Gorgas GSA

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-4

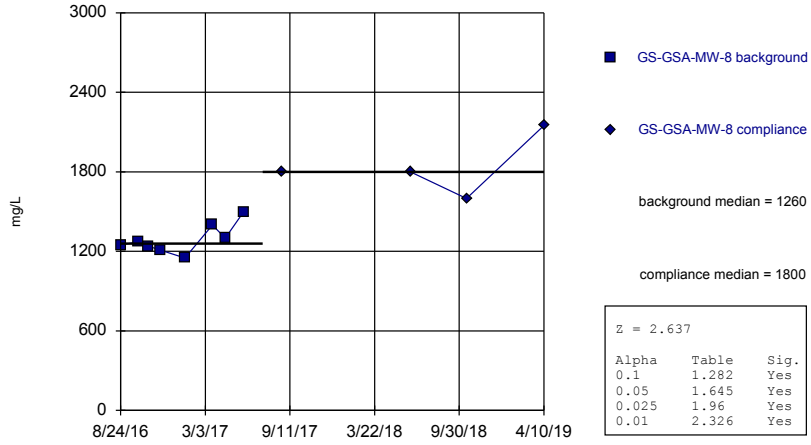


Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-8

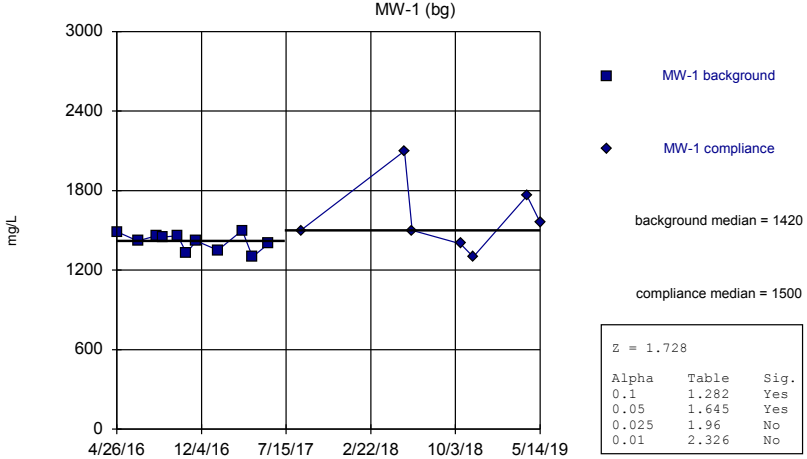


Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-1 (bg)

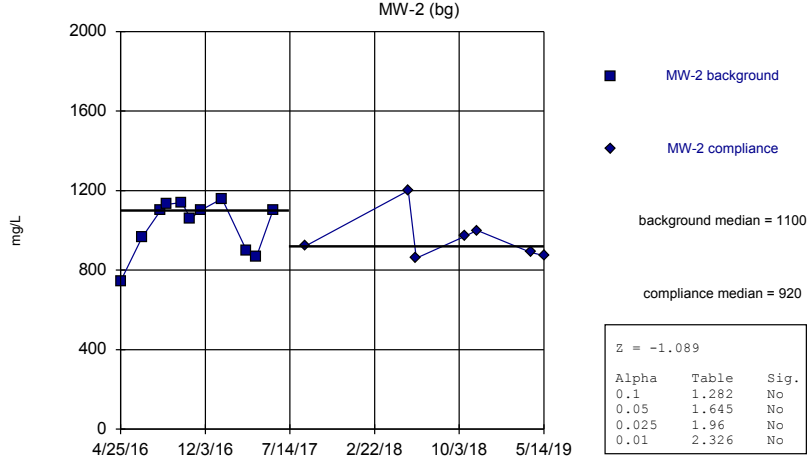


Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

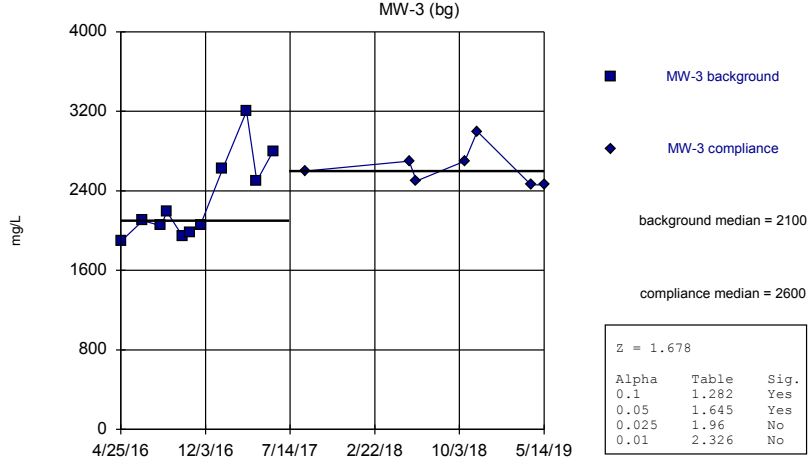
MW-2 (bg)



Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Mann-Whitney (Wilcoxon Rank Sum)

MW-3 (bg)

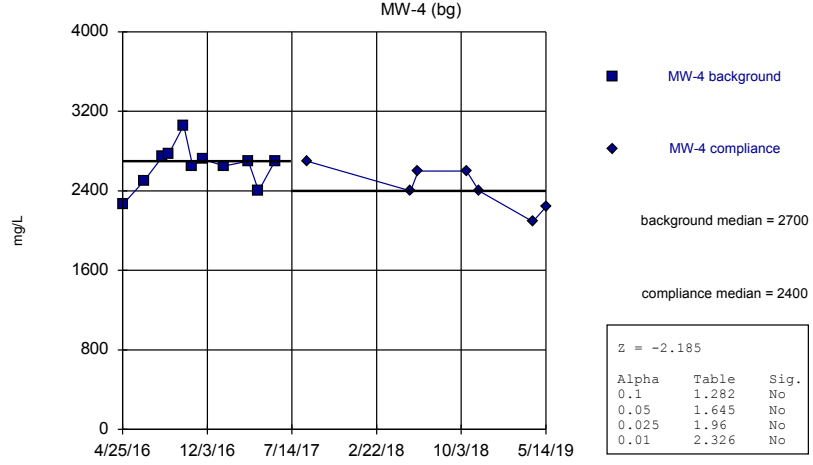


Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-4 (bg)

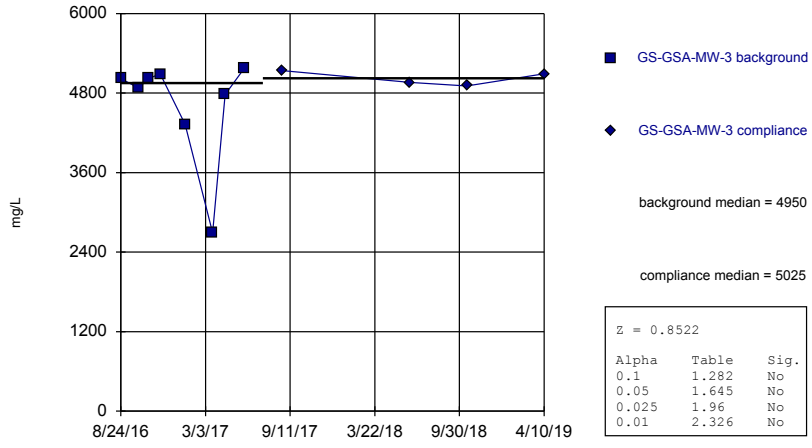


Constituent: Sulfate Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-3

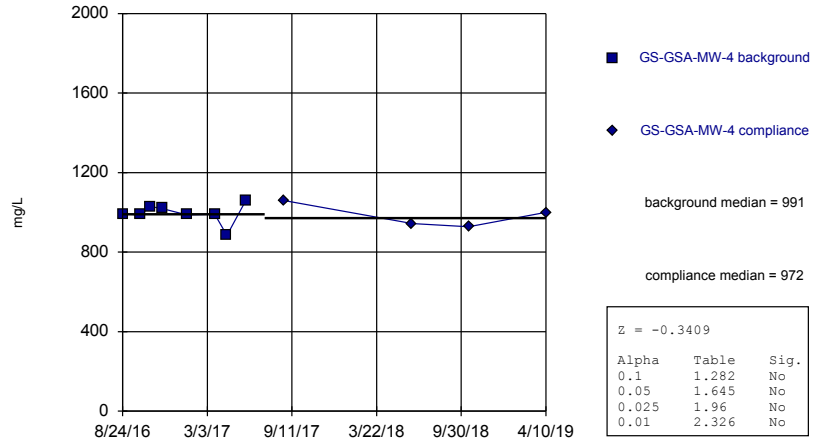


Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

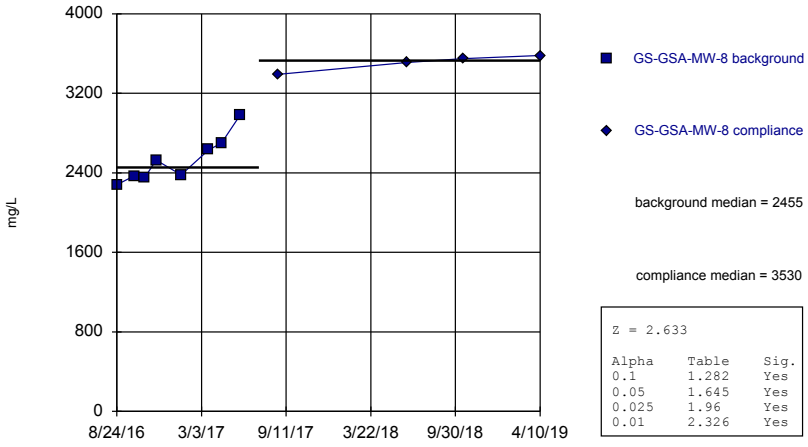
GS-GSA-MW-4



Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Mann-Whitney (Wilcoxon Rank Sum)

GS-GSA-MW-8



Z = 2.633

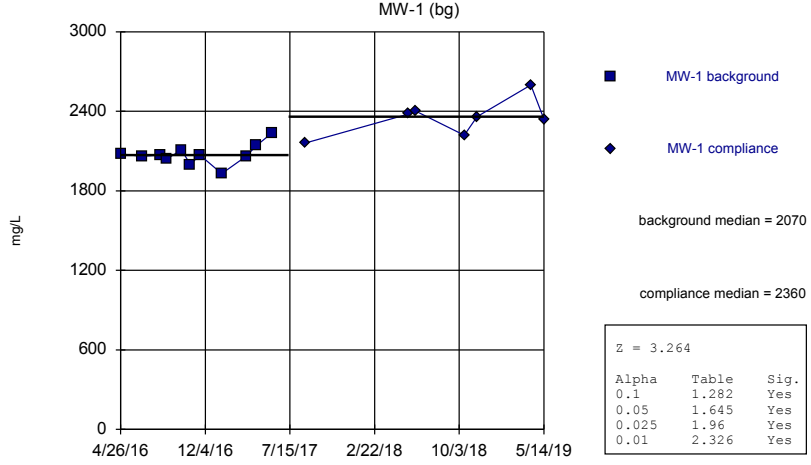
Alpha	Table	Sig.
0.1	1.282	Yes
0.05	1.645	Yes
0.025	1.96	Yes
0.01	2.326	Yes

Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-1 (bg)



Z = 3.264

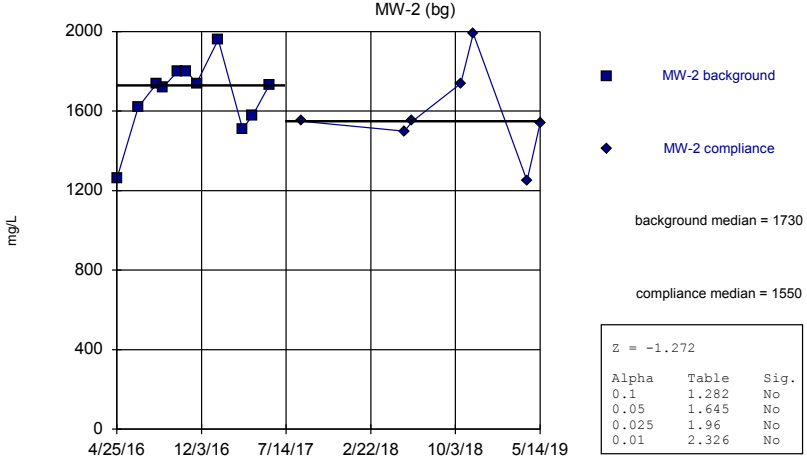
Alpha	Table	Sig.
0.1	1.282	Yes
0.05	1.645	Yes
0.025	1.96	Yes
0.01	2.326	Yes

Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

MW-2 (bg)



Z = -1.272

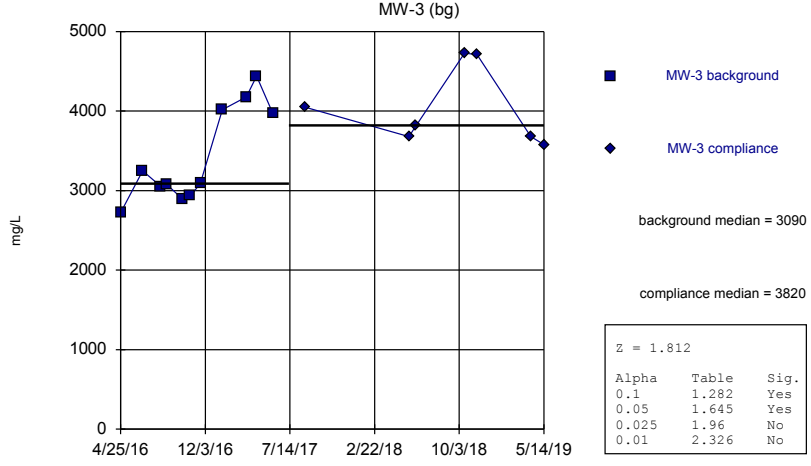
Alpha	Table	Sig.
0.1	1.282	No
0.05	1.645	No
0.025	1.96	No
0.01	2.326	No

Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

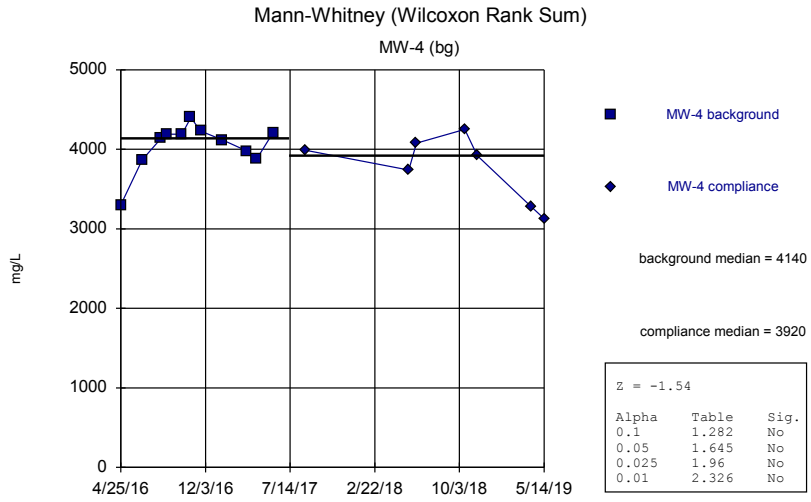
MW-3 (bg)



Z = 1.812

Alpha	Table	Sig.
0.1	1.282	Yes
0.05	1.645	Yes
0.025	1.96	No
0.01	2.326	No

Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney
Plant Gadsden Client: Southern Company Data: Gorgas GSA



Constituent: TDS Analysis Run 9/23/2019 5:56 PM View: Mann Whitney

Plant Gadsden Client: Southern Company Data: Gorgas GSA

FIGURE E.

Trend Tests Summary Table - Significant Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 1:43 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	**MW-1 (bg)**	**10.03**	**64**	**63**	**Yes**	**18**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	**MW-3 (bg)**	**36.6**	**67**	**63**	**Yes**	**18**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Fluoride (mg/L)	**MW-2 (bg)**	**0.02017**	**79**	**68**	**Yes**	**19**	**0**	**n/a**	**n/a**	**0.02**	**NP**

Trend Tests Summary Table - All Results

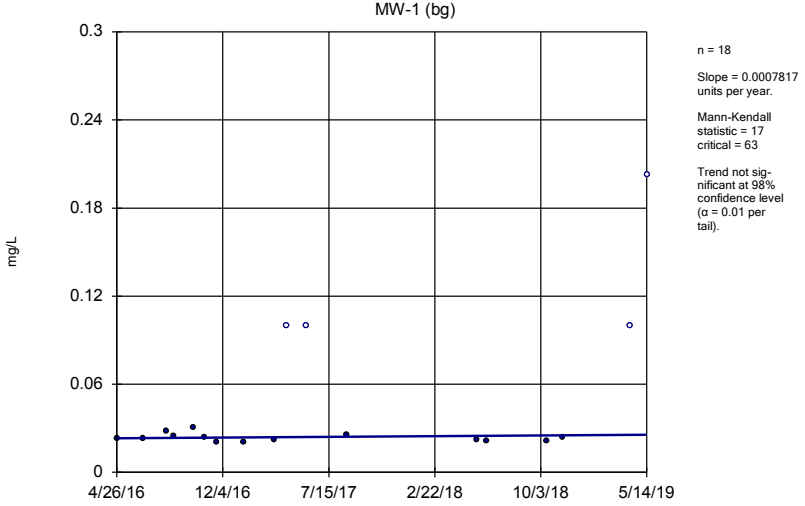
Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/23/2019, 1:43 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-1 (bg)	0.0007817	17	63	No	18	22.22	n/a	n/a	0.02	NP
Boron (mg/L)	MW-2 (bg)	0.002461	27	63	No	18	11.11	n/a	n/a	0.02	NP
Boron (mg/L)	MW-3 (bg)	0.009173	48	63	No	18	22.22	n/a	n/a	0.02	NP
Boron (mg/L)	MW-4 (bg)	0.001738	29	63	No	18	11.11	n/a	n/a	0.02	NP
Calcium (mg/L)	**MW-1 (bg)**	**10.03**	**64**	**63**	**Yes**	**18**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	MW-2 (bg)	8.704	33	63	No	18	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**MW-3 (bg)**	**36.6**	**67**	**63**	**Yes**	**18**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	MW-4 (bg)	1.834	7	63	No	18	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-1 (bg)	0.04948	17	63	No	18	5.556	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-2 (bg)	0.1043	4	63	No	18	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-3 (bg)	0.1053	36	63	No	18	11.11	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-4 (bg)	-0.07231	-23	-63	No	18	11.11	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-1 (bg)	0.006759	27	68	No	19	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	**MW-2 (bg)**	**0.02017**	**79**	**68**	**Yes**	**19**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Fluoride (mg/L)	MW-3 (bg)	0.03309	54	68	No	19	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4 (bg)	0.01492	52	68	No	19	0	n/a	n/a	0.02	NP

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1 (bg)



n = 18

Slope = 0.0007817 units per year.

Mann-Kendall statistic = 17
critical = 63

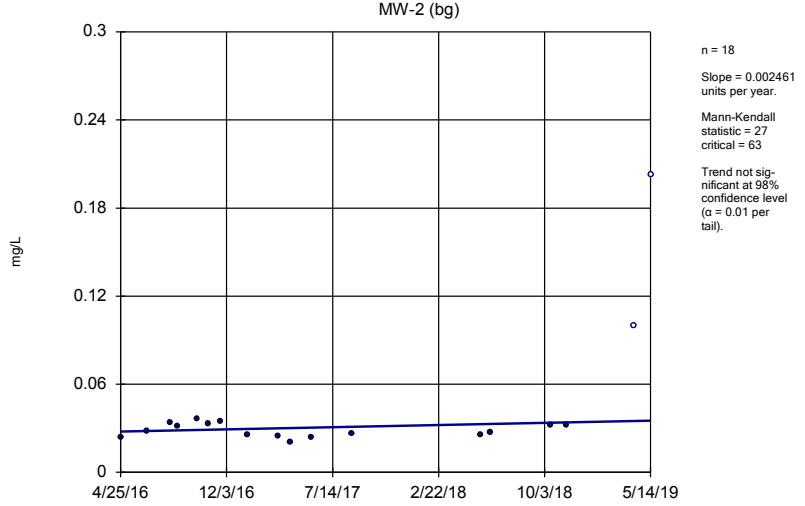
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-2 (bg)



n = 18

Slope = 0.002461 units per year.

Mann-Kendall statistic = 27
critical = 63

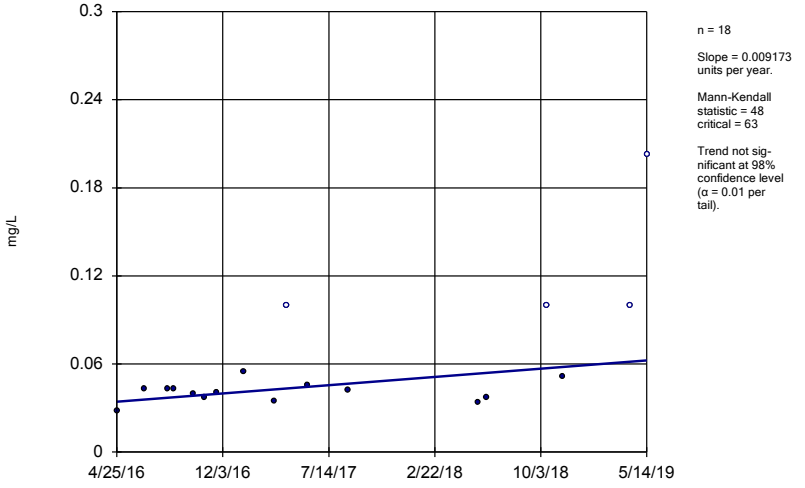
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-3 (bg)



n = 18

Slope = 0.009173 units per year.

Mann-Kendall statistic = 48
critical = 63

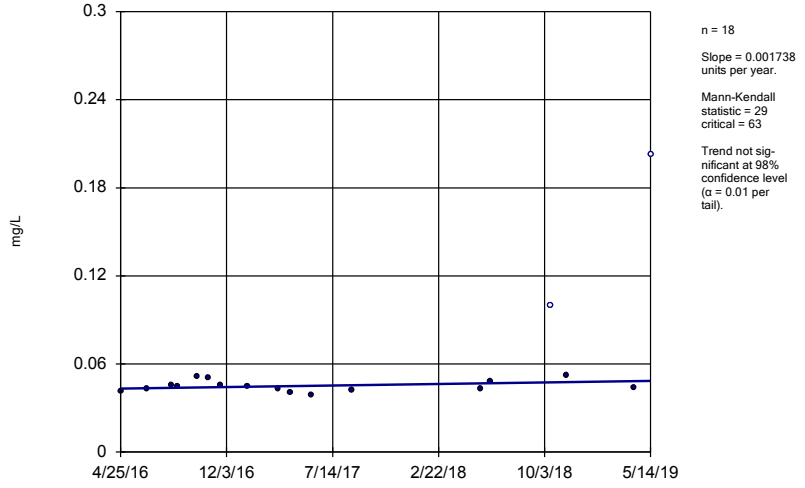
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-4 (bg)



n = 18

Slope = 0.001738 units per year.

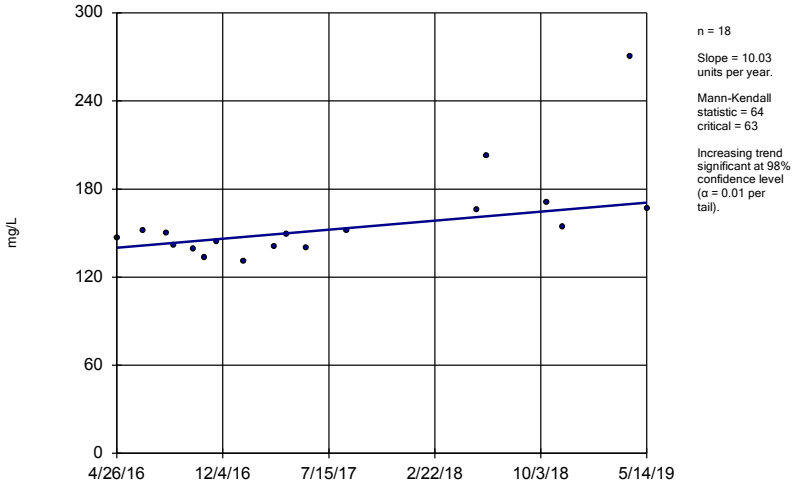
Mann-Kendall statistic = 29
critical = 63

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sen's Slope Estimator

MW-1 (bg)



n = 18

Slope = 10.03 units per year.

Mann-Kendall statistic = 64
critical = 63

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

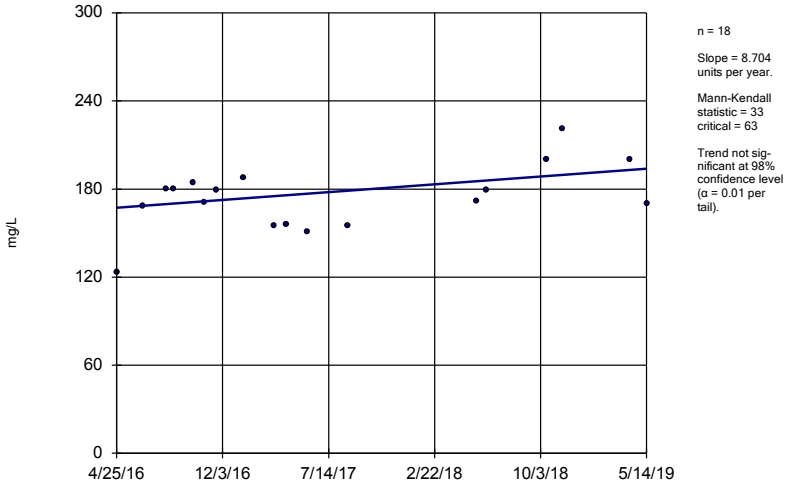
Constituent: Calcium Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-2 (bg)



n = 18

Slope = 8.704 units per year.

Mann-Kendall statistic = 33
critical = 63

Trend not significant at 98% confidence level (α = 0.01 per tail).

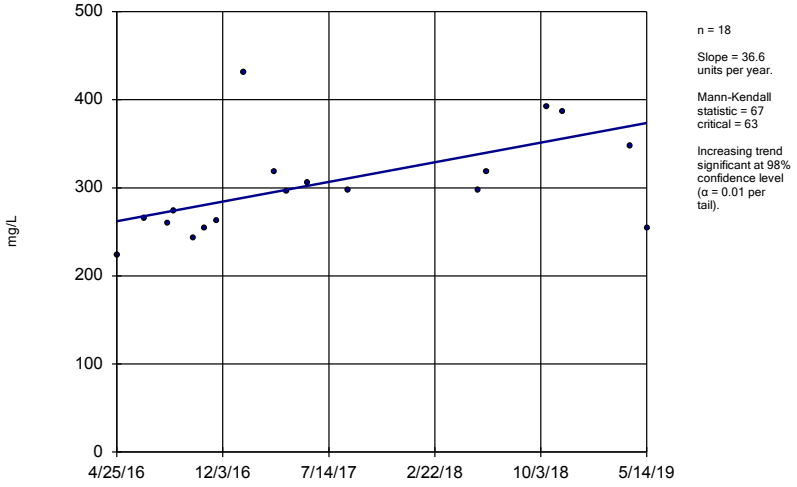
Constituent: Calcium Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-3 (bg)



n = 18

Slope = 36.6 units per year.

Mann-Kendall statistic = 67
critical = 63

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

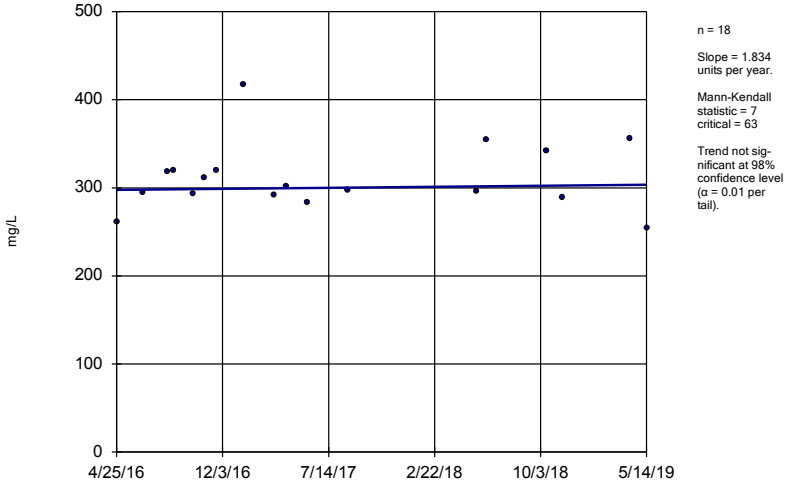
Constituent: Calcium Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-4 (bg)



n = 18

Slope = 1.834 units per year.

Mann-Kendall statistic = 7
critical = 63

Trend not significant at 98% confidence level (α = 0.01 per tail).

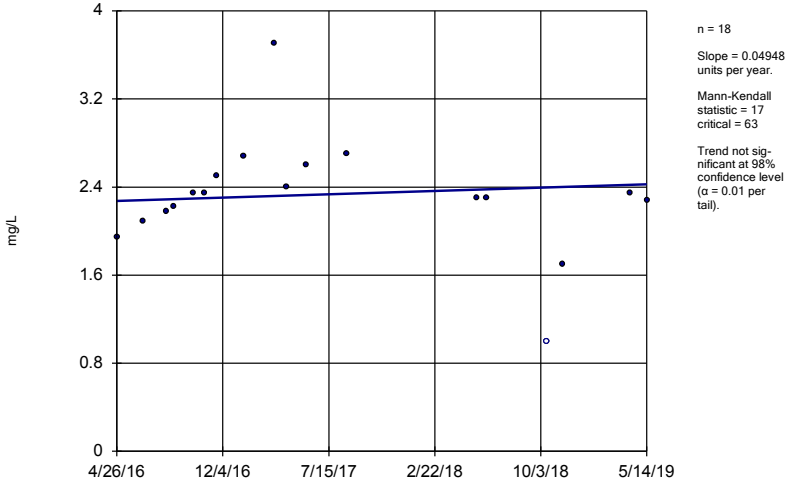
Constituent: Calcium Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1 (bg)



n = 18

Slope = 0.04948 units per year.

Mann-Kendall statistic = 17
critical = 63

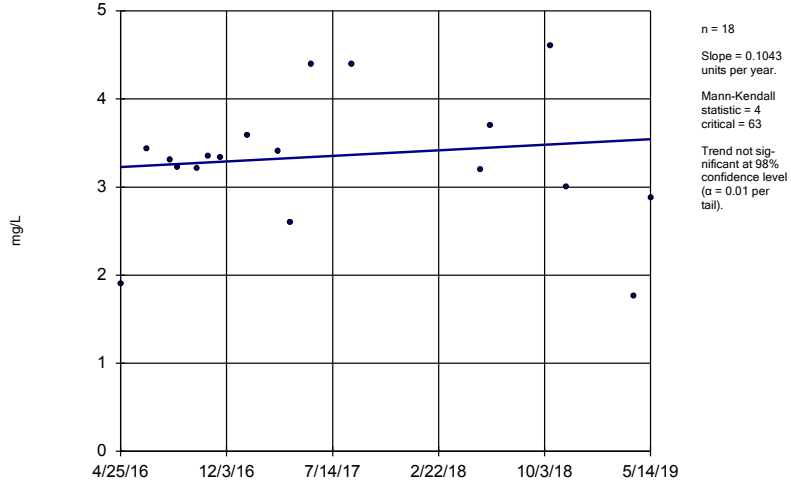
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-2 (bg)



n = 18

Slope = 0.1043 units per year.

Mann-Kendall statistic = 4
critical = 63

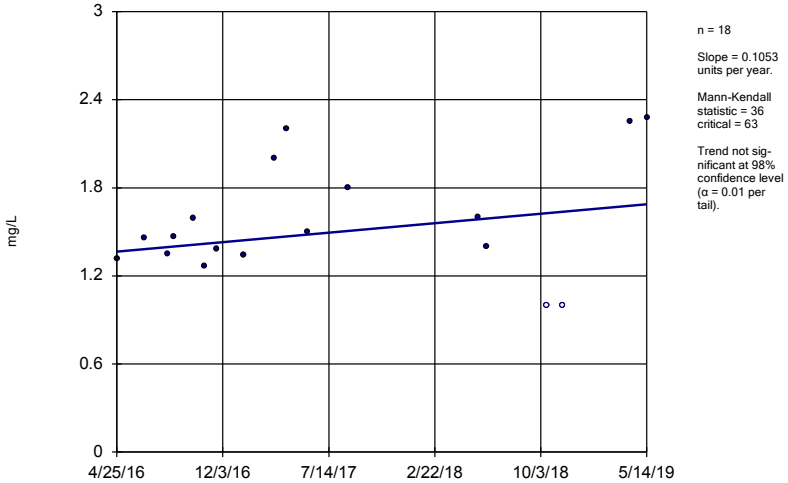
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-3 (bg)



n = 18

Slope = 0.1053 units per year.

Mann-Kendall statistic = 36
critical = 63

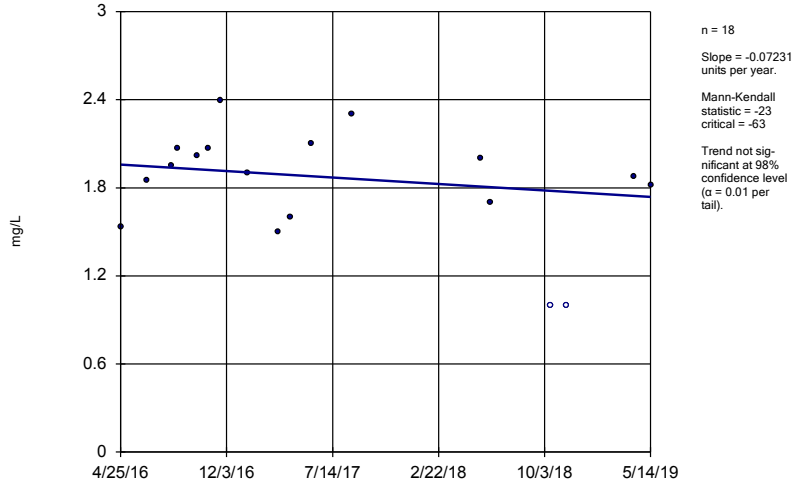
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-4 (bg)



n = 18

Slope = -0.07231 units per year.

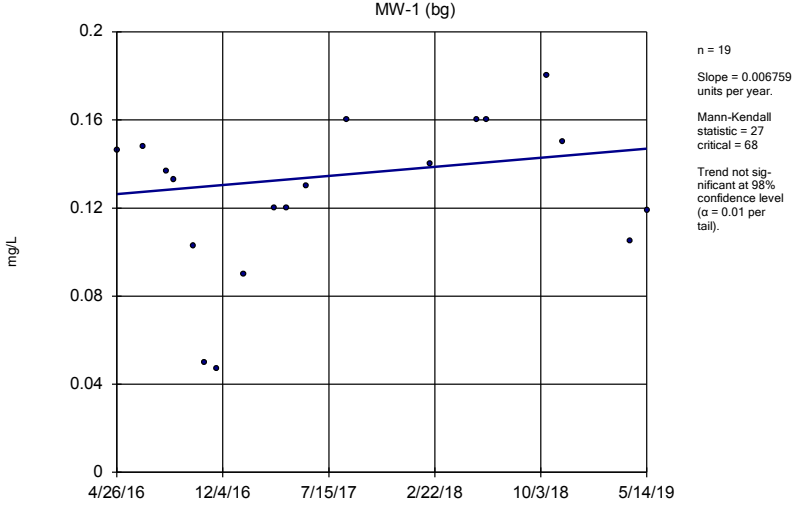
Mann-Kendall statistic = -23
critical = -63

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 9/23/2019 1:42 PM View: Interwell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sen's Slope Estimator

MW-1 (bg)



n = 19

Slope = 0.006759 units per year.

Mann-Kendall statistic = 27
critical = 68

Trend not significant at 98% confidence level (α = 0.01 per tail).

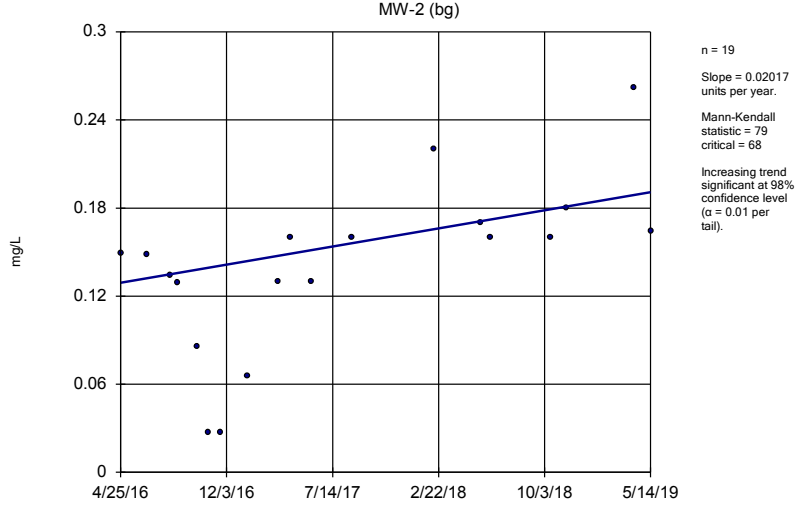
Constituent: Fluoride Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-2 (bg)



n = 19

Slope = 0.02017 units per year.

Mann-Kendall statistic = 79
critical = 68

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

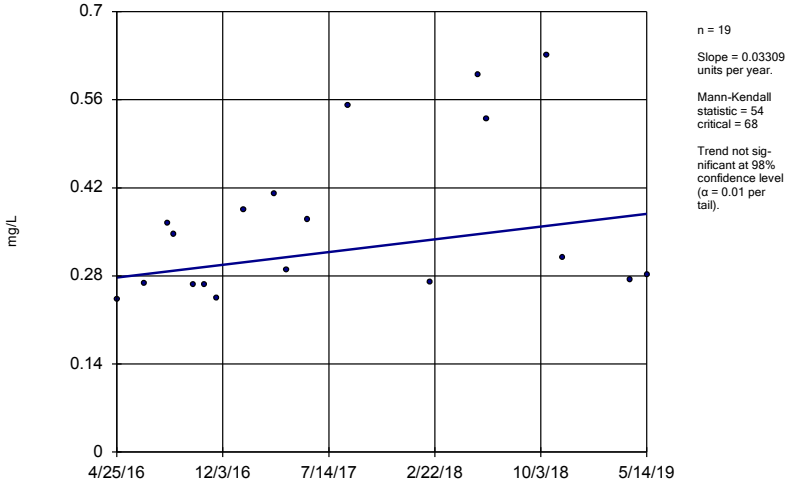
Constituent: Fluoride Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-3 (bg)



n = 19

Slope = 0.03309 units per year.

Mann-Kendall statistic = 54
critical = 68

Trend not significant at 98% confidence level (α = 0.01 per tail).

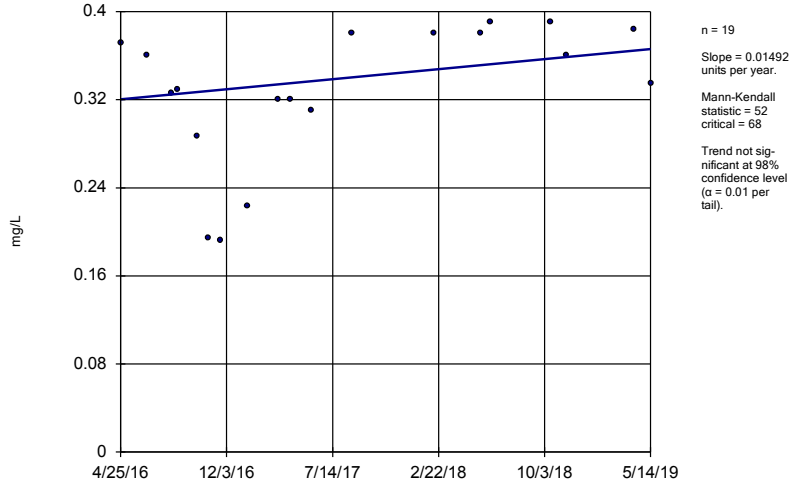
Constituent: Fluoride Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Sen's Slope Estimator

MW-4 (bg)



n = 19

Slope = 0.01492 units per year.

Mann-Kendall statistic = 52
critical = 68

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Fluoride Analysis Run 9/23/2019 1:42 PM View: Interwell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

FIGURE F.

Interwell Prediction Limit Summary Table - All Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/26/2019, 2:37 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	n/a	0.203	n/a	n/a	3 future	n/a	72	n/a	n/a	16.67	n/a	n/a	0.0003715	NP Inter (normality) 1 of 2
Calcium (mg/L)	n/a	431	n/a	n/a	3 future	n/a	72	n/a	n/a	0	n/a	n/a	0.0003715	NP Inter (normality) 1 of 2
Chloride (mg/L)	n/a	3.764	n/a	n/a	3 future	n/a	72	1.474	0.2749	6.944	None	sqrt(x)	0.002505	Param Inter 1 of 2
Fluoride (mg/L)	n/a	0.4922	n/a	n/a	3 future	n/a	76	0.47	0.1367	0	None	sqrt(x)	0.002505	Param Inter 1 of 2

FIGURE G.

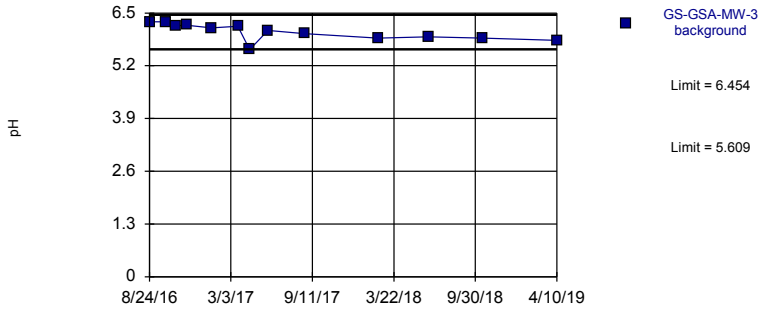
Intrawell Prediction Limit Summary Table - All Results

Plant Gorgas Client: Southern Company Data: Gorgas GSA Printed 9/30/2019, 9:41 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH (pH)	GS-GSA-MW-3	6.454	5.609	n/a	1 future	n/a	13	6.032	0.2034	0	None	No	0.001253	Param Intra 1 of 2
pH (pH)	GS-GSA-MW-4	3.868	3.701	n/a	1 future	n/a	13	3.785	0.04034	0	None	No	0.001253	Param Intra 1 of 2
pH (pH)	GS-GSA-MW-8	7.202	6.366	n/a	1 future	n/a	13	6.784	0.2012	0	None	No	0.001253	Param Intra 1 of 2
pH (pH)	MW-1	5.24	5.09	n/a	1 future	n/a	18	5.165	0.03869	0	None	No	0.001253	Param Intra 1 of 2
pH (pH)	MW-2	6.161	5.76	n/a	1 future	n/a	18	5.961	0.1039	0	None	No	0.001253	Param Intra 1 of 2
pH (pH)	MW-3	6.175	4.135	n/a	1 future	n/a	19	27.62	5.502	0	None	x^2	0.001253	Param Intra 1 of 2
pH (pH)	MW-4	6.242	6.064	n/a	1 future	n/a	19	6.153	0.04655	0	None	No	0.001253	Param Intra 1 of 2
Sulfate (mg/L)	GS-GSA-MW-3	3089	n/a	n/a	1 future	n/a	12	1.9e17	4.2e16	0	None	x^5	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	GS-GSA-MW-4	648.7	n/a	n/a	1 future	n/a	12	564.5	39.86	0	None	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	GS-GSA-MW-8	2123	n/a	n/a	1 future	n/a	12	1473	307.9	0	None	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-1	2100	n/a	n/a	1 future	n/a	18	n/a	n/a	0	n/a	n/a	0.005373	NP Intra (normality) 1 of 2
Sulfate (mg/L)	MW-2	1249	n/a	n/a	1 future	n/a	18	998.9	129.3	0	None	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-3	3164	n/a	n/a	1 future	n/a	18	2431	379.6	0	None	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-4	3017	n/a	n/a	1 future	n/a	18	2566	233.5	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	GS-GSA-MW-3	5416	n/a	n/a	1 future	n/a	12	1.4e22	5.4e21	0	None	x^6	0.002505	Param Intra 1 of 2
TDS (mg/L)	GS-GSA-MW-4	1100	n/a	n/a	1 future	n/a	12	990.3	51.88	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	GS-GSA-MW-8	4264	n/a	n/a	1 future	n/a	8	3090	477.8	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	MW-1	2516	n/a	n/a	1 future	n/a	18	2181	173.6	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	MW-2	2031	n/a	n/a	1 future	n/a	18	1643	200.5	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	MW-3	4874	n/a	n/a	1 future	n/a	18	3661	628.6	0	None	No	0.002505	Param Intra 1 of 2
TDS (mg/L)	MW-4	4571	n/a	n/a	1 future	n/a	18	1.6e7	2719774	0	None	x^2	0.002505	Param Intra 1 of 2

Prediction Limit

Intrawell Parametric, GS-GSA-MW-3

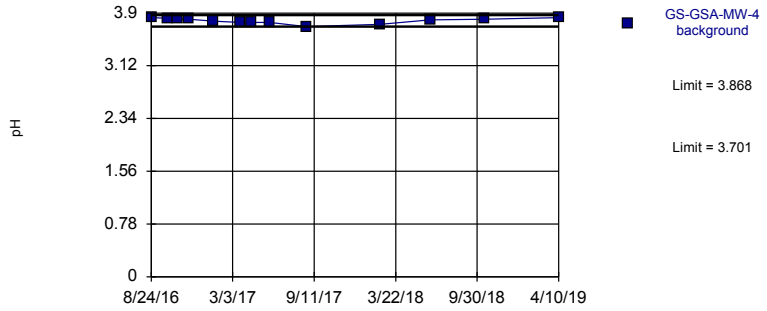


Background Data Summary: Mean=6.032, Std. Dev.=0.2034, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9319, critical = 0.814. Kappa = 2.077 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, GS-GSA-MW-4

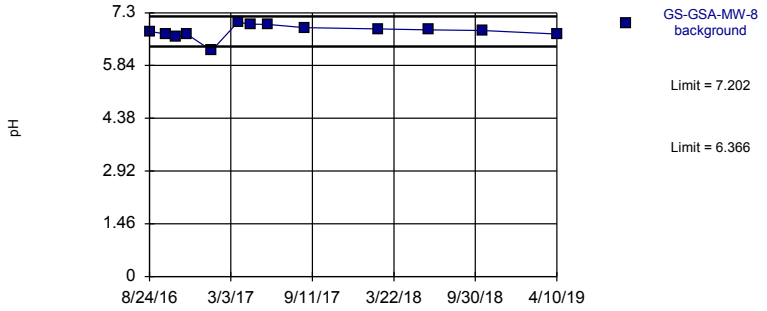


Background Data Summary: Mean=3.785, Std. Dev.=0.04034, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9065, critical = 0.814. Kappa = 2.077 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, GS-GSA-MW-8

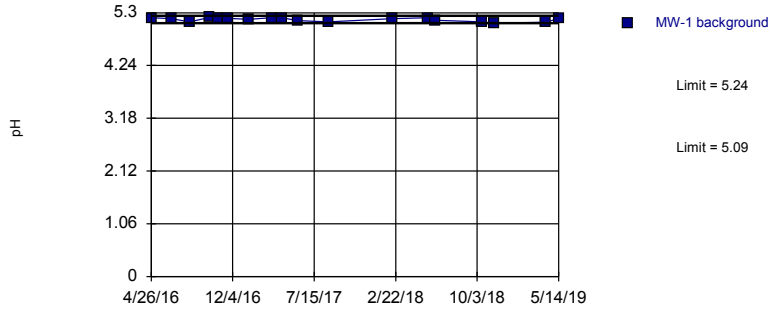


Background Data Summary: Mean=6.784, Std. Dev.=0.2012, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8769, critical = 0.814. Kappa = 2.077 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, MW-1 (bg)



Background Data Summary: Mean=5.165, Std. Dev.=0.03869, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8696, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3
8/24/2016	6.28
10/3/2016	6.28
10/26/2016	6.19
11/21/2016	6.2
1/17/2017	6.13
3/20/2017	6.17
4/17/2017	5.6
5/30/2017	6.07
8/24/2017	5.99
2/13/2018	5.88
6/11/2018	5.91
10/17/2018	5.88
4/10/2019	5.83

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-4
8/24/2016	3.83 (E)
10/3/2016	3.82 (E)
10/26/2016	3.81 (E)
11/21/2016	3.81
1/17/2017	3.78
3/21/2017	3.76
4/17/2017	3.76
5/30/2017	3.76
8/24/2017	3.7
2/13/2018	3.73
6/11/2018	3.8
10/17/2018	3.81
4/10/2019	3.83

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-8
8/24/2016	6.78
10/3/2016	6.71
10/26/2016	6.65
11/21/2016	6.7
1/17/2017	6.25
3/20/2017	7.04
4/18/2017	6.99
5/30/2017	6.98
8/24/2017	6.89
2/13/2018	6.85
6/12/2018	6.83
10/17/2018	6.81
4/10/2019	6.71

Prediction Limit

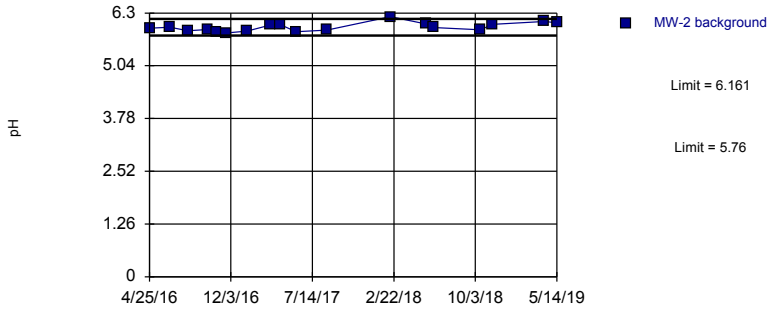
Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-1
4/26/2016	5.2
6/20/2016	5.18
8/8/2016	5.12
10/3/2016	5.21 (D)
10/26/2016	5.2
11/21/2016	5.19 (D)
1/17/2017	5.17 (D)
3/22/2017	5.2 (D)
4/18/2017	5.2
5/30/2017	5.14 (D)
8/23/2017	5.12 (D)
2/13/2018	5.18
5/22/2018	5.2
6/12/2018	5.15
10/17/2018	5.12
11/19/2018	5.09 (D)
4/10/2019	5.11
5/14/2019	5.19

Prediction Limit

Intrawell Parametric, MW-2 (bg)



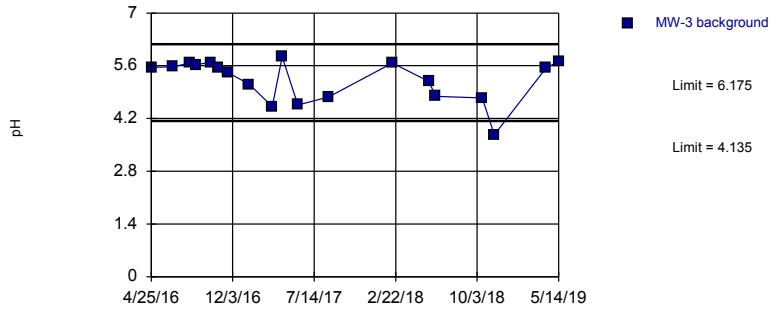
Background Data Summary: Mean=5.961, Std. Dev.=0.1039, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9465, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-3 (bg)



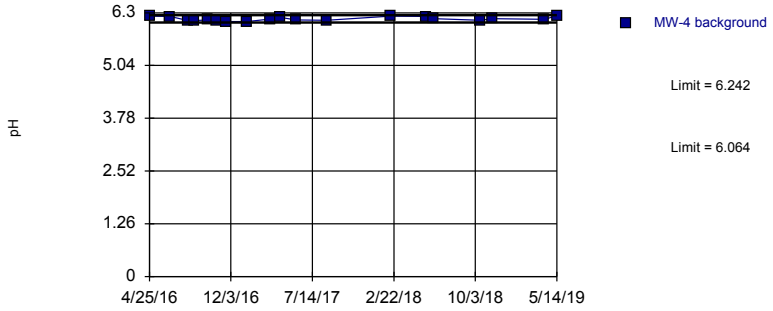
Background Data Summary (based on square transformation): Mean=27.62, Std. Dev.=5.502, n=19. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8755, critical = 0.863. Kappa = 1.912 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-4 (bg)



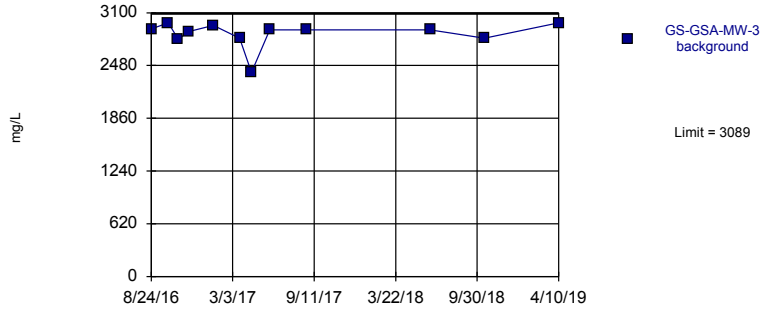
Background Data Summary: Mean=6.153, Std. Dev.=0.04655, n=19. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9053, critical = 0.863. Kappa = 1.912 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, GS-GSA-MW-3



Background Data Summary (based on x^5 transformation): Mean=1.9e17, Std. Dev.=4.2e16, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8091, critical = 0.805. Kappa = 2.112 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-2
4/25/2016	5.94
6/20/2016	5.96
8/8/2016	5.88
10/3/2016	5.91 (D)
10/26/2016	5.84
11/21/2016	5.82 (D)
1/17/2017	5.87 (D)
3/22/2017	6.01 (D)
4/18/2017	6.02
5/31/2017	5.85 (D)
8/23/2017	5.89 (D)
2/13/2018	6.21
5/22/2018	6.04
6/12/2018	5.95
10/17/2018	5.9
11/19/2018	6.03 (D)
4/10/2019	6.1
5/14/2019	6.07

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-3
4/25/2016	5.56
6/22/2016	5.57
8/9/2016	5.67
8/24/2016	5.63
10/4/2016	5.69 (D)
10/26/2016	5.56
11/21/2016	5.42 (D)
1/18/2017	5.11 (D)
3/22/2017	4.52 (D)
4/18/2017	5.84
5/31/2017	4.56 (D)
8/23/2017	4.77 (D)
2/13/2018	5.67
5/24/2018	5.19
6/12/2018	4.79
10/17/2018	4.75
11/19/2018	3.77 (D)
4/10/2019	5.54
5/14/2019	5.71

Prediction Limit

Constituent: pH (pH) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-4
4/25/2016	6.22
6/20/2016	6.21
8/9/2016	6.11
8/24/2016	6.11
10/3/2016	6.13 (D)
10/26/2016	6.12
11/21/2016	6.09 (D)
1/18/2017	6.09 (D)
3/22/2017	6.15 (D)
4/18/2017	6.19
5/31/2017	6.13 (D)
8/23/2017	6.12 (D)
2/13/2018	6.22
5/23/2018	6.21
6/12/2018	6.16
10/17/2018	6.12
11/19/2018	6.16 (D)
4/10/2019	6.14
5/14/2019	6.23

Prediction Limit

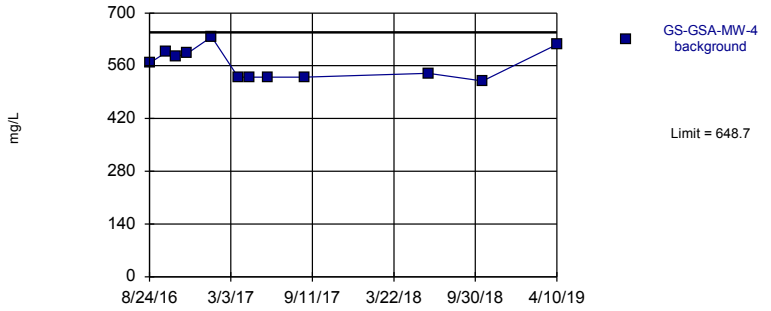
Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3
8/24/2016	2910
10/3/2016	2980
10/26/2016	2790
11/21/2016	2880
1/17/2017	2950
3/20/2017	2800
4/17/2017	2400
5/30/2017	2900
8/24/2017	2900
6/11/2018	2900
10/17/2018	2800
4/10/2019	2980

Prediction Limit

Intrawell Parametric, GS-GSA-MW-4



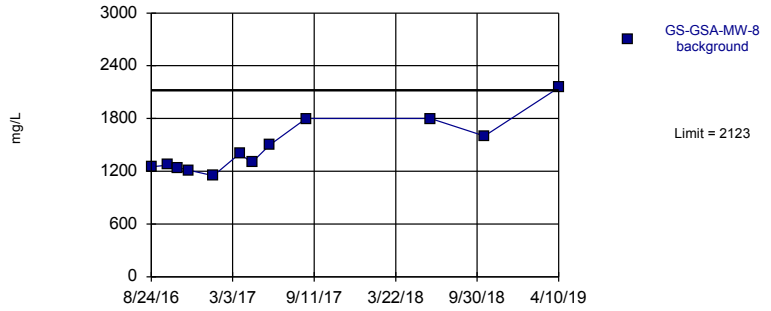
Background Data Summary: Mean=564.5, Std. Dev.=39.86, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8799, critical = 0.805. Kappa = 2.112 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, GS-GSA-MW-8



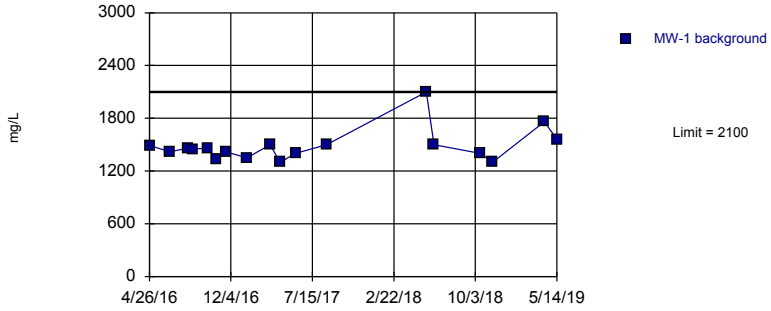
Background Data Summary: Mean=1473, Std. Dev.=307.9, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8741, critical = 0.805. Kappa = 2.112 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Non-parametric, MW-1 (bg)



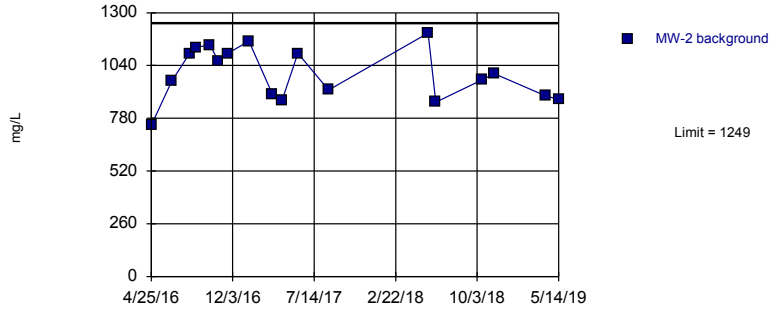
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 18 background values. Well-constituent pair annual alpha = 0.01072. Individual comparison alpha = 0.005373 (1 of 2). Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-2 (bg)



Background Data Summary: Mean=998.9, Std. Dev.=129.3, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9464, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-4
8/24/2016	567
10/3/2016	596
10/26/2016	585
11/21/2016	593
1/17/2017	637
3/21/2017	530
4/17/2017	530
5/30/2017	530
8/24/2017	530
6/11/2018	540
10/17/2018	520
4/10/2019	616

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-8
8/24/2016	1250
10/3/2016	1270
10/26/2016	1240
11/21/2016	1210
1/17/2017	1150
3/20/2017	1400
4/18/2017	1300
5/30/2017	1500
8/24/2017	1800
6/12/2018	1800
10/17/2018	1600
4/10/2019	2150

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-1
4/26/2016	1490
6/20/2016	1420
8/8/2016	1460
8/24/2016	1450
10/3/2016	1460
10/26/2016	1330
11/21/2016	1420
1/17/2017	1350
3/22/2017	1500
4/18/2017	1300
5/30/2017	1400
8/23/2017	1500
5/22/2018	2100
6/12/2018	1500
10/17/2018	1400
11/19/2018	1300
4/10/2019	1760
5/14/2019	1560

Prediction Limit

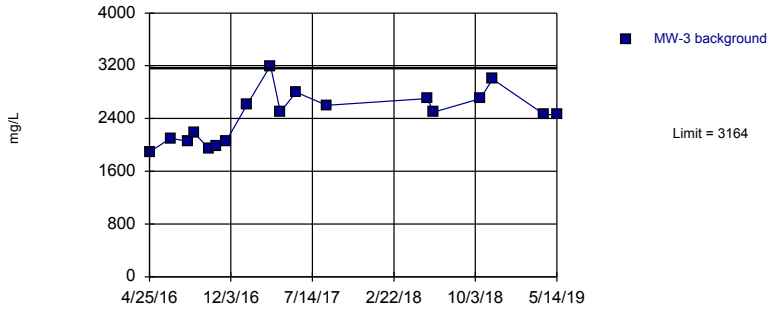
Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-2
4/25/2016	745
6/20/2016	964
8/8/2016	1100
8/24/2016	1130
10/3/2016	1140
10/26/2016	1060
11/21/2016	1100
1/17/2017	1160
3/22/2017	900
4/18/2017	870
5/31/2017	1100
8/23/2017	920
5/22/2018	1200
6/12/2018	860
10/17/2018	970
11/19/2018	1000
4/10/2019	889
5/14/2019	873

Prediction Limit

Intrawell Parametric, MW-3 (bg)

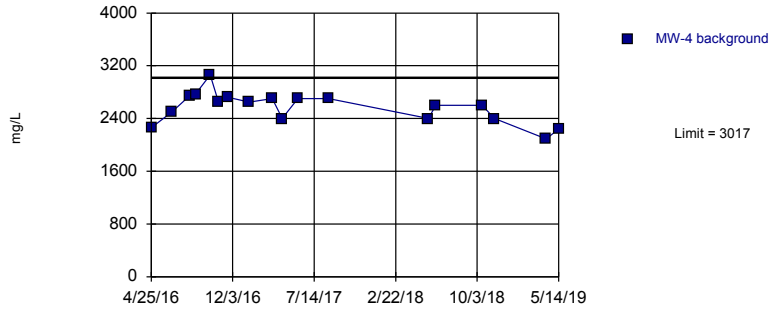


Background Data Summary: Mean=2431, Std. Dev.=379.6, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9476, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, MW-4 (bg)

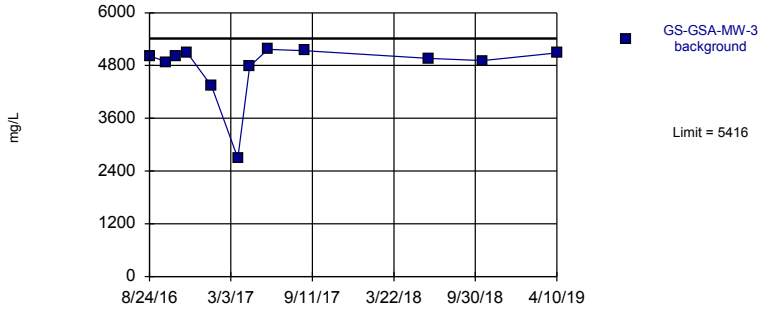


Background Data Summary: Mean=2566, Std. Dev.=233.5, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9529, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, GS-GSA-MW-3

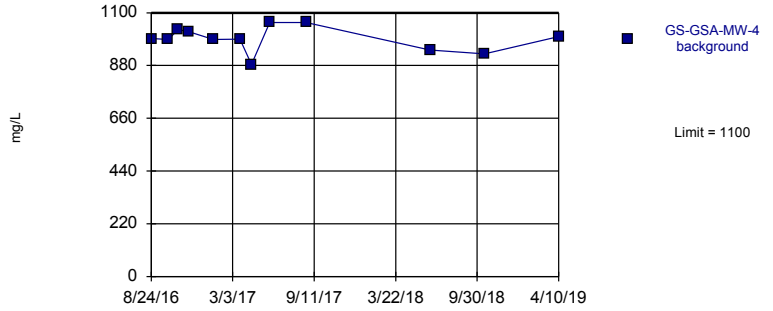


Background Data Summary (based on x^6 transformation): Mean=1.4e22, Std. Dev.=5.4e21, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8255, critical = 0.805. Kappa = 2.112 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Intrawell Parametric, GS-GSA-MW-4



Background Data Summary: Mean=990.3, Std. Dev.=51.88, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9383, critical = 0.805. Kappa = 2.112 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-3
4/25/2016	1890
6/22/2016	2100
8/9/2016	2050
8/24/2016	2190
10/4/2016	1950
10/26/2016	1980
11/21/2016	2060
1/18/2017	2620
3/22/2017	3200
4/18/2017	2500
5/31/2017	2800
8/23/2017	2600
5/24/2018	2700
6/12/2018	2500
10/17/2018	2700
11/19/2018	3000
4/10/2019	2460
5/14/2019	2460

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-4
4/25/2016	2260
6/20/2016	2500
8/9/2016	2750
8/24/2016	2770
10/3/2016	3060
10/26/2016	2650
11/21/2016	2720
1/18/2017	2650
3/22/2017	2700
4/18/2017	2400
5/31/2017	2700
8/23/2017	2700
5/23/2018	2400
6/12/2018	2600
10/17/2018	2600
11/19/2018	2400
4/10/2019	2090
5/14/2019	2240

Prediction Limit

Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-3
8/24/2016	5020
10/3/2016	4880
10/26/2016	5020
11/21/2016	5090
1/17/2017	4330
3/20/2017	2690
4/17/2017	4780
5/30/2017	5170
8/24/2017	5140
6/11/2018	4960
10/17/2018	4910
4/10/2019	5090

Prediction Limit

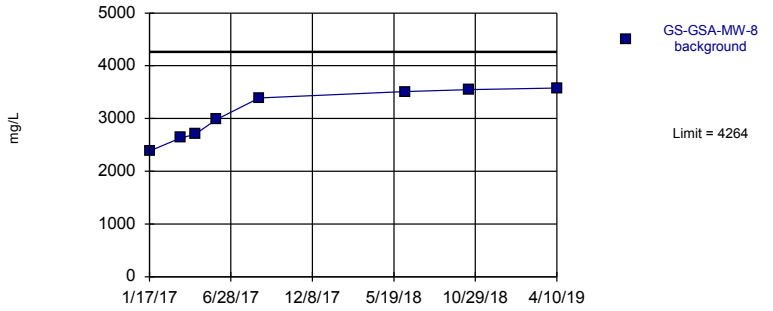
Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-4
8/24/2016	992
10/3/2016	988
10/26/2016	1030
11/21/2016	1020
1/17/2017	988
3/21/2017	990
4/17/2017	884
5/30/2017	1060
8/24/2017	1060
6/11/2018	944
10/17/2018	928
4/10/2019	1000

Prediction Limit

Intrawell Parametric, GS-GSA-MW-8



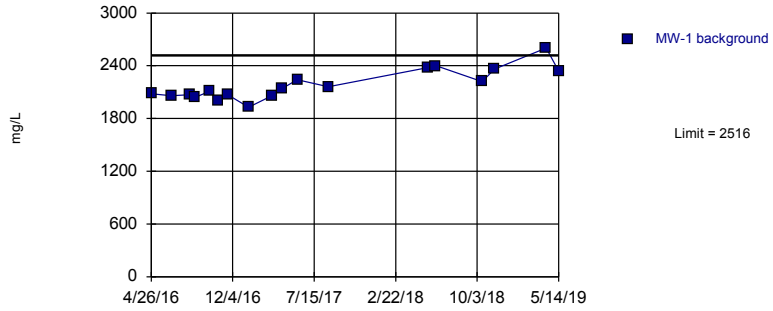
Background Data Summary: Mean=3090, Std. Dev.=477.8, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8736, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-1 (bg)



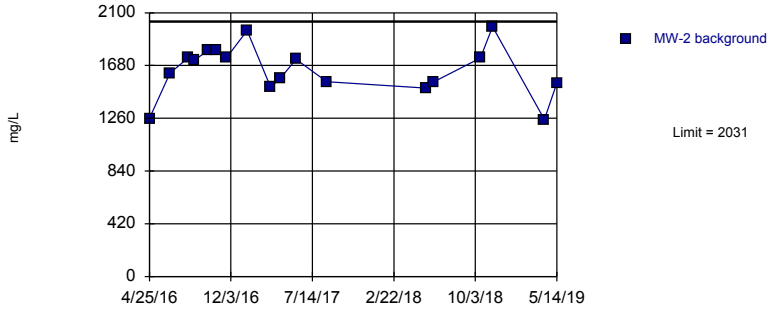
Background Data Summary: Mean=2181, Std. Dev.=173.6, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9208, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-2 (bg)



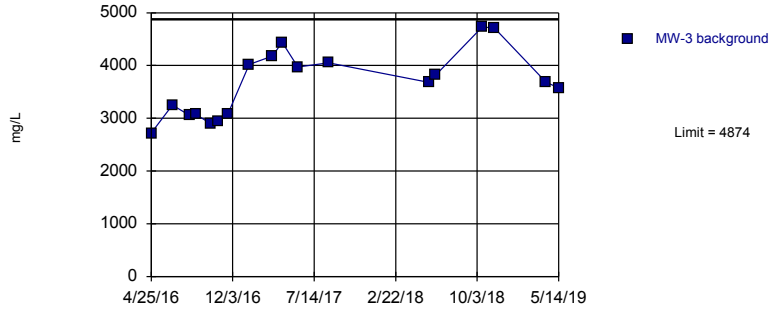
Background Data Summary: Mean=1643, Std. Dev.=200.5, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9458, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Sanitas™ v.9.6.23 Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, MW-3 (bg)



Background Data Summary: Mean=3661, Std. Dev.=628.6, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9455, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell
Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	GS-GSA-MW-8
8/24/2016	2280
10/3/2016	2370
10/26/2016	2350
11/21/2016	2530
1/17/2017	2380
3/20/2017	2630
4/18/2017	2700
5/30/2017	2980
8/24/2017	3390
6/12/2018	3510
10/17/2018	3550
4/10/2019	3580

Prediction Limit

Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-1
4/26/2016	2080
6/20/2016	2060
8/8/2016	2070
8/24/2016	2040
10/3/2016	2110
10/26/2016	2000
11/21/2016	2070
1/17/2017	1930
3/22/2017	2060
4/18/2017	2140
5/30/2017	2240
8/23/2017	2160
5/22/2018	2380
6/12/2018	2400
10/17/2018	2220
11/19/2018	2360
4/10/2019	2600
5/14/2019	2340 (D)

Prediction Limit

Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-2
4/25/2016	1260
6/20/2016	1620
8/8/2016	1740
8/24/2016	1720
10/3/2016	1800
10/26/2016	1800
11/21/2016	1740
1/17/2017	1960
3/22/2017	1510
4/18/2017	1580
5/31/2017	1730
8/23/2017	1550
5/22/2018	1500
6/12/2018	1550
10/17/2018	1740
11/19/2018	1990
4/10/2019	1250
5/14/2019	1540 (D)

Prediction Limit

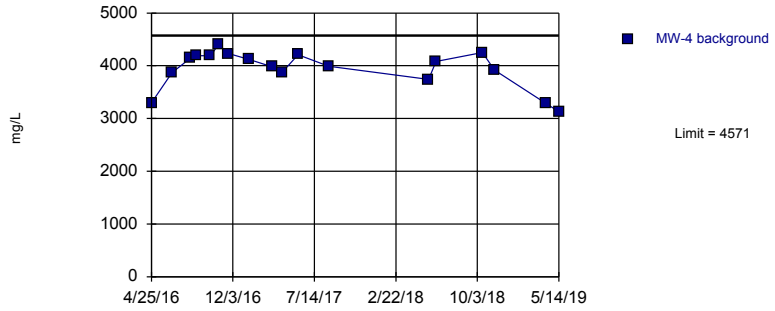
Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-3
4/25/2016	2720
6/22/2016	3250
8/9/2016	3050
8/24/2016	3080
10/4/2016	2900
10/26/2016	2940
11/21/2016	3090
1/18/2017	4020
3/22/2017	4180
4/18/2017	4440
5/31/2017	3970
8/23/2017	4050
5/24/2018	3680
6/12/2018	3820
10/17/2018	4730
11/19/2018	4710
4/10/2019	3680
5/14/2019	3580 (D)

Prediction Limit

Intrawell Parametric, MW-4 (bg)



Background Data Summary (based on square transformation): Mean=1.6e7, Std. Dev.=2719774, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8799, critical = 0.858. Kappa = 1.931 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: TDS Analysis Run 9/30/2019 9:40 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

Prediction Limit

Constituent: TDS (mg/L) Analysis Run 9/30/2019 9:41 AM View: Intrawell

Plant Gorgas Client: Southern Company Data: Gorgas GSA

	MW-4
4/25/2016	3300
6/20/2016	3870
8/9/2016	4140
8/24/2016	4190
10/3/2016	4190
10/26/2016	4400
11/21/2016	4230
1/18/2017	4120
3/22/2017	3980
4/18/2017	3880
5/31/2017	4210
8/23/2017	3990
5/23/2018	3740
6/12/2018	4080
10/17/2018	4250
11/19/2018	3920
4/10/2019	3280
5/14/2019	3130 (D)

Appendix C

WFG Low-Flow Groundwater Sampling TSOP

1. Purpose

1.1. The purpose of this Technical SOP (TSOP) is to discuss the process and requirements associated with conducting Low-Flow groundwater sampling.

1.2. This TSOP specifically describes using bladder pumps and peristaltic pumps to obtain groundwater samples collected for laboratory analysis by the Alabama Power Company (APC) Environmental Affairs (EA), Water Field Group (WFG).

2. Scope

2.1. This procedure is to be used by field personnel when collecting and handling groundwater samples using the Low-Flow groundwater collection method in the field.

2.2. The sampling equipment covered in this TSOP may be portable (well-to-well) or well-dedicated.

2.3. The sampling of SVOCs and VOCs should not be collected with the use of peristaltic pumps unless prior written customer approval is attained.

2.4. The procedure is designed to ensure that the samples collected are representative of the aquifer or target formation and that sample cross-contamination is eliminated during the sampling and handling process.

2.5. This procedure cannot replace education and experience. Professional judgment should be used in conjunction with this procedure.

3. Definitions/Abbreviations

3.1. Low-Flow (or micropurge) - Refers to the velocity with which water is withdrawn from the well. The objective of low-flow sampling is to extract fresh samples of the ambient groundwater from within the screened interval of the well with minimal impact to the zone of influence of the well.

3.2. Drawdown - Lowering of the water column within a well due to pumping. Typically associated with high-flow purging of a well for water sampling.

3.3. DI water – De-ionized water. Water that has been passed through a standard deionizing resin column. Water used for decontamination of field equipment.

3.4. Ultra-pure DI water- Water that is filtered and treated to the highest levels of purity. This water is used for the filling of blanks.

3.5. Phosphate-free soap or cleaner – A cleaner which contains, by weight, 0.5% or less of phosphates or derivatives of phosphates (Liquinox® or Luminox®).

3.6. Potable water- Water that is safe to consume. Can be used in detergent solution and first rinse during decontamination. Can be replaced by DI water.

3.7. PPE - Personal Protective Equipment.

3.8. NTU - Nephelometeric Turbidity Units. The unit of measure used when measuring the turbidity of water.

3.9. COC - Chain of Custody. A controlled document used to record sample information and transfer the samples to the laboratory after collection.

3.10. SVOCs and VOCs- Semi-volatile organic compounds and volatile organic compounds.

3.11. DO - Dissolved Oxygen

3.12. ORP - Oxidation Reduction Potential

3.13. SAP - Sampling and Analysis Plan

3.14. EDAS- Environmental Data Acquisition System

3.15. Artesian well- A well in which water rises under pressure from a permeable stratum overlaid by impermeable rock.

4. References

4.1. Internal Documents

4.1.1. WFG Groundwater Equipment Decontamination TSOP
4.1.2. WFG Groundwater Water Level and Total Depth Measurements TSOP
4.1.3. WFG General Water Sampling and Field Measurement TSOP
4.1.4. WFG Deployment and Maintenance of Dedicated Groundwater Equipment TSOP
4.1.5. WFG Turbidity TSOP
4.1.6. WFG Temperature TSOP
4.1.7. WFG Conductivity TSOP
4.1.8. WFG Luminescent Dissolved Oxygen (LDO) TSOP
4.1.9. WFG Oxidation-Reduction Potential (ORP) TSOP
4.1.10. WFG pH (TSOP-SM-4500H) TSOP
4.1.11. WFG Electronic Calibration Form
4.1.12. Groundwater Electronic Chain of Custody

4.1.13. Site specific SAP

4.2. External Documents

4.2.1. United States Environmental Protection Agency (U.S. EPA). Region 4, Groundwater Sampling. Document # SESDPROC-301-R4.

4.2.2. Florida Department of Environmental Protection (DEP). FS 2200 Groundwater Sampling. Document # DEP-SOP-001/01.

4.2.3. United States Environmental Protection Agency (U.S. EPA). Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. Document # EPA/540/S-95/504.

4.2.4. ASTM Standard D6771-18- Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations

5. Method Overview

5.1. Low flow sampling of groundwater from within the screened interval is accomplished by maintaining a low pump rate that minimizes drawdown of the water column while leaving the more stagnant water above the screened interval undisturbed.

5.2. Indicator parameters and water levels are measured at the beginning of and while micro-purging the well. Stabilization acceptance criteria for turbidity, pH, specific conductance and DO are found in the site specific SAP. Stabilization of these parameters indicates that the water is representative of ambient conditions and sample collection can begin. ORP and temperature measurements should also be collected but will not be used as indicators of stability.

5.3. Non-dedicated sampling equipment must be decontaminated prior to next use in a well to avoid cross contamination. Refer to and understand the Groundwater Equipment Decontamination TSOP prior to performing groundwater sampling.

6. Detection Limit

6.1. Some of the indicator parameter methods used to show equilibrium of the well water have minimum detection limits or other quality control requirements. Refer to the latest version of the TSOPs associated with these procedures (turbidity, pH, specific conductance, and DO).

6.2. Users of this procedure must study and be familiar with the applicable data acceptance criteria and required field measurements. Refer to the SAP for information on these parameters and other information.

7. Safety

7.1. Appropriate PPE should be worn and utilized when sampling groundwater wells in accordance with APC policies. Generally this includes safety glasses, hard hats, gloves and safety-toed boots. Plant-specific requirements may also apply and should be determined/known prior to arriving at the work location.

7.2. Refer to the WFG General Water Sampling and Field Measurement TSOP procedure for general safety requirements.

7.3. If using compressed Nitrogen gas for deep wells, always secure tanks when transporting and ensure protective cap is secured over valve. Take care to avoid exceeding the max pressure rating of the controller, air hose and pump.

8. Equipment and Materials

The following is a basic listing of the necessary reusable and expendable items that are required to complete this procedure.

8.1. Reusable Items

8.1.1. Field Book
8.1.2. Appropriate installation diagram and/or well construction data
8.1.3. Keys for well locks
8.1.4. Water level meter
8.1.5. Pump with parts (tubing grab plates, bladders, O-rings, etc.)
8.1.6. Pump controller
8.1.7. Peristaltic pump
8.1.8. Flow-through cell
8.1.9. iPad
8.1.10. InSitu™ multi-parameter probe
8.1.11. Handheld turbidity meter
8.1.12. Generator (min. 2,000 kW)
8.1.13. Air compressor and hose
8.1.14. Graduated cylinder
8.1.15. Tubing Weight (for peristaltic application)
8.1.16. Tubing caddy with counter unit or other measurement device
8.1.17. Decon/wash containers w/ lids (3)
8.1.18. Coolers for samples
8.1.19. Procedures & SAPs

8.2. Consumable/Disposable Items

8.2.1. Tubing (estimated for number of wells x well depths with extra)
8.2.2. Silicone tubing for peristaltic pump head
8.2.3. COCs (if electronic format is not suitable)
8.2.4. Plastic sheeting
8.2.5. Gasoline (in approved container)
8.2.6. Ice for samples
8.2.7. Sample Bottles
8.2.8. DI water (For decon)
8.2.9. Ultra-Pure DI water (For blanks collection)
8.2.10. Potable water (for decon)
8.2.11. Phosphate free detergent (e.g. Liquinox or Luminox®)
8.2.12. Support rope or coated safety cable
8.2.13. Calibration Standards
8.2.14. Disposal sample bags & trash bags
8.2.15. Paper towels

9. Reagents & Standards

9.1. This document describes the Low-Flow purging and sampling procedure and does not include method calibration procedures. Calibration procedures may be found in the associated method TSOP on the APC Qualtrax site. The instrument(s) used to measure indicator parameters must be verified daily using the below appropriate calibration standards (or equivalent).

9.1.1. ORP- ZoBell's ORP Solution
9.1.2. pH- 3-point calibration

9.1.2.1. 2.00 buffer standard for pH
9.1.2.2. 4.00 buffer standard for pH
9.1.2.3. 7.00 buffer standard for pH
9.1.2.4. 10.00 buffer standard for pH
9.1.2.5. 12.00 buffer standard for pH

9.1.3. DO - NA
9.1.4. Specific Conductance - 1,412 µS/cm, or appropriate conductivity standard
9.1.5. Turbidity – Zeroed with 0.00 standard and calibrated with 10.00 NTU standard

10. Calibration

10.1. Calibration and/or verification of water quality measurement equipment shall be performed at the start of each day and should be specific to the manufacturer's calibration instructions. A verification check of the instrument calibration will be performed after the calibration and at the end of each day with a standard of the same value but different lot number or manufacturer.

10.2. All calibration data, and initial and final LCS data, should be recorded electronically in the calibration log on EDAS.

10.3. Refer to the APC TSOP for each method to complete the instrument calibration (TSOPs: turbidity, pH, temperature, specific conductance, DO and ORP).

11. Procedure

General Note

At the start of each sampling event, a round of water levels from each well should be collected for use in generating a potentiometric surface map. This should be completed on the first day of the sampling event. Refer to the Groundwater Water Level and Total Depth Measurement TSOP for guidance.

11.1. Well lock keys are maintained by the plant compliance contact and must be obtained from the compliance office, if not already assigned a key, prior to beginning work

11.2. Inspect the well for any damage or tampering. If there is evidence of damage or tampering, immediately notify the Technical Manager or the Water Field Services Supervisor. Take photos of the site as documentation and make sure not to disturb the well. The damage/tampering and any discussions about a response should also be documented in the field logbook or electronically in the iPad.

11.3. If the well is in good condition, open the well head and if the well is non-dedicated and non-vented, remove the inner casing cap to allow for atmospheric equilibration. Begin setting up to sample by arranging/organizing the work zone.

11.4. Designate a clean work space or work surface used to provide a contaminant-free area to place sampling equipment during assembly.

11.5. Calibrate or verify all field parameter measurement equipment at the start of each day (this typically includes an InSitu multi-meter probe and a handheld turbidity meter if an inline turbidity sensor is not used). Refer to the appropriate method TSOP and calibration procedure for each instrument used.

11.6. All non-dedicated equipment that will, or could come into contact with groundwater (e.g. pump and water level meter) in the well must be decontaminated prior to each use. Refer to the Groundwater Equipment Decontamination TSOP for more details.

11.7. Using a properly functioning water level indicator, lower the probe into the well and obtain an initial water level measurement for the well (Refer to WFG Groundwater Water Level and Total Depth Measurements TSOP).

11.8. Measure and record all water levels to the nearest hundredth (0.01) foot at the reference point or survey mark on the well casing.

11.9. Refer to the WFG Deployment and Maintenance of Dedicated Groundwater Equipment TSOP for initial or re-deployment of dedicated pumps and for performing maintenance activities.

11.10. Dedicated Low-Flow – Bladder Pump

11.10.1. Connect the external compressor hose to the pump controller intake port using the quick-connect.

11.10.2. Connect the pump air supply line to the “Air Out” quick connect on the control box. Connect the other end of the air supply line to the air connection on the dedicated well cap.

11.10.3. Connect a short piece of tubing to the existing sample line on the dedicated well cap and then connect to the bottom of the flow-through cell for the InSitu multi-probe. Use care to ensure proper connection of the tubing.

11.10.4. Using data from the Field Logbook, SAP, or associated well construction data (See Section 15), determine the total well depth and the intake screen mid-point depth. Ensure that the dedicated pump is still located below the water table, and at a suitable sampling depth.

11.10.5. Insert the InSitu multi-parameter probe into the flow-through cell and press the power button

11.10.6. Turn on the iPad and open the InSitu Low-Flow application (iSitu® or VuSitu® app). Enter the initial data needed to initiate the program or if a template is available, open the well specific template. Refer to the manufacturer’s instructions for a step-by-step explanation of the Low-Flow app and the data input required.

11.10.7. Continue to fill in all appropriate information in the InSitu program using the parameter stabilization criteria set forth in the site-specific SAP. Always confirm with the Technical Manager that the current SAP is being used.

11.10.8. Place the generator as far away as possible from the well, preferable downwind. Start the generator and the air compressor to

begin pumping. If the well is too deep for a traditional air compressor, use of compressed Nitrogen gas, high pressure controller and pressure regulator may be required.

11.10.9. Monitor the water level and adjust the flow rate on the pump controller to provide a constant water level in the well. Pump rates should not exceed three tenths of a foot (0.3) water level drawdown when sampling. During initial pump start-up, drawdown may exceed three tenths of a foot (0.3) while flow rate adjustments are being made or while water level stabilization occurs.

11.10.10. Use a graduated cylinder (or similar) to measure the flow rate in milliliters per minute (ml/min). Purge rates must fall between 100 and 500 ml/min or meet the specific requirements provided in the project SAP. If the minimum flow rate requirement of 100 ml/min cannot be achieved without water level drawdown exceeding three tenths of a foot (0.3), refer to section 16.1.

11.10.10.1. If the well has been previously purged and sampled, refer back to the most recent well record and make an effort to target that purge rate for consistency.

11.10.11. When a stable purge rate is attained, enter that flow rate in the InSitu program and set the measurement frequency to every 5 minutes. The Low-Flow application (iSitu® or VuSitu® app) will now be used to determine when groundwater samples can be taken. The Low-Flow app uses the previously entered SAP acceptance criteria and applies them to each measurement. When the criteria are met, the indicator parameter will be highlighted in green on the iPad screen, indicating equilibration.

11.10.12. Note the start time and other well information in the field log book and start the program.

11.10.13. Turbidity measurements may be taken with an inline turbidity sensor or with an external handheld unit. If using an external turbidity meter, readings must collected as close as possible to the time as the readings acquired from the InSitu meter.

11.10.14. Continue to measure water level and turbidity at the same measurement frequency as the indicator parameters, entering the values in the iPad InSitu application.

11.10.15. Once the water level and all field parameters have stabilized and turbidity is less than 10 NTU according to the criteria in the SAP, the well is considered equilibrated and sampling may take place. Refer to the site-specific SAP and Sections 16.2 and 16.3 of this procedure for direction on wells where 10 NTU are unattainable.

11.10.16. Tap the "**Finish Test**" button on the iPad and enter any relevant notes such as time sampled in the comment section. Email the data file to a secure company email address for storage and use. In the event that there is no data service to email the file and the iPad is damaged or lost before the field report can be sent, the well will be re-sampled.

11.10.17. **DO NOT** turn off the pump. Complete the labeling for all sample bottles and also record the same information for each sample in the field log book, and all electronic forms.

11.10.18. Put on nitrile or latex gloves and make sure that all bottles are preserved with the appropriate acid.

11.10.19. Carefully remove the sample line from the bottom of the flow-through cell. Cut the end off of the sample tubing and begin filling up the sample containers.

11.10.20. Do not adjust the flow rate when sampling.

11.10.21. Fill up the containers by placing the tubing in the mouth of the bottle, using care not to touch the mouth or sides of the container. Do not overfill sample bottles. Bottle should be filled to the top leaving a small amount of headspace, unless otherwise directed by the customer or lab.

11.10.22. Upon filling and capping all sample containers, place the samples in the sample cooler and ensure that the samples with temperature requirements are placed on ice.

11.10.23. Turn off the controller, air compressor and generator.

11.10.24. Remove the water level indicator from the well, making sure to decontaminate the wetted tape and probe portion.

11.10.25. Disconnect the airline tubing from the controller and make sure the sample line tubing is disconnected. Secure the dedicated tubing within the wellhead in such manner that the tubing stays clean and does not fall into the well. Close and secure the well.

11.11. Non- Dedicated Low Flow- Bladder Pump

11.11.1. Complete Steps 11.1 – 11.9 from the above procedure.

11.11.2. Assemble a clean pump system with a bladder, and connect the support rope or cable, sample line, and air line to the top of the pump assembly. Use care to ensure proper connection and positioning. Never lower a pump in a well without a support rope attached.

11.11.3. Using data from the Field Logbook, SAP, or associated well construction data (See Section 15), determine the total well depth and the intake screen mid-point depth.

11.11.4. Slowly lower the pump assembly into the well, using care to minimize disturbance once the groundwater interface is reached. The tubing counter or other depth measurement devices can be used to aid in determining appropriate depth.

11.11.5. Recharge characteristics may dictate the need to place the pump intake slightly lower than the mid-screen depth if drawdown historically is unavoidable.

11.11.6. With the pump intake lowered to approximately mid-screen depth, secure the support rope or cable so that the pump is fixed and stationary in the well.

11.11.7. Cut the air line to an appropriate length and attach to the air hose on the pump controller. Next, cut the water line to an appropriate length and attach to the bottom of the flow-through cell.

11.11.8. Re-lower the water level meter into the well.

11.11.9. Follow above Steps 11.10.5 – 11.10.23.

11.11.10. Remove the pump and tubing from the well. Discard the used tubing and pump bladder. Never re-use disposable sampling equipment or tubing.

11.11.11. Place the well cap back on the well and close and lock the well lid.

11.12. Low Flow –Peristaltic Pumps

11.12.1. Complete steps 11.1 – 11.9 from the above procedures.

11.12.2. Peristaltic- Dedicated Well Tubing

11.12.2.1. Prepare an adequate length of clean silicon tubing that has the correct outside and inside dimensions to allow proper fit in the pump head. Insert into the pump head rollers and secure (refer to pump user manual for additional information).

11.12.2.2. Connect the vacuum end of the silicone tubing to the barb fitting on the dedicated well cap.

11.12.2.3. Attach the discharge end of the silicone tubing to the bottom of the flow through cell.

11.12.3. Peristaltic- Non-Dedicated Well Tubing

11.12.3.1. Attach the tubing weight to the end of clean polyethylene tubing.

11.12.3.2. Using data from the Field Logbook, SAP, or associated well construction data (See Section 15), determine the total well depth and the intake screen mid-point depth.

11.12.3.3. Using the tubing caddy or another tubing depth measurement device, slowly lower the tubing and weight to the mid-screen depth.

11.12.3.4. Once the tubing intake is at the correct depth, allow for excess tubing at the surface and insert into the pump head rollers and secure.

11.12.3.5. Allow for a short section (one to three feet) of tubing from the discharge side of the pump head. This may be used for both the purge discharge and to fill sample bottles upon stabilization.

11.12.3.6. Attach the discharge tubing to the intake (lower) port of the flow-through cell.

11.12.4. Insert the InSitu multi-parameter probe into the flow-through cell and press the power button on the battery pack.

11.12.5. Turn on the iPad and open the InSitu Low-Flow application (iSitu® or VuSitu® app). Enter the initial data needed to initiate the program or if a template is available, open the well-specific template. Refer to the manufacturer's instructions for a step-by-step explanation of the Low-Flow app and the data input required.

11.12.6. Make the necessary preparations to provide power to the pump. Turn on the peristaltic pump to produce a vacuum on the well side of the pump head and begin purging. Observe pump direction to ensure that the pump operation is applying a vacuum to the sample line (down-hole) tubing.

11.12.7. Monitor the water level and adjust the flow rate to provide a constant water level in the well. The pump rate will initially require adjustment based on the site and well properties. Pump rates should not exceed three tenths of a foot (0.3) water level drawdown when sampling. During initial pump start-up, drawdown may exceed three tenths of a foot (0.3) while flow rate adjustments are being made or while water level stabilization occurs. If the minimum flow rate requirement of 100 ml/min cannot be achieved without water level drawdown exceeding three tenths of a foot (0.3), refer to section 16.1.

11.12.8. Continue to fill in all appropriate information in the InSitu program using the parameter stabilization criteria set forth in the site-specific SAP. Always confirm with the Technical Manager that the current SAP data are being used.

11.12.9. Use a graduated cylinder (or similar) to measure the flow rate in milliliters per minute (ml/min). Purge rates must fall between 100 and 500 ml/min or meet the specific requirements provided in the project SAP.

11.12.9.1. If the well has been previously purged and sampled, refer back to the most recent well record and make an effort to match the purge rate for consistency.

11.12.10. When a stable purge rate is attained, enter that flow rate in the InSitu program and set the measurement frequency to 5 minutes. The Low-Flow application (iSitu® or VuSitu® app) will now be used to determine when groundwater samples can be taken. The Low-Flow app uses the previously entered SAP acceptance criteria and compares them to each measurement. When the criteria are met, the indicator parameter will be highlighted in green on the iPad screen, indicating equilibration.

11.12.11. Note the start time and other well information in the field log book and start the program.

11.12.12. Turbidity measurements may be taken with an inline turbidity sensor or with an external handheld unit. If using an external turbidity meter, readings must be collected as close as possible to the time as the readings acquired from the InSitu meter.

11.12.13. Continue to measure water level and turbidity at the same measurement frequency as the indicator parameters, entering the values in the iPad SmarTROLL™ application.

11.12.14. Once the water level and all field parameters have stabilized and turbidity is less than 10 NTU according to the criteria in the SAP, the well is considered equilibrated and sampling may take place. Refer to the site-specific SAP and Sections 16.2 and 16.3 of this procedure for wells where 10 NTU is unattainable.

11.12.15. Tap the "**Finish Test**" button on the iPad and enter any relevant notes such as time sampled in the comment section. Email the data file to a secure company email address for storage and use. In the event that there is no data service to email the file and the iPad is damaged or lost before the field report can be sent, the well will be re-sampled.

11.12.16. **DO NOT** turn off the pump. Complete the labeling for all sample bottles and also record the same information for each sample in the field log book and associated electronic forms.

11.12.17. Make sure that all bottles are preserved with the appropriate acid.

11.12.18. Carefully remove the sample line from the bottom of the flow-through cell. Cut the end off of the sample tubing and begin filling up the sample containers.

11.12.19. Do not adjust the flow rate when sampling.

11.12.20. Fill up the containers by placing the tubing in the mouth of the bottle, using care not to touch the mouth or sides of the container. Do not overfill sample bottles. Bottles should be filled to the top leaving a

small amount of headspace unless otherwise directed by the customer or lab.

11.12.21. Upon filling and capping all sample containers, place the samples in the sample cooler and ensure that the samples with temperature requirements are placed on ice.

11.12.22. Stop the pump and reverse the flow direction so that the sample line is emptied of water.

11.12.23. Turn off the peristaltic pump and generator.

11.12.24. Remove the water level indicator from the well, making sure to decontaminate the wetted tape and probe.

11.12.25. For dedicated tubing, disconnect the silicone tubing piece from the pump and dedicated well cap and throw away. Close and secure the well. For non-dedicated tubing, disconnect the tubing from the pump and throw away.

11.13. Decontamination and Clean-Up – For all Reusable Components

11.13.1. Decontamination of any reusable components can be completed as a separate task at a later time but must not be re-used until decontaminated according to the WFG Groundwater Equipment Decontamination TSOP.

11.13.2. Do not re-use any disposable sampling equipment and throw away all non-dedicated tubing and bladders after use.

11.13.3. Pack up and secure all equipment and complete all sample information on the COC.

11.13.4. Reattach well cap (as appropriate) and close and lock the wellhead.

12. Calculations and Reports

12.1. Sample reports should be emailed in the field using the InSitu iPad application to a secure company email address.

13. Data Interpretation, Recording and Reporting

13.1. Data interpretation and reporting will be completed by personnel with Southern Company Services (SCS) and will subsequently be used to produce the compliance report per the Coal Combustion Residuals Rule [80 FR 21301] and respective state agency requirements.

13.2. Recording of field data used to support the interpretation and reporting process will be completed using field log books and/or sample reports that will be filled out each time groundwater monitoring activities are conducted. The field log book or sample report should contain the following information:

13.2.1. Well identification number
13.2.2. Well depth
13.2.3. Static water level depth, date & time
13.2.4. Pumping rate, drawdown, indicator parameter values, time at five minute intervals; calculated or measured total volume pumped
13.2.5. Time of sample collection
13.2.6. Field observations
13.2.7. Name of sample collectors
13.2.8. Weather conditions
13.2.9. QA/QC data for blanks (sample time and location)

13.3. Information on sample times, dates, analytical methods, personnel, etc. should be filled out on the COC for each sample and turned in with the samples to the proper lab.

14. Quality Control Acceptance Criteria and Corrective Actions for Failed QC

14.1. Any deviations or issues related to the well sampling process should be documented in the field log book or sample report.

14.2. One sample duplicate and one field blank shall be collected per every group of 10 wells sampled as specified in the SAP. An equipment rinsate blank should also be collected at a rate of 1 per every CCR storage unit. Refer to the site specific SAP for guidance. Ultra-pure DI water shall be used as the control water for all blanks.

14.3. Calibration acceptance criteria for field parameters may be found in the individual TSOP documents. Refer to individual TSOPs for guidance on initial and final LCS failures.

15. Diagrams

15.1. Well construction logs are maintained by SCS Earth Sciences and may be consulted to confirm total well depth and screened interval.

16. Deviations/Exceptions

16.1. The low-flow sampling method is not always feasible in some wells due to very slow recharge rates. Depending on the geology and conditions of water bearing zones, water levels may decline at rates greater than the accepted minimum drawdown limit of three tenths of a foot (0.3 ft) even with minimal flow rates. If this is the case, and the well has a dedicated pump, minimum

purge sampling may be necessary. Follow the below steps for minimum purge sampling:

16.1.1. Calculate the total system volume (bladder, tubing & flow through cell) by inputting the necessary information in the InSitu program.
16.1.2. Purge 1-3 times the system volume, depending on the volume of the overhead water column.
16.1.3. Purge rates should occur at rates less than 100 ml/min.
16.1.4. Collect field readings after at least 1 system volume has been purged.
16.1.5. Commence sampling once system volume(s) have been purged.
16.1.6. Document field methodology, data, calculations and observations.

16.2. The target for monitoring turbidity is readings less than or equal to 5 NTUs, however this value is not mandatory (EPA, July 1996). In some instances, turbidity levels may exceed the recommended turbidity level due to natural aquifer conditions, changes in aquifer recharge, or other well characteristics. When these conditions are encountered, the following guidelines shall be considered:

16.2.1. If turbidity readings are greater than 5 NTU but less than 10 NTU and all other parameter criteria has been met, sampling can commence.
16.2.2. If turbidity readings are slightly above 10 NTU, but are trending downward, purging and monitoring shall continue.
16.2.3. If turbidity readings are greater than 10 NTUs and are stable within 10% for the final 3 consecutive readings and pumping has occurred for at least 2 hours, well sampling shall be based upon stabilization of critical indicator parameters (pH, Specific Conductance and DO).

16.2.3.1. In situations described in the above section, first collect a preserved sample set followed by an additional preserved sample set to be field filtered.
16.2.3.2. After the first sample set is collected, attach a 0.45 micron field filter to the end of the sample line. Allow for about 300 ml of sample water to pass through the filter prior to sample collection. Once filtered bottles have been filled, dispose of the filter. Ensure that the filtered sample set is properly denoted on the label.

16.3. Artesian Wells

16.3.1. For wells that are artesian, water may free flow out of the well casing before it reaches equilibrium. In such cases, a dedicated pump is not required. It is acceptable to collect the sample using traditional low flow criteria utilizing a special well cap fitted with control valve routed directly to the flow through cell. A minimum of 1 well volume should be purged before sample collection.

17. Client-Defined Specifications/Observations/Specialized Analysis

17.1. A project SAP is required on a groundwater sampling project and is available for review in the groundwater folder on EDAS. This document provides project-specific information regarding regulatory, sampling, containerization, chemical analysis, and data acceptance criteria requirements.

*****END OF DOCUMENT*****

APPENDIX 10

WRITTEN CLOSURE PLAN

AMENDED CLOSURE PLAN FOR GYPSUM POND

Plant Gorgas
Alabama Power Company
Parrish, Alabama

Revision 1 April 2020

Contents

1.0 INTRODUCTION

This Amended Closure Plan has been prepared to support the permit application previously submitted to the Alabama Department of Environmental Management (ADEM) for the CCR Surface Impoundment known as the Plant Gorgas Gypsum Pond, located near Parrish, Walker County, Alabama. The permit application was submitted in accordance with ADEM Admin. Code r. 335-13-15-.09(1)(c). This Amended Closure Plan, along with other documents, is intended to supplement the previous submittal in response to the ADEM letter dated May 24, 2019 which provided response comments to the original application.

2.0 GENERAL

The Plant Gorgas Gypsum Pond was designed to receive and store coal combustion residuals (gypsum only) produced from the flue gas desulfurization system during the electric generating process at Plant Gorgas. Gypsum products were sluiced from the plant to the Gypsum Pond. The pond currently stores about 600,000 cubic yards of CCR.

The gypsum pond was constructed in 2007. An area approximately 50 acres in size was used to create the gypsum storage area. The gypsum pond itself covers approximately 18 acres. There is an area to the southeast at a lower elevation that consists of a sedimentation pond, clear pool, and an emergency storage pond. All ponds are lined with an HDPE liner.

As a part of construction, the existing soils/mine spoil was graded, the subgrade proofrolled and a granular fill consisting primarily of bottom ash was placed beneath the liner. Embankments were constructed of compacted soil fill obtained from nearby borrow pits. After initial construction, the downstream slopes of the embankment were surfaced with limestone riprap.

The Plant Gorgas Gypsum Pond will be closed through removal of the CCR. The gypsum pond will be dewatered as required to facilitate excavation of the gypsum for removal. All gypsum will be excavated and transported primarily for beneficial reuse. Some of the gypsum, however, may need to be disposed of in the Plant Gorgas Private Industrial Solid Waste permitted landfill (ADEM Solid Waste Permit No. 64-10, dated June 24, 2016). Closure will include removing all gypsum, followed by removal of the existing HDPE geomembrane and the underlying granular bottom ash layer. Excavation below the HDPE liner will include removing all visible bottom ash and over excavating into the subgrade soils. Additional details about the construction methods to be used can be found within this Closure Plan.

3.0 NOTIFICATION – INTENT TO CLOSE

Notification of intent to close the Plant Gorgas Gypsum Pond was placed in the plant's Operating Record on April 15, 2019. The notice of intent was subsequently submitted directly to ADEM. The surface impoundment is closing under the requirements of § 257.101(a)(1) and r. 335-13-15-.07(2)(a)1. Closure of the surface impoundment will be conducted under § 257.102(c) and r. 335-13-15-.07(3)(c), closure by removal of CCR. Closure will include confirmation that groundwater monitoring concentrations do not exceed the groundwater protection standard established for constituents in Appendix IV of this Rule.

Major closure activities will commence following receipt of a CCR permit from ADEM pursuant to r. 335-13-15-.09. Removal of gypsum for beneficial reuse purposes is ongoing pending receipt of the closure permit from the Department.

4.0 WRITTEN CLOSURE PLAN

4.1 Overview

The Plant Gorgas Gypsum Pond is being closed by removal of CCR in accordance with § 257.102(c) and r. 335-13-15-.07(3)(c).

The Gypsum Pond contains approximately 600,000 cubic yards of CCR with a current pond footprint of about 18 acres. After closure, the embankments will be modified so that the pond no longer impounds water.

The closure consists of excavation of CCR from above the existing HDPE liner, followed by removal of the HDPE liner and the underlying 12-in layer of granular material that consists primarily of bottom ash. During closure, the gypsum pond will be progressively dewatered as required to facilitate closure by removal. Water from the gypsum pond will continue to be directed to the lower ponds. Water will be returned to the plant for treatment in the wastewater treatment facility. Once the gypsum pond is closed through the removal of the gypsum, liner and underlying granular layer, decommissioning of the lower sedimentation pond, clear pool and emergency storage pond will take place, removing any sediment and the HDPE liners. This area will then be regraded for management of stormwater runoff for the closed facility.

4.2 Closure Steps

Closure of the Plant Gorgas Gypsum Pond will occur in a series of phases / steps to achieve the planned closure, including:

- dewatering of CCR;
- excavation of CCR from the impoundment;
- removal of the HDPE liner and underlying granular layer;
- breaching and regrading of the southeast embankment so the facility will no longer impound water;
- decommissioning and regrading of the lower elevation pond system.

Initial stages of dewatering will include lowering of the pond levels through pumping and gravity flow to the lower pond system for pumping to the plant's wastewater treatment facility. Plant Gorgas has been retired and no longer generates electricity, and therefore no longer produces gypsum and gypsum transport water. Therefore, the only water that enters the pond is the rainwater that falls into it.

4.2.1.1 Contractor Mobilization and Removal of Gypsum for Beneficial Reuse

As much of the gypsum as possible will be reused for beneficial reuse purposes. The CCR marketer will be responsible for management of the CCR removal. All gypsum will be removed to fully expose the HDPE liner.

Site access will be restricted and monitored via security at access gates.

Current site infrastructure will remain and be relied upon to facilitate closure, including all roads, sedimentation and other ponds, as well as the pumps that return water from these ponds to the plant's treatment facilities. Additional temporary site infrastructure (such as additional access roads, security gates, temporary offices and shelters, etc.) will be developed as needed.

4.2.1.2 Vegetation Management

There is no significant vegetation in or around the pond that requires removal. What limited vegetation that does exist will be removed and properly disposed of. In the event any vegetation is present that is in contact or comes in contact with CCR, measures will be taken to wash such vegetative materials prior to further processing and handling onsite via approved means such as mulching, controlled burning, etc.

4.2.2 Removal of free water and in situ dewatering

Initial dewatering will include removal of free water and interstitial water from the impoundment through gravity drainage (utilizing existing decant systems) and pumping, as needed, to allow for excavation of the gypsum. Free and interstitial water in contact with CCR will be directed to the lower elevation sedimentation and process ponds and then pumped to the Plant's treatment facility for treatment to established regulatory limits prior to discharging off site through the existing NPDES discharge point.

4.2.3 Excavation of CCR

The gypsum will be excavated from the impoundment using mechanical means, with the majority of the gypsum taken off-site for beneficial reuse. There is a possibility that some material may be placed in the Plant Gorgas permitted Private Industrial Solid Waste Landfill that is also located on plant property. The gypsum will be removed down to the HDPE liner using means that will not damage the liner until all gypsum has been removed. The liner will be cleaned using washing or other appropriate means to ensure all gypsum has been removed.

4.2.4 Removal of HDPE Liner

Once all gypsum has been removed, the HDPE liner will be removed and properly disposed of in a permitted landfill. Methods of removal of the liner will be the responsibility of the Contractor selected to perform the work, but it is anticipated that the liner will be cut into portions suitable for handling and transport for disposal in a permitted landfill. As stated above, the liner will be cleaned of all visible gypsum using washing or other appropriate means prior to its removal.

4.2.5 Removal of granular layer below the HDPE liner

At the time of construction, a 12-in (nominal) thickness of granular material was placed on top of the graded subgrade and prior to the installation of the HDPE liner. This granular layer was designed to be constructed using bottom ash. Therefore, this granular layer will be removed down to the impoundment subgrade as a part of closure using mechanical excavation means.

Excavation will be undertaken using conventional excavators, loading directly into trucks. The granular layer materials will be treated as CCR and will be disposed of in a permitted landfill, either the on-site Plant Gorgas Industrial Landfill permitted to receive CCR, or in an approved off-site permitted landfill. All equipment departing the site that have been in contact with CCR will be decontaminated via washing to remove all CCR materials. The overspray and all contact water from decontamination operations will be stored on site and treated prior to discharge.

4.2.6 CCR removal verification protocol

The procedure for of CCR granular layer beneath the HDPE liner will involve the following steps:

1) Identification and demarcation of the area (or portion of the area) subject to removal verification. It is noted that the verification and documentation of removal procedures may be completed in phases.

2) Removal of CCR such that no CCR remains visible.

3) Visual inspection and documentation of the area by qualified person.

    a. For areas where the CCR and the underlying fill or mine spoil materials are difficult to distinguish, a hand lens or other visual aid may be used by the qualified person to aid the visual inspection.

    b. For areas where a clear color contrast between accumulated CCR and natural ground exists, colorimetric methods (such as the Munsell Color Chart) can be considered to supplement visual identifications.

4) If required, repeat steps 1 through 3 until CQA Engineer is satisfied that no CCR remains visible.

5) Complete “Pre 6-Inch Over-Dig Survey” and photographic documentation of applicable removal area(s).

    a. The Pre and Post 6-inch Over-Dig surveys will be performed either by:

        - A grid of discrete survey points with a maximum 100-ft spacing (each way). Horizontal control shall be within 0.1 ft, and vertical control shall be within 0.02 ft; or

        - For large areas, a photogrammetric or Lidar survey capable of generating a continuous surface of the surveyed area. For near continuous surveys Horizontal and Vertical controls for Pre and Post Over Dig surveys can be reduced to 0.2 and 0.04 ft, respectively.

6) Over-excavation of a minimum of 6 inches in the designated removal area(s).

7) Complete Post 6-Inch Over-Dig Survey and photographic documentation using the same survey points, procedures, and prescribed minimum tolerances as for the Pre 6-Inch Over-Dig Survey. Complete verification of the prescribed minimum 6” removal across the removal area by survey and visual comparison of the removal area(s). Photographs taken to verify CCR removal will be maintained at the site and will be available for review by project team members and ADEM personnel as necessary.

8) Hand augers borings or other means of limited excavation to 12” depth will then be performed at a minimum frequency of every acre and the collected samples visually assessed to check for the presence of CCR materials below the visible surface.

The details of the CCR Removal verification procedures are further outlined and incorporated into the project Quality Assurance Plan and technical specifications for closure.

4.2.7 Fugitive Dust Control Plan (ADEM 335-13-15-.02(11); 40 CFR 257.53)

The fugitive dust control plan identifies and describes the CCR fugitive dust control measures that will be implemented during closure to minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from the gypsum pond, roads, and material handling activities. 40 CFR 257.53 and ADEM Admin. Code r.ule 335-13-15.02(11) defines “fugitive dust” as “solid airborne particulate matter that contains or is derived from CCR, emitted from any source other that a stack or chimney”.

Fugitive dust originating from the gypsum pond or gypsum pond closure activities will be controlled using water suppression or polymer tackifiers.

The fugitive dust control measures identified and described in the plan will be adopted and implemented based upon an evaluation of site-specific conditions and are determined to be applicable and appropriate for the Plant Gorgas Gypsum Pond closure. Evaluation will include assessing the effectiveness of the fugitive dust control measures for the facility, taking into consideration various factors such as site conditions, weather conditions, and operative conditions.

Water suppression or polymer tackifiers will be used as needed to control fugitive dust on the facility roads used to transport CCR and other CCR management areas. Speed limits will be utilized to reduce the potential for fugitive dust. Trucks used to transport CCR will be filled to just under full capacity to reduce the potential for material spillage.

Southern Company and construction personnel will assess the effectiveness of the control measures by performing visual observations of the gypsum pond and surrounding areas and implementing appropriate corrective actions for fugitive dust, as necessary.

Any complaint received from a citizen regarding a CCR fugitive dust event at the facility will be documented and investigated. Appropriate steps will be taken, including any corrective action, if needed.

4.2.8 Stormwater Management During Closure

Stormwater management will mainly entail management of water that falls into the pond during rain events. The facility is designed to divert runoff from adjoining areas around the impoundment. The water that falls into the pond during rain events will have to be managed through the construction areas during closure.

Stormwater management during closure will be achieved by the management and operation of temporary berms, linings, and pumps to covey contact water as needed to facilitate excavation of the gypsum, removal of the HDPE liner and removal of the granular layer below the HDPE liner. All water will be routed through the lower sedimentation pond before being pumped to the plant’s water treatment facility.

4.2.9 Site Security

All access points to the site will be gated and gates will be locked with controlled access by approved personnel only. The facility is located on Plant Gorgas property, and access to the plant is controlled by the plant security team. There may be an additional security checkpoint at the facility itself. All site visitors including construction personnel will be required to check in at the security point before being allowed to enter the site. No unauthorized personnel will be allowed to enter the site.

4.2.10 Groundwater Monitoring

A groundwater monitoring plan was submitted with the original Plant Gorgas Gypsum Pond permit application. Please refer to Appendix 4 of the original permit application.

4.2.11 Operational inspections

Inspections will be conducted by a Qualified Person at intervals not exceeding 7 days to look for appearances of structural weakness and for proper operation of all outlet structures maintained for use during closure. Furthermore, an annual inspection will continue to be conducted by a qualified Professional Engineer throughout the closure process.

4.3 Final Grading and Decommissioning

Once all CCR and liner removal activities have been completed within the gypsum pond, the southeast embankment will be regraded and breached so that the facility can no longer impound water. Also, the series of ponds to the east that are present at a lower elevation will be decommissioned as well by the removal of any sediment and their HDPE liners. Areas of the pond will then be regraded as needed to facilitate stormwater management from the area. Some retention is expected prior to discharging any non-contact stormwater from the site.

5.0 MAXIMUM INVENTORY OF CCR – § 257.102(B)(1)(IV) AND R. 335-13-15-.07(3)(B)1.(IV)

The current estimate of the maximum inventory of CCR ever on-site at the Gorgas Gypsum Pond over the active life of the CCR unit is nominally 925,000 cubic yards. The current estimated inventory is approximately600,000 cubic yards.

Maximum unit inventory volume figures are derived from available information.

6.0 CERTIFICATION OF CLOSURE

In accordance with §257.102(h) and r. 335-13-15-.0.7(3)(h), within 30 days of completion of closure of the Plant Gorgas Gypsum Pond, a professional engineer registered in Alabama will prepare and APC will submit a Closure Construction Certification Report to ADEM documenting the completion of closure activities as indicated in § 257.102(f)(3) and r. 335-13-15-.07(3)(f)3. APC, as required by ADEM, will submit confirmation that a notation on the property deed has been recorded in accordance with § 257.102(i) and r. 335-13-15-.07(3)(i).

7.0 DIRECTIONAL INFORMATIONAL SIGNS

A designated construction entrance and access road will be established prior to initiating closure activities. Signs will be posted at the entrance notifying users of the closure activities and a telephone number for emergencies will be posted. Emergency evacuation routes will be maintained for the duration of closure activities.

8.0 VEGETATION PLAN

Disturbed areas will be vegetated in accordance with the Erosion and Sedimentation Control Plans submitted as a part of the permit application.

9.0 SITE EQUIPMENT NEEDED

The Contractor selected to perform closure construction will be responsible for all equipment needed during the construction period. For post-closure care, Alabama Power will provide all necessary company owned, leased or contracted equipment needed to perform maintenance and any necessary repairs.

10.0 SEDIMENT REMOVAL

On a periodic basis during closure, accumulated sediment will be removed when necessary from drop inlets, drainage pipes, diversion ditches, and other drainage structures.

11.0 EROSION AND SEDIMENT CONTROL

Upon closure, all proposed ditches, diversion berms, culverts, riprap, and other drainage structures serving disturbed areas, but not already built, will be constructed and placed according to the Design Drawings.

12.0 COST OF CLOSURE

Development of a construction cost estimate for this project is currently underway. The cost estimate can be provided once is it available.

13.0 CLOSURE SCHEDULE

A detailed construction schedule is attached to this Amended Closure Plan as Table 1.

14.0 RECORDKEEPING/NOTIFICATION/INTERNET REQUIREMENTS

As outlined in § 257.105 and r. 335-13-15-.08(1), each Owner or Operator of a CCR unit subject to the Department regulations must maintain files of certain information in an operating record at the facility. Each file is to be retained for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record or study. Electronic storage of the records is acceptable. These records are to be made available to the Department upon request.

Certain notifications are to be made in accordance with the requirements of § 257.106 and r. 335-13-15-.08(2). In many instances, such notifications are to be placed in the facility's Operating Record. In certain instances, further notifications are to be made to the Department Directory within 30 days of placement of a notification into the Operating Records. Furthermore, a publicly accessible internet site must be established for posting of certain notifications and compliance information within 30 days of it being placed in the Operating Record.

Alabama Power and Plant Gorgas maintain an electronic Operating Record for the facility. In addition, a publicly accessible internet site has already been established for compliance with EPA's CCR Rule. Required notifications and compliance data, as outlined in § 257.105 through § 257.107 and r. 335-13-15-.08 and as applicable to the Plant Gorgas Gypsum Pond, will be maintained in the electronic Operating Record, and as required, made available on the publicly accessible internet site within 30 days of placement in the Operating Record. Furthermore, required notifications will be made to the Department Director within 30 days of placement in the Operating Record.

Certain plans and assessments are required to be updated at specified intervals and/or upon modification of certain components of the facility. If and when applicable, updates will be made to the respective plans and assessments, and notifications placed in the Operating Record, posted to the

publicly accessible internet site, and communicated in writing to the Department Director in accordance with the Department rules.

Table 1: Gorgas Gypsum Pond Closure Milestones Schedule (335-13-15-.07(3)(b)1.(vi))

Closure Activity	Completion Date
Notice of Intent to Close	October 2016
Cease Receipt of Waste Streams	April 2019
Beneficial Use Sales	Ongoing
Initiate Construction Activities	January 2022
Finalize Construction Activities/Site Restoration	October 2023

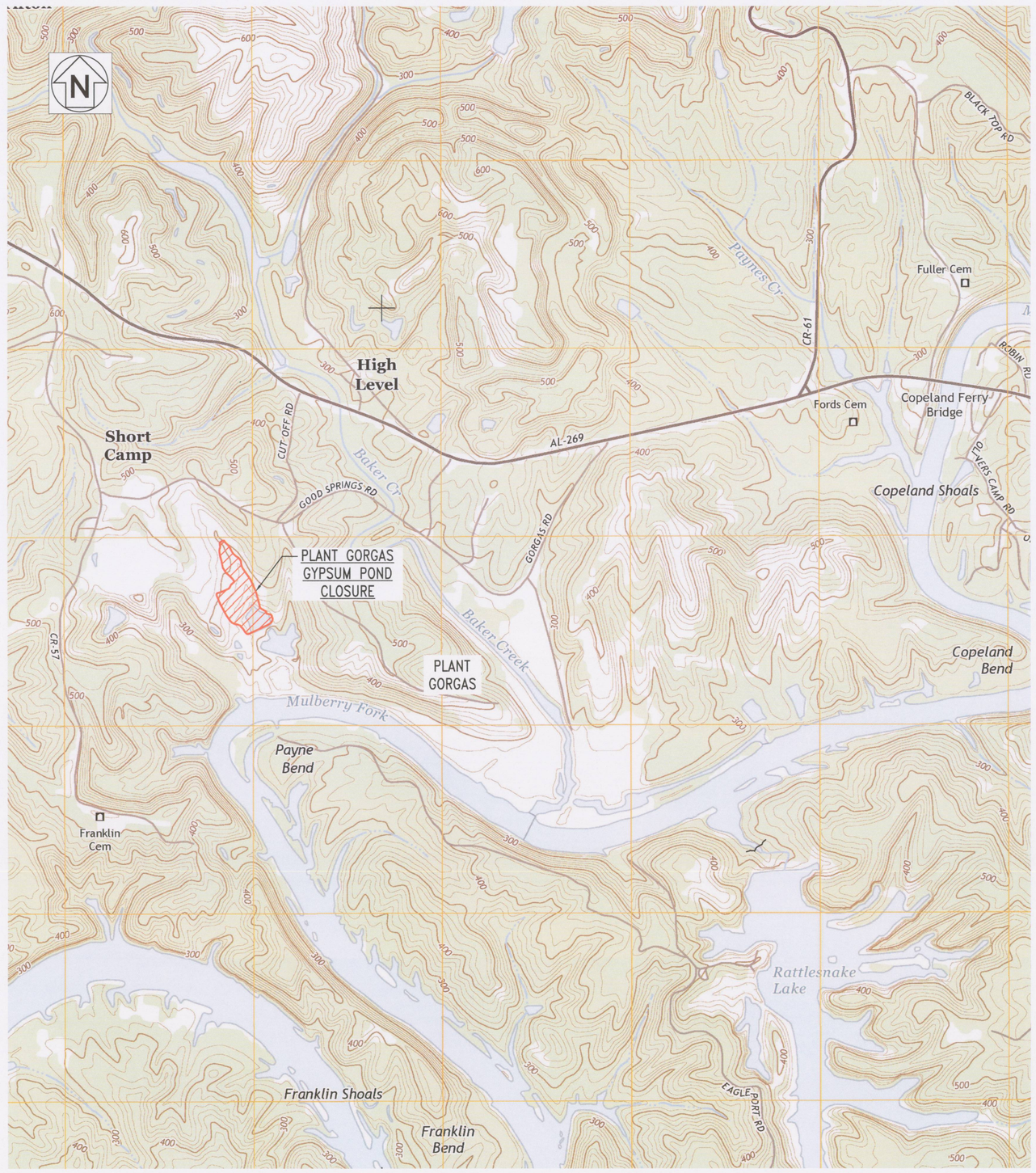
PLANT GORGAS GYPSUM POND CLOSURE

SITEWORK CONSTRUCTION AND CBMPP DRAWINGS

WALKER COUNTY, ALABAMA

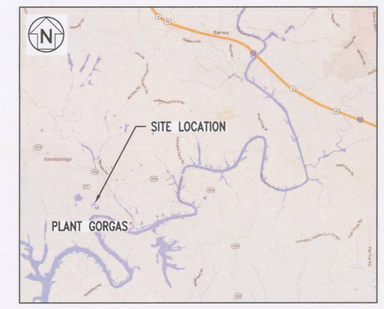
SECTIONS 13, TOWNSHIP 16 SOUTH, RANGE 7 WEST

DRAWING INDEX	
DRAWING NUMBER	DRAWING TITLE
E720308	TITLE SHEET AND DRAWING INDEX
E720309	GENERAL NOTES, LEGEND AND ABBREVIATIONS
E720310	EXISTING CONDITIONS SHEET 1
E720311	EXISTING CONDITIONS SHEET 2
E720312	OVERALL PHASE 1 SITE GRADING AND DRAINAGE PLAN
E720313	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 1
E720314	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 2
E720315	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 3
E720316	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 4
E720317	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 5
E720318	PHASE 1 SITE GRADING AND DRAINAGE PLAN SHEET 6
E720319	OVERALL PHASE 2 SITE GRADING AND DRAINAGE PLAN
E720320	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 1
E720321	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 2
E720322	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 3
E720323	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 4
E720324	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 5
E720325	PHASE 2 SITE GRADING AND DRAINAGE PLAN SHEET 6
E720328	CLOSURE SECTIONS AND DETAILS SHEET 1
E720329	CLOSURE SECTIONS AND DETAILS SHEET 2
E720330	CLOSURE SECTIONS AND DETAILS SHEET 3
E720331	CBMPP NOTES SHEET 1
E720332	CBMPP NOTES SHEET 2
E720333	CBMPP NOTES SHEET 3
E720334	CBMPP DETAILS SHEET 1
E720335	CBMPP DETAILS SHEET 2
E720336	CBMPP DETAILS SHEET 3
E720337	CBMPP DETAILS SHEET 4
E720338	CBMPP INITIAL AND INTERMEDIATE PHASE SHEET 1
E720339	CBMPP INITIAL AND INTERMEDIATE PHASE SHEET 2
E720340	CBMPP FINAL PHASE SHEET 1
E720341	CBMPP FINAL PHASE SHEET 2

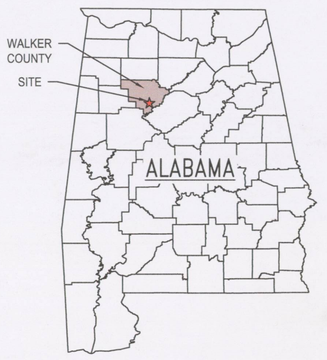


GOODSPRINGS, AL QUADRANGLE
2014

GRAPHIC SCALE
1000 0 500 1000 2000 4000
(IN FEET)
1 inch = 1000 ft.



VICINITY MAP
NO SCALE



LOCATION MAP
NOT TO SCALE

LEGEND:

PROJECT AREA

NOTES:
1. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

PROJECT STREET/LOCATION
PLANT GORGAS
460 GORGAS ROAD
PARRISH, ALABAMA 35580

PERMITTEE:
ALABAMA POWER COMPANY
600 18TH STREET NORTH
BIRMINGHAM, ALABAMA 35203

PROJECT MANAGER:
SOUTHERN COMPANY SERVICES, INC.
DAVID B. PRATER
460 GORGAS ROAD
PARRISH, ALABAMA 35580-5715
TEL: (205) 992-7266
EMAIL: DBPRATER@SOUTHERNCO.COM

CBMPP CONTACT/QCP:
ALABAMA POWER COMPANY
PAMELA R. McDANIEL, P.E.
P.O. BOX 2641
BIRMINGHAM, ALABAMA 35291
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

REVISION	DATE
0	12/20/2018
ISSUED FOR CONSTRUCTION	

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
TITLE SHEET AND DRAWING INDEX

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720308	1	FINAL	0

ANSI E: 44x34

Approved

TECHNICAL SPECIFICATION REFERENCE FOR PLANT GORGAS GYPSUM POND CLOSURE

1. REFER TO THE PROJECT TECHNICAL SPECIFICATIONS SECTION 31 23 00 FOR EXCAVATION AND BACKFILL FOR PLANT GORGAS GYPSUM POND CLOSURE. REFER TO THE EXCAVATION AND GRADING NOTES FOR EXCAVATION AND BACKFILL REQUIREMENTS.

GENERAL CONSTRUCTION NOTES:

1. GRID COORDINATE SYSTEM IS ALABAMA STATE PLANE NAD27 WEST ZONE GRID.
2. SEE SURVEY AND TOPOGRAPHY NOTES, THIS DRAWING, FOR SURVEY INFORMATION.
3. ALL EROSION CONTROL MEASURES SHALL BE IN CONFORMANCE WITH THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS", CURRENT EDITION.
4. CONTRACTOR SHALL COORDINATE WITH PCM ON SAFETY MEASURES REQUIRED FOR ALL WORK UNDER AND IN THE VICINITY OF EXISTING POWER LINES.
5. EXISTING ACCESS AND ROADS SHALL BE MAINTAINED AND REPAIRED AS NECESSARY DURING CONSTRUCTION BY THE CONTRACTOR TO THE SATISFACTION OF THE PURCHASER'S PROJECT CONSTRUCTION MANAGER, PCM.
6. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING HIS OWN STANDARD QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM OR PRACTICES AND SHALL INSTITUTE ANY ADDITIONAL CONTROLS OR PROCEDURES IN ACCORDANCE WITH PROVEN INDUSTRY PRACTICE TO ASSURE COMPLIANCE WITH THESE DRAWINGS AND TECHNICAL SPECIFICATIONS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLANNING AND OPERATING ANY DEWATERING, SURFACE WATER RUNOFF CONTROL, AND PROVISIONS FOR DRAINAGE OF EXCAVATIONS, AND FOR THE PLACEMENT OF MATERIALS. SUCH WORK SHALL BE AT NO ADDITIONAL EXPENSE TO THE PURCHASER.
8. ALL WORK SHALL BE IN STRICT COMPLIANCE WITH CURRENT OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS. CONTRACTOR IS RESPONSIBLE FOR ALL SHORING/CRIBBING REQUIRED FOR INSTALLATION OF PIPES AND APPURTENANCES INCLUDING ANY DEEP EXCAVATIONS REQUIRING A PROFESSIONAL ENGINEER'S DESIGN.
9. CONSTRUCTION ACTIVITIES INCLUDING MATERIAL STOCKPILING ARE NOT PERMITTED IN AREAS OUTSIDE OF THE DESIGNATED LIMITS OF DISTURBANCE UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR AS APPROVED BY THE PCM.
10. CONSTRUCTION DEBRIS, FLOWABLE FILL, OLD SUPPORT MATERIALS OR OTHER REFUSE SHALL BE DISPOSED IN APPROVED LANDFILLS OFF-SITE.
11. SEE EROSION CONTROL PLANS FOR BEST MANAGEMENT PRACTICES (BMP'S) NECESSARY FOR THE THE CONSTRUCTION OF THIS PROJECT. THESE PLANS REPRESENT THE MINIMUM REQUIRED TO CONSTRUCT THIS PROJECT. ADDITIONAL BMP'S WILL BE NECESSARY AS THE PROGRESS OF CONSTRUCTION REQUIRES. ALL WORK SHALL BE IN ACCORDANCE WITH THE ALABAMA NPDES CONSTRUCTION STORMWATER DISCHARGE GENERAL PERMIT FOR STAND ALONE CONSTRUCTION PROJECTS AND THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS" (CURRENT EDITION).
12. SIX INCHES OF UNSETTLED TOPSOIL SHALL BE PLACED ON ALL AREAS THAT REQUIRE PERMANENT GRASSING (UNLESS NOTED AS ENGINEERED SOIL (BIOTIC) COVER) PRIOR TO APPLICATION OF SEEDING. THE CONTRACTOR SHALL ADHERE TO PROPER SEEDING PROCEDURES AND SPECIFICATIONS, SPECIFICALLY, PAGE 119 THROUGH 127 OF THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS," LATEST EDITION. THE CONTRACTOR SHALL PERFORM SOIL TESTS TO IDENTIFY AND IMPLEMENT SITE-SPECIFIC FERTILIZER NEEDS OR OTHER SOIL AMENDMENTS FOR ALL AREAS THAT REQUIRE PERMANENT SEEDING.
13. THE CONTRACTOR SHALL PROVIDE AN OPTION AND PRICE FOR USING A BIOTIC SOIL AMENDMENT SUCH AS PROGRANICS BY PROFILE, OR OTHER SIMILAR PRODUCT. THIS OPTION SHALL INCLUDE SOIL TESTING AND RECOMMENDATIONS FROM THE ALABAMA COOPERATIVE EXTENSION IN AUBURN, AL. SOILS TESTS, RECOMMENDATIONS, AND SEED MIXES (TEMPORARY AND PERMANENT) SHALL BE SUBMITTED TO THE PCM AND ENGINEER PRIOR TO PURCHASING AND PRIOR TO APPLICATION OF THE SOIL AMENDMENT AND SEEDING.
14. SEVERAL APPLICATIONS OF TEMPORARY OR PERMANENT VEGETATION MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO ESTABLISH AN ACCEPTABLE FINAL VEGETATIVE COVER. THE CONTRACTOR SHALL ADJUST HIS/HER BID ACCORDINGLY TO ACCOUNT FOR THIS DURING CONSTRUCTION.
15. THE CONTRACTOR SHALL PROTECT ALL STORM SEWER STRUCTURES (PIPES, CULVERTS, INLETS, JUNCTION BOXES, ETC.) FROM DAMAGE AND ENSURE THEY REMAIN OPERATIONAL UNLESS SPECIFIED OTHERWISE. ANY DAMAGE TO THESE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

DEMOLITION NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES TO EXISTING IMPROVEMENTS ON- OR OFF-SITE DUE TO THE CONSTRUCTION OF THE PROJECT. ANY DAMAGE WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE AND TO THE SATISFACTION OF THE PURCHASER.
2. CONTRACTOR SHALL COORDINATE WITH PURCHASER PRIOR TO BEGINNING DEMOLITION OPERATIONS. CONTRACTOR SHALL COORDINATE DEMOLITION OPERATION PHASING WITH PURCHASER PRIOR TO AND THROUGHOUT THE PROJECT LIFE.
3. SOME EXISTING UTILITIES SCHEDULED TO REMAIN ARE LOCATED WITHIN PROPOSED PROJECT LIMITS. CONTRACTOR SHALL USE EXTREME CAUTION WHILE WORKING IN THESE AREAS TO ASSURE NO UTILITY SERVICE INTERRUPTIONS. CONTRACTOR SHALL HAVE ANY AND ALL EXISTING UTILITIES LOCATED BY UTILITY LINE LOCATER SERVICE PRIOR TO ANY DEMOLITION AND/OR CONSTRUCTION OPERATIONS.
4. CONTRACTOR SHALL COORDINATE WITH PURCHASER PRIOR TO DISRUPTION OF ANY UTILITY SERVICE.
5. ALL UTILITY LOCATIONS, DIMENSIONS AND ELEVATIONS SHOWN ARE APPROXIMATE AND OTHER UTILITIES MAY EXIST.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL/RELOCATION OF ALL ABOVE AND BELOW GROUND EXISTING IMPROVEMENTS THAT ARE IN CONFLICT WITH THE PROPOSED IMPROVEMENTS.
7. DEMOLITION OF ANY AND ALL MATERIALS TO BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT REGULATIONS.

STORM DRAINAGE PIPES/APPURTENANCES GENERAL INFORMATION & NOTES:

1. PIPE LENGTHS AND SLOPES ARE CALCULATED FROM THE WORK POINTS OF THE PIPES/STRUCTURES.
   WORK POINTS FOR PIPES/STRUCTURES:
   MANHOLES – CENTER OF MANHOLE
   YARD INLET – CENTER OF STRUCTURE
   GRATE INLET – CENTER OF STRUCTURE
   PIPES WITH SLOPE PAVED HEADWALL – END OF PIPE/FACE OF CONCRETE
   PIPES WITH CONCRETE HEADWALL/WINGWALL – END OF PIPE/FACE OF CONCRETE
   PIPES WITH NO END TREATMENT – END OF PIPE.
2. ALL MANHOLES SHALL CONTAIN STEPS INSTALLED IN ACCORDANCE WITH OSHA REGULATIONS AND SHALL BE SEALED AT JOINTS AND PIPE ENTRY/EXIT POINTS TO PROVIDE A WATERTIGHT STRUCTURE.
3. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL STORM PIPE MATERIALS TO THE PROJECT CONSTRUCTION MANAGER PRIOR TO INSTALLATION AND/OR FABRICATION.
4. STORM DRAINAGE SYSTEMS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM. VERIFY ALL PIPE GRADES, INVERT ELEVATIONS, AND CONNECTION POINTS PRIOR TO CONSTRUCTION. NOTIFY THE PROJECT CONSTRUCTION MANAGER OF ANY AND ALL DISCREPANCIES.
5. ALL STORM PIPES SHALL BE BEDDED IN A MINIMUM OF 6" OF CRUSHED AGGREGATE (ALDOT NO. 57 STONE OR APPROVED EQUAL).
6. ALL STORM PIPES SHALL BE CORRUGATED ADS N-12 WTIB OR SOLID WALL DR 32.5 FUSION WELDED PIPE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE NOTED.

EXCAVATION AND GRADING NOTES:

1. ALL EXISTING UTILITIES SHOWN ON THESE DRAWINGS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO THE PURCHASER.
2. ALL EXISTING IMPROVEMENTS SHALL REMAIN UNLESS SPECIFICALLY NOTED, "TO BE REMOVED".
3. COORDINATE THE SEQUENCING OF ALL GRADING OPERATIONS WITH THE CBMPP PLAN.
4. NEW GRADES INDICATED ON THESE PLANS ARE TO FINISH GRADE. THE CONTRACTOR SHALL MAKE SUBGRADE ADJUSTMENTS FOR TOPSOIL, PAVING, ROCK, POND LINERS, ETC.
5. CONTRACTOR SHALL NOT CONDUCT ANY CONSTRUCTION OPERATIONS INSIDE OF DELINEATED WETLANDS, STREAM BUFFERS, AND ENVIRONMENTALLY SENSITIVE AREAS WITHOUT PRIOR APPROVAL. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ENVIRONMENTALLY SENSITIVE AREAS DUE TO THE CONSTRUCTION OF THIS PROJECT. ANY DAMAGES SHALL BE REPAIRED OR REMEDIED AT THE CONTRACTOR'S EXPENSE.
6. CONTRACTOR MAY ADJUST DESIGN COORDINATES AND ELEVATIONS OF THE FLAT BOTTOM STORMWATER DRAINAGE CHANNELS/SWALES TO AVOID UTILITIES AND/OR BEST FIT THE DRAINAGE CHANNELS TO EXISTING FIELD CONDITIONS. CONTRACTOR SHALL RECEIVE PRIOR PURCHASER REVIEW BY THE PCM AND APPROVAL OF THE DESIRED VARIATION BEFORE ATTEMPTING FIELD ADJUSTMENTS.
7. ALL EARTHWORK CONSTRUCTION SHALL BE DONE TO THE LINES, GRADES, AND CROSS SECTIONS SHOWN ON THE DRAWINGS. THE CONTRACTOR WILL ESTABLISH ALL NECESSARY BENCHMARKS AND BASE LINES REQUIRED FOR THE WORK.
8. ALL SLOPES SHALL BE 4-FEET HORIZONTAL TO 1-FOOT VERTICAL UNLESS SHOWN OTHERWISE.
9. ALL EXCAVATED MATERIAL USED AS BACKFILL SHALL MEET ALL REQUIREMENTS FOR BACKFILL AS STATED IN TECHNICAL SPECIFICATIONS SECTION 31 23 00.
10. ALL EXCAVATED MATERIAL NOT SUITABLE FOR BACKFILL SHALL BE PROPERLY DISPOSED OF IN AN APPROVED LOCATION AS DIRECTED BY THE PCM.
11. PROPOSED CONTOUR ELEVATION 1 FOOT.

SURVEY AND TOPOGRAPHY NOTES:

1. TOPOGRAPHIC SURVEY PROVIDED BY SOUTHERN COMPANY CIVIL FIELD SERVICES, MARCH 2018. EXISTING CONTOUR INTERVAL 2 FOOT.
2. EXISTING CONTOURS BEYOND THE LIMIT OF SURVEY TAKEN FROM DRAWING D-591491, DATED SEPT. 2006. EXISTING CONTOUR INTERVAL 10 FOOT.

GENERAL NOTES FOR SEQUENCING ACTIVITIES

PHASE 1

1. CONTRACTOR SHALL EXCAVATE ANY RESIDUAL GYPSUM, 1' ASH LAYER, AND AN ADDITIONAL 6" FROM WITHIN THE GYPSUM CELL AND TRANSPORT OFFSITE. PROPOSED GRADING SHOWN WITHIN THE EXISTING CELL ON PHASE 1 DRAWINGS REPRESENT THIS EXCAVATION. PRE-GYPSUM AND PRE-ASH PLACEMENT ELEVATIONS WERE DEVELOPED BASED ON LIMITED INFORMATION AND ARE APPROXIMATE. INFORMATION TAKEN FROM DRAWING D-591422, DATED MARCH 2007. CONTRACTOR SHALL VERIFY BOTH HORIZONTAL AND VERTICAL EXTENTS OF ASH IN THE FIELD. IF BEDROCK IS ENCOUNTERED WITHIN THE 6" BELOW PRE-ASH PLACEMENT SURFACE, ASH WILL BE REMOVED TO BEDROCK.
2. CONTRACTOR SHALL CONSTRUCT NEW TEMPORARY SEDIMENT POND.
3. STORMWATER WITHIN THE GYPSUM CELL SHALL CONTINUE TO DRAIN VIA EXISTING LEACHATE COLLECTION RISERS AND PIPES TO EXISTING SEDIMENT POND WITH THE RETURN WATER SYSTEM IN OPERATION SENDING DISCHARGE TO THE PLANT WATER TREATMENT FACILITY.
4. CONTRACTOR SHALL ADD/REMOVE ADDITIONAL TEMPORARY PUMPS AS NEEDED TO MANAGE WATER WITHIN WORK AREAS.
5. EMERGENCY STORAGE CELL LINER MAY BE REMOVED AND ASH TRANSPORTED OFF-SITE. ALL ASH CONTACT WATER TO BE PUMPED TO THE EXISTING CLEAR POOL FOR RETURN TO THE WATER TREATMENT PLANT.
6. CONSTRUCT NEW DISCHARGE PIPE FROM SW CORNER OF SITE TO THE TRANSLOADER AREA. PLUG INLET UNTIL SUCH TIME THAT THE SEDIMENT AND CLEAR POOL PONDS HAVE BEEN REMOVED AND THE AREA GRADED AND GRASSED WITH SUFFICIENT COVER.

PHASE 2

1. CONTRACTOR SHALL GRADE FLUMES AND DITCHES ALONG SLOPES FOR THE CONVEYANCE OF STORMWATER WITHIN THE EXISTING GYPSUM CELL.
2. PRIOR TO OPENING OF CELL DIKE, ALL GYPSUM, ASH, AND LINER SHALL BE REMOVED FROM THE CELL, AND THE NEWLY GRADED CELL AREA SHALL BE GRASSED.
3. UPON OPENING OF THE CELL DIKE AND COMPLETING DISCHARGE DITCH TO THE TEMPORARY SEDIMENT POND, THE PROCESS SEDIMENT POND AND CLEAR POOL LINER SYSTEMS ALONG WITH ASH LAYER SHALL BE REMOVED AND DISPOSED OF OFF-SITE. THE AREA SHALL THEN GRADED TO DRAIN TO THE SW CORNER AND THE SITE GRASSED.
4. RETURN WATER SYSTEM MAY BE DECOMMISSIONED AND DEMOLITION OF BUILDINGS AND EQUIPMENT MAY BEGIN WHEN ALL ASH MATERIAL HAS BEEN REMOVED FROM THE SITE AND CONTRACTOR HAS A WORKING PLAN/SYSTEM TO MANAGE STORMWATER.

LEGEND

720	EXISTING CONTOURS (MAJOR)
719	EXISTING CONTOURS (MINOR)
730	CONTOURS (MAJOR)
728	CONTOURS (MINOR)
x730.20	EXISTING SPOT ELEV.
x 731.10	SPOT ELEV.
	℄ DITCH OR SWALE
	EXISTING ROADS
X X	EXISTING FENCE
X X	FENCE
	RIDGELINE
BUILDING	EXISTING BUILDING
	GRAVEL ROADS
	CONCRETE PAVING
	POND LINER
	RIPRAP SLOPE & DITCHES
	RIPRAP OUTLET PROTECTION
	EXISTING GUARDRAIL
	LIMITS OF DISTURBANCE
	EXISTING RAILROAD TRACKS
	EXISTING TREELINE
	EXISTING SIGN
TL TL TL	EXISTING UNDERGROUND FIBER OPTIC CABLE
SS SS	EXISTING SANITARY SEWER PIPE & MANHOLE
St	EXISTING STORM PIPE
St St	EXISTING STORM PIPE & GRATE INLET
St St	EXISTING STORM PIPE & STORM MANHOLE
St	EXISTING STORM PIPE AND HEADWALL
W W	EXISTING WATER LINE AND WATER VALVE
GV	EXISTING GAS VALVE
	EXISTING FIRE HYDRANT
	EXISTING LIGHT POLE
OHE	EXISTING POWER POLE AND GUY WIRE
	GUARDRAIL
	STORM PIPE AND HEADWALL
	STORM PIPE & YARD INLET
WWT-7	PIEZOMETER LOCATION
MW-4	EXISTING MONITORING WELL

ABBREVIATIONS

A.A.S.H.T.O.	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
A.S.T.M.	AMERICAN SOCIETY OF TESTING MATERIALS
B/C	BACK OF CURB
B.C.C.M.P.	BITUMINOUS COATED CORRUGATED METAL PIPE
B.O.P.	BOTTOM OF PIPE
℄	CENTERLINE
C.C.	CENTER TO CENTER
CL.	CLASS (OF PIPE)
C.M.P.	CORRUGATED METAL PIPE
CONC.	CONCRETE
COR.	CORNER
C.P.V.C.	CORRUGATED POLYVINYL CHLORIDE PIPE
C & G	CURB & GUTTER
C.F.	CUBIC FEET
DIA.	DIAMETER
D.O.T.	DEPARTMENT OF TRANSPORTATION
DBL.	DOUBLE
D.I.P.	DUCTILE IRON PIPE
D.I.	DROP INLET
e	DISTANCE FROM P.V.I. TO V.C. @ P.V.I.
EL.	ELEVATION
E.O.C.	EDGE OF CONCRETE
E.O.P.	EDGE OF PAVEMENT
E.W.	EACH WAY
ESPCP	EROSION, SEDIMENTATION AND POLLUTION CONTROL PLAN
F.B.	FLAT BOTTOM
F/C	FACE OF CURB
F.H.	FIRE HYDRANT
FES	FLARED END SECTION
F.F.E.	FINISHED FLOOR ELEVATION
G.C.M.P.	GALVANIZED CORRUGATED METAL PIPE
GRD. BRK.	GRADE BREAK
G.I.	GRATE INLET
H.D.P.E.	HIGH DENSITY POLYETHYLENE PIPE
H.P.	HIGH POINT
I.E.	INVERT ELEVATION
J.B.	JUNCTION BOX
LB.	POUND
L.O.D.	LIMITS OF DISTURBANCE
L.F.	LINEAR FEET
L.P.	LOW POINT
M.H.	MANHOLE
MIN.	MINIMUM
N.T.S.	NOT TO SCALE
O.F.B.	OUTSIDE FACE OF BUILDING
P.I.	POINT OF INTERSECTION
P.I.V.	POST INDICATOR VALVE
P.C.	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PCM	PROJECT CONSTRUCTION MANAGER
P.	PROPERTY LINE
P.P.	POWER POLE
P.S.	POINT OF SWITCH
P.S.F.	POUNDS PER SQUARE FOOT
P.S.I.	POUNDS PER SQUARE INCH
P.T.	POINT OF TANGENT
P.V.I.	POINT OF VERTICAL INTERSECTION
P.O.C.	POINT ON CURVE
PVC	POLYVINYL CHLORIDE PIPE
P.V.C.	POINT OF VERTICAL CURVE
P.V.T.	POINT OF VERTICAL TANGENT
R	RADIUS
R.C.A.P.	REINFORCED CONCRETE ARCH PIPE
R.C.P.	REINFORCED CONCRETE PIPE
R.O.W.	RIGHT OF WAY
SCH.	SCHEDULE
SHLD.	SHOULDER
SGL.	SINGLE
TOE	TOE OF SLOPE
T & B	TOP AND BOTTOM
T/C	TOP OF CURB
T.O.P.	TOP OF PIPE
T/R	TOP OF RAIL
T/S	TOP OF SLOPE
TYP.	TYPICAL
V.C.	VERTICAL CURVE
V.G.	VALLEY GUTTER
W.P.	WORKING POINT

REFERENCES:

E720308
E720310–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
GENERAL NOTES, LEGEND AND ABBREVIATIONS

RECORD

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
NONE	E720309	1	FINAL	0

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

N 1331000 | N 1330500 | N 1330000 | N 1329500

E 586500 | E 586000 | E 585500 | E 585000

OHE

18" HDPE PIPE

30" HDPE PIPE

36" HDPE PIPE

54" HDPE RISER

ST

FENCE

GRAVEL ROAD

PROCESS PIPE

BUILDING

CONCRETE SLURRY FLUME

EBLDG.

MATCH LINE (SEE DWG. E720311)

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

REFERENCES:

E720308-E720309
E720311-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.
3. SEE DRAWING E720309 FOR SURVEY NOTES.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

REVISION	0	DATE	12/20/2018
ISSUED FOR CONSTRUCTION			

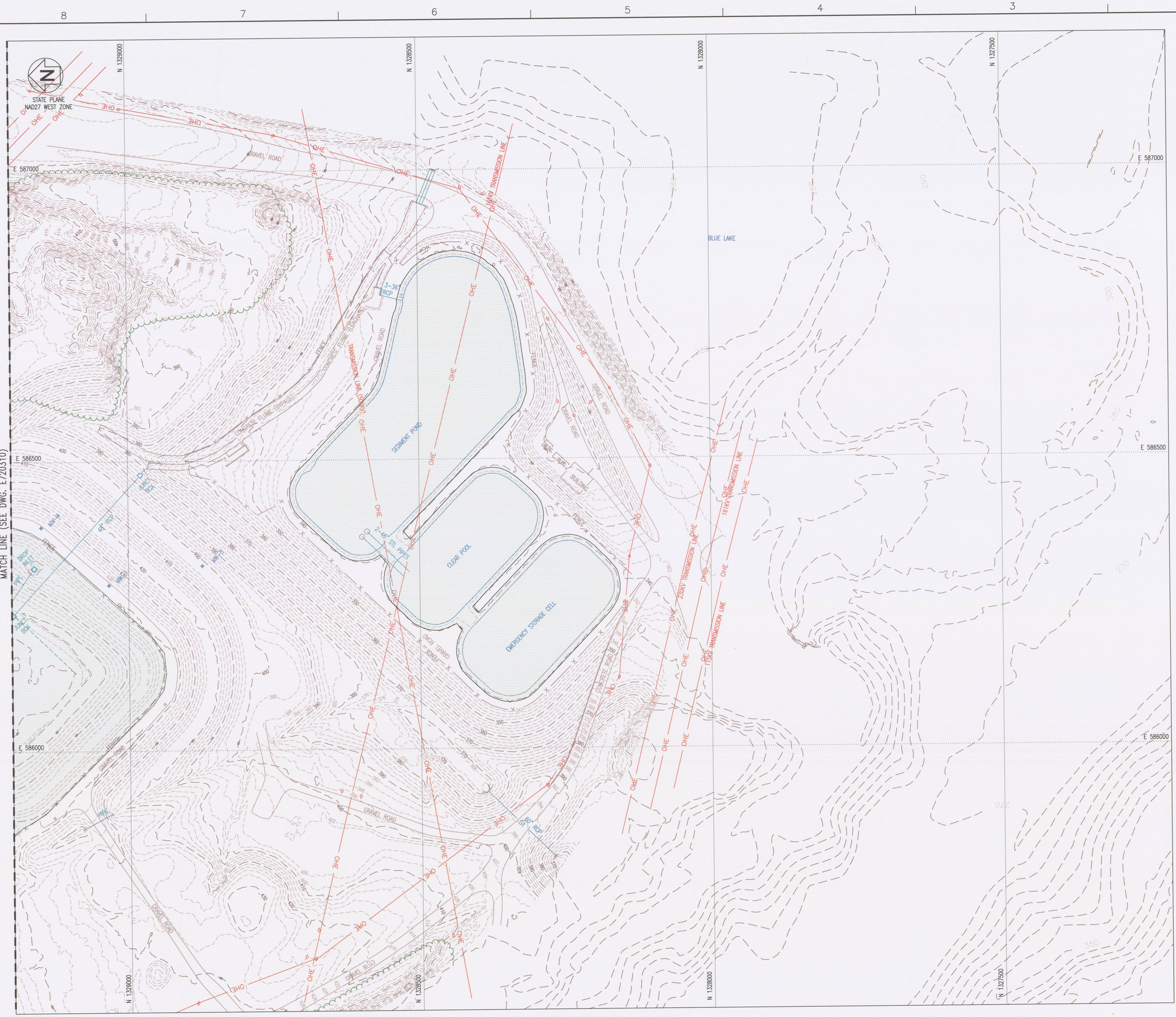
MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

PLANT GORGAS
SITEWORK
EXISTING CONDITIONS
SHEET 1

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720310	1	FINAL	0

ANSI E: 44x34



GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)

1 inch = 60 ft.

REFERENCES:

E720308–E720310
E720312–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.
3. SEE DRAWING E720309 FOR SURVEY NOTES.

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
EXISTING CONDITIONS
SHEET 2

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720311	1	FINAL	0

Approved

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

N 1331000 N 1330500 N 1330000 N 1329500 N 1329000 N 1328500 N 1328000 N 1327500

E 587000 E 586500 E 586000 E 585500 E 585000

SHEET 1
E720313

SHEET 2
E720314

SHEET 3
E720315

SHEET 4
E720316

SHEET 5
E720317

SHEET 6
E720318

BLUE LAKE

SEDIMENT POND

CLEAR POOL

EMERGENCY STORAGE CELL

GYPSUM POND

BUILDING

OFFICE BUILDING

OHE

TRANSMISSION LINE

FENCE

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

REFERENCES:

E720308–E720311
E720313–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
OVERALL PHASE 1 SITE GRADING AND DRAINAGE PLAN

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	E720312	1	FINAL	0

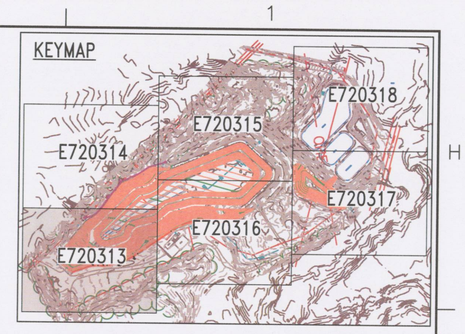
ANSI E: 44x34

Approved

MATCH LINE (SEE DWG. E720314)

MATCH LINE (SEE DWG. E720316)

KEYMAP



STATE PLANE
NAD27 WEST ZONE

STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330. (IN-PLACE, RETAIN)

PRE-GYPSUM PLACEMENT BENCH (SEE ESEE PLAN D-591422)

UNDERDRAIN PIPE TO BE REMOVED

EXISTING FENCE TO BE REMOVED

APPROXIMATE LIMITS OF LINER TO BE REMOVED

GYPSUM, 1' ASH LAYER, AND 6" UNDERCUT TO BE REMOVED (TYP.) (SEE DETAIL ON DRAWING E720329)

CONCRETE SLURRY FLUME TO BE REMOVED

PT ℄ DITCH
N 1330333.44
E 585377.77
EL 481.65

PC ℄ DITCH
N 1330424.76
E 585363.45
EL 482.43

PC ℄ DITCH
N 1330304.96
E 585376.91
EL 481.51

PT ℄ DITCH
N 1330260.38
E 585380.56
EL 481.30

PC ℄ DITCH
N 1330196.54
E 585393.08
EL 480.94

PT ℄ DITCH
N 1330140.72
E 585411.05
EL 479.20

PC ℄ DITCH
N 1330092.07
E 585433.29
EL 477.62

PT ℄ DITCH
N 1330015.46
E 585476.86
EL 475.02

℄ 4' F.B. BYPASS DITCH (GRASSED), CONSTRUCT BEFORE REMOVAL OF LINER.

APPROXIMATE LIMIT OF LINER TO BE REMOVED

EXISTING FENCE TO BE REMOVED

BP ℄ DITCH
N 1330537.05
E 585323.54
EL 485.27

BUILDINGS/TRAILERS
(TO BE REMOVED BY OTHERS)

GRAVEL ROAD

N 1330500

N 1330000

E 585500

E 585000

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REFERENCES:

E720308–E720312
E720314–E720341
D-591422

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
3. ALL SLOPE INDICATORS SHOWN ARE APPROXIMATE AND REPRESENT THE PRE-GYPSUM/PRE-ASH PLACEMENT SLOPES DEPICTED ON DRAWING D-591422, DATED MATCH 2007.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 1 SITE GRADING AND DRAINAGE PLAN
SHEET 1

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720313	1	FINAL	0

ANSI E: 44x34

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 1 SITE GRADING AND DRAINAGE PLAN
SHEET 2

ISSUED FOR CONSTRUCTION

REVISION	0	DATE	12/20/2018

MWO: APC590792
PROJECT ID: GOR18004

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	1"=30'	DRAWING NUMBER	E720314	SHEET	1	CONT'D	FINAL	REV	O

ANSI E 44X34

Approved

REVISION		DATE											
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR							

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.
30 0 15 30 60 120

MATCH LINE (SEE DWG. E720313)

MATCH LINE (SEE DWG. E720316)

MATCH LINE (SEE DWG. E720315)

N 1330000
N 1330500
E 586000
E 586500

EXISTING FENCE TO BE REMOVED

UNDERDRAIN PIPE TO BE REMOVED

PRE-GYPSUM PLACEMENT BENCH (SEE ESEE PLAN D-591422)

GYPSUM, 1' ASH LAYER, AND 6' UNDERCUT TO BE REMOVED (TYP.) (SEE DETAIL ON DRAWING E720329)

STORM PIPE AND SLOPE PAVED HEADWALLS (TYP.) SEE DWG E720330. (IN PLACE, RETAIN)

APPROXIMATE LIMIT OF LINER TO BE REMOVED

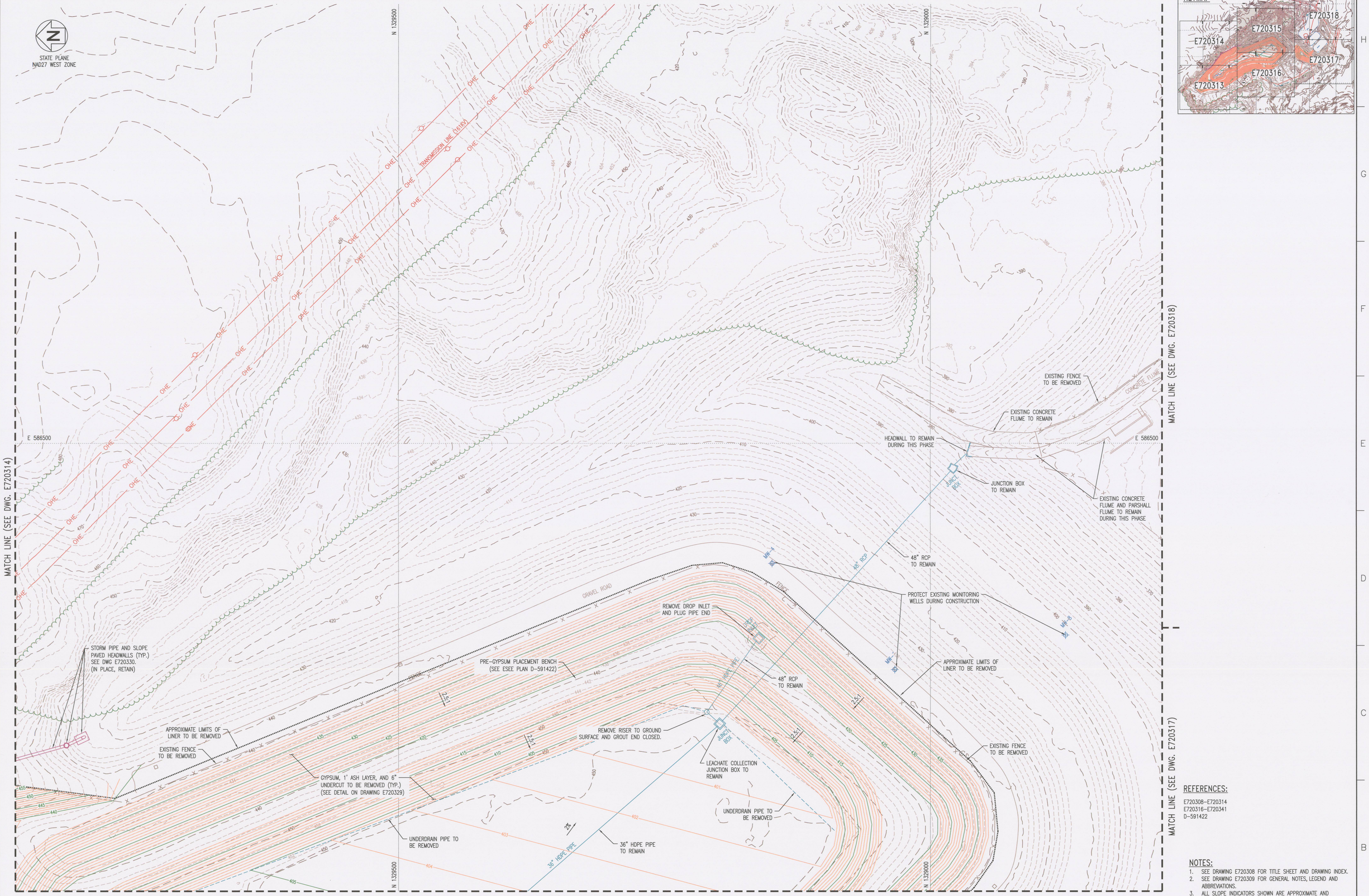
OHE

STATE PLANE
NAD27 WEST ZONE

KEYMAP
E720313
E720316
E720317
E720314
E720315
E720318

NOTES:
1. SEE DRAWING E72030 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVATIONS.
3. ALL SLOPE INDICATORS SHOWN ARE APPROXIMATE AND REPRESENT THE PRE-GYPSUM/PRE-ASH PLACEMENT SLOPES DEPICTED ON DRAWING D-591422, DATED MATCH 2007.

REFERENCES:
E720308-E720313
E720315-E720341
D-591422



REFERENCES:

E720308–E720314
E720316–E720341
D–591422

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
3. ALL SLOPE INDICATORS SHOWN ARE APPROXIMATE AND REPRESENT THE PRE-GYPSUM/PRE-ASH PLACEMENT SLOPES DEPICTED ON DRAWING D-591422, DATED MATCH 2007.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 1 SITE GRADING AND DRAINAGE PLAN
SHEET 3

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720315	1	FINAL	0

Approved

ANSI E: 44x34

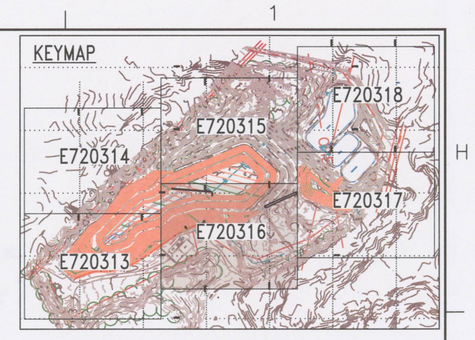
MATCH LINE (SEE DWG. E720315)

MATCH LINE (SEE DWG. E720314)

MATCH LINE (SEE DWG. E720313)

MATCH LINE (SEE DWG. E720317)

KEYMAP



STATE PLANE
NAD27 WEST ZONE

N 1329500

N 1329000

E 586000

E 585500

TEMPORARY BERM

36" HDPE PIPE TO REMAIN

REMOVE RISER TO GROUND ELEVATION AND USE AS TEMPORARY DISCHARGE STRUCTURE.

TEMPORARY BERM

GYPSUM, 1' ASH LAYER, AND 6" UNDERCUT TO BE REMOVED (TYP.) (SEE DETAIL ON DRAWING E720329)

PRE-GYPSUM PLACEMENT BENCH (SEE ESEE PLAN D-591422)

APPROXIMATE LIMITS OF LINER TO BE REMOVED

℄ EXIST. 4' F.B. HDPE LINED DITCH. REMOVE LINER AND REPLACE WITH RIP RAP, ALDOT CL1, 18" TK., 3' DEPTH, (SEE DETAIL ON DRAWING E720329)

PC ℄ DITCH
N 1329747.10
E 585662.19
EL 469.75

PT ℄ DITCH
N 1329594.00
E 585738.32
EL 468.51

PC ℄ DITCH
N 1329537.18
E 585757.05
EL 468.25

PT ℄ DITCH
N 1329483.20
E 585752.79
EL 470.02

EP ℄ DITCH
N 1329481.83
E 585752.09
EL ???

APPROXIMATE LIMITS OF LINER TO BE REMOVED

EXISTING FENCE TO BE REMOVED

℄ 4' F.B. BYPASS DITCH (GRASSED), CONSTRUCT BEFORE REMOVAL OF LINER.

GYPSUM BARN TO REMAIN

TANKS, PUMPS, PIPING, CONCRETE SLABS, AND BUILDING TO BE REMOVED.

EXISTING GYPSUM SLURRY LINE, TO BE REMOVED, SEE NOTE 4.

FENCE

GRAVEL ROAD

PROCESS PIPE

PIPE

OHE

BUILDING

REFERENCES:

E720308-E720315
E720317-E720341
D-591422

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
3. ALL SLOPE INDICATORS SHOWN ARE APPROXIMATE AND REPRESENT THE PRE-GYPSUM/PRE-ASH PLACEMENT SLOPES DEPICTED ON DRAWING D-591422, DATED MATCH 2007.
4. ALL ABOVE GROUND PIPING TO AND FROM THE PLANT SCRUBBER TO BE REMOVED UP TO THE FIRST ISOLATION VALVES AT THE SCRUBBER.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 1 SITE GRADING AND DRAINAGE PLAN
SHEET 4

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720316	1	FINAL	0

Approved

ANSI E: 44x34

REFERENCES:

E720308–E720316
E720318–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 1 SITE GRADING AND DRAINAGE PLAN
SHEET 5

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR	SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AES	THB	CRU	XXX	XXX	XXX	SSS	1"=30'	E720317	1	FINAL	0

ANSI E: 44x34

Approved

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

Approved

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
OVERALL PHASE 2 SITE GRADING AND DRAINAGE PLAN

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	E720319	1	FINAL	0

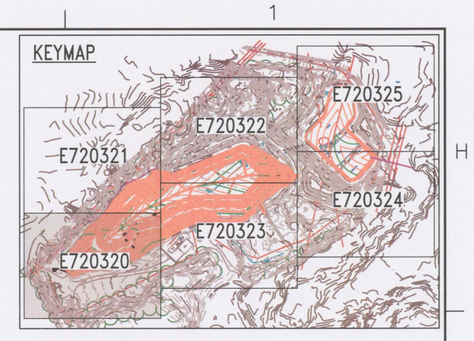
ANSI E: 44x34

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720323)

STATE PLANE
NAD27 WEST ZONE

KEYMAP



NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330. (IN PLACE, RETAIN)

PI ℄ DITCH N 1330246.29 E 585804.32 EL 435.85

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

PC ℄ DITCH N 1330033.02 E 585831.38 EL 411.17

PT ℄ DITCH N 1329898.11 E 585831.58 EL 410.73

PC ℄ DITCH N 1329885.05 E 585808.32 EL 416.02

DRAINAGE BENCH

PI ℄ DITCH N 1330200.43 E 585757.84 EL 417.40

PC ℄ DITCH N 1330191.95 E 585749.37 EL 417.28

EP ℄ DITCH N 1330146.49 E 585737.21 EL 413.74

PC ℄ DITCH N 1329893.73 E 585791.41 EL 417.81

PT ℄ DITCH N 1330022.38 E 585755.86 EL 419.14

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

PT ℄ DITCH N 1329874.36 E 585801.77 EL 417.94

PT ℄ DITCH N 1330375.32 E 585675.62 EL 437.68

EP ℄ DITCH N 1330166.12 E 585720.91 EL 414.19

PT ℄ DITCH N 1330178.31 E 585742.40 EL 414.92

PC ℄ DITCH N 1329880.24 E 585713.88 EL 437.09

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

PT ℄ DITCH N 1330154.70 E 585667.82 EL 415.89

PC ℄ DITCH N 1330129.37 E 585652.42 EL 417.83

PI ℄ DITCH N 1329951.16 E 585694.33 EL 437.82

PT ℄ DITCH N 1329998.28 E 585685.06 EL 436.86

BP ℄ DITCH N 1329861.22 E 585720.41 EL 437.00

BP ℄ DITCH N 1330309.05 E 585654.32 EL 419.25

PC ℄ DITCH N 1330143.99 E 585652.18 EL 417.26

PI ℄ DITCH N 1330131.92 E 585644.25 EL 417.40

PC ℄ DITCH N 1330057.72 E 585633.31 EL 435.39

PC ℄ DITCH N 1330147.65 E 585626.96 EL 418.03

PT ℄ DITCH N 1330063.48 E 585616.60 EL 435.29

BP ℄ DITCH N 1330060.93 E 585623.97 EL 435.19

PC ℄ DITCH N 1330417.23 E 585580.85 EL 438.76

BP ℄ DITCH N 1330314.15 E 585598.07 EL 422.42

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

BP ℄ DITCH N 1330418.36 E 585556.35 EL 439.00

BP ℄ DITCH N 1330261.59 E 585585.58 EL 419.25

DRAINAGE BENCH

PC ℄ DITCH N 1330124.11 E 585554.94 EL 436.25

PI ℄ DITCH N 1330167.76 E 585539.05 EL 436.72

BP ℄ DITCH N 1330358.80 E 585534.25 EL 438.79

PC ℄ DITCH N 1330344.24 E 585525.52 EL 438.62

PT ℄ DITCH N 1330242.12 E 585514.29 EL 437.50

℄ 2' F.B. DITCH, RIP RAP ALDOT CL1, 18" TK., 2' DEPTH, (SEE DRAWING E720329 FOR DETAILS)

4' WIDE DIVERSION DITCH (PHASE 1)

EP ℄ DITCH N 1330606.70 E 585368.77 EL 486.00

GRAVEL ROAD

BLDG.

BLDG.

BLDG.

GRAVEL ROAD

GRAVEL ROAD

OHE

E 585500

E 585000

N 1330500

N 1330000

REFERENCES:

E720308–E720319
E720321–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

REVISION	DATE
0	12/20/2018
ISSUED FOR CONSTRUCTION	

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Approved

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720320	1	FINAL	0

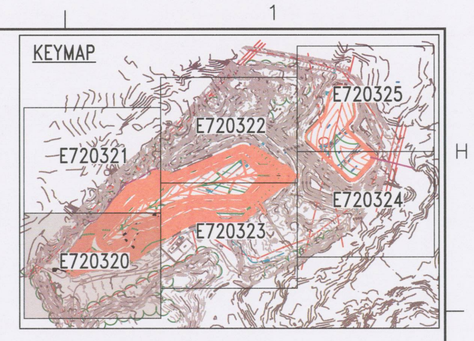
ANSI E: 44x34

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720323)

STATE PLANE
NAD27 WEST ZONE

KEYMAP



NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330. (IN PLACE, RETAIN)

PI ℄ DITCH N 1330246.29 E 585804.32 EL 435.85

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

PC ℄ DITCH N 1330033.02 E 585831.38 EL 411.17

PT ℄ DITCH N 1329898.11 E 585831.58 EL 410.73

PC ℄ DITCH N 1329885.05 E 585808.32 EL 416.02

DRAINAGE BENCH

PI ℄ DITCH N 1330200.43 E 585757.84 EL 417.40

PC ℄ DITCH N 1330191.95 E 585749.37 EL 417.28

EP ℄ DITCH N 1330146.49 E 585737.21 EL 413.74

PC ℄ DITCH N 1329893.73 E 585791.41 EL 417.81

PT ℄ DITCH N 1330022.38 E 585755.86 EL 419.14

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

PT ℄ DITCH N 1329874.36 E 585801.77 EL 417.94

PT ℄ DITCH N 1330375.32 E 585675.62 EL 437.68

EP ℄ DITCH N 1330166.12 E 585720.91 EL 414.19

PT ℄ DITCH N 1330178.31 E 585742.40 EL 414.92

PC ℄ DITCH N 1329880.24 E 585713.88 EL 437.09

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

PT ℄ DITCH N 1330154.70 E 585667.82 EL 415.89

PC ℄ DITCH N 1330129.37 E 585652.42 EL 417.83

PI ℄ DITCH N 1329951.16 E 585694.33 EL 437.82

PT ℄ DITCH N 1329998.28 E 585685.06 EL 436.86

BP ℄ DITCH N 1329861.22 E 585720.41 EL 437.00

BP ℄ DITCH N 1330309.05 E 585654.32 EL 419.25

PC ℄ DITCH N 1330143.99 E 585652.18 EL 417.26

PI ℄ DITCH N 1330131.92 E 585644.25 EL 417.40

PC ℄ DITCH N 1330057.72 E 585633.31 EL 435.39

PC ℄ DITCH N 1330147.65 E 585626.96 EL 418.03

PT ℄ DITCH N 1330063.48 E 585616.60 EL 435.29

BP ℄ DITCH N 1330060.93 E 585623.97 EL 435.19

PC ℄ DITCH N 1330417.23 E 585580.85 EL 438.76

BP ℄ DITCH N 1330314.15 E 585598.07 EL 422.42

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

BP ℄ DITCH N 1330418.36 E 585556.35 EL 439.00

BP ℄ DITCH N 1330261.59 E 585585.58 EL 419.25

DRAINAGE BENCH

PC ℄ DITCH N 1330124.11 E 585554.94 EL 436.25

PI ℄ DITCH N 1330167.76 E 585539.05 EL 436.72

BP ℄ DITCH N 1330358.80 E 585534.25 EL 438.79

PC ℄ DITCH N 1330344.24 E 585525.52 EL 438.62

PT ℄ DITCH N 1330242.12 E 585514.29 EL 437.50

℄ 2' F.B. DITCH, RIP RAP ALDOT CL1, 18" TK., 2' DEPTH, (SEE DRAWING E720329 FOR DETAILS)

4' WIDE DIVERSION DITCH (PHASE 1)

EP ℄ DITCH N 1330606.70 E 585368.77 EL 486.00

GRAVEL ROAD

BLDG.

BLDG.

BLDG.

GRAVEL ROAD

GRAVEL ROAD

OHE

E 585500

E 585000

N 1330500

N 1330000

REFERENCES:

E720308–E720319
E720321–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

REVISION	DATE
0	12/20/2018
ISSUED FOR CONSTRUCTION	

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Approved

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

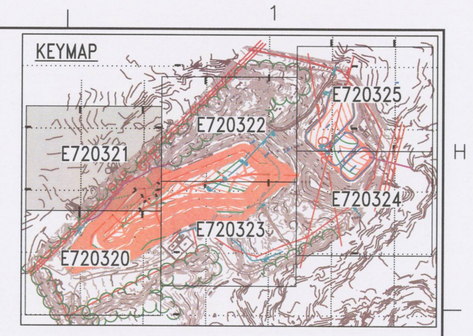
PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720320	1	FINAL	0

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

KEYMAP



N 1330500

N 1330000

E 586500

E 586000

MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720323)

MATCH LINE (SEE DWG. E720320)

OHE

NEW STORM PIPE AND SLOPE PAVED HEADWALL. SEE DWG E720330. (IN-PLACE, RETAIN)

PC ℄ DITCH
N 1329860.59
E 586117.91
EL 438.23

PT ℄ DITCH
N 1329890.89
E 586074.30
EL 437.70

PC ℄ DITCH
N 1329996.61
E 586017.64
EL 436.76

BP ℄ DITCH
N 1329988.75
E 586018.04
EL 436.79

PT ℄ DITCH
N 1330000.84
E 586017.56
EL 436.81

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

PC ℄ DITCH
N 1330086.29
E 585982.30
EL 438.66

PI ℄ DITCH
N 1330118.54
E 585951.50
EL 439.50

PT ℄ DITCH
N 1329996.41
E 585952.61
EL 417.88

PI ℄ DITCH
N 1329983.07
E 585953.09
EL 417.36

PC ℄ DITCH
N 1330015.04
E 585944.89
EL 418.12

PC ℄ DITCH
N 1329981.31
E 585933.28
EL 414.87

EP ℄ DITCH
N 1329889.74
E 585910.11
EL 408.34

PC ℄ DITCH
N 1329996.00
E 585952.62
EL 417.88

DRAINAGE BENCH

PT ℄ DITCH
N 1329973.33
E 585917.09
EL 410.42

EP ℄ DITCH
N 1329939.68
E 585886.14
EL 409.27

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

PI ℄ DITCH
N 1330097.12
E 585866.65
EL 419.25

PT ℄ DITCH
N 1329971.24
E 585870.99
EL 409.88

℄ 4' WIDE FLUME

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

REFERENCES:

E720308–E720320
E720322–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

REVISION	0	DATE	12/20/2018

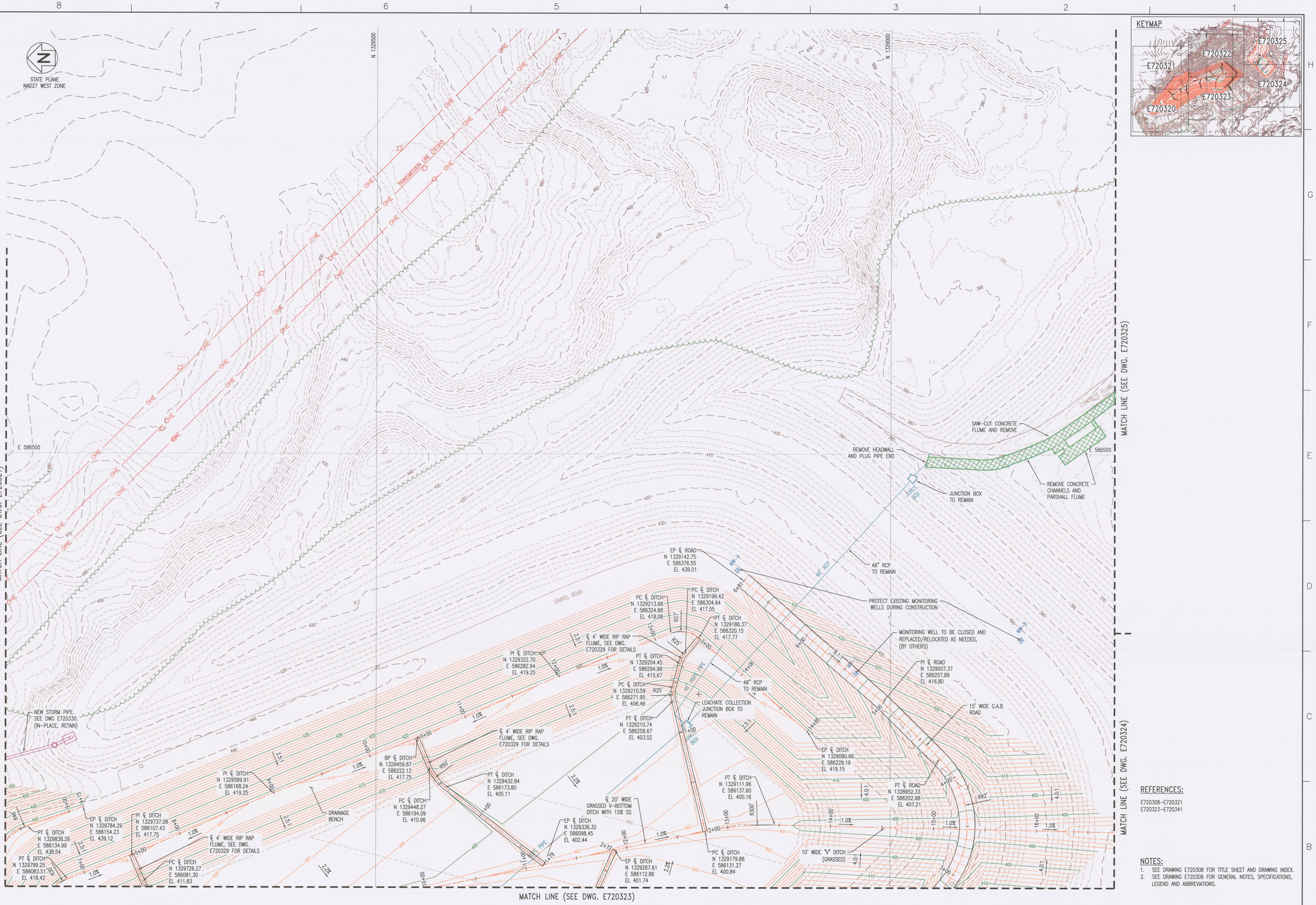
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 2

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR	SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AES	THB	CRU	XXX	XXX	XXX	SSS	1"=30'	E720321	1	FINAL	0

ANSI E: 44x34



REFERENCES:

E720308–E720321
E720323–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	0	DATE	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 3

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720322	1	FINAL	0

ANSI E: 44x34

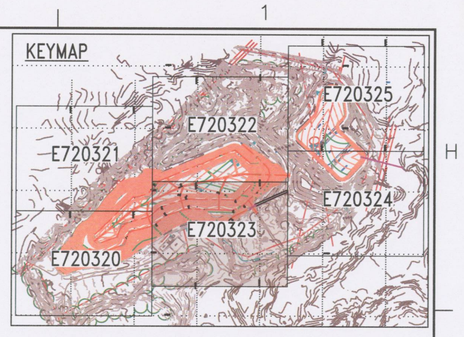
MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720321)

MATCH LINE (SEE DWG. E720324)

MATCH LINE (SEE DWG. E720320)

KEYMAP



STATE PLANE NAD27 WEST ZONE

PC ℄ DITCH N 1329814.49 E 586070.53 EL 418.64

PT ℄ DITCH N 1329823.76 E 586054.57 EL 418.83

PT ℄ DITCH N 1329714.64 E 586066.47 EL 407.39

PC ℄ DITCH N 1329655.08 E 586022.74 EL 405.73

EP ℄ DITCH N 1329609.03 E 586040.34 EL 405.24

PT ℄ DITCH N 1329586.86 E 586045.88 EL 405.01

36" HDPE PIPE TO REMAIN

54"ø HDPE RISER

RISER TO BE PLUGGED

PT ℄ DITCH N 1329322.69 E 585989.65 EL 404.72

PC ℄ DITCH N 1329327.04 E 585968.86 EL 409.62

PT ℄ DITCH N 1329175.10 E 585944.27 EL 418.54

PC ℄ DITCH N 1329206.18 E 585931.92 EL 418.35

EP ℄ DITCH N 1329073.75 E 586044.96 EL 419.25

PC ℄ ROAD N 1328948.97 E 586075.54 EL 405.65

PI ℄ ROAD N 1328994.78 E 586024.74 EL 414.00

PT ℄ ROAD N 1329123.24 E 585897.04 EL 436.13

PC ℄ ROAD N 1329140.05 E 585883.82 EL 438.74

BP ℄ ROAD N 1329090.94 E 585928.15 EL 430.56

BP ℄ ROAD N 1329150.07 E 585877.67 EL 440.18

EP ℄ ROAD N 1329022.90 E 585823.13 EL 430.81

EP ℄ DITCH N 1329102.50 E 585851.70 EL 428.00

EP ℄ DITCH N 1329186.13 E 585855.48 EL 438.45

PT ℄ DITCH N 1329186.86 E 585855.30 EL 438.44

PT ℄ DITCH N 1329173.82 E 585816.08 EL 430.62

PC ℄ DITCH N 1329245.92 E 585765.65 EL 446.26

PT ℄ DITCH N 1329293.09 E 585721.03 EL 458.12

BP ℄ DITCH N 1329440.24 E 585721.66 EL 470.00

PC ℄ DITCH N 1329407.74 E 585704.85 EL 467.80

PT ℄ DITCH N 1329778.00 E 585876.22 EL 419.29

PC ℄ DITCH N 1329806.98 E 585859.97 EL 418.83

PT ℄ DITCH N 1329816.24 E 585748.08 EL 437.43

PC ℄ DITCH N 1329761.64 E 585795.24 EL 438.16

PT ℄ DITCH N 1329740.42 E 585807.14 EL 438.01

PI ℄ DITCH N 1329604.66 E 585850.53 EL 436.60

PT ℄ DITCH N 1329561.46 E 585859.31 EL 437.02

PC ℄ DITCH N 1329578.18 E 585857.56 EL 436.87

PI ℄ DITCH N 1329443.62 E 585853.37 EL 438.20

BP ℄ DITCH N 1329326.25 E 585853.32 EL 437.03

PC ℄ DITCH N 1329246.45 E 585849.30 EL 437.83

PT ℄ DITCH N 1329626.34 E 585924.71 EL 417.41

PC ℄ DITCH N 1329593.46 E 585933.44 EL 418.09

PT ℄ DITCH N 1329565.79 E 585936.52 EL 418.36

PI ℄ DITCH N 1329476.82 E 585933.15 EL 419.25

PI ℄ DITCH N 1329326.79 E 585934.97 EL 417.46

PC ℄ DITCH N 1329632.84 E 585946.92 EL 413.47

PT ℄ DITCH N 1329631.80 E 585978.14 EL 406.72

℄ 20' WIDE GRASSED V-BOTTOM DITCH WITH 15% SS

DRAINAGE BENCH

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

℄ 4' WIDE RIP RAP FLUME, SEE DWG. E720329 FOR DETAILS

℄ 4' F.B. DITCH, RIP RAP ALDOT CL1, 18" TK., 2' DEPTH, (SEE DRAWING E720329 FOR DETAILS)

℄ EXIST. 4' F.B. HDPE LINED DITCH. REMOVE LINER AND REPLACE WITH RIP RAP, ALDOT CL1, 18" TK., 3' DEPTH, (SEE DETAIL ON DRAWING E720329)

56.0 L.F. 60"ø HDPE PIPE, ADS N12 WATERTIGHT, S=4.3%

SLOPE PAVED HEADWALLS, SEE DETAIL DWG. E720329 (REMOVE EXIST. PIPE MATCH INVERTS)

15' WIDE G.A.B. ROAD

GRAVEL ROAD

PROCESS PIPE

OHE

4' WIDE DIVERSION DITCH (PHASE 1)

BUILDING

EXISTING GYPSUM SLURRY LINE, TO BE REMOVED, SEE NOTE 3.

E 586000

E 585500

N 1329500

N 1329000

REFERENCES:

E720308–E720322
E720324–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
3. ALL ABOVE GROUND PIPING TO AND FROM THE PLANT SCRUBBER TO BE REMOVED UP TO THE FIRST ISOLATION VALVES AT THE SCRUBBER.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 4

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720323	1	FINAL	0

Approved

ANSI E: 44x34

MATCH LINE (SEE DWG. E720325)

MATCH LINE (SEE DWG. E720322)

MATCH LINE (SEE DWG. E720323)

STATE PLANE
NAD27 WEST ZONE

E.P. ℄ DITCH
N 1328779.65
E 586130.61
EL 396.23

P.I. ℄ DITCH
N 1328755.14
E 586127.95
EL 394.00

33.3%

B.P. ℄ DITCH
N 1328682.93
E 586120.10
EL 370.00

℄ 10' F.B. DITCH, (RIP RAP LINED, SEE DRAWING E720329 FOR DETAIL)

PT ℄ SWALE
N 1328395.99
E 586319.29
EL 328.34

PC ℄ SWALE
N 1328280.15
E 586275.89
EL 327.07

BP ℄ SWALE
N 1328199.97
E 586281.24
EL 326.26

48"ø OUTLET CONTROL STRUCTURE
N 1328197.6
E 586279.0
6" ORIFICE EL 326.00
INV. EL. 326.00
TOP EL. 336.00

342.0 L.F. 24"ø HDPE PIPE, DR32.5, S=3.2%

EXACT OUTFALL LOCATION TO BE DETERMINED

REMOVE TEMPORARY OUTLET STRUCTURE AND 48" HDPE PIPE UPON SITE STABILIZATION.

CLEAR POOL

EMERGENCY STORAGE CELL

GRAVEL ROAD

CONCRETE ROAD

GRAVEL ROAD

GRAVEL ROAD

60" RCP

230kV TRANSMISSION LINE

161kV TRANSMISSION LINE

OHE

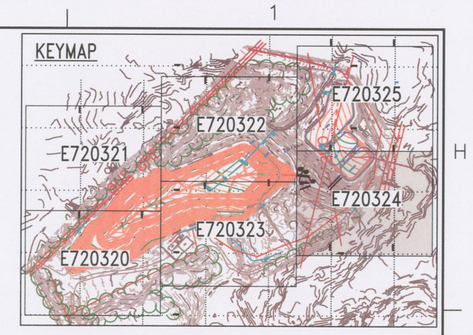
E 586000

N 1328500

N 1328000

E 585500

KEYMAP



REFERENCES:

E720308–E720323
E720325–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	0	DATE	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004

GYPSUM POND CLOSURE

Southern Company Generation
Engineering and Construction Services
FOR

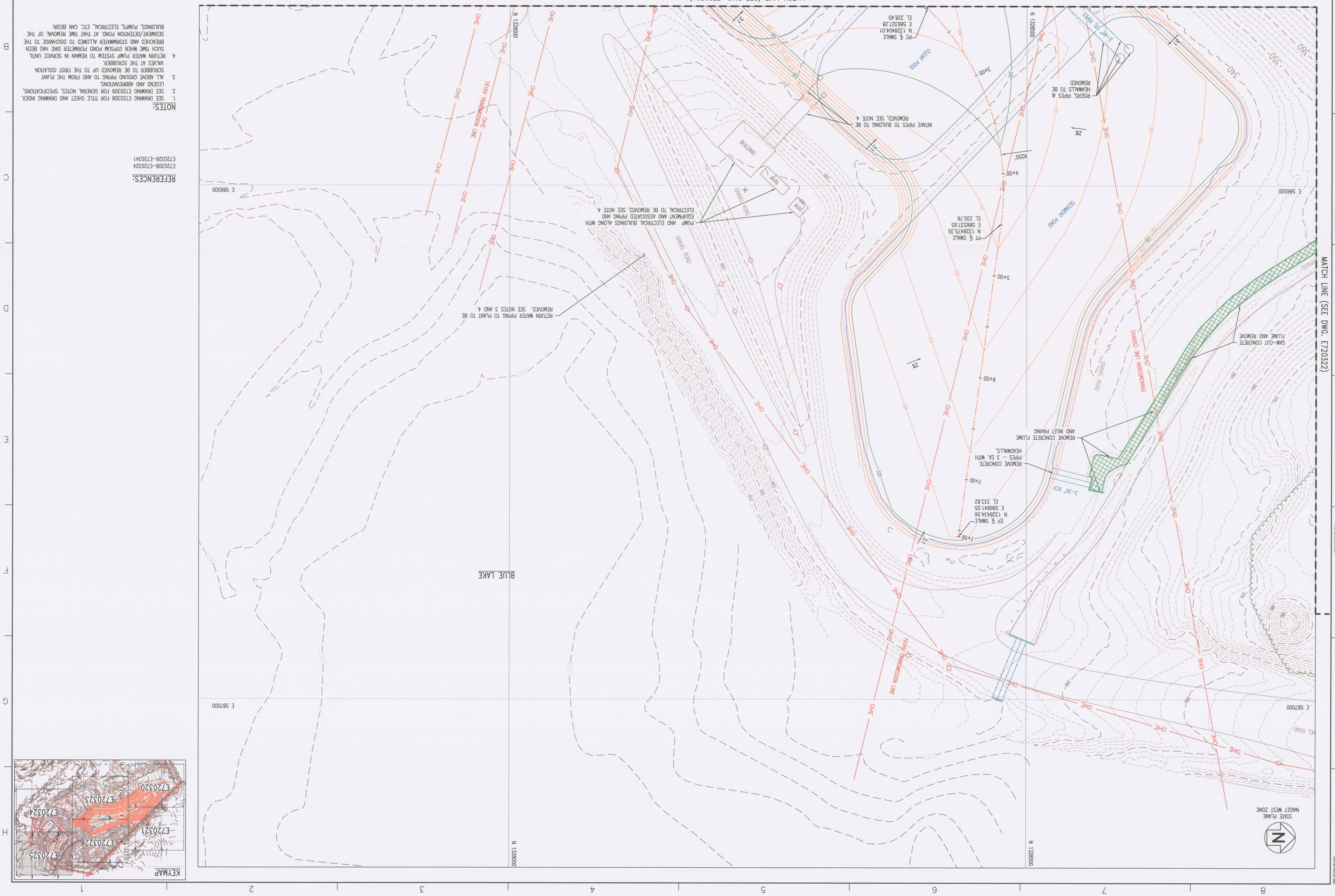
Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 5

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720324	1	FINAL	0

ANSI E: 44x34



REFERENCES:

E720308–E720324
E720326–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, SPECIFICATIONS, LEGEND AND ABBREVIATIONS.
3. ALL ABOVE GROUND PIPING TO AND FROM THE PLANT SCRUBBER TO BE REMOVED UP TO THE FIRST ISOLATION VALVES AT THE SCRUBBER.
4. RETURN WATER PUMP SYSTEM TO REMAIN IN SERVICE UNTIL SUCH TIME WHEN GYPSUM POND PERIMETER DIKE HAS BEEN BREACHED AND STORMWATER ALLOWED TO DISCHARGE TO THE SEDIMENT/DETENTION POND. AT THAT TIME REMOVAL OF THE BUILDINGS, PUMPS, ELECTRICAL, ETC. CAN BEGIN.

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
PHASE 2 SITE GRADING AND DRAINAGE PLAN
SHEET 6

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=30'	E720325	1	FINAL	0

ANSI E: 44x34

Approved

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

REVISION	0
DATE	12/20/2018

ISSUED FOR CONSTRUCTION

MMO: APC5907Q2
PROJECT ID: GGR18004

GYPSUM POND CLOSURE

	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DATE	AES	THB	CRU	XXX	XXX	XXX	SSS

AS NOTED

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
	E720328	1	FINAL	0

PLANT GORGAS
SITEWORK
CLOSURE SECTIONS AND DETAILS
SHEET 1

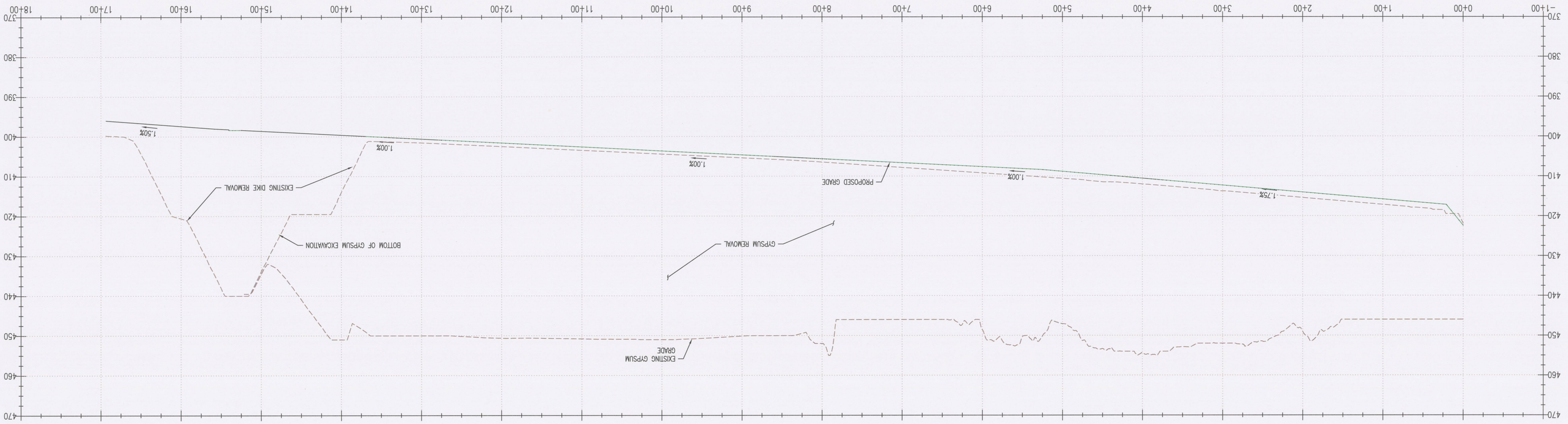
ANSI E 44x34

Approved

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

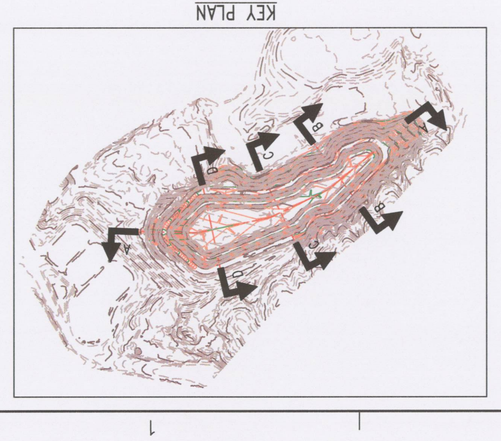
SECTION A–A

SCALE: 1"=50' HORIZ.
1"=10' VERT.



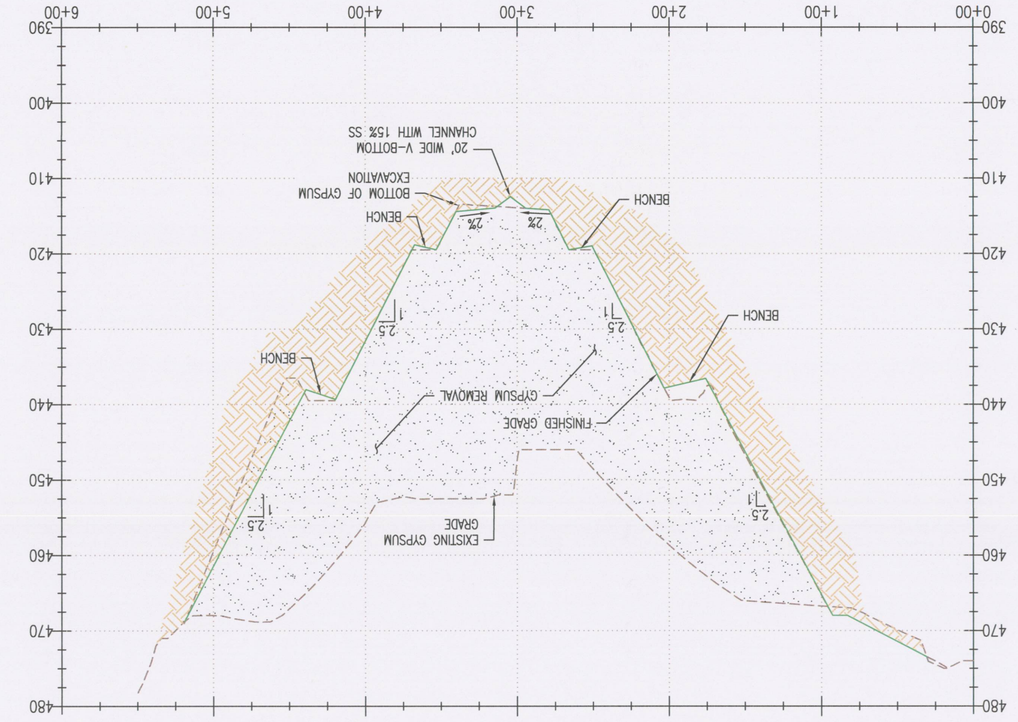
KEY PLAN

SCALE: 1"=500'



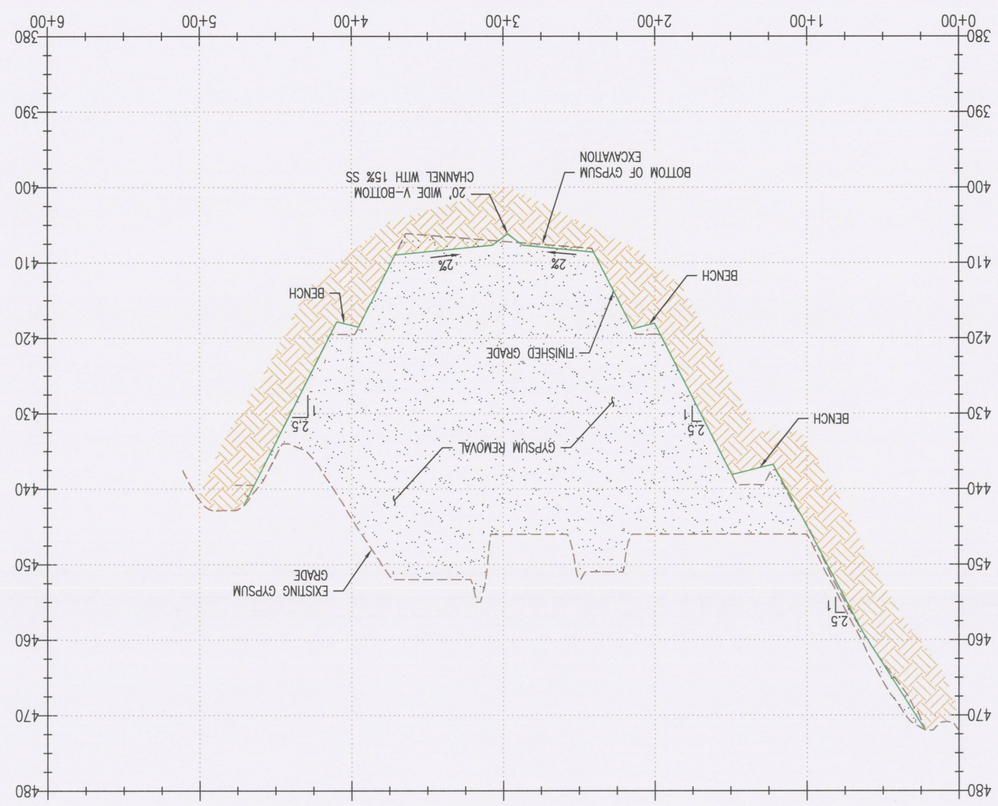
SECTION B–B

SCALE: 1"=50' HORIZ.
1"=10' VERT.



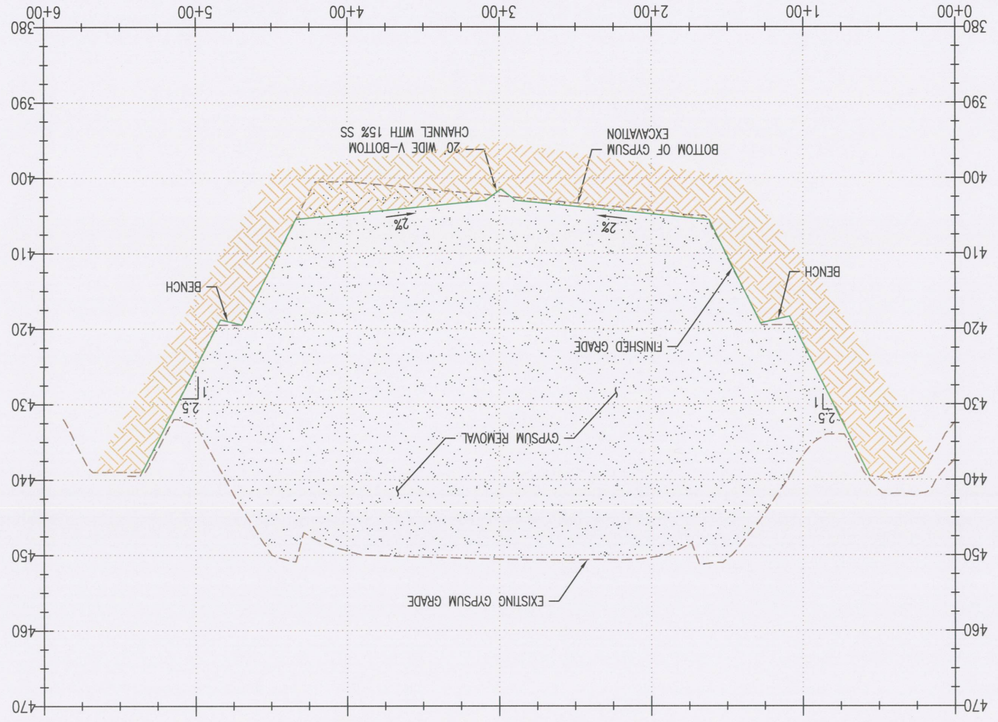
SECTION C–C

SCALE: 1"=50' HORIZ.
1"=10' VERT.



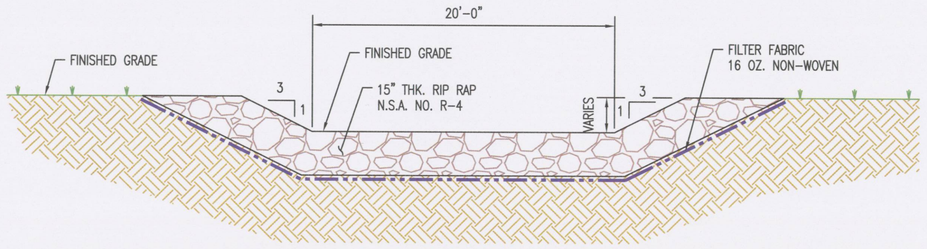
SECTION D–D

SCALE: 1"=50' HORIZ.
1"=10' VERT.

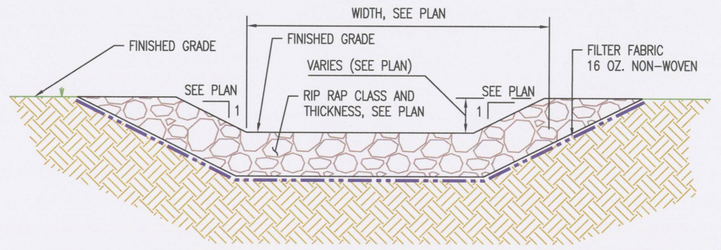


REFERENCES:

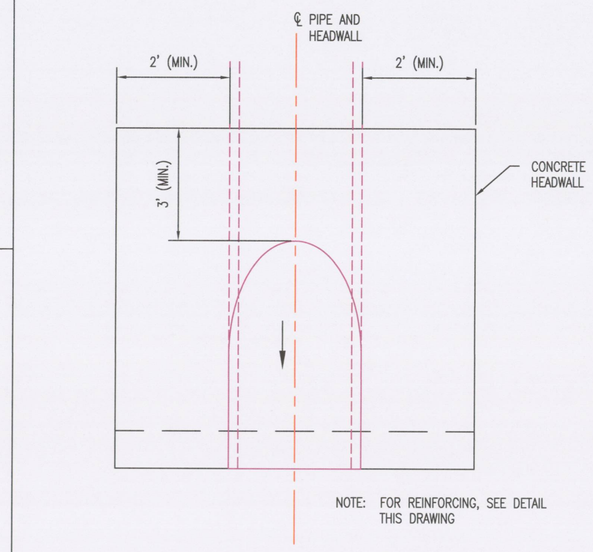
E720308–E720327
E720329–E720341



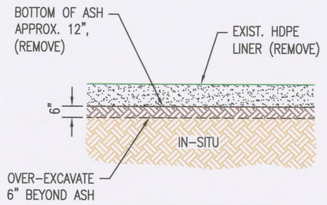
EMERGENCY SPILLWAY
DETAIL
N.T.S.



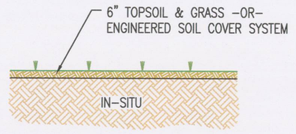
TYPICAL RIP RAP LINED
DITCH
N.T.S.



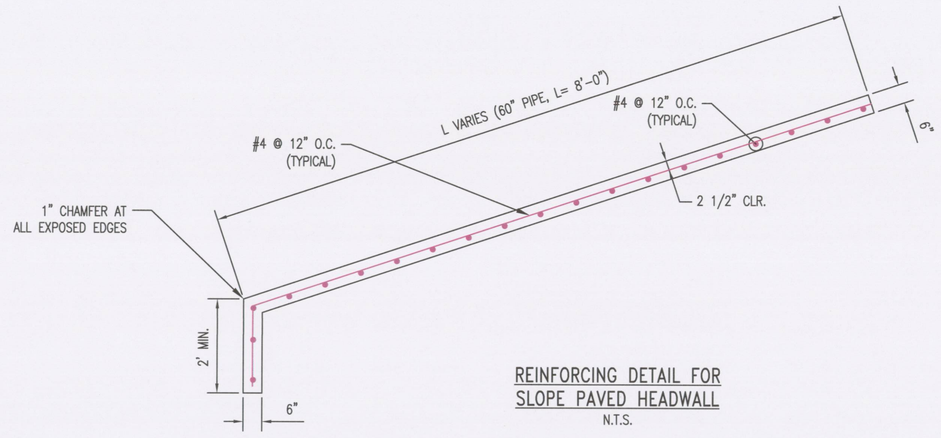
SLOPE PAVED HEADWALL TYPICAL PLAN
N.T.S.



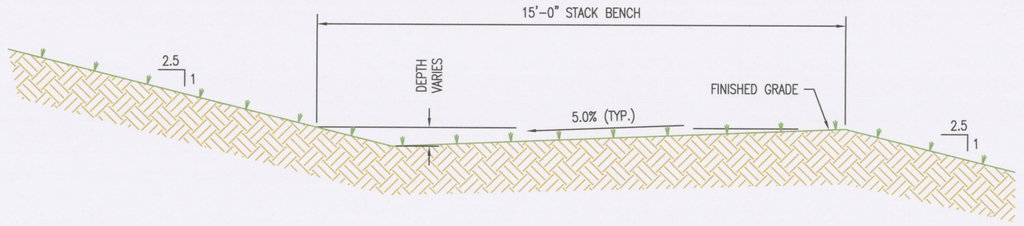
EXISTING LINER DETAIL
N.T.S.



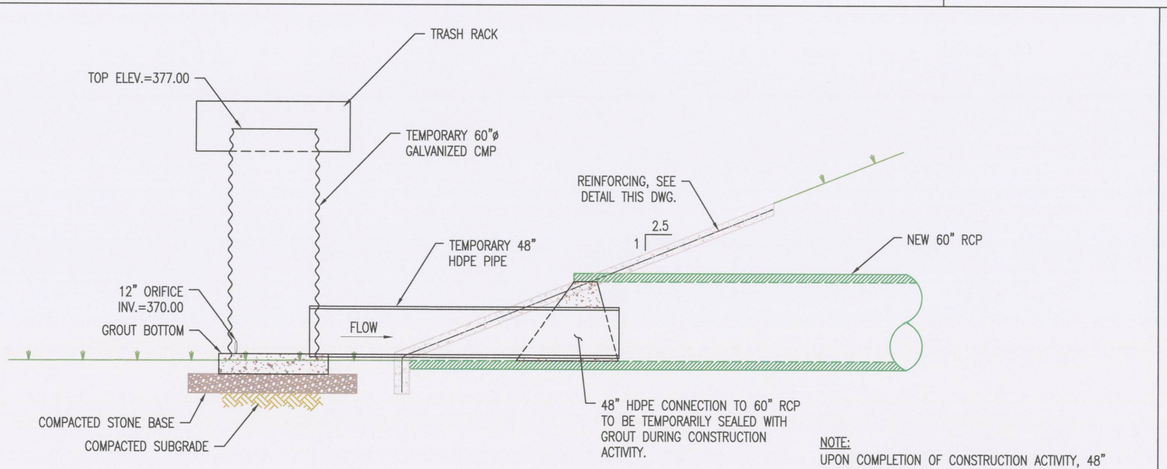
POND AREA FINAL COVER DETAIL
N.T.S.



REINFORCING DETAIL FOR
SLOPE PAVED HEADWALL
N.T.S.

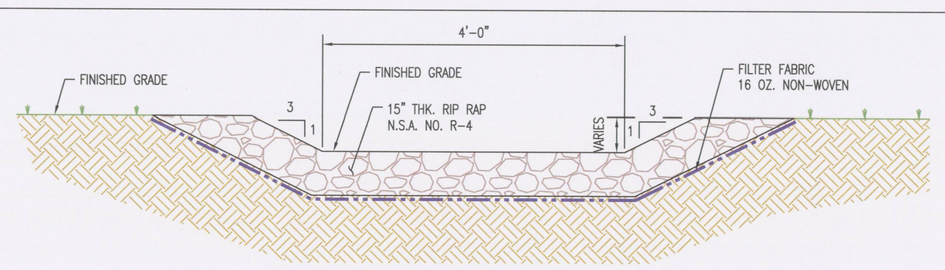


SECTION "B-B"
BENCH DETAIL
N.T.S.

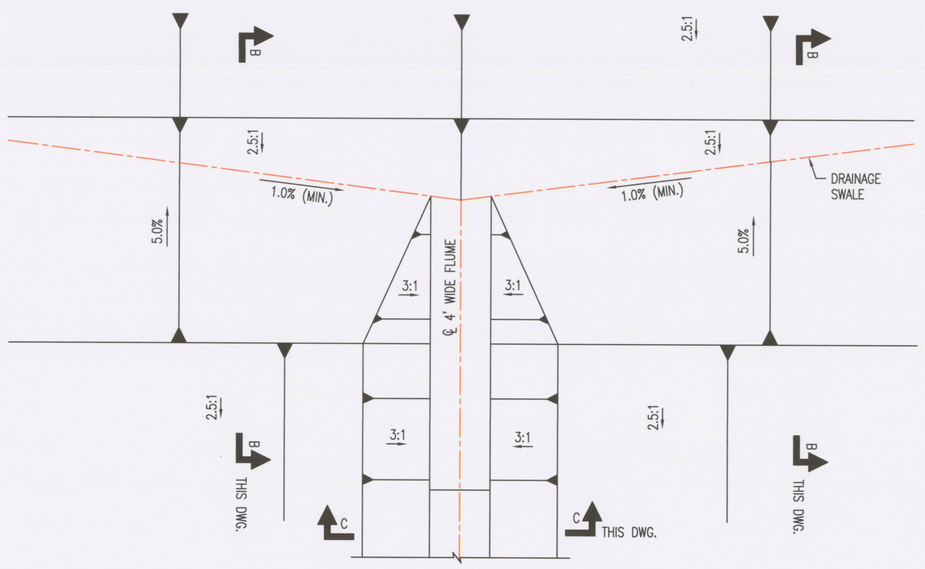


NOTE:
UPON COMPLETION OF CONSTRUCTION ACTIVITY, 48" HDPE PIPE, 60" CMP RISER, AND GROUT PLUG SHALL BE REMOVED TO ALLOW 60" RCP AND HEADWALL TO OPERATE WITH NO RESTRICTION.

TEMPORARY OUTLET CONTROL
STRUCTURE DETAIL
N.T.S.



SECTION "C-C"
FLUME ON SLOPE DETAIL
N.T.S.



TYPICAL DITCHES & FLUMES ALONG
PRE-GYPSUM PLACEMENT ROAD - PLAN VIEW
N.T.S
(E720320 THRU E720323)

REFERENCES:

E720308-E720328
E720330-E720341

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

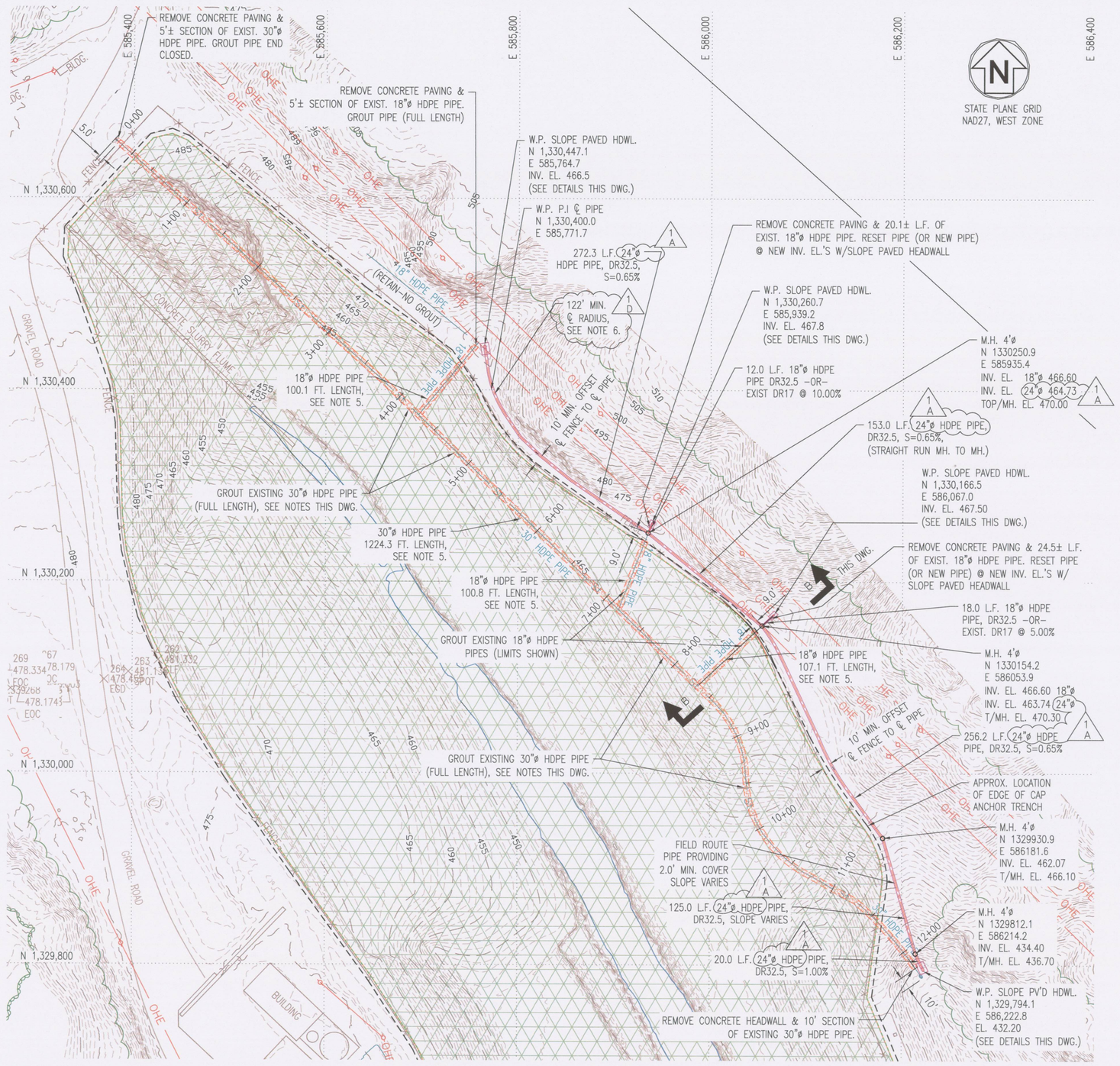
Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CLOSURE SECTIONS AND DETAILS
SHEET 2

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
NONE	E720329	1	FINAL	0

Approved

ANSI E: 44x34



STORMWATER DIVERSION PIPE PLAN

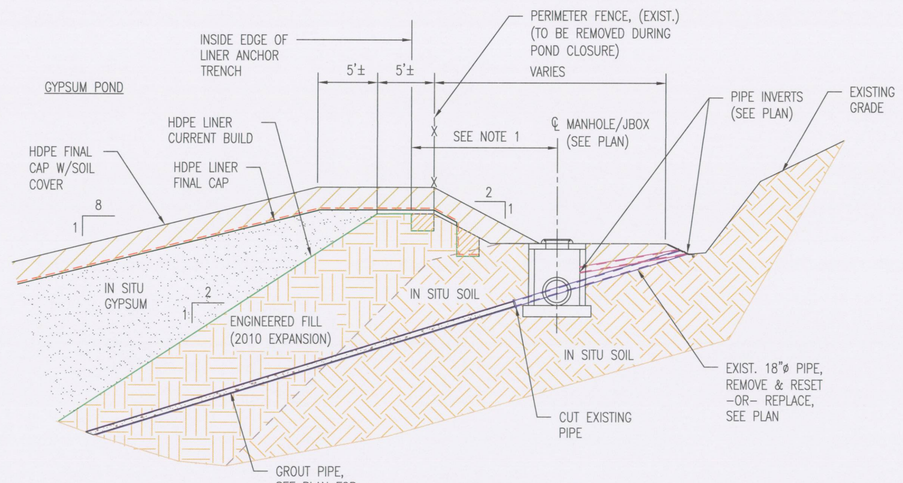
SCALE: 1" = 60'

FLOWABLE FILL (FOR PIPE BACKFILL)

1. FLY ASH/CEMENT FLOWABLE FILL MIX SHALL CONSIST OF THE FOLLOWING (OR APPROVED ALTERNATE):
   2000 LBS OF CLASS "F" FLY ASH
   150 LBS OF CEMENT
   200 LBS OF CONCRETE SAND (OPTIONAL)
   87 GALLONS OF WATER (POTABLE)
2. ALL FLOWABLE FILL (BACKFILL) TO SET 72 HOURS PRIOR TO PLACING COMPACTED SOIL BACKFILL ON FLOWABLE FILL.
3. TO PREVENT FLOTATION OF NEW PIPES, HOLD DOWN STRAPS SHALL BE USED TO SECURE HDPE PIPES PRIOR TO PLACING FLOWABLE FILL.
4. PIPE SUPPORT MATERIAL FOR FLOWABLE FILL CONSTRUCTION SHALL BE CONCRETE BLOCKS OR BRICKS. WOODEN SUPPORTS ARE NOT ALLOWED.
5. COMPRESSION TESTING OF FLOWABLE FILL INCLUDING MAKING OF TEST CYLINDERS IS NOT REQUIRED.

PIPES/APPURTENANCES GENERAL INFORMATION

1. PIPE LENGTHS AND SLOPES ARE CALCULATED FROM THE WORKPOINTS OF THE PIPES/STRUCTURES.
   WORK POINTS FOR PIPES/STRUCTURES:
   MANHOLES – CENTER OF MANHOLE
   PIPES WITH SLOPE PAVED HEADWALL – END OF PIPE/FACE OF CONCRETE
2. STORM DRAINAGE PIPES SHALL BE HDPE SOLID WALL DR32.5 PIPE OR IN THE CASE OF THE 18 INCH PIPES, EXISTING DR (ASSUMED DR17) PIPE OR NEW DR32.5.
4. MANHOLES SHALL CONTAIN STEPS (IF DEPTHS REQUIRE) INSTALLED IN ACCORDANCE WITH OSHA REGULATIONS AND SHALL BE SEALED AT JOINTS AND PIPE ENTRY/EXIT POINTS TO PROVIDE A WATERTIGHT STRUCTURE.



SECTION B–B

(THIS DWG.)
NOT TO SCALE

PIPE BEDDING NOTES

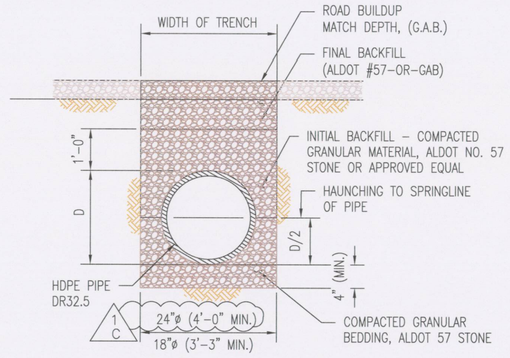
1. THE PIPE SHALL BE BEDDED WITH CARE IN A CONTINUOUS COMPACTED GRANULAR BED FORMED IN THE TRENCH BOTTOM SHAPED TO CONFORM TO 60% OF THE OUTSIDE DIAMETER OF THE PIPE.
2. THE BELL OF THE PIPE SHALL BE INSTALLED IN THE SAME MANNER AS THE BARREL.
3. WHERE PIPE IS INSTALLED IN ROADBED, SELECT COMPACTED FILL SHALL BE GRANULAR BEDDING MATERIAL/ROAD AGGREGATE.
4. TRENCH BACKFILL TO BE COMPACTED TO MIN. 95% STANDARD PROCTOR DENSITY.
5. IF BACKFILLING WITH FLOWABLE FILL, TRENCH WIDTHS MAY BE REDUCED.

PIPE GROUTING

1. CLEAN ENTIRE LENGTHS OF PIPES AND CONFIRM BY VISUAL INSPECTION (CAMERA) THAT ALL DEBRIS AND WATER HAS BEEN REMOVED PRIOR TO GROUTING OPERATIONS. INSERT A WATER JET TO PUSH MATERIALS WITHIN THE PIPE DOWNSTREAM TO THE OUTFALL.
2. COLLECT ALL MATERIAL REMOVED FROM THE PIPES AND DISPOSE OF PROPERLY.
3. VERIFY ALL PIPE VOLUMES PRIOR TO GROUTING. MEASURE DIAMETERS AND CALCULATE VOLUMES USING LENGTHS PROVIDED ON THIS DRAWING. CALCULATED PIPE VOLUME IS TO BE COMPARED TO THE VOLUME OF GROUT INJECTED INTO THE PIPES FOR DETERMINATION OF FILL. ALL VOLUMES ARE TO BE RECORDED.
4. CONSULT SCS TECHNICAL SERVICES AND SCS CIVIL FIELD SERVICES FOR ASSISTANCE/GUIDANCE IN GROUTING METHODS. NOTE THAT SCS CIVIL FIELD SERVICES IS AVAILABLE TO PERFORM GROUTING OPERATIONS. GROUT TO BE NON–SHRINK WITH STRENGTH AS DESIGNATED BY OWNER'S ENGINEER/GROUTING PROFESSIONAL. INSTALL INFLATABLE BLADDERS AND VENT/INJECTION PORTS AS NEEDED TO COMPLETELY FILL PIPE SYSTEM.

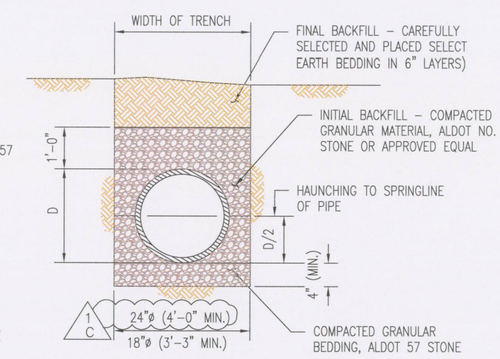
NOTES

1. CONTRACTOR TO VERIFY DISTANCE BETWEEN INSIDE EDGE OF EXISTING LINER ANCHOR TRENCH AND MANHOLES 24"ø HDPE PIPE (1A) TO PROVIDE CLEARANCE FOR CAP LINER ANCHOR TRENCH. MEASUREMENTS SHOULD BE MADE AT MINIMUM OF 50' INTERVALS ALONG THE LINER EDGE. ADJUST LOCATION OF PIPES AND MANHOLES TO ACCOMMODATE CAP ANCHOR TRENCH AND FIELD CONDITIONS.
2. MANHOLES TO BE FOLEY 48" DIA. PRECAST BASE AND RISERS WITH FLAT TOP. SEE FOLEY CATALOG DRAWING NO.'S 1.1. & 1.17. COVER TO BE NEENAH R–1647 OR APPROVED EQUAL.
3. THE CONTRACTOR SHALL ENSURE THAT ALL EXCAVATION WORK IS IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (O.S.H.A.) CONSTRUCTION STANDARDS FOR EXCAVATIONS, 29 CFR PART 1926, SUBPART P AND ALL APPLICABLE STATE OR LOCAL REGULATIONS.
4. CONTRACTOR MAY SUBSTITUTE FLOWABLE FILL IN LIEU OF COMPACTED AGGREGATE BACKFILL. EMPLOY STRAPS OR OTHER METHODS TO PREVENT FLOTATION OF PIPES AND ENSURE ALIGNMENTS. SEE FLOWABLE FILL NOTES, THIS DRAWING.
5. EXISTING PIPE LENGTHS NOTED IN PLAN ARE CALCULATED LENGTHS ALONG THE SLOPE FOR AID IN DETERMINING VOLUMES FOR GROUTING. THESE ARE BEST ESTIMATES OF LENGTHS USING CONSTRUCTION DRAWINGS (NOT AS–BUILT SURVEYS).
6. APPROXIMATE RADIUS REQUIRED AS SHOWN. FIELD ADJUST AS NEEDED. NOTE THAT THE MINIMUM COLD BENDING RADIUS OF 24 INCH DIA., DR32.5 PIPE IS 85 FEET. (1D)



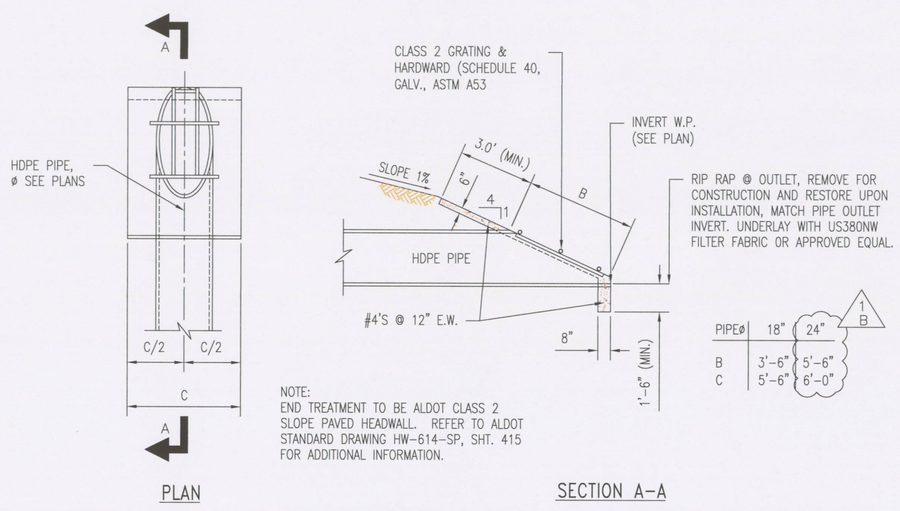
PIPE BEDDING AT ROADS

NOT TO SCALE



PIPE BEDDING YARD AREAS

NOT TO SCALE



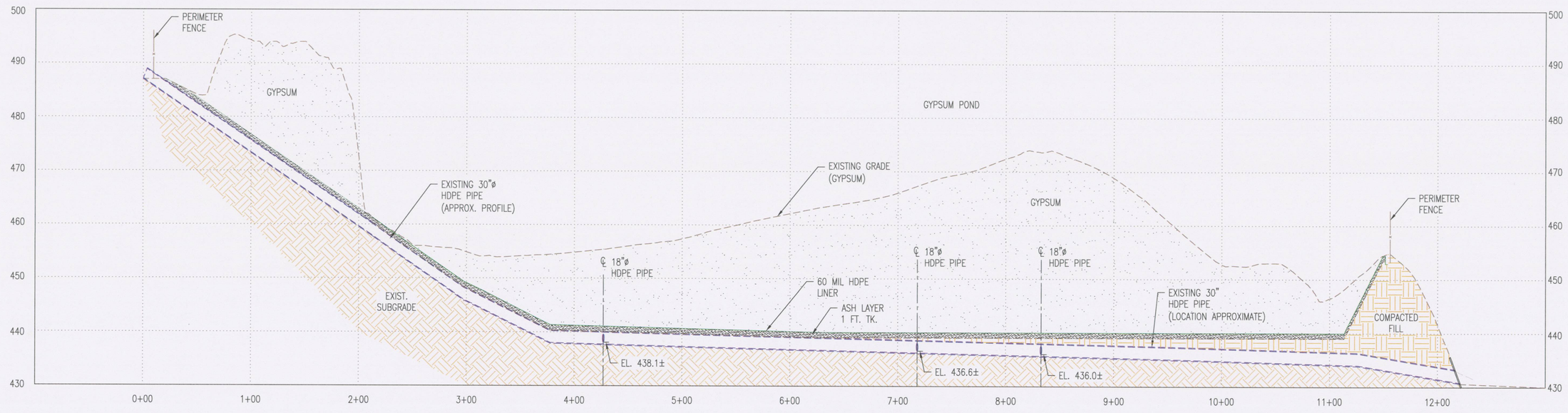
NOTE:
END TREATMENT TO BE ALDOT CLASS 2 SLOPE PAVED HEADWALL. REFER TO ALDOT STANDARD DRAWING HW–614–SP, SHT. 415 FOR ADDITIONAL INFORMATION.

PLAN

SECTION A–A

SLOPE PAVED HEADWALL

NOT TO SCALE



PROFILE – EXIST. 30" HDPE PIPE

SCALE: 1" = 50' HORIZ.
1" = 10' VERT.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	8/1/18	AES	CRU	CRU	XXX	XXX	XXX	SSS
0	6/29/2018	AES	WFW	CRU	XXX	XXX	XXX	SSS

1. A. REVISED PIPE DIAMETER FROM 30" TO 24".
   B. REVISED HEADWALL DIMENSIONS.
   C. REVISED TRENCH WIDTHS.
   D. ADDED NOTE 6.

APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

0. ISSUED FOR CONSTRUCTION

APC590792
PROJECT ID: GOR18002 GYPSUM POND CLOSURE

Southern Company Generation Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CLOSURE SECTIONS AND DETAILS
SHEET 3

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720330	1	FINAL	1

Approved

ANSI E: 44x34

PLANT GORGAS GYPSUM POND CLOSURE
CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)
WALKER COUNTY, ALABAMA

NOTE: ALL MEASURES OUTLINED IN THIS PLAN ARE TO BE IN ACCORDANCE WITH THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS," CURRENT EDITION, WITH THE INFORMATION BELOW FOLLOWING THE CBMPP TEMPLATE.

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 PROJECT/SITE INFORMATION

PROJECT NAME: PLANT GORGAS GYPSUM POND CLOSURE
PROJECT LOCATION: PLANT GORGAS
460 GORGAS ROAD
PARRISH, AL 35580
WALKER COUNTY, ALABAMA

LATITUDE/LONGITUDE OF THE SITE CONSTRUCTION ENTRANCE/EXIT: 33°38'43.59" N 87°11'43.53" W

METHOD FOR DETERMINING LATITUDE/LONGITUDE: GOOGLE MAPS

1.2 CONTACT INFORMATION/RESPONSIBLE PARTIES

PERMITTEE:
ALABAMA POWER COMPANY (APC)
PAMELA R. McDANIEL, P.E.
600 18TH STREET NORTH
BOX 2641
BIRMINGHAM, ALABAMA 35203
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

PROJECT MANAGER:
SOUTHERN COMPANY SERVICES, INC.
DAVID B. PRATER
460 GORGAS ROAD
PARRISH, ALABAMA 35580-5715
TEL.: (205) 992-7266
EMAIL: DBPRATER@SOUTHERNCO.COM

CBMPP CONTACT/QCP:
ALABAMA POWER COMPANY
PAMELA R. McDANIEL, P.E.
P.O. BOX 2641
BIRMINGHAM, ALABAMA 35291
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

QCI
ALABAMA POWER COMPANY
JESSICA SMOKE
600 18TH STREET NORTH
BIN 12N-0830
BIRMINGHAM, AL 35203
TEL: (205) 257-4255
EMAIL: JSMOKE@SOUTHERNCO.COM

EMERGENCY 24-HOUR CONTACT:
ALABAMA POWER COMPANY
MAJOR HOLLIS
TEL: (205) 488-2388

1.3 NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY

PERMIT REQUIREMENT(S):
PART III.D.3. (b) REQUIRED A DESCRIPTION OF THE INTENDED SEQUENCE OF MAJOR ACTIVITIES WHICH DISTURB SOILS, INCLUDING BUT NOT LIMITED TO, GRUBBING, EXCAVATION, AND/OR GRADING.

PART III.D.3. (c) REQUIRES ESTIMATES OF THE TOTAL AREA EXPECTED TO BE DISTURBED BY GRUBBING, EXCAVATION, AND/OR GRADING, INCLUDING OFFSITE BORROW AND FILL AREAS.

NATURE OF CONSTRUCTION ACTIVITIES:

THE PLANT GORGAS GYPSUM POND CLOSURE PROJECT CONSISTS OF REMOVING THE GYPSUM WITHIN THE EXISTING PARTIALLY FILLED POND AND GRADING THE AREA TO DRAIN. CONSTRUCTION FOR THIS PROJECT WILL ALSO CONSIST OF GRADING IN AREAS OUTSIDE OF THE LINED POND INCLUDING DITCH AND PIPE CONSTRUCTION AND REMOVAL/GRADING OF THE EXISTING HDPE LINED SEDIMENT AND CLEAR POOL PONDS AND EMERGENCY STORAGE CELL.

THE CURRENT PLANT PROCESS SYSTEM CONSISTING OF A PUMPED RETURN LINE FROM THE LEACHATE COLLECTION SYSTEM'S LINED PONDS WILL BE UTILIZED DURING CONSTRUCTION TO COLLECT PUMP AND TREAT CCR CONTACT WATER. NO CONTACT WATER WILL BE ALLOWED TO DISCHARGE INTO THE NEARBY STREAMS (MULBERRY FORK). A SEDIMENT POND WILL BE CONSTRUCTED TO RECEIVE NON-CONTACT STORMWATER. THIS POND WILL BE UTILIZED AS A DETENTION POND UPON COMPLETION OF THIS PROJECT.

CONSTRUCTION SITE ESTIMATES:

AREA TO BE DISTURBED

POND CLOSURE AREA	38.0 ACRES (APPROX.)
IMPERVIOUS AREA ADDED* (PERCENTAGE OF TOTAL)	0%

ANTICIPATED OFF-SITE FILL AREAS WILL BE COORDINATED WITH PLANT GORGAS.

TABLE 1. INTENDED SEQUENCE AND BMP IMPLEMENTATION

ESTIMATED DATES OF ACTIVITY	CONSTRUCTION ACTIVITY AND BMPs TO BE IMPLEMENTED
TBD – DURATION APPROX. 1 WEEKS	CONTRACTOR MOBILIZATION
TBD – DURATION APPROX. 2 WEEKS	–INSTALL INITIAL BMP'S (SILT FENCE, CHECK DAMS, INLET PROTECTION) –INSTALL EAST BYPASS DITCH TO INTERCEPT OFF-SITE STORMWATER RUNOFF AND DIRECT AWAY FROM GYPSUM POND AREA.
TBD – DURATION APPROX. 36 WEEKS	–REMOVE EXISTING LINER SYSTEM AND ASH BEDDING BELOW. INSTALL INTERMEDIATE BMP'S (DIVERSION, DITCH CHECKS AND INLET PROTECTION) WITHIN GYPSUM POND AREA TO CONTROL STORMWATER RUNOFF AND DIRECT INTO EXISTING PLANT TREATMENT SYSTEM. –CONSTRUCT NEW SEDIMENT POND, INSTALLING 60" RCP & TEMP. RISER. –GRADE BENCHES TO DRAIN, INSTALL RIP RAP FLUMES AND CENTRAL DRAINAGE DITCH AT POND BOTTOM. (THIS MAY BE PERFORMED CONCURRENTLY WITH LINER/ASH REMOVAL AND GRADING BY INSTALLING AT HIGHER ELEVATIONS TO PREVENT ASH CONTACT.) –INSTALL FINAL COVER SYSTEM AS WORK PROGRESSES. –REMOVE LINER SYSTEM AND ASH AT EMERGENCY STORAGE CELL.
TBD – DURATION APPROX. 4 WEEKS	–EXCAVATE DIKE AT SW CORNER OF GYPSUM POND TO BREACH CONTAINMENT. PLACE COMPACTED FILL IN EMERGENCY STORAGE CELL AREA AND SW CORNER OF SITE. –PLUG REMAINING PIPE SYSTEM IN GYPSUM POND.
TBD – DURATION APPROX. 8 WEEKS	–DIVERT STORM WATER TO NEW SEDIMENT POND. –INSTALL NEW DISCHARGE PIPE AT SW CORNER UNDER ROAD TO TRANSLOADER AREA. –REMOVE LINER SYSTEMS AND ASH BEDDING LAYER AT SEDIMENT POND AND CLEAR POOL. SHUT OFF DISCHARGE TO PLANT TREATMENT SYSTEM AND REMOVE BUILDING AND PUMPS ALONG WITH DISCHARGE LINE(S) TO PLANT WWT. –GRADE SEDIMENT POND AND CLEAR POOL AREAS TO DRAIN TO SW CORNER DISCHARGE PIPE AND PLACE FINAL COVER.
TBD – DURATION APPROX. 1 WEEK	CONTRACTOR DEMOBILIZE – SITE STABILIZED, TEMPORARY BMPS REMOVED

PROPOSED ACTIVITIES TO BE CONDUCTED ARE INDUSTRIAL.

REFER TO CBMPP TEMPLATE PACKAGE FOR LIST OF MULTIPLE OPERATORS AND REQUIRED INFORMATION.

1.4 RECEIVING WATERS

DESCRIPTION OF RECEIVING WATERS:
THE EXISTING SITE RUNOFF FOR THE GORGAS POND CLOSURE PROJECT CURRENTLY IS CONVEYED TO THE EXISTING STORMWATER COLLECTION POND LOCATED NORTH OF THE MULBERRY FORK RIVER WHICH FLOWS SOUTH INTO THE BLACK WARRIOR RIVER BASIN.
THE PROPOSED STORM DRAINAGE SYSTEM WILL CONTINUE TO COLLECT AND CONVEY STORMWATER RUNOFF TO THE STORMWATER COLLECTION POND. THE POND DISCHARGE WILL CONTINUE TO THE EXISTING PERMITTED NPDES DISCHARGE LOCATION ON THE NORTH SIDE OF THE MULBERRY FORK RIVER.

EXISTING STORM SEWER SYSTEMS:
THE EXISTING STORM DRAINAGE SYSTEM WITHIN THE CONSTRUCTION LIMITS IS OWNED AND MAINTAINED BY PLANT GORGAS STEAM PLANT

IMPAIRED WATERS OR WATERS SUBJECT TO TMDLs:
REFER TO THE CBMPP TEMPLATE, SECTION 1.3 FOR DETERMINATION IF ANY WATERBODIES NAMED ABOVE ARE OUTSTANDING ALABAMA WATERS (OAW), OUTSTANDING NATIONAL RESOURCE WATERS (ONRW), OR TREASURED ALABAMA LAKE (TAL), OR IF ANY OF THE WATERBODIES DOWNSTREAM OF THE WASTEWATER MANAGEMENT PROJECT ARE IMPAIRED AND/OR SUBJECT TO TOTAL MAXIMUM DAILY LOADS (TMDLs).

1.5 POTENTIAL SOURCES OF POLLUTION

STORMWATER RUNOFF CONTAINING MINOR SEDIMENT MAY OCCUR DURING CONSTRUCTION DUE TO GRADING OPERATIONS, BUT THE PROPOSED CONSTRUCTION BEST MANAGEMENT PRACTICES (CBMPP) WILL BE UTILIZED DURING CONSTRUCTION OF THE WASTEWATER MANAGEMENT PROJECT AND WILL MINIMIZE THE POTENTIAL FOR SEDIMENT IN THE STORMWATER RUNOFF.

THERE ARE NO KNOWN POTENTIAL POLLUTANTS IDENTIFIED OTHER THAN SEDIMENT TO STORMWATER RUNOFF.

1.6 MAPS

REFER TO CBMPP TEMPLATE PACKAGE FOR ANY MAPS REQUIRED THAT ARE NOT PROVIDED ON THE CBMPP DRAWINGS.

1.7 ADDITIONAL INFORMATION

REFER TO CBMPP TEMPLATE PACKAGE FOR A LISTING OF ADDITIONAL INFORMATION (I.E., ENDANGERED SPECIES HISTORIC PRESERVATION, AND U.S. CORPS OF ENGINEERS DOCUMENTATION) PROVIDED IN APPENDIX H.

1.8 DELEGATION OF AUTHORITY

REFER TO CBMPP TEMPLATE PACKAGE FOR THE DELEGATION OF AUTHORITY FORM PROVIDED IN APPENDIX J.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

REFER TO DRAWING E720308 FOR THE CBMPP DRAWING LIST

MEASURING RAINFALL
A RAIN GAUGE MUST BE INSTALLED AT THE SITE, AND RAINFALL MEASUREMENTS MUST BE RECORDED EVERY 24 HOURS.

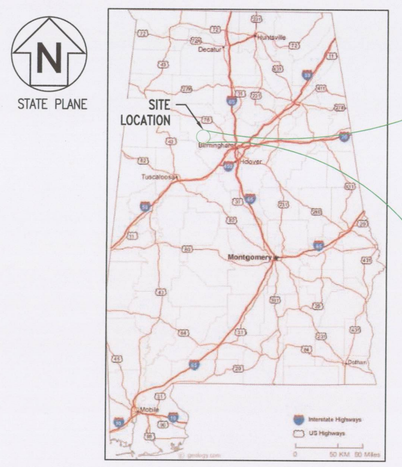
AMENDMENTS TO THE CBMPP
THE OWNER OR OPERATOR MUST COMMUNICATE WITH THE LICENSED PROFESSIONAL WHO PREPARED THE CBMPP IF CURRENT BMP's AND EROSION CONTROL MEASURES ARE NOT EFFECTIVELY ELIMINATING OR MINIMIZING THE POLLUTANTS PRESENT IN STORMWATER DISCHARGES AT THE SITE. ANY SIGNIFICANT CHANGES MUST BE UPDATED BY SAME.

A COPY OF THE CBMPP MUST BE RETAINED ON-SITE OR AT AN ALTERNATIVE LOCATION PREVIOUSLY IDENTIFIED TO ADEM. ALL PERSONS ASSOCIATED WITH THE PROJECT MUST BE PROVIDED A COPY OF THE CBMPP, AND IT IS IMPORTANT THAT THE REGISTRANT OBTAIN WRITTEN ACKNOWLEDGEMENT THAT A COPY OF THE CBMPP HAS BEEN OBTAINED BY ALL PERSONS ASSOCIATED WITH THE PROJECT.

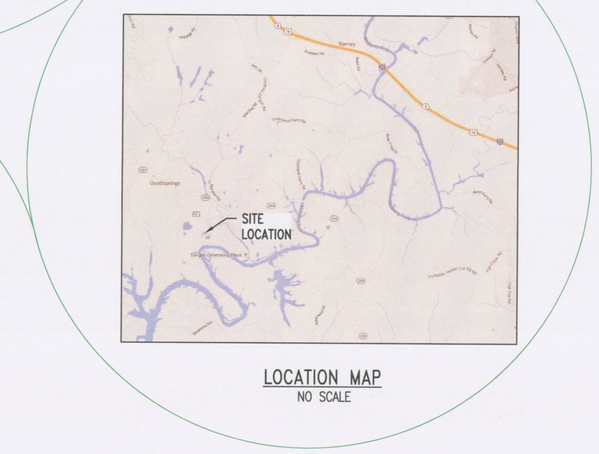
NON-STORM WATER DISCHARGE
IT IS NOT ANTICIPATED THAT ANY NON-STORM WATER DISCHARGES WILL OCCUR. IF IT IS DETERMINED THAT NON-STORM WATER DISCHARGES WILL BE MADE, INCLUDING DISCHARGES FROM FIRE FIGHTING ACTIVITIES, FIRE HYDRANT FLUSHING, POTABLE WATER SOURCES, INCLUDING INLINE FLUSHING, IRRIGATION DRAINAGE, AIR CONDITIONING CONDENSATE, SPRINGS, UNCONTAMINATED GROUND WATER, FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE TO BE CONTAMINATED WITH PROCESS MATERIALS OR POLLUTANTS, THIS SECTION WILL BE AMENDED WITH THE DETAILS OF THE DRAINAGE. NO UNAUTHORIZED NON-STORMWATER DISCHARGES SHALL BE RELEASED OFF-SITE. ANY DRUM WASH DISCHARGE, CONCRETE TRUCK WASHOUT, AND RINSEWATERS MUST BE CONTAINED AND REMOVED FROM THE SITE ACCORDING TO LOCAL, STATE, AND FEDERAL REGULATIONS.

NOTE:
CBMPP DRAWINGS SHALL MEET OR EXCEED ALL REQUIREMENTS AND SPECIFICATIONS OF THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, LATEST EDITION.

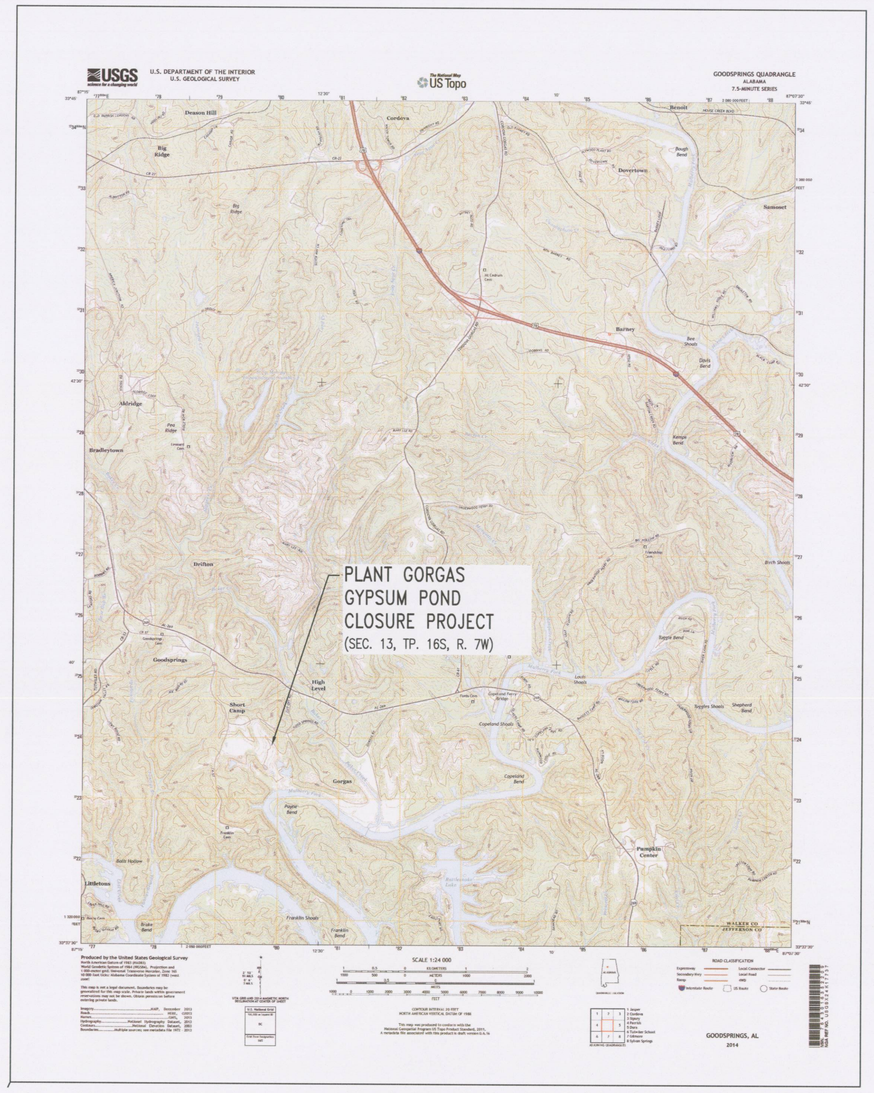
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, MONITORING, RECORD KEEPING AND CBMPP REQUIRED INSPECTIONS FOR THE LIFE OF THE PROJECT AND UNTIL FINAL STABILIZATION IS REACHED AS OUTLINED IN SECTION 7 OF THE CBMPP TEMPLATE. FINAL STABILIZATION APPROVAL FROM THE OWNER AND APCO ENVIRONMENTAL AFFAIRS IS REQUIRED. ALL RECORDS AND INSPECTION REPORTS MUST RECEIVE FINAL APPROVAL FROM ALABAMA POWER COMPANY ENVIRONMENTAL AFFAIRS.



VICINITY MAP
NO SCALE



LOCATION MAP
NO SCALE



GOODSPRINGS, AL QUADRANGLE 2014
SCALE: 1"=1000'

REFERENCES:

E720308-E720330
E720332-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP NOTES
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720331	1	FINAL	0

ANSI E: 44x34

PLANT GORGAS GYPSUM POND CLOSURE
CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)
WALKER COUNTY, ALABAMA

NOTE: ALL MEASURES OUTLINED IN THIS PLAN ARE TO BE IN ACCORDANCE WITH THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS," CURRENT EDITION, WITH THE INFORMATION BELOW FOLLOWING THE CBMPP TEMPLATE.

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 PROJECT/SITE INFORMATION

PROJECT NAME: PLANT GORGAS GYPSUM POND CLOSURE
PROJECT LOCATION: PLANT GORGAS
460 GORGAS ROAD
PARRISH, AL 35580
WALKER COUNTY, ALABAMA

LATITUDE/LONGITUDE OF THE SITE CONSTRUCTION ENTRANCE/EXIT: 33°38'43.59" N 87°11'43.53" W

METHOD FOR DETERMINING LATITUDE/LONGITUDE: GOOGLE MAPS

1.2 CONTACT INFORMATION/RESPONSIBLE PARTIES

PERMITTEE:
ALABAMA POWER COMPANY (APC)
PAMELA R. McDANIEL, P.E.
600 18TH STREET NORTH
BOX 2641
BIRMINGHAM, ALABAMA 35203
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

PROJECT MANAGER:
SOUTHERN COMPANY SERVICES, INC.
DAVID B. PRATER
460 GORGAS ROAD
PARRISH, ALABAMA 35580-5715
TEL.: (205) 992-7266
EMAIL: DBPRATER@SOUTHERNCO.COM

CBMPP CONTACT/QCP:
ALABAMA POWER COMPANY
PAMELA R. McDANIEL, P.E.
P.O. BOX 2641
BIRMINGHAM, ALABAMA 35291
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

QCI
ALABAMA POWER COMPANY
JESSICA SMOKE
600 18TH STREET NORTH
BIN 12N-0830
BIRMINGHAM, AL 35203
TEL: (205) 257-4255
EMAIL: JSMOKE@SOUTHERNCO.COM

EMERGENCY 24-HOUR CONTACT:
ALABAMA POWER COMPANY
MAJOR HOLLIS
TEL: (205) 488-2388

1.3 NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY

PERMIT REQUIREMENT(S):
PART III.D.3. (b) REQUIRED A DESCRIPTION OF THE INTENDED SEQUENCE OF MAJOR ACTIVITIES WHICH DISTURB SOILS, INCLUDING BUT NOT LIMITED TO, GRUBBING, EXCAVATION, AND/OR GRADING.

PART III.D.3. (c) REQUIRES ESTIMATES OF THE TOTAL AREA EXPECTED TO BE DISTURBED BY GRUBBING, EXCAVATION, AND/OR GRADING, INCLUDING OFFSITE BORROW AND FILL AREAS.

NATURE OF CONSTRUCTION ACTIVITIES:

THE PLANT GORGAS GYPSUM POND CLOSURE PROJECT CONSISTS OF REMOVING THE GYPSUM WITHIN THE EXISTING PARTIALLY FILLED POND AND GRADING THE AREA TO DRAIN. CONSTRUCTION FOR THIS PROJECT WILL ALSO CONSIST OF GRADING IN AREAS OUTSIDE OF THE LINED POND INCLUDING DITCH AND PIPE CONSTRUCTION AND REMOVAL/GRADING OF THE EXISTING HDPE LINED SEDIMENT AND CLEAR POOL PONDS AND EMERGENCY STORAGE CELL.

THE CURRENT PLANT PROCESS SYSTEM CONSISTING OF A PUMPED RETURN LINE FROM THE LEACHATE COLLECTION SYSTEM'S LINED PONDS WILL BE UTILIZED DURING CONSTRUCTION TO COLLECT PUMP AND TREAT CCR CONTACT WATER. NO CONTACT WATER WILL BE ALLOWED TO DISCHARGE INTO THE NEARBY STREAMS (MULBERRY FORK). A SEDIMENT POND WILL BE CONSTRUCTED TO RECEIVE NON-CONTACT STORMWATER. THIS POND WILL BE UTILIZED AS A DETENTION POND UPON COMPLETION OF THIS PROJECT.

CONSTRUCTION SITE ESTIMATES:

AREA TO BE DISTURBED

POND CLOSURE AREA	38.0 ACRES (APPROX.)
IMPERVIOUS AREA ADDED* (PERCENTAGE OF TOTAL)	0%

ANTICIPATED OFF-SITE FILL AREAS WILL BE COORDINATED WITH PLANT GORGAS.

TABLE 1. INTENDED SEQUENCE AND BMP IMPLEMENTATION

ESTIMATED DATES OF ACTIVITY	CONSTRUCTION ACTIVITY AND BMPs TO BE IMPLEMENTED
TBD – DURATION APPROX. 1 WEEKS	CONTRACTOR MOBILIZATION
TBD – DURATION APPROX. 2 WEEKS	–INSTALL INITIAL BMP'S (SILT FENCE, CHECK DAMS, INLET PROTECTION) –INSTALL EAST BYPASS DITCH TO INTERCEPT OFF-SITE STORMWATER RUNOFF AND DIRECT AWAY FROM GYPSUM POND AREA.
TBD – DURATION APPROX. 36 WEEKS	–REMOVE EXISTING LINER SYSTEM AND ASH BEDDING BELOW. INSTALL INTERMEDIATE BMP'S (DIVERSION, DITCH CHECKS AND INLET PROTECTION) WITHIN GYPSUM POND AREA TO CONTROL STORMWATER RUNOFF AND DIRECT INTO EXISTING PLANT TREATMENT SYSTEM. –CONSTRUCT NEW SEDIMENT POND, INSTALLING 60" RCP & TEMP. RISER. –GRADE BENCHES TO DRAIN, INSTALL RIP RAP FLUMES AND CENTRAL DRAINAGE DITCH AT POND BOTTOM. (THIS MAY BE PERFORMED CONCURRENTLY WITH LINER/ASH REMOVAL AND GRADING BY INSTALLING AT HIGHER ELEVATIONS TO PREVENT ASH CONTACT.) –INSTALL FINAL COVER SYSTEM AS WORK PROGRESSES. –REMOVE LINER SYSTEM AND ASH AT EMERGENCY STORAGE CELL.
TBD – DURATION APPROX. 4 WEEKS	–EXCAVATE DIKE AT SW CORNER OF GYPSUM POND TO BREACH CONTAINMENT. PLACE COMPACTED FILL IN EMERGENCY STORAGE CELL AREA AND SW CORNER OF SITE. –PLUG REMAINING PIPE SYSTEM IN GYPSUM POND.
TBD – DURATION APPROX. 8 WEEKS	–DIVERT STORM WATER TO NEW SEDIMENT POND. –INSTALL NEW DISCHARGE PIPE AT SW CORNER UNDER ROAD TO TRANSLOADER AREA. –REMOVE LINER SYSTEMS AND ASH BEDDING LAYER AT SEDIMENT POND AND CLEAR POOL. SHUT OFF DISCHARGE TO PLANT TREATMENT SYSTEM AND REMOVE BUILDING AND PUMPS ALONG WITH DISCHARGE LINE(S) TO PLANT WWT. –GRADE SEDIMENT POND AND CLEAR POOL AREAS TO DRAIN TO SW CORNER DISCHARGE PIPE AND PLACE FINAL COVER.
TBD – DURATION APPROX. 1 WEEK	CONTRACTOR DEMOBILIZE – SITE STABILIZED, TEMPORARY BMPS REMOVED

PROPOSED ACTIVITIES TO BE CONDUCTED ARE INDUSTRIAL.

REFER TO CBMPP TEMPLATE PACKAGE FOR LIST OF MULTIPLE OPERATORS AND REQUIRED INFORMATION.

1.4 RECEIVING WATERS

DESCRIPTION OF RECEIVING WATERS:
THE EXISTING SITE RUNOFF FOR THE GORGAS POND CLOSURE PROJECT CURRENTLY IS CONVEYED TO THE EXISTING STORMWATER COLLECTION POND LOCATED NORTH OF THE MULBERRY FORK RIVER WHICH FLOWS SOUTH INTO THE BLACK WARRIOR RIVER BASIN.
THE PROPOSED STORM DRAINAGE SYSTEM WILL CONTINUE TO COLLECT AND CONVEY STORMWATER RUNOFF TO THE STORMWATER COLLECTION POND. THE POND DISCHARGE WILL CONTINUE TO THE EXISTING PERMITTED NPDES DISCHARGE LOCATION ON THE NORTH SIDE OF THE MULBERRY FORK RIVER.

EXISTING STORM SEWER SYSTEMS:
THE EXISTING STORM DRAINAGE SYSTEM WITHIN THE CONSTRUCTION LIMITS IS OWNED AND MAINTAINED BY PLANT GORGAS STEAM PLANT

IMPAIRED WATERS OR WATERS SUBJECT TO TMDLs:
REFER TO THE CBMPP TEMPLATE, SECTION 1.3 FOR DETERMINATION IF ANY WATERBODIES NAMED ABOVE ARE OUTSTANDING ALABAMA WATERS (OAW), OUTSTANDING NATIONAL RESOURCE WATERS (ONRW), OR TREASURED ALABAMA LAKE (TAL), OR IF ANY OF THE WATERBODIES DOWNSTREAM OF THE WASTEWATER MANAGEMENT PROJECT ARE IMPAIRED AND/OR SUBJECT TO TOTAL MAXIMUM DAILY LOADS (TMDLs).

1.5 POTENTIAL SOURCES OF POLLUTION

STORMWATER RUNOFF CONTAINING MINOR SEDIMENT MAY OCCUR DURING CONSTRUCTION DUE TO GRADING OPERATIONS, BUT THE PROPOSED CONSTRUCTION BEST MANAGEMENT PRACTICES (CBMPP) WILL BE UTILIZED DURING CONSTRUCTION OF THE WASTEWATER MANAGEMENT PROJECT AND WILL MINIMIZE THE POTENTIAL FOR SEDIMENT IN THE STORMWATER RUNOFF.

THERE ARE NO KNOWN POTENTIAL POLLUTANTS IDENTIFIED OTHER THAN SEDIMENT TO STORMWATER RUNOFF.

1.6 MAPS

REFER TO CBMPP TEMPLATE PACKAGE FOR ANY MAPS REQUIRED THAT ARE NOT PROVIDED ON THE CBMPP DRAWINGS.

1.7 ADDITIONAL INFORMATION

REFER TO CBMPP TEMPLATE PACKAGE FOR A LISTING OF ADDITIONAL INFORMATION (I.E., ENDANGERED SPECIES HISTORIC PRESERVATION, AND U.S. CORPS OF ENGINEERS DOCUMENTATION) PROVIDED IN APPENDIX H.

1.8 DELEGATION OF AUTHORITY

REFER TO CBMPP TEMPLATE PACKAGE FOR THE DELEGATION OF AUTHORITY FORM PROVIDED IN APPENDIX J.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

REFER TO DRAWING E720308 FOR THE CBMPP DRAWING LIST

MEASURING RAINFALL
A RAIN GAUGE MUST BE INSTALLED AT THE SITE, AND RAINFALL MEASUREMENTS MUST BE RECORDED EVERY 24 HOURS.

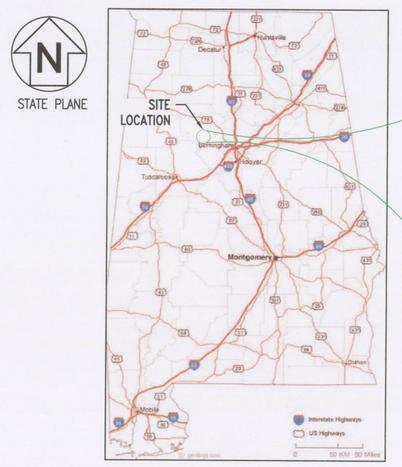
AMENDMENTS TO THE CBMPP
THE OWNER OR OPERATOR MUST COMMUNICATE WITH THE LICENSED PROFESSIONAL WHO PREPARED THE CBMPP IF CURRENT BMP's AND EROSION CONTROL MEASURES ARE NOT EFFECTIVELY ELIMINATING OR MINIMIZING THE POLLUTANTS PRESENT IN STORMWATER DISCHARGES AT THE SITE. ANY SIGNIFICANT CHANGES MUST BE UPDATED BY SAME.

A COPY OF THE CBMPP MUST BE RETAINED ON-SITE OR AT AN ALTERNATIVE LOCATION PREVIOUSLY IDENTIFIED TO ADEM. ALL PERSONS ASSOCIATED WITH THE PROJECT MUST BE PROVIDED A COPY OF THE CBMPP, AND IT IS IMPORTANT THAT THE REGISTRANT OBTAIN WRITTEN ACKNOWLEDGEMENT THAT A COPY OF THE CBMPP HAS BEEN OBTAINED BY ALL PERSONS ASSOCIATED WITH THE PROJECT.

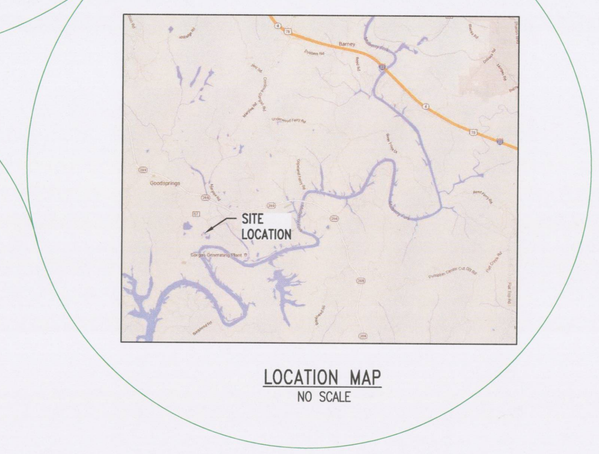
NON-STORM WATER DISCHARGE
IT IS NOT ANTICIPATED THAT ANY NON-STORM WATER DISCHARGES WILL OCCUR. IF IT IS DETERMINED THAT NON-STORM WATER DISCHARGES WILL BE MADE, INCLUDING DISCHARGES FROM FIRE FIGHTING ACTIVITIES, FIRE HYDRANT FLUSHING, POTABLE WATER SOURCES, INCLUDING INLINE FLUSHING, IRRIGATION DRAINAGE, AIR CONDITIONING CONDENSATE, SPRINGS, UNCONTAMINATED GROUND WATER, FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE TO BE CONTAMINATED WITH PROCESS MATERIALS OR POLLUTANTS, THIS SECTION WILL BE AMENDED WITH THE DETAILS OF THE DRAINAGE. NO UNAUTHORIZED NON-STORMWATER DISCHARGES SHALL BE RELEASED OFF-SITE. ANY DRUM WASH DISCHARGE, CONCRETE TRUCK WASHOUT, AND RINSEWATERS MUST BE CONTAINED AND REMOVED FROM THE SITE ACCORDING TO LOCAL, STATE, AND FEDERAL REGULATIONS.

NOTE:
CBMPP DRAWINGS SHALL MEET OR EXCEED ALL REQUIREMENTS AND SPECIFICATIONS OF THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, LATEST EDITION.

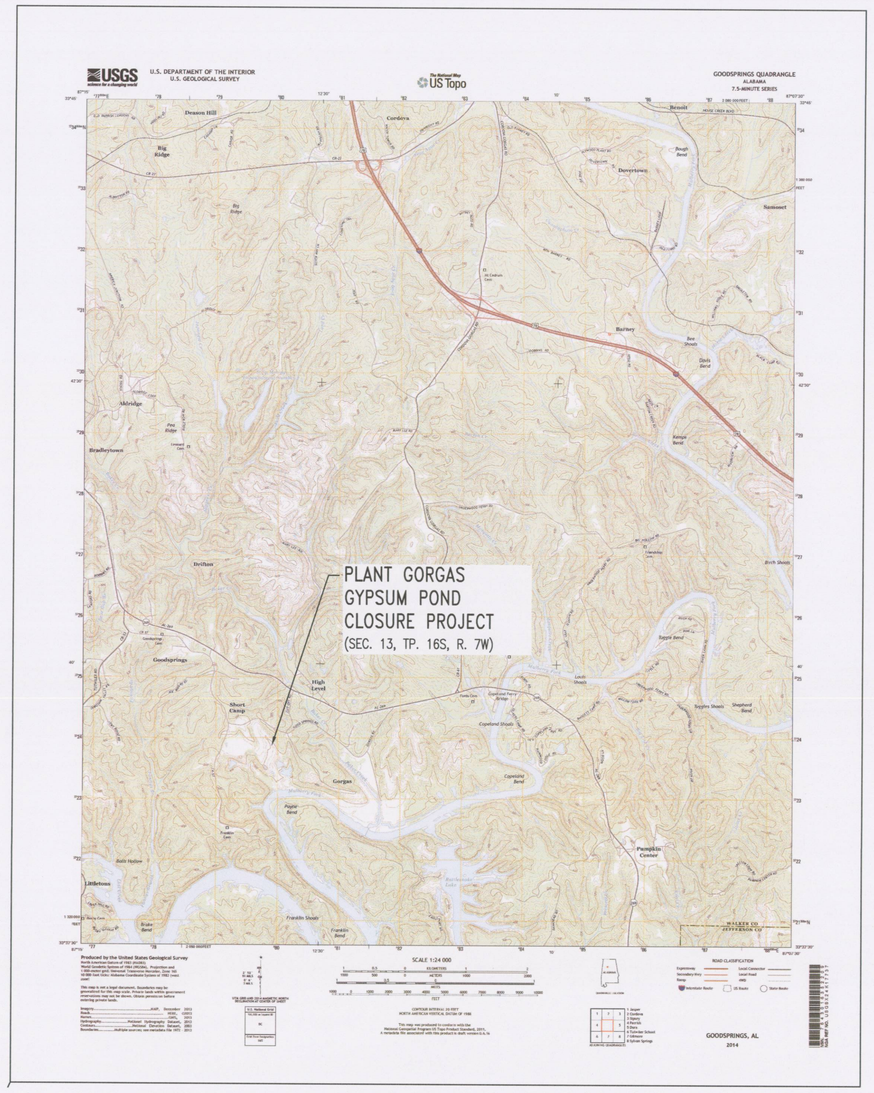
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, MONITORING, RECORD KEEPING AND CBMPP REQUIRED INSPECTIONS FOR THE LIFE OF THE PROJECT AND UNTIL FINAL STABILIZATION IS REACHED AS OUTLINED IN SECTION 7 OF THE CBMPP TEMPLATE. FINAL STABILIZATION APPROVAL FROM THE OWNER AND APCO ENVIRONMENTAL AFFAIRS IS REQUIRED. ALL RECORDS AND INSPECTION REPORTS MUST RECEIVE FINAL APPROVAL FROM ALABAMA POWER COMPANY ENVIRONMENTAL AFFAIRS.



VICINITY MAP
NO SCALE



LOCATION MAP
NO SCALE



GOODSPRINGS, AL QUADRANGLE 2014
SCALE: 1"=1000'

REFERENCES:

E720308-E720330
E720332-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP NOTES
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720331	1	FINAL	0

ANSI E: 44x34

PLANT GORGAS GYPSUM POND CLOSURE
CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)
WALKER COUNTY, ALABAMA

NOTE: ALL MEASURES OUTLINED IN THIS PLAN ARE TO BE IN ACCORDANCE WITH THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS," CURRENT EDITION, WITH THE INFORMATION BELOW FOLLOWING THE CBMPP TEMPLATE.

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 PROJECT/SITE INFORMATION

PROJECT NAME: PLANT GORGAS GYPSUM POND CLOSURE
PROJECT LOCATION: PLANT GORGAS
460 GORGAS ROAD
PARRISH, AL 35580
WALKER COUNTY, ALABAMA

LATITUDE/LONGITUDE OF THE SITE CONSTRUCTION ENTRANCE/EXIT: 33°38'43.59" N 87°11'43.53" W

METHOD FOR DETERMINING LATITUDE/LONGITUDE: GOOGLE MAPS

1.2 CONTACT INFORMATION/RESPONSIBLE PARTIES

PERMITTEE:
ALABAMA POWER COMPANY (APC)
PAMELA R. McDANIEL, P.E.
600 18TH STREET NORTH
BOX 2641
BIRMINGHAM, ALABAMA 35203
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

PROJECT MANAGER:
SOUTHERN COMPANY SERVICES, INC.
DAVID B. PRATER
460 GORGAS ROAD
PARRISH, ALABAMA 35580-5715
TEL.: (205) 992-7266
EMAIL: DBPRATER@SOUTHERNCO.COM

CBMPP CONTACT/QCP:
ALABAMA POWER COMPANY
PAMELA R. McDANIEL, P.E.
P.O. BOX 2641
BIRMINGHAM, ALABAMA 35291
TEL.: (205) 257-4190
EMAIL: PJMCDANI@SOUTHERNCO.COM

QCI
ALABAMA POWER COMPANY
JESSICA SMOKE
600 18TH STREET NORTH
BIN 12N-0830
BIRMINGHAM, AL 35203
TEL: (205) 257-4255
EMAIL: JSMOKE@SOUTHERNCO.COM

EMERGENCY 24-HOUR CONTACT:
ALABAMA POWER COMPANY
MAJOR HOLLIS
TEL: (205) 488-2388

1.3 NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY

PERMIT REQUIREMENT(S):
PART III.D.3. (b) REQUIRED A DESCRIPTION OF THE INTENDED SEQUENCE OF MAJOR ACTIVITIES WHICH DISTURB SOILS, INCLUDING BUT NOT LIMITED TO, GRUBBING, EXCAVATION, AND/OR GRADING.

PART III.D.3. (c) REQUIRES ESTIMATES OF THE TOTAL AREA EXPECTED TO BE DISTURBED BY GRUBBING, EXCAVATION, AND/OR GRADING, INCLUDING OFFSITE BORROW AND FILL AREAS.

NATURE OF CONSTRUCTION ACTIVITIES:

THE PLANT GORGAS GYPSUM POND CLOSURE PROJECT CONSISTS OF REMOVING THE GYPSUM WITHIN THE EXISTING PARTIALLY FILLED POND AND GRADING THE AREA TO DRAIN. CONSTRUCTION FOR THIS PROJECT WILL ALSO CONSIST OF GRADING IN AREAS OUTSIDE OF THE LINED POND INCLUDING DITCH AND PIPE CONSTRUCTION AND REMOVAL/GRADING OF THE EXISTING HDPE LINED SEDIMENT AND CLEAR POOL PONDS AND EMERGENCY STORAGE CELL.

THE CURRENT PLANT PROCESS SYSTEM CONSISTING OF A PUMPED RETURN LINE FROM THE LEACHATE COLLECTION SYSTEM'S LINED PONDS WILL BE UTILIZED DURING CONSTRUCTION TO COLLECT PUMP AND TREAT CCR CONTACT WATER. NO CONTACT WATER WILL BE ALLOWED TO DISCHARGE INTO THE NEARBY STREAMS (MULBERRY FORK). A SEDIMENT POND WILL BE CONSTRUCTED TO RECEIVE NON-CONTACT STORMWATER. THIS POND WILL BE UTILIZED AS A DETENTION POND UPON COMPLETION OF THIS PROJECT.

CONSTRUCTION SITE ESTIMATES:

AREA TO BE DISTURBED

POND CLOSURE AREA	38.0 ACRES (APPROX.)
IMPERVIOUS AREA ADDED* (PERCENTAGE OF TOTAL)	0%

ANTICIPATED OFF-SITE FILL AREAS WILL BE COORDINATED WITH PLANT GORGAS.

TABLE 1. INTENDED SEQUENCE AND BMP IMPLEMENTATION

ESTIMATED DATES OF ACTIVITY	CONSTRUCTION ACTIVITY AND BMPs TO BE IMPLEMENTED
TBD – DURATION APPROX. 1 WEEKS	CONTRACTOR MOBILIZATION
TBD – DURATION APPROX. 2 WEEKS	–INSTALL INITIAL BMP'S (SILT FENCE, CHECK DAMS, INLET PROTECTION) –INSTALL EAST BYPASS DITCH TO INTERCEPT OFF-SITE STORMWATER RUNOFF AND DIRECT AWAY FROM GYPSUM POND AREA.
TBD – DURATION APPROX. 36 WEEKS	–REMOVE EXISTING LINER SYSTEM AND ASH BEDDING BELOW. INSTALL INTERMEDIATE BMP'S (DIVERSION, DITCH CHECKS AND INLET PROTECTION) WITHIN GYPSUM POND AREA TO CONTROL STORMWATER RUNOFF AND DIRECT INTO EXISTING PLANT TREATMENT SYSTEM. –CONSTRUCT NEW SEDIMENT POND, INSTALLING 60" RCP & TEMP. RISER. –GRADE BENCHES TO DRAIN, INSTALL RIP RAP FLUMES AND CENTRAL DRAINAGE DITCH AT POND BOTTOM. (THIS MAY BE PERFORMED CONCURRENTLY WITH LINER/ASH REMOVAL AND GRADING BY INSTALLING AT HIGHER ELEVATIONS TO PREVENT ASH CONTACT.) –INSTALL FINAL COVER SYSTEM AS WORK PROGRESSES. –REMOVE LINER SYSTEM AND ASH AT EMERGENCY STORAGE CELL.
TBD – DURATION APPROX. 4 WEEKS	–EXCAVATE DIKE AT SW CORNER OF GYPSUM POND TO BREACH CONTAINMENT. PLACE COMPACTED FILL IN EMERGENCY STORAGE CELL AREA AND SW CORNER OF SITE. –PLUG REMAINING PIPE SYSTEM IN GYPSUM POND.
TBD – DURATION APPROX. 8 WEEKS	–DIVERT STORM WATER TO NEW SEDIMENT POND. –INSTALL NEW DISCHARGE PIPE AT SW CORNER UNDER ROAD TO TRANSLOADER AREA. –REMOVE LINER SYSTEMS AND ASH BEDDING LAYER AT SEDIMENT POND AND CLEAR POOL. SHUT OFF DISCHARGE TO PLANT TREATMENT SYSTEM AND REMOVE BUILDING AND PUMPS ALONG WITH DISCHARGE LINE(S) TO PLANT WWT. –GRADE SEDIMENT POND AND CLEAR POOL AREAS TO DRAIN TO SW CORNER DISCHARGE PIPE AND PLACE FINAL COVER.
TBD – DURATION APPROX. 1 WEEK	CONTRACTOR DEMOBILIZE – SITE STABILIZED, TEMPORARY BMPS REMOVED

PROPOSED ACTIVITIES TO BE CONDUCTED ARE INDUSTRIAL.

REFER TO CBMPP TEMPLATE PACKAGE FOR LIST OF MULTIPLE OPERATORS AND REQUIRED INFORMATION.

1.4 RECEIVING WATERS

DESCRIPTION OF RECEIVING WATERS:
THE EXISTING SITE RUNOFF FOR THE GORGAS POND CLOSURE PROJECT CURRENTLY IS CONVEYED TO THE EXISTING STORMWATER COLLECTION POND LOCATED NORTH OF THE MULBERRY FORK RIVER WHICH FLOWS SOUTH INTO THE BLACK WARRIOR RIVER BASIN.
THE PROPOSED STORM DRAINAGE SYSTEM WILL CONTINUE TO COLLECT AND CONVEY STORMWATER RUNOFF TO THE STORMWATER COLLECTION POND. THE POND DISCHARGE WILL CONTINUE TO THE EXISTING PERMITTED NPDES DISCHARGE LOCATION ON THE NORTH SIDE OF THE MULBERRY FORK RIVER.

EXISTING STORM SEWER SYSTEMS:
THE EXISTING STORM DRAINAGE SYSTEM WITHIN THE CONSTRUCTION LIMITS IS OWNED AND MAINTAINED BY PLANT GORGAS STEAM PLANT

IMPAIRED WATERS OR WATERS SUBJECT TO TMDLs:
REFER TO THE CBMPP TEMPLATE, SECTION 1.3 FOR DETERMINATION IF ANY WATERBODIES NAMED ABOVE ARE OUTSTANDING ALABAMA WATERS (OAW), OUTSTANDING NATIONAL RESOURCE WATERS (ONRW), OR TREASURED ALABAMA LAKE (TAL), OR IF ANY OF THE WATERBODIES DOWNSTREAM OF THE WASTEWATER MANAGEMENT PROJECT ARE IMPAIRED AND/OR SUBJECT TO TOTAL MAXIMUM DAILY LOADS (TMDLs).

1.5 POTENTIAL SOURCES OF POLLUTION

STORMWATER RUNOFF CONTAINING MINOR SEDIMENT MAY OCCUR DURING CONSTRUCTION DUE TO GRADING OPERATIONS, BUT THE PROPOSED CONSTRUCTION BEST MANAGEMENT PRACTICES (CBMPP) WILL BE UTILIZED DURING CONSTRUCTION OF THE WASTEWATER MANAGEMENT PROJECT AND WILL MINIMIZE THE POTENTIAL FOR SEDIMENT IN THE STORMWATER RUNOFF.

THERE ARE NO KNOWN POTENTIAL POLLUTANTS IDENTIFIED OTHER THAN SEDIMENT TO STORMWATER RUNOFF.

1.6 MAPS

REFER TO CBMPP TEMPLATE PACKAGE FOR ANY MAPS REQUIRED THAT ARE NOT PROVIDED ON THE CBMPP DRAWINGS.

1.7 ADDITIONAL INFORMATION

REFER TO CBMPP TEMPLATE PACKAGE FOR A LISTING OF ADDITIONAL INFORMATION (I.E., ENDANGERED SPECIES HISTORIC PRESERVATION, AND U.S. CORPS OF ENGINEERS DOCUMENTATION) PROVIDED IN APPENDIX H.

1.8 DELEGATION OF AUTHORITY

REFER TO CBMPP TEMPLATE PACKAGE FOR THE DELEGATION OF AUTHORITY FORM PROVIDED IN APPENDIX J.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

REFER TO DRAWING E720308 FOR THE CBMPP DRAWING LIST

MEASURING RAINFALL
A RAIN GAUGE MUST BE INSTALLED AT THE SITE, AND RAINFALL MEASUREMENTS MUST BE RECORDED EVERY 24 HOURS.

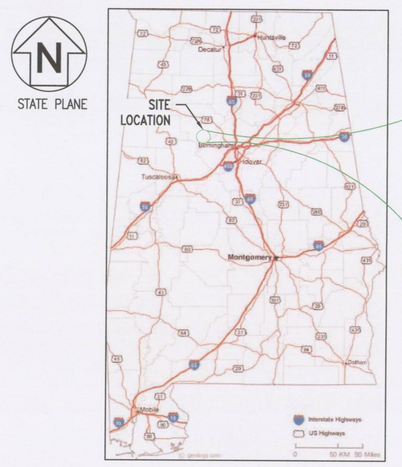
AMENDMENTS TO THE CBMPP
THE OWNER OR OPERATOR MUST COMMUNICATE WITH THE LICENSED PROFESSIONAL WHO PREPARED THE CBMPP IF CURRENT BMP's AND EROSION CONTROL MEASURES ARE NOT EFFECTIVELY ELIMINATING OR MINIMIZING THE POLLUTANTS PRESENT IN STORMWATER DISCHARGES AT THE SITE. ANY SIGNIFICANT CHANGES MUST BE UPDATED BY SAME.

A COPY OF THE CBMPP MUST BE RETAINED ON-SITE OR AT AN ALTERNATIVE LOCATION PREVIOUSLY IDENTIFIED TO ADEM. ALL PERSONS ASSOCIATED WITH THE PROJECT MUST BE PROVIDED A COPY OF THE CBMPP, AND IT IS IMPORTANT THAT THE REGISTRANT OBTAIN WRITTEN ACKNOWLEDGEMENT THAT A COPY OF THE CBMPP HAS BEEN OBTAINED BY ALL PERSONS ASSOCIATED WITH THE PROJECT.

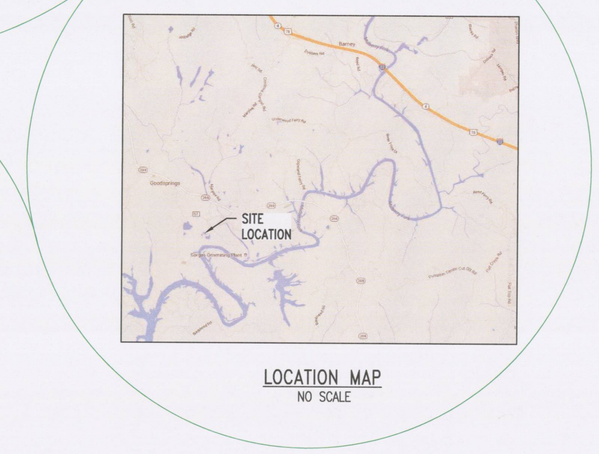
NON-STORM WATER DISCHARGE
IT IS NOT ANTICIPATED THAT ANY NON-STORM WATER DISCHARGES WILL OCCUR. IF IT IS DETERMINED THAT NON-STORM WATER DISCHARGES WILL BE MADE, INCLUDING DISCHARGES FROM FIRE FIGHTING ACTIVITIES, FIRE HYDRANT FLUSHING, POTABLE WATER SOURCES, INCLUDING INLINE FLUSHING, IRRIGATION DRAINAGE, AIR CONDITIONING CONDENSATE, SPRINGS, UNCONTAMINATED GROUND WATER, FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE TO BE CONTAMINATED WITH PROCESS MATERIALS OR POLLUTANTS, THIS SECTION WILL BE AMENDED WITH THE DETAILS OF THE DRAINAGE. NO UNAUTHORIZED NON-STORMWATER DISCHARGES SHALL BE RELEASED OFF-SITE. ANY DRUM WASH DISCHARGE, CONCRETE TRUCK WASHOUT, AND RINSEWATERS MUST BE CONTAINED AND REMOVED FROM THE SITE ACCORDING TO LOCAL, STATE, AND FEDERAL REGULATIONS.

NOTE:
CBMPP DRAWINGS SHALL MEET OR EXCEED ALL REQUIREMENTS AND SPECIFICATIONS OF THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, LATEST EDITION.

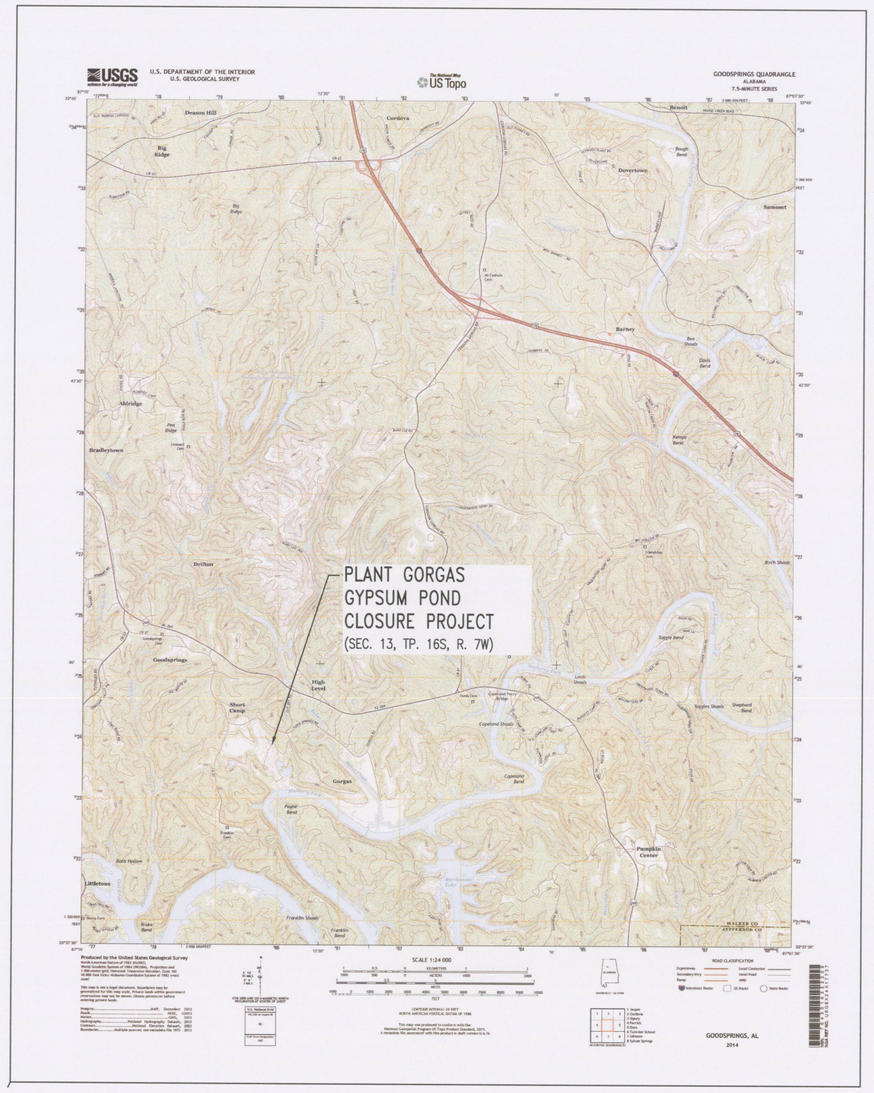
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, MONITORING, RECORD KEEPING AND CBMPP REQUIRED INSPECTIONS FOR THE LIFE OF THE PROJECT AND UNTIL FINAL STABILIZATION IS REACHED AS OUTLINED IN SECTION 7 OF THE CBMPP TEMPLATE. FINAL STABILIZATION APPROVAL FROM THE OWNER AND APCO ENVIRONMENTAL AFFAIRS IS REQUIRED. ALL RECORDS AND INSPECTION REPORTS MUST RECEIVE FINAL APPROVAL FROM ALABAMA POWER COMPANY ENVIRONMENTAL AFFAIRS.



VICINITY MAP
NO SCALE



LOCATION MAP
NO SCALE



GOODSPRINGS, AL QUADRANGLE 2014
SCALE: 1"=1000'

REFERENCES:

E720308-E720330
E720332-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

Approved

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP NOTES
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720331	1	FINAL	0

ANSI E: 44x34

SECTION 2.0: EROSION AND SEDIMENT CONTROL BMPs

PERMIT REQUIREMENT(S):
PART III.A.4. REQUIRES THE PERMITTEE TO IMPLEMENT EROSION CONTROL AND SEDIMENT CONTROL MEASURES OR REQUIREMENTS TO ACHIEVE THE POLLUTANT REDUCTIONS CONSISTENT WITH A TMDL FINALIZED TO APPROVED BY EPA. APPLICABLE TMDLS ARE LOCATED AND/OR CAN BE ACCESSED AT http://adem.alabama.gov/programs/water/approvedTMDLs.htm

PART III.A.14. REQUIRES THAT THE EROSION CONTROL AND SEDIMENT CONTROL MEASURES TO BE DESIGNED, IMPLEMENTED, AND MAINTAINED TO, AT A MINIMUM, ADDRESS THE FOLLOWING ADDITIONAL DESIGN REQUIREMENTS:

- (A) SEDIMENT CONTROL MEASURES, EROSION CONTROL MEASURES, AND OTHER SITE MANAGEMENT PRACTICES MUST BE PROPERLY SELECTED BASED ON SITE-SPECIFIC CONDITIONS, MUST MEET OR EXCEED THE TECHNICAL STANDARDS OUTLINED IN THE ALABAMA HANDBOOK AND THE SITE-SPECIFIC CBMPP PREPARED IN ACCORDANCE WITH PART III.D.
- (B) UNLESS SPECIFIED OTHERWISE BY THE ALABAMA HANDBOOK, SEDIMENT CONTROL MEASURES, EROSION CONTROL MEASURES AND OTHER SITE MANAGEMENT PRACTICES SHALL BE DESIGNED AND MAINTAINED TO MINIMIZE EROSION AND MAXIMIZE SEDIMENT REMOVAL RESULTING FROM A 2-YEAR, 24-HOUR STORM EVENT.
- (C) THE PERMITTEE IS ENCOURAGED TO DESIGN THE SITE, THE EROSION PREVENTION MEASURES, SEDIMENT CONTROLS MEASURES, AND OTHER SITE MANAGEMENT PRACTICES WITH CONSIDERATION OF MINIMIZING STORMWATER RUNOFF, BOTH DURING AND FOLLOWING CONSTRUCTION, INCLUDING FACILITATING THE USE OF LOW-IMPACT DEVELOPMENT (LID) AND GREEN TECHNOLOGIES.

THE CBMPP DRAWINGS HAVE BEEN DESIGNED TO MINIMIZE DISTURBED AREAS AND PROTECT NATURAL FEATURES AND SOIL WITHIN AND BEYOND THE SITE CONSTRUCTION AREAS.

2.1 PHASE CONSTRUCTION ACTIVITY

PERMIT REQUIREMENT(S):
PART III.A.1. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, MINIMIZE THE AMOUNT OF SOIL EXPOSED DURING CONSTRUCTION ACTIVITY THROUGH THE USE OF PROJECT PHASING OR OTHER APPROPRIATE TECHNIQUES.

PART III.E.4. (d) REQUIRES A DETAILED DESCRIPTION OF THE EROSION CONTROLS, SEDIMENT CONTROLS, AND MANAGEMENT PRACTICES TO BE IMPLEMENTED AT THE SITE DURING EACH SEQUENCE OF ACTIVITY IN ACCORDANCE WITH PART III.A.

THE CBMPP DRAWINGS HAVE BEEN PHASED WITH SUITABLE BMPS AND DURATION OF EACH PHASE TO ASSURE STABILIZATION OF SOIL DURING EACH PHASE OF CONSTRUCTION.

2.2 CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT

PERMIT REQUIREMENT(S):
PART III.A.3. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION.

PART III.A.5. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, CONTROL STORMWATER DISCHARGES, INCLUDING BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND TO MINIMIZE DOWNSTREAM CHANNEL AND STREAMBANK EROSION.

STRUCTURAL PRACTICES (E.G., RIPRAP DITCHES, GRASSED SWALES) INCLUDING DESIGN SPECIFICATIONS AND DETAILS HAVE BEEN USED TO DIVERT FLOWS FROM EXPOSED SOILS, DETAIN FLOWS AND LIMIT RUNOFF AND THE DISCHARGE OF POLLUTANTS FROM EXPOSED AREAS OF THE SITE.

2.3 STABILIZE SOILS

PERMIT REQUIREMENT(S):
PART III.A.8. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, MINIMIZE THE GENERATION OF DUST.

PART III.C. REQUIRES THAT FINAL STABILIZATION OF DISTURBED AREAS MUST, AT A MINIMUM, BE INITIATED IMMEDIATELY WHENEVER ANY CLEARING, GRADING, EXCAVATING OR OTHER EARTH DISTURBING ACTIVITIES HAVE PERMANENTLY CEASED ON ANY PORTION OF THE SITE. TEMPORARY STABILIZATION OF DISTURBED AREAS MUST BE INITIATED IMMEDIATELY WHENEVER WORK TOWARD PROJECT COMPLETION AND FINAL STABILIZATION OF ANY PORTION OF THE SITE HAS TEMPORARILY CEASED ON ANY PORTION OF THE SITE AND WILL NOT RESUME FOR A PERIOD EXCEEDING THIRTEEN (13) CALENDAR DAYS.

CONTROLS (E.G., INTERIM SEEDING WITH NATIVE VEGETATION, HYDROSEEDING) HAVE BEEN USED TO STABILIZE EXPOSED SOILS WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, WITH MEASURES USED TO CONTROL DUST GENERATION. IMPERVIOUS SURFACES HAVE NOT BEEN USED FOR STABILIZATION. A HEALTHY STAND OF VEGETATION ON ALL DISTURBED AREAS IS REQUIRED AT COMPLETION OF CONSTRUCTION.

2.4 STABILIZE SLOPES

PERMIT REQUIREMENT(S):
PART III.A.6. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, MINIMIZE THE DISTURBANCE OF STEEP SLOPES, UNLESS INFEASIBLE.

CONTROLS (E.G., EROSION CONTROL BLANKETS, TACKIFIERS) HAVE BEEN IMPLEMENTED TO PROTECT SLOPES, AS REQUIRED. DESIGN SPECIFICATIONS AND DETAILS ARE INCLUDED ON THE PLANS.

2.5 PROTECT STORM DRAIN INLETS

PERMIT REQUIREMENT(S):
PART III.A.11. REQUIRES THAT WHERE APPLICABLE, STORM DRAIN INLET PROTECTION MEASURES TO BE DESIGNED, IMPLEMENTED, AND MAINTAINED TO FURTHER PREVENT SEDIMENT DISCHARGES.

FABRIC AND BLOCK AND GRAVEL INLET PROTECTION, WITH DESIGN SPECIFICATIONS AND DETAILS ON THE DRAWINGS, WILL BE IMPLEMENTED TO PROTECT ALL INLETS RECEIVING STORMWATER FROM THE PROJECT.

2.6 ESTABLISH PERIMETER CONTROLS AND SEDIMENT BARRIERS

STRUCTURAL PRACTICES (E.G., SILT FENCES AND MULCH-FILLED COMPOST FILTER SOCK), INCLUDING DESIGN SPECIFICATION AND DETAILS, HAVE BEEN USED AS PERIMETER CONTROLS TO FILTER AND TRAP SEDIMENT BEFORE IT LEAVES THE CONSTRUCTION SITE.

2.7 RETAIN SEDIMENT ON-SITE

PERMIT REQUIREMENT(S):
IN ACCORDANCE WITH PART I.C.8. DISCHARGES TO SURFACE WATERS FROM SEDIMENT BASINS OR IMPOUNDMENTS IS PROHIBITED, UNLESS AN OUTLET STRUCTURE THAT WITHDRAWS WATER FROM THE SURFACE, UNLESS INFEASIBLE, IS UTILIZED.

PART III.A.7. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, MINIMIZE SEDIMENT DISCHARGES FROM THE SITE.

2.8 ESTABLISH STABILIZED CONSTRUCTION EXITS

PERMIT REQUIREMENT(S):
PART III.A.10. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, STABILIZE ALL CONSTRUCTION ENTRANCES AND EXITS; AND MINIMIZE OFF-SITE TRACKING OF SEDIMENT FROM VEHICLES.

TWO CONSTRUCTION ENTRANCES/EXITS HAVE BEEN ESTABLISHED FOR THE GORGAS GYPSUM POND CLOSURE CONSTRUCTION SITE AND WILL BE CONSTRUCTED WITH A STONE PAD AND WASH RACK, AS REQUIRED, TO MINIMIZE OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND DISCHARGES TO STORMWATER. SPECIFICATIONS AND DETAILS OF PADS ARE INCLUDED ON THE DRAWINGS.

2.9 ADDITIONAL BMPS

PERMIT REQUIREMENT(S):
PART III.A.12. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, PROVIDE AND MAINTAIN NATURAL BUFFERS AROUND SURFACE WATERS, DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION, UNLESS INFEASIBLE.

PART III.A.13. REQUIRES THE PERMITTEE TO DESIGN, INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENT CONTROL MEASURES APPROPRIATE FOR SITE CONDITIONS TO, AT A MINIMUM, MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL

SECTION 3.0: GOOD HOUSEKEEPING (GROUNDS KEEPING) BMPS

PERMIT REQUIREMENT(S):
PART III.E.4 (p) REQUIRES A DESCRIPTION OF THE PROCEDURES FOR HANDLING AND DISPOSING OF WASTES GENERATED AT THE SITE, INCLUDING, BUT NOT LIMITED TO, CLEARING AND DEMOLITION DEBRIS, SEDIMENT REMOVED FROM THE SITE, CONSTRUCTION AND DOMESTIC WASTE, HAZARDOUS OR TOXIC WASTE, AND SANITARY WASTE.

3.1 MATERIAL HANDLING AND WASTE MANAGEMENT

CONTRACTOR SHALL ASSURE MEASURES (E.G., TRASH DISPOSAL, SANITARY WASTES, RECYCLING, AND PROPER MATERIAL HANDLING) ARE TAKEN TO PREVENT THE DISCHARGE OF SOLID MATERIALS AND/OR WASTES TO RECEIVING WATERS, EXCEPT AS AUTHORIZED BY A PERMIT ISSUED UNDER SECTION 404 OF THE CWA.

3.2 ESTABLISH PROPER BUILDING MATERIAL STAGING AREAS

CONTRACTOR SHALL IDENTIFY CONSTRUCTION MATERIALS EXPECTED TO BE STORED ON-SITE OR WITHIN DESIGNATED STAGING AREAS AS DESIGNATED AND APPROVED BY THE PURCHASER AND PERMITTEE IN ACCORDANCE WITH THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, LATEST EDITION, AND ESTABLISH PROCEDURES TO ASSURE THE STORAGE OF MATERIALS WILL MINIMIZE THEIR EXPOSURE TO STORMWATER. ALL INFORMATION TO BE APPROVED BY PERMITTEE.

3.3 DESIGNATE WASHOUT AREAS

CONTRACTOR SHALL ESTABLISH AND PROVIDE PERMITTEE WITH LOCATIONS AND CONTROLS TO ELIMINATE THE POTENTIAL FOR DISCHARGES FROM WASHOUT AREAS ASSOCIATED WITH CONCRETE MIXERS, POINT, ETC. ALL WASHOUT AREAS AND CONTROLS SHALL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTING AND USE.

3.4 ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES

CONTRACTOR SHALL ESTABLISH AND PROVIDE PERMITTEE WITH EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES THAT WILL BE IMPLEMENTED TO CONTROL POLLUTANTS TO STORMWATER (E.G., SECONDARY CONTAINMENT, DRIP PANS, AND SPILL KITS).

3.5 CONTROL EQUIPMENT/VEHICLE WASHING

CONTRACTOR SHALL ESTABLISH AND PROVIDE PERMITTEE EQUIPMENT/VEHICLE WASHING PRACTICES THAT WILL BE IMPLEMENTED TO CONTROL POLLUTANTS TO STORMWATER.

3.6 SPILL PREVENTION, CONTROL AND MANAGEMENT

PERMIT REQUIREMENTS(S):
PART III.F. OF THE PERMIT REQUIRES THAT THE PERMITTEE SHALL PREPARE, IMPLEMENT, AND MAINTAIN A SPILL PREVENTION, CONTROL AND COUNTERMEASURES (SPCC) PLAN IN ACCORDANCE WITH 40 CFR PART 112 AND ADEM ADMIN CODE r.335-6-6-.12(r) FOR ALL APPLICABLE ONSITE PETROLEUM STORAGE TANKS. THE PERMITTEE SHALL ALSO PREPARE, IMPLEMENT, AND MAINTAIN A SPCC PLAN IN ACCORDANCE WITH ADEM ADMIN CODE r.335-6-6-.12(r) FOR ANY STORED POLLUTANT(S) THAT MAY, IF SPILLED, BE REASONABLY EXPECTED TO ENTER A WATER OF THE STATE OR THE COLLECTION SYSTEM FOR A PUBLICLY OR PRIVATELY OWNED TREATMENT WORKS. THE SPCC PLAN(S) SHALL BE MAINTAINED AS A SEPARATE DOCUMENT OR AS PART OF THE CBMPP PLAN REQUIRED IN PART III.D ABOVE. THE PERMITTEE SHALL IMPLEMENT APPROPRIATE STRUCTURAL AND/OR NON-STRUCTURAL SPILL PREVENTION, CONTROL, AND/OR MANAGEMENT SUFFICIENT TO PREVENT ANY SPILLS OF POLLUTANTS FROM ENTERING A WATER OF THE STATE OR A PUBLICLY OR PRIVATELY OWNED TREATMENT WORKS. THE PLAN(S) MUST BE CONSISTENT WITH THE REQUIREMENTS OF 40 CFR PART 112 AND/OR ADEM ADMIN CODE r.335-6-6-.12(r). ANY CONTAINMENT SYSTEM USED TO IMPLEMENT THIS REQUIREMENT SHALL BE CONSTRUCTED OF MATERIALS COMPATIBLE WITH THE SUBSTANCE(S) CONTAINED AND OF MATERIALS WHICH SHALL PREVENT THE CONTAMINATION OF GROUNDWATER AND SHALL BE CAPABLE OF RETAINING 110 PERCENT OF THE VOLUME OF THE LARGEST CONTAINER OF POLLUTANTS FOR WHICH THE CONTAINMENT SYSTEM IS PROVIDED. THE PERMITTEE SHALL MAINTAIN ONSITE OR HAVE READILY AVAILABLE SUFFICIENT OIL & GREASE ABSORBING MATERIAL AND FLOATATION BOOMS TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS. SOIL CONTAMINATED BY PAINT OR CHEMICAL SPILLS, OIL SPILLS, ETC. MUST BE IMMEDIATELY CLEANED UP, REMEDIATED, OR BE REMOVED AND DISPOSED OF IN A DEPARTMENT APPROVED MANNER.

THE SPILL PREVENTION AND CONTROL PLAN SHALL BE PROVIDED BY THE CONTRACTOR AND INCLUDE WAYS TO REDUCE THE CHANCE OF SPILLS, STOP THE SOURCE OF SPILLS, CONTAIN AND CLEAN UP SPILLS, DISPOSE OF MATERIALS CONTAMINATED BY SPILLS, AND TRAIN PERSONNEL RESPONSIBLE FOR SPILL PREVENTION AND CONTROL.

3.7 NON-STORMWATER DISCHARGE MANAGEMENT

PERMIT REQUIREMENT(S):
PART I.B.2. THIS PERMIT AUTHORIZES THE FOLLOWING NON-STORMWATER DISCHARGES PROVIDED THE NON-STORMWATER COMPONENT OF THE DISCHARGE IS IN COMPLIANCE WITH PART III.D.:

- (A) DISCHARGE FROM FIRE-FIGHTING ACTIVITIES;
- (B) FIRE HYDRANT FLUSHINGS;
- (C) WATER USED TO CONTROL DUST;
- (D) POTABLE WATER INCLUDING UNCONTAMINATED WATER LINE FLUSHINGS NOT ASSOCIATED WITH HYDROSTATIC TESTING;
- (E) PAVEMENT WASH WATERS WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED (UNLESS ALL SPILLED MATERIAL HAS BEEN REMOVED) AND WHERE DETERGENTS ARE NOT USED;
- (F) UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE ASSOCIATED WITH TEMPORARY OFFICE TRAILERS AND OTHER SIMILAR BUILDINGS;
- (G) UNCONTAMINATED GROUND WATER OR SPRING WATER;

PART III.E.4. (k) OF THE PERMIT REQUIRES A DESCRIPTION OF THE POLLUTION PREVENTION MEASURES USED TO MANAGE NON-STORMWATER DISCHARGES.

CONTRACTOR SHALL PROVIDE PERMITTEE WITH DESCRIPTION OF THE POLLUTION PREVENTION MEASURES USED TO MANAGE NON-STORMWATER DISCHARGES.

SECTION 4: SELECTING POST-CONSTRUCTION BMPs

PERMIT REQUIREMENT(S):
PART III.E.4. (l). REQUIRES A DESCRIPTION OF THE BEST MANAGEMENT PRACTICES TO BE INSTALLED DURING SITE CONSTRUCTION AND OPERATION AND MAINTAINED FOLLOWING FINAL STABILIZATION AT SITES WHERE THE POST-CONSTRUCTION VOLUMES OR VELOCITIES OF STORMWATER RUNOFF ARE SIGNIFICANTLY DIFFERENT FROM CONDITIONS EXISTING PRIOR TO THE CONSTRUCTION ACTIVITY.

POST-CONSTRUCTION STORMWATER MANAGEMENT MEASURES THAT WILL BE INSTALLED DURING CONSTRUCTION TO CONTROL POLLUTANTS IN STORMWATER DISCHARGES AFTER CONSTRUCTION OPERATIONS ARE COMPLETED INCLUDE, BUT ARE NOT LIMITED TO, VEGETATED SWALES, RIPRAP LINED DITCHES, SLOPE PROTECTION AND OUTLET PROTECTION.

SECTION 5: INSPECTIONS

5.1 INSPECTIONS

PART III.H. INSPECTION REQUIREMENTS

1. DAILY OBSERVATIONS
   - (A) EACH DAY THERE IS ACTIVITY AT THE SITE, THE PERMITTEE SHALL VISUALLY OBSERVE THAT PORTION OF THE CONSTRUCTION PROJECT WHERE ACTIVE DISTURBANCE, WORK, OR CONSTRUCTION OCCURRED TO NOTE ANY RAINFALL MEASUREMENTS OCCURRING SINCE THE PREVIOUS OBSERVATION, AND ANY APPARENT BMP DEFICIENCIES IN THE AREA OF ACTIVE DISTURBANCE.
   - (B) SUCH DAILY OBSERVATIONS MAY BE PERFORMED BY APPROPRIATE SITE PERSONNEL
   - (C) THE PERMITTEE SHALL MAINTAIN A LOG OF ALL DAILY OBSERVATIONS AND RECORD IN SUCH LOG ANY RAINFALL MEASUREMENTS AND BMP DEFICIENCIES OBSERVED.
2. SITE INSPECTIONS
   - (A) A SITE INSPECTION SHALL CONSIST OF A COMPLETE AND COMPREHENSIVE OBSERVATION OF THE ENTIRE CONSTRUCTION SITE INCLUDING ALL AREAS OF LAND DISTURBANCE, AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION, AFFECTED DITCHES AND OTHER STORMWATER CONVEYANCES, AS WELL AS ALL OUTFALLS, RECEIVING WATERS AND STREAM BANKS TO DETERMINE IF, AND ENSURE THAT:
     - (i) EFFECTIVE EROSION CONTROLS AND SEDIMENT CONTROLS HAVE BEEN FULLY IMPLEMENTED AND MAINTAINED IN ACCORDANCE WITH THIS PERMIT, THE SITE CBMPP, AND THE ALABAMA HANDBOOK;
     - (ii) POLLUTANT DISCHARGES HAVE BEEN PREVENTED/MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE, AND
     - (iii) DISCHARGES DO NOT RESULT IN A CONTRAVENTION OF APPLICABLE STATE WATER QUALITY STANDARDS FOR THE RECEIVING STREAM(S) OR OTHER WATERS IMPACTED OR AFFECTED BY THE PERMITTEE.
   - (B) SITE INSPECTIONS SHALL BE PERFORMED BY A QCI, QCP, OR A QUALIFIED PERSON UNDER THE DIRECT SUPERVISION OF A QCP.
   - (C) FOR NON-LINEAR PROJECTS, A SITE INSPECTION SHALL BE PERFORMED ONCE EACH MONTH AND AFTER ANY QUALIFYING PRECIPITATION EVENT, COMMENCING AS PROMPTLY AS POSSIBLE, BUT NO LATER THAN 24-HOURS AFTER RESUMING OR CONTINUING ACTIVE CONSTRUCTION OF DISTURBANCE, AND COMPLETED NO LATER THAN 72-HOURS FOLLOWING THE QUALIFYING PRECIPITATION EVENT;
   - (D) FOR LINEAR PROJECTS WHERE ACTIVE CONSTRUCTION OR AREAS WHERE PERENNIAL VEGETATION HAS NOT BEEN FULLY ESTABLISHED, MEETING THE DEFINITION OF FINAL STABILIZATION, A SITE INSPECTION SHALL BE PERFORMED AFTER ANY QUALIFYING PRECIPITATION EVENT SINCE THE LAST INSPECTION, BEGINNING AS PROMPTLY AS POSSIBLE, BUT NO LATER THAN 24-HOURS AFTER RESUMING OR CONTINUING ACTIVE CONSTRUCTION OR DISTURBANCE AND COMPLETED NO LATER THAN FIVE (5) DAYS AFTER THE QUALIFYING PRECIPITATION EVENT;
   - (E) A SITE INSPECTION SHALL ALSO BE PERFORMED AS OFTEN AS IS NECESSARY UNTIL ANY POORLY FUNCTIONING EROSION CONTROLS OR SEDIMENT CONTROLS, NON-COMPLIANT DISCHARGES, OR ANY OTHER DEFICIENCIES OBSERVED DURING A PRIOR INSPECTION ARE CORRECTED AND DOCUMENTED AS BEING IN COMPLIANCE WITH THE REQUIREMENTS OF THIS PERMIT.
   - (F) ON ALL ACTIVE DISTURBANCE, DREDGING, EXCAVATION, OR CONSTRUCTION UNDERTAKEN OR LOCATED WITHIN THE BANKS OF A WATERBODY, INCLUDING BUT NOT LIMITED TO, EQUIPMENT/VEHICLE CROSSINGS, PIPELINES, OR OTHER TRANSMISSION LINE INSTALLATION, CONVEYOR STRUCTURE INSTALLATION, AND WATERBODY RELOCATION, STREAMBANK STABILIZATION, OR OTHER ALTERATIONS, A SITE INSPECTION SHALL BE PERFORMED AT LEAST ONCE A WEEK AND AS OFTEN AS IS NECESSARY UNTIL THE DISTURBANCE/ACTIVITY IMPACTING THE WATERBODY IS COMPLETE AND RECLAMATION OR EFFECTIVE STORMWATER QUALITY REMEDIATION IS ACHIEVED.

5.2 CORRECTIVE ACTION

PERMIT REQUIREMENT(S):
PART III.I.1. OF THE PERMIT REQUIRES ANY POORLY FUNCTIONING EROSION CONTROLS OR SEDIMENT CONTROLS, NON-COMPLIANT DISCHARGES, OR ANY OTHER DEFICIENCIES OBSERVED DURING THE INSPECTIONS REQUIRED UNDER PART III.G.2 SHALL BE CORRECTED AS SOON AS POSSIBLE, BUT NOT TO EXCEED FIVE (5) DAYS OF THE INSPECTION UNLESS PREVENTED BY UNSAFE WEATHER CONDITIONS.

PART III.I.2. OF THE PERMIT REQUIRES THAT IN THE EVENT OF A BREACH OF A SEDIMENT BASIN/POND, TEMPORARY CONTAINMENT MEASURES SHALL BE TAKEN WITHIN 24 HOURS AFTER THE INSPECTION. PERMANENT CORRECTIVE MEASURES SHALL BE IMPLEMENTED WITHIN FIVE (5) DAYS OF THE INSPECTION; HOWEVER, IF PERMANENT CORRECTIVE MEASURES CANNOT BE IMPLEMENTED WITHIN THE TIME FRAMES PROVIDED HEREIN THE PERMITTEE SHALL CONTACT THE DEPARTMENT.

PART III.I.3. OF THE PERMIT REQUIRES THAT THE OPERATOR SHALL PROMPTLY TAKE ALL REASONABLE STEPS TO REMOVE, TO THE MAXIMUM EXTENT PRACTICAL, POLLUTANTS DEPOSITED OFFSITE OR IN ANY WATERBODY OR STORMWATER CONVEYANCE STRUCTURE.

PERMITTEE SHALL CREATE A CORRECTIVE ACTION LOG DESCRIBING REPAIR, REPLACEMENT, AND MAINTENANCE OF BMPS UNDERTAKEN AS A RESULT OF THE INSPECTIONS AND MAINTENANCE PROCEDURES. ACTIONS RELATED TO THE FINDINGS OF INSPECTIONS SHOULD REFERENCE THE SPECIFIC INSPECTION REPORT. THE LOG SHOULD DESCRIBE THE ACTIONS TAKEN, THE DATE THE ACTIONS WERE COMPLETED, AND INDICATE THE PERSON(S) WHO COMPLETED THE WORK.

SECTION 6: RECORD KEEPING AND TRAINING

6.1 RECORD KEEPING

PERMIT REQUIREMENT(S):
PART IV.K.1 OF THE PERMIT REQUIRES THAT THE PERMITTEE SHALL RETAIN RECORDS OF ALL INSPECTION RECORDS, MONITORING INFORMATION, INCLUDING ALL CALIBRATION AND MAINTENANCE RECORDS AND ALL ORIGINAL STRIP CHART RECORDINGS FOR CONTINUOUS MONITORING INSTRUMENTATION, COPIES OF ALL REPORTS REQUIRED BY THE PERMIT, AND RECORDS OF ALL DATA USED TO COMPLETE SUCH REPORTS, FOR A PERIOD OF AT LEAST THREE (3) YEARS FROM THE DATE OF THE INSPECTION, SAMPLE MEASUREMENT, OR REPORT. THIS PERIOD MAY BE EXTENDED BY REQUEST OF THE DIRECTOR AT ANY TIME. IF LITIGATION OR OTHER ENFORCEMENT ACTION, UNDER THE AWPCA AND/OR THE FWPCA, IS ONGOING WHICH INVOLVES ANY OF THESE RECORDS, THE RECORDS SHALL BE KEPT UNTIL THE LITIGATION IS RESOLVED.

PART IV.K.2. OF THE PERMIT REQUIRES THAT ALL RECORDS REQUIRED TO BE KEPT FOR A PERIOD OF THREE (3) YEARS SHALL BE KEPT AT THE PERMITTED FACILITY OR AN ALTERNATE LOCATION IDENTIFIED TO THE DEPARTMENT IN WRITING AND SHALL BE AVAILABLE FOR INSPECTION.

THE FOLLOWING IS A LIST OF RECORDS THE PERMITTEE SHALL KEEP AT THE PROJECT SITE AND AVAILABLE FOR INSPECTORS TO REVIEW:

- DATES OF GRADING, CONSTRUCTION ACTIVITY, AND STABILIZATION
- THE SIGNED AND CERTIFIED NOI FORM OR PERMIT APPLICATION FORM
- A COPY OF THE LETTER FROM ADEM ACKNOWLEDGING RECEIPT OF YOUR COMPLETE NOR/APPLICATION
- INSPECTION REPORTS
- MONITORING DATA, IF REQUIRED TO MONITOR
- RAINFALL DATA
- COPY OF THE CBMPP PLAN
- COPY OF SPCC, IF NEEDED.

6.2 LOG OF CHANGES TO THE CBMPP

PART III.E.5.(a). OF THE PERMIT REQUIRES THAT THE CBMPP SHALL BE UPDATED AS NECESSARY TO ADDRESS CHANGES IN THE CONSTRUCTION ACTIVITY, SITE WEATHER PATTERNS, NEW TMDLS FINALIZED OR APPROVED BY EPA, NEW 303(d) LISTINGS APPROVED BY EPA, OR MANUFACTURER SPECIFICATIONS FOR SPECIFIC CONTROL TECHNOLOGIES.

PART III.E.5.(b) OF THE PERMIT REQUIRES THAT THE CBMPP SHALL BE AMENDED IF INSPECTIONS OR INVESTIGATIONS BY SITE STAFF OR BY LOCAL, STATE, OR FEDERAL OFFICIALS DETERMINE THAT THE EXISTING SEDIMENT CONTROL MEASURES, EROSION CONTROL MEASURES, OR OTHER SITE MANAGEMENT PRACTICES ARE INEFFECTIVE OR DO NOT MEET THE REQUIREMENTS OF THIS PERMIT. ALL NECESSARY MODIFICATIONS TO THE CBMPP SHALL BE MADE WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING NOTIFICATION OF THE INSPECTION UNLESS GRANTED AN EXTENSION OF TIME BY THE DEPARTMENT.

PART III.E.5.(c). OF THE PERMIT REQUIRES THAT IF EXISTING SEDIMENT CONTROL MEASURES, EROSION CONTROL MEASURES, OR OTHER SITE MANAGEMENT PRACTICES PROVE INEFFECTIVE IN PROTECTING WATER QUALITY OR NEED TO BE MODIFIED; OR IF ADDITIONAL SEDIMENT CONTROL MEASURES, EROSION CONTROL MEASURES, OR OTHER SITE MANAGEMENT PRACTICES ARE NECESSARY TO MEET THE REQUIREMENTS OF PART III.A.B.C. AND E., IMPLEMENTATION SHALL BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THEN NEW LAND DISTURBANCE ACTIVITIES MUST CEASE UNTIL THE MODIFIED OR ADDITIONAL CONTROLS CAN BE IMPLEMENTED.

PART III.E.5.(d) OF THE PERMIT REQUIRES THAT A COPY OF THE CBMPP SHALL BE MAINTAINED AT THE SITE DURING NORMAL OPERATING HOURS AS DEFINED BY PART IV.T. OF THIS PERMIT WHEN REGULATED LAND DISTURBING ACTIVITIES ARE OCCURRING.

PERMITTEE SHALL CREATE A LOG OF CHANGES AND UPDATES TO THE CBMPP, WHICH SHOULD INCLUDE ADDITIONS OF NEW BMPS, REPLACEMENT OF FAILED BMPS, SIGNIFICANT CHANGES IN THE ACTIVITIES OR THEIR TIMING ON THE PROJECT, CHANGES IN PERSONNEL, CHANGES IN INSPECTION AND MAINTENANCE PROCEDURES, UPDATES TO SITE MAPS, ETC.

6.3 TRAINING

PERMIT REQUIREMENTS:
PART III.G. TRAINING:
UNLESS THE PERMITTEE HAS EMPLOYED OR CONTRACTED WITH A QCP THAT PERFORMS DUTIES AS REQUIRED BY THIS PERMIT, AND THE QCP IS READILY AVAILABLE AND ABLE TO BE PRESENT ONSITE AS OFTEN AS IS NECESSARY TO ENSURE FULL COMPLIANCE WITH THE REQUIREMENTS OF THIS PERMIT, THE PERMITTEE SHALL ENSURE THAT:

1. AT LEAST ONE ONSITE EMPLOYEE SHALL BE CERTIFIED AS A QUALIFIED CREDENTIALED INSPECTOR (QCI) BY COMPLETING AN INITIAL TRAINING AND ANNUAL REFRESHERS THROUGH AN ADEM-APPROVED QUALIFIED CREDENTIALED INSPECTOR PROGRAM (QCIP) CONDUCTED BY A COOPERATING TRAINING ENTITY.
2. THE QCIP MUST BE APPROVED BY THE DEPARTMENT PRIOR TO USE AND PROVIDE TRAINING IN THE FOLLOWING AREAS:
   - A. THE APPLICABLE REQUIREMENTS OF THE ALABAMA NPDES RULES;
   - B. THE REQUIREMENTS OF THIS PERMIT;
   - C. THE EVALUATION OF CONSTRUCTION SITES TO ENSURE THAT QCP DESIGNED AND CERTIFIED EROSION CONTROLS AND SEDIMENT CONTROLS DETAILED IN A CBMPP ARE EFFECTIVELY IMPLEMENTED AND MAINTAINED;
   - D. THE EVALUATION OF CONVEYANCE STRUCTURES, RECEIVING WATERS AND ADJACENT INSPECTED OFFSITE AREAS TO ENSURE THE PROTECTION OF WATER QUALITY AND COMPLIANCE WITH THE REQUIREMENTS OF THIS PERMIT; AND
   - E. THE GENERAL OPERATION OF A TURBIDITY METER OR SIMILAR DEVICE INTENDED FOR THE MEASUREMENT OF TURBIDITY.
3. EACH INDIVIDUAL HOLDING A QCI CERTIFICATION NEED NOT BE ON-SITE CONTINUOUSLY AND THEY MAY CONDUCT SITE INSPECTIONS AT MULTIPLE SITES PERMITTED BY THEM OR THEIR EMPLOYER.
4. EACH INDIVIDUAL HOLDING QCI CERTIFICATION SHALL OBTAIN ANNUAL CERTIFICATION OF SATISFACTORY COMPLETION OF FORMAL REFRESHER EDUCATION OR TRAINING REGARDING GENERAL EROSION CONTROLS AND SEDIMENT CONTROLS, THE REQUIREMENTS OF THIS PERMIT, AND THE GENERAL OPERATION OF A TURBIDITY METER OR SIMILAR DEVICE INTENDED FOR THE MEASUREMENT OF TURBIDITY. THE REFRESHER TRAINING REQUIREMENTS, INCLUDING BUT NOT LIMITED T, APPROPRIATE CURRICULA, COURSE CONTENT, COURSE LENGTH, AND ANY PARTICIPANT TESTING, SHALL BE SUBJECT TO ACCEPTANCE BY THE DIRECTOR PRIOR TO USE.

PERMITTEE SHALL DOCUMENT THE TRAINING TAKEN BY YOUR STAFF, FOR THOSE WITH SPECIFIC STORMWATER RESPONSIBILITIES (E.G. INSTALLING, INSPECTING, AND MAINTAINING BMPS), AND FOR SUBCONTRACTORS. INCLUDE DATES, NUMBER OF ATTENDEES, SUBJECTS COVERED, AND LENGTH OF TRAINING. TRAINING INCLUDES, BUT IS NOT LIMITED TO, THE QUALIFIED CREDENTIALED INSPECTION TRAINING (QCIP) PROGRAM. ADDITIONAL TRAINING MAY BE NECESSARY.

SECTION 7: FINAL STABILIZATION

PERMIT REQUIREMENTS:
PART III.C. OF THE PERMIT REQUIRES THAT FINAL STABILIZATION OF DISTURBED AREAS MUST, AT A MINIMUM, BE INITIATED IMMEDIATELY WHENEVER ANY CLEARING, GRADING, EXCAVATING OR OTHER EARTH DISTURBING ACTIVITIES HAVE PERMANENTLY CEASED ON ANY PORTION OF THE SITE.

AS DEFINED IN PART V OF THE PERMIT, FINAL STABILIZATION MEANS THE APPLICATION AND ESTABLISHMENT OF THE PERMANENT GROUND COVER (VEGETATIVE, PAVEMENTS OF EROSION RESISTANT HARD OR SOFT MATERIAL OR IMPERVIOUS STRUCTURES) PLANNED FOR THE SITE TO PERMANENTLY ELIMINATE SOIL EROSION TO THE MAXIMUM EXTENT PRACTICABLE. ESTABLISHED VEGETATION WILL BE CONSIDERED FINAL IF 100% OF THE SOIL SURFACE IS UNIFORMLY COVERED IN PERMANENT VEGETATION WITH A DENSITY OF 85% OR GREATER. PERMANENT VEGETATION SHALL CONSIST OF; PLANTED TEES, SHRUBS, PERENNIAL VINES; AN AGRICULTURAL OR A PERENNIAL CROP OF VEGETATION APPROPRIATE FOR THE REGION. FINAL STABILIZATION APPLIES TO EACH PHASE OF CONSTRUCTION.

IF YOU COMPLETE MAJOR CONSTRUCTION ACTIVITIES ON PART OF YOUR SITE, YOU CAN DOCUMENT YOUR FINAL STABILIZATION EFFORTS FOR THAT PORTION OF THE SITE. DISCONTINUING INSPECTIONS CAN BE APPROVED UPON SUBMITTAL OF INSPECTION REPORTS OF SUBJECT AREA(S), CERTIFICATION OF COMPLETE STABILIZATION AND NOI REQUESTING MODIFICATION OF EXISTING PERMIT COVERAGE TO REMOVE SUBJECT AREA(S) FROM COVERAGE. UPDATE YOUR SITE PLANS TO INDICATE AREAS THAT HAVE ACHIEVED FINAL STABILIZATION. DATES FOR AREAS THAT HAVE ACHIEVED FINAL STABILIZATION SHOULD BE INCLUDED IN THE CBMPP.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, MONITORING, RECORD KEEPING AND CBMPP REQUIRED INSPECTIONS FOR THE LIFE OF THE PROJECT AND UNTIL FINAL STABILIZATION IS REACHED AS OUTLINED IN SECTION 7 OF THE CBMPP TEMPLATE. FINAL STABILIZATION APPROVAL FROM THE OWNER AND APCO ENVIRONMENTAL AFFAIRS IS REQUIRED. ALL RECORDS AND INSPECTION REPORTS MUST RECEIVE FINAL APPROVAL FROM ALABAMA POWER COMPANY ENVIRONMENTAL AFFAIRS.

FROM "ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, WATER DIVISION - WATER QUALITY PROGRAM, VOLUME I, DIVISION 335-6" AS REVISED EFFECTIVE: SEPTEMBER 29, 2015:

335-6-12-.26 DISCHARGE AND RECEIVING WATER EVALUATION REQUIREMENTS.

(1) IT IS POSSIBLE AND ALLOWABLE TO ACHIEVE AND MAINTAIN COMPLIANCE WITH THE REQUIREMENTS OF THIS CHAPTER WITHOUT CONDUCTING ANY DISCHARGE SAMPLING PROVIDED A QCI, QCP OR A QUALIFIED PERSON UNDER THE DIRECT SUPERVISION OF A QCP DOCUMENTS AND CERTIFIES EACH INSPECTION REPORT OR OTHER REPORT/LOG THAT SAMPLING IS NOT NECESSARY TO PROPERLY EVALUATE AND DOCUMENT THE EFFECTIVENESS OR DEFICIENCIES OF BMP IMPLEMENTATION TO ENSURE COMPLIANCE WITH THIS CHAPTER. IT REMAINS THE RESPONSIBILITY OF THE OPERATOR TO BE CONTINUALLY AWARE OF AND TO EFFECTIVELY EVALUATE THE QUALITY OF THE STORMWATER BEING DISCHARGED.
LACK OF KNOWLEDGE REGARDING STORMWATER DISCHARGE QUALITY OR RECEIVING WATER QUALITY SHALL NOT CONSTITUTE A VALID DEFENSE WITH REGARD TO DEFICIENCIES IN BMP IMPLEMENTATION AND MAINTENANCE, NEGATIVE IMPACTS TO WATER QUALITY, OR OTHER NONCOMPLIANCE WITH THE REQUIREMENTS OF THIS CHAPTER.

(5) RECEIVING WATER TURBIDITY MONITORING AND LIMITATIONS.

- (A) A QCI, QCP, OR A QUALIFIED PERSON UNDER THE DIRECT SUPERVISION OF A QCP SHALL INSPECT AS NECESSARY, AND IF NEEDED, CONDUCT SAMPLING, DURING NPDES CONSTRUCTION ACTIVITY, MONITORING UPSTREAM AND DOWNSTREAM TURBIDITY AFTER REASONABLE OPPORTUNITY FOR MIXING HAS BEEN AFFORDED OF ALL AFFECTED WATERCOURSE(S) TO ENSURE PROTECTION OF WATER QUALITY.
- (B) IT IS POSSIBLE AND ALLOWABLE TO ACHIEVE AND MAINTAIN COMPLIANCE WITH THE REQUIREMENTS OF THIS CHAPTER WITHOUT CONDUCTING ANY INSTREAM TURBIDITY OR OTHER INSTREAM SAMPLING PROVIDED QCI, QCP, OR A QUALIFIED PERSON UNDER THE DIRECT SUPERVISION OF A ZCP DOCUMENTS AND CERTIFIES ON ANY INSPECTION REPORT OR OTHER REPORT/LOG THAT INSTREAM SAMPLING IS NOT NECESSARY TO PROPERTY EVALUATE AND DOCUMENT THE EFFECTIVENESS OR DEFICIENCIES OF BMP IMPLEMENTATION AND THAT DISCHARGES ARE NOT CAUSING OR CONTRIBUTING TO A CONTRAVENTION OF ALABAMA WATER QUALITY OF AND TO EFFECTIVELY EVALUATE INSTREAM WATER QUALITY.

SECTION 9: CERTIFICATION AND NOTIFICATION

REFER TO CBMPP TEMPLATE PACKAGE FOR SIGNED CERTIFICATION AND NOTIFICATION.

Pursuant to Part IV.S. [Facility Identification] of the GP, the permittee is required to post and maintain facility identification. The permittee is required to post a sign at the front gate/entrance to identify the site. The permittee may use this example sign or create and use a sign meeting the requirements of Part IV.S. of the permit. If this sign is used, please make copies to post, and keep this original in your files. PLEASE PRINT CLEARLY USING BLUE OR BLACK INK. Areas that contain * are not required to be completed.

ADEM NPDES General Permit #:

ALR100000

ADEM Authorization #:

ALR10 ______________________

Facility Name:

PERMITTEE:	***CONTACT:**	***PHONE #**
***ADDRESS:**		
***City**	***State:**	***Zip:**

ADEM Form 22 11/11

CONTRACTOR IS REQUIRED TO POST AND MAINTAIN A FACILITY IDENTIFICATION SIGN AT THE EACH CONSTRUCTION ENTRANCE/EXIT.

THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF CONSTRUCTION BEST MANAGEMENT PRACTICES PRIOR TO LAND DISTURBING ACTIVITIES. EXCEPT AS REQUIRED TO INSTALL THE INITIAL SEDIMENT STORAGE REQUIREMENTS AND PERIMETER CONTROL BMPS, THE INITIAL SEDIMENT STORAGE REQUIREMENTS AND PERIMETER CONTROL BMPS MUST BE INSTALLED AND IMPLEMENTED PRIOR TO CONDUCTING ANY OTHER CONSTRUCTION ACTIVITIES (E.G. CLEARING, GRUBBING AND GRADING) WITHIN THE CONSTRUCTION SITE OR WHEN APPLICABLE, WITHIN PHASE SUB-PARTS OR SEGMENTS OF THE CONSTRUCTION SITE.

CBMPP MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE BMPS, ADDITIONAL EROSION & SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.

ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 13 DAYS SHALL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.

REFERENCES:

E720308-E720331
E720333-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

Southern Company Generation
Engineering and Construction Services
FOR

Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP NOTES
SHEET 2

Quality Record

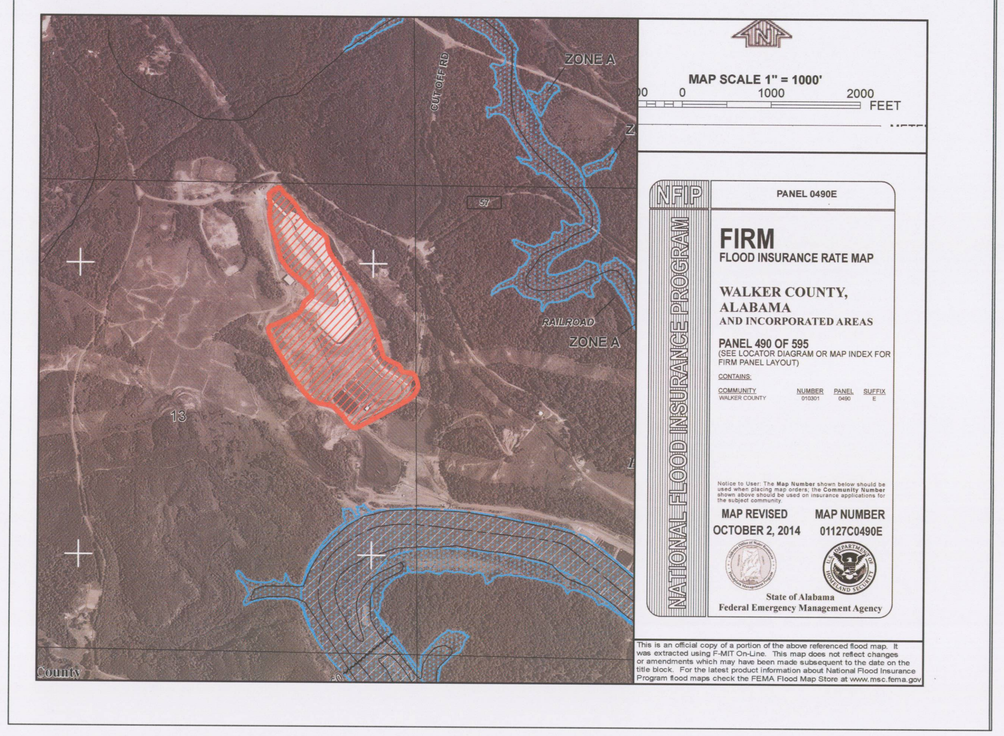
REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR	SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
DSM	THB	CRU	XXX	XXX	XXX	SSS	NONE	E720332	1	FINAL	0

ANSI E: 44x34

Approved



CONSTRUCTION SITE ONE (1) MILE RADIUS
NO SCALE

SOIL CHARACTERISTICS FOR PRINCIPAL SOILS IN ALABAMA

NAME	DEPTH (In.)	pH	K	HYDR. GROUP	P.I.	TEXTURAL CLASSIFICATION USDA	UNIFIED	AASHTO
BRILLIANT	0–7	5.6–7.3	.24	B	NP–16	CNV–SL,CNV–L,CNV–SIL	SM,SC,SM–SC,GM	A–2–4,A–2–6 A–1
	0–7	5.6–7.3	.24		NP–16	CNX–SL,CNX–L,CNX–SIL	SM,SC,SP–SM,SM–SC	A–2–4,A–2–6 A–1
	0–7	5.6–7.3	.24		NP–7	CNV–SL,CN–L,CN–SIL	SM,SM–SC,GM,GM–GC	A–4,A–2–4
	7–72	5.6–7.3	.24		NP–16	CNX–SL,CNX–L,CNX–SIL	SM,SC,SM–SC,SP–SM	A–2–4,A–2–6 A–1
PALMERDALE	0–5	3.6–5.5	.24	B	NP–10	CNX–SL,CNX–L,CNX–SIL	GC,SM,GM SC	A–1,A–2 A–3,A–4
	0–5	3.6–5.5	.24		3–16	CNV–SIL,CNV–SICL	GM,SC,GC,SM	A–2,A–4 A–6,A–1
	5–80	3.6–5.5	.24		3–16	CNV–SIL,CNV–L,CNX–L	GC,SM,GM,SC	A–2,A–4 A–6,A–1
MONTEVALLO	0–6	4.5–6.0	.20	D	NP–10	CNV–SIL,CNV–L,CNX–L	GM–GC,GC,SM–SC,SC	A–2,A–4 A–1–B
	0–6	4.5–6.0	.28		NP–10	CN–SIL,CN–L	SM–SC,SC,CL–ML,CL	A–4
	6–16	5.6–7.3	.32		2–15	CNV–SIL,CNX–L	GM–GC,GC,SM–SC,SC	A–2,A–4,A–6
	16–36					WB		
SUNLIGHT	0–3	4.5–5.5	.24	D	NP–10	CN–SL,CN–SIL,CN–L	SM,ML,GM	A–4
	0–3	4.5–5.5	.28		NP–10	SL,SIL,L	SM,ML	A–4
	3–5	4.5–5.5	.24		4–15	CN–SL,CN–SICL,CN–L	SM–SC,GC,GM–GC,CL	A–4,A–6
	5–12	4.5–5.5	.17		4–15	CNV–SIL,CNV–SICL,CN–L	GC,GM–GC	A–2,A–4,A–6
	12–24					WB		
TOWNLEY	0–6	3.6–5.5	.28	C	NP–7	SL,FSL	SM,CL–ML,ML	A–2,A–4
	0–6	3.6–5.5	.32		12–30	SICL,CL,C	CL,CH	A–6,A–7
	0–6	3.6–5.5	.37		NP–10	L,SIL	ML,CL,CL–ML	A–4
	6–22	3.6–5.5	.28		14–37	SICL,SIC,C	CL,ML,CH,MH	A–7
	22–35					VAR		
	35–40					UWB		

MAP UNIT LEGEND

SOIL SYMBOL	SOIL NAME
BPE	Brilliant and Palmerdale extremely channery loams, 6 to 60 percent slopes
McE	Montevallo channery silt loam, 30 to 60 percent slopes
StE	Sunlight–Townley complex, 15 to 45 percent slopes

SITE SOILS MAPS AND SOIL CHARACTERISTICS
NO SCALE

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, MONITORING, RECORD KEEPING AND CBMPP REQUIRED INSPECTIONS FOR THE LIFE OF THE PROJECT AND UNTIL FINAL STABILIZATION IS REACHED AS OUTLINED IN SECTION 7 OF THE CBMPP TEMPLATE. FINAL STABILIZATION APPROVAL FROM THE OWNER AND APCO ENVIRONMENTAL AFFAIRS REQUIRED. ALL RECORDS AND INSPECTION REPORTS MUST RECEIVE FINAL APPROVAL FROM ALABAMA POWER COMPANY ENVIRONMENTAL AFFAIRS.

THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF CONSTRUCTION BEST MANAGEMENT PRACTICES PRIOR TO LAND DISTURBING ACTIVITIES. EXCEPT AS REQUIRED TO INSTALL THE INITIAL SEDIMENT STORAGE REQUIREMENTS AND PERIMETER CONTROL BMPS, THE INITIAL SEDIMENT STORAGE REQUIREMENTS AND PERIMETER CONTROL BMPS MUST BE INSTALLED AND IMPLEMENTED PRIOR TO CONDUCTING ANY OTHER CONSTRUCTION ACTIVITIES (E.G. CLEARING, GRUBBING AND GRADING) WITHIN THE CONSTRUCTION SITE OR WHEN APPLICABLE, WITHIN PHASE SUB–PARTS OR SEGMENTS OF THE CONSTRUCTION SITE.

CBMPP MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE BMPS, ADDITIONAL EROSION & SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.

ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 13 DAYS SHALL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.

REFERENCES:

E720308–E720332
E720334–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
0	12/20/2018	DSM	THB	CRU	XXX	XXX	XXX	SSS

ISSUED FOR CONSTRUCTION

MWO: APCS90792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP NOTES
SHEET 3

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	E720333	1	FINAL	0

Approved

ANSI E: 44x34

PERMANENT SEEDING IS THE ESTABLISHMENT OF PERENNIAL VEGETATION ON DISTURBED AREAS FROM SEED. PERMANENT VEGETATION PROVIDES ECONOMICAL LONG-TERM EROSION CONTROL AND HELPS PREVENT SEDIMENT FROM LEAVING THE SITE. THIS PRACTICE IS USED WHEN VEGETATION IS DESIRED AND APPROPRIATE TO PERMANENTLY STABILIZE THE SOIL.

DESIGN CRITERIA

PLANT SELECTION

SELECT PLANTS THAT CAN BE EXPECTED TO MEET PLANTING OBJECTIVES. TO SIMPLIFY PLANT SELECTION, USE FIGURE PS-1 GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES FOUND ON PAGE 121 OF THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, AND TABLE PS-1 ON THIS DRAWING, COMMONLY USED PLANTS FOR PERMANENT COVER. MIXTURES COMMONLY SPECIFIED BY THE ALABAMA DEPARTMENT OF TRANSPORTATION ARE AN APPROPRIATE ALTERNATIVE FOR PLANTINGS ON RIGHTS-OF-WAYS.

THE PLANTS USED FOR TEMPORARY VEGETATION MAY BE USED FOR COMPANION PLANTS PROVIDED THE SEEDING RATE IS REDUCED BY ONE HALF. SEE THE TEMPORARY SEEDING PRACTICE FOR ADDITIONAL INFORMATION ON ESTABLISHING TEMPORARY VEGETATION. RYEGRASS OR OTHER HIGHLY COMPETITIVE PLANTS SHOULD NOT BE USED AS A COMPANION PLANT.

TABLE PS-1 COMMONLY USED PLANTS FOR PERMANENT COVER WITH SEEDING RATES AND DATES

SPECIES	SEEDING RATES/AC PLS	NORTH	CENTRAL	SOUTH
			SEEDING DATES	
BAHIAGRASS, PENSACOLA	40 LBS	--	MAR 1-JULY 1	FEB 1-NOV 1
BERMUDAGRASS, COMMON	10 LBS	APR 1-JULY 1	MAR 15-JULY 15	MAR 1-JULY 15
BAHIAGRASS, PENSACOLA BERMUDAGRASS, COMMON	30 LBS 5 LBS	--	MAR 1-JULY 1	MAR 1-JULY 15
BERMUDAGRASS, HYBRID (LAWN TYPES)	SOLID SOD	ANYTIME	ANYTIME	ANYTIME
BERMUDAGRASS, HYBRID (LAWN TYPES)	SPRIGS 1/SQ FT	MAR 1-AUG 1	MAR 1-AUG 1	FEB 15-SEP 1
FESCUE, TALL	40-50 LBS	SEP 1-NOV 1	SEP 1-NOV 1	--
SERICEA	40-60 LBS	MAR 15-JULY 15	MAR 1-JULY 15	FEB 15-JULY 15
SERICEA & COMMON BERMUDAGRASS	40 LBS 10 LBS	MAR 15-JULY 15	MAR 1-JULY 15	FEB 15-JULY 15
SWITCHGRASS, ALAMO	4 LBS	APR 1-JUN 15	MAR 15-JUN 15	MAR 15-JUN 15

PLS MEANS PURE LIVE SEED AND IS USED TO ADJUST SEEDING RATES. FOR EXAMPLE, TO PLANT 10 LBS PLS OF A SPECIES WITH GERMINATION OF 80% AND PURITY OF 90%, PLS = 0.8 X 0.9 = 72%. 10 LBS PLS = 10/0.70 = 13.9 LBS. OF THE SPECIES TO BE PLANTED.

SEEDBED REQUIREMENTS

ESTABLISHMENT OF VEGETATION SHOULD NOT BE ATTEMPTED ON SITES THAT ARE UNSUITABLE DUE TO COMPACTION OR INAPPROPRIATE SOIL TEXTURE, POOR DRAINAGE, CONCENTRATED OVERLAND FLOW, OR STEEPNESS OF SLOPE UNTIL MEASURES HAVE BEEN COMPLETED T CORRECT THESE PROBLEMS. TO MAINTAIN A GOOD STAND OF VEGETATION, THE SOIL MUST MEET CERTAIN MINIMUM REQUIREMENTS AS A GROWTH MEDIUM. A GOOD GROWTH MEDIUM SHOULD HAVE THESE ATTRIBUTES:

- SUFFICIENT PORE SPACE TO PERMIT ROOT PENETRATION.
- ENOUGH FINE-GRAINED SOIL MATERIAL (SILT AND CLAY) TO MAINTAIN ADEQUATE MOISTURE AND NUTRIENT SUPPLY.
- SUFFICIENT DEPTH OF SOIL TO PROVIDE AN ADEQUATE ROOT ZONE. THE DEPTH TO ROCK OR IMPERMEABLE LAYERS SUCH AS HARDPANS SHOULD BE 12" FOR MORE, EXCEPT ON SLOPES STEEPER THAN 2:1 WHERE TOPSOILING IS NOT FEASIBLE.
- A FAVORABLE pH RANGE FOR PLANT GROWTH, USUALLY 6.0-6.5.
- SUFFICIENT NUTRIENTS (NITROGEN, PHOSPHORUS AND POTASSIUM) FOR INITIAL PLANT ESTABLISHMENT.
- FREEDOM FROM LARGE ROOTS, BRANCHES, STONES, OR LARGE CLODS. CLODS AND STONES MAY BE LEFT ON SLOPES STEEPER THAN 3:1 IF THEY ARE TO BE HYDROSEEDED.

IF ANY OF THE ABOVE ATTRIBUTES ARE NOT MET: I.E., IF THE EXISTING SOIL IS TOO DENSE, COARSE, SHALLOW OR ACIDIC TO FOSTER VEGETATION - CHISELING TOPSOIL, OR SPECIAL AMENDMENTS SHOULD BE USED TO IMPROVE SOIL CONDITIONS. THE SOIL CONDITIONERS DESCRIBED BELOW MAY BE BENEFICIAL OR TOPSOIL MAY BE APPLIED (FOR GUIDANCE ON TOPSOILING SEE TOPSOILING PRACTICE). THESE AMENDMENTS SHOULD ONLY BE NECESSARY WHERE SOILS HAVE LIMITATIONS THAT MAKE THEM POOR FOR PLANT GROWTH OR FOR TURF WHERE SOILS HAVE LIMITATIONS THAT MAKE THEM POOR FOR PLANT GROWTH OR FOR TURF ESTABLISHMENT.

- PEAT - APPROPRIATE TYPES ARE SPHAGNUM MOSS PEAT, REED-SEDGE PEAT, OR PEAT HUMUS, ALL FROM FRESH-WATER SOURCES. PEAT SHOULD BE SHREDDED AND CONDITIONED IN STORAGE PILES FOR AT LEAST 6 MONTHS AFTER EXCAVATION.
- SAND - SHOULD BE CLEAN AND FREE OF TOXIC MATERIALS.
- VERMICULITE - USE HORTICULTURAL GRADE.
- ROTTED MANURE - USE STABLE OR CATTLE MANURE NOT CONTAINING UNDUE AMOUNTS OF STRAW OR OTHER BEDDING MATERIALS.
- THOROUGHLY ROTTED SAWDUST - SHOULD BE FREE OF STONES AND DEBRIS. ADD 6 LBS OF NITROGEN TO EACH CUBIC YARD.

SOIL AMENDMENTS

LIMING MATERIALS

LIME (AGRICULTURAL LIMESTONE) SHOULD HAVE A NEUTRALIZING VALUE OF NOT LESS THAN 90 PERCENT CALCIUM CARBONATE EQUIVALENT AND 90 PERCENT WILL PASS THROUGH A 10 MESH SIEVE AND 50 PERCENT WILL PASS THROUGH A 60 MESH SIEVE.

SELMA CHALK SHOULD HAVE A NEUTRALIZING VALUE OF NOT LESS THAN 80 PERCENT CALCIUM CARBONATE EQUIVALENT AND 90 PERCENT WILL PASS THROUGH A 10 MESH SIEVE.

OTHER LIMING MATERIALS THAT MAY BE SELECTED SHOULD BE PROVIDED IN AMOUNTS THAT PROVIDE EQUAL VALUE TO THE CRITERIA LISTED FOR AGRICULTURAL LIME OR BE USED IN COMBINATION WITH AGRICULTURAL LIMESTONE OR SELMA CHALK TO PROVIDE EQUIVALENT VALUES TO AGRICULTURAL LIMESTONE.

PLANT NUTRIENTS

COMMERCIAL GRADE FERTILIZERS THAT COMPLY WITH CURRENT ALABAMA FERTILIZER LAWS SHOULD BE USED TO SUPPLY NUTRIENTS REQUIRED TO ESTABLISH VEGETATION.

LIME AND FERTILIZER NEEDS SHOULD BE DETERMINED BY SOIL TESTS. SOIL TESTING IS PERFORMED BY THE AUBURN UNIVERSITY SOIL TESTING LABORATORY AND PROVIDES RECOMMENDATIONS BASED ON FIELD TESTS ON ALABAMA SOILS. THE LOCAL COUNTY COOPERATIVE EXTENSION SERVICE CAN PROVIDE INFORMATION ON OBTAINING SOIL TESTS. COMMERCIAL LABORATORIES THAT MAKE RECOMMENDATIONS BASED ON SOIL ANALYSIS MAY BE USED.

WHEN SOIL TESTS ARE NOT AVAILABLE, USE THE FOLLOWING RATES FOR APPLICATION OF SOIL AMENDMENTS.

SANDY SOILS: USE 1 TON/ACRE (EXCEPTION ON SANDY SOILS - IF THE COVER WILL BE TALL FESCUE AND CLOVER USE 2 TONS/ACRE).
CLAYEY SOILS: 2 TONS/ACRE
(DO NOT APPLY LIME TO ALKALINE SOILS).

GRASSES ALONE: USE 400 LBS/ACRE OF 8-24-24 OR THE EQUIVALENT. APPLY 30 LBS OF ADDITIONAL NITROGEN WHEN GRASS HAS EMERGED AND BEGUN GROWTH (APPROXIMATELY 0.8 LBS/1000 FT^2).
GRASS-LEGUME MIXTURES: USE 800 TO 1200 LBS/ACRE OF 5-10-10 OR THE EQUIVALENT.
LEGUMES ALONE: USE 400 TO 600 LBS/ACRE OF 0-20-20 OR THE EQUIVALENT.

NOTE: FERTILIZER CAN BE BLENDED TO MEET EXACT FERTILIZER RECOMMENDATIONS. TAKE SOIL TEST RECOMMENDATIONS TO LOCAL FERTILIZER DEALER FOR BULK FERTILIZER BLENDS. THIS MAY BE MORE ECONOMICAL THAN BAGGED FERTILIZER.

APPLICATION OF SOIL AMENDMENTS

APPLY LIME AND FERTILIZER EVENLY AND INCORPORATE INTO THE TOP 6" OF SOIL BY DISKING, CHISELING OR OTHER SUITABLE MEANS DURING SEEDBED PREPARATION. OPERATE MACHINERY ON THE CONTOUR. ON SITES TOO STEEP FOR SEEDBED PREPARATION, FERTILIZER AND LIME CAN BE APPLIED WITH A HYDROSEEDER.

SEEDBED PREPARATION

IF NEEDED, GRADE AND SHAPE TO PROVIDE A SURFACE ON WHICH EQUIPMENT CAN SAFELY AND EFFICIENTLY BE USED FOR SEEDBED PREPARATION AND SEEDING.

INSTALL NECESSARY SEDIMENT CONTROL PRACTICES BEFORE SEEDBED PREPARATION AND COMPLETE GRADING ACCORDING TO THE APPROVED PLAN.

PREPARE A FRIABLE SEEDBED WITH TILLAGE TO A DEPTH OF AT LEAST 6". BREAK UP LARGE CLODS, ALLEVIATE COMPACTION, AND SMOOTH AND FIRM THE SOIL INTO A UNIFORM SURFACE. FILL IN OR LEVEL DEPRESSIONS THAT CAN COLLECT WATER.

PLANTING METHODS

SEEDING

USE CERTIFIED SEED FOR PERMANENT SEEDING WHENEVER POSSIBLE. CERTIFIED SEED IS INSPECTED BY THE ALABAMA CROP IMPROVEMENT ASSOCIATION TO MEET HIGH QUALITY STANDARDS AND WILL BE TAGGED WITH A "CERTIFIED SEED" TAG. (NOTE: ALL SEED SOLD IN ALABAMA IS REQUIRED BY LAW TO BE TAGGED TO IDENTIFY SEED PURITY, GERMINATION, AND PRESENCE OF WEED SEEDS. SEED MUST MEET STATE STANDARDS FOR CONTENT OF NOXIOUS WEEDS).

SEEDING DATES ARE DETERMINED USING TABLE PS-1 FOUND ON THIS DRAWING AND FIGURE PS-1 GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES FOUND ON PAGE 121 OF THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1.
NOTE: WALKER COUNTY IS LOCATED IN THE NORTH GEOGRAPHICAL AREA FOR ADAPTATION AND SEEDING.

INOCULATE LEGUME SEED WITH THE RHIZOBIUM BACTERIA APPROPRIATE TO THE SPECIES OF LEGUME. DETAILS OF LEGUME INOCULATION ARE LOCATED IN CHAPTER 2 IN THE PART ON VEGETATION FOR EROSION AND SEDIMENT CONTROL UNDER INOCULATION OF LEGUMES.

PLANT SEED UNIFORMLY WITH A CYCLONE SEEDER, A DRILL SEEDER, A CULTIPACKER SEEDER, OR BY HAND ON A FRESH, FIRM, FRIABLE SEEDBED. IF THE SEEDBED HAS BEEN SEALED BY RAINFALL, IT SHOULD BE DISKED SO THE SEED WILL BE SOWN INTO A FRESHLY PREPARED SEEDBED.

WHEN USING BROADCAST-SEEEDING METHODS, SUBDIVIDE THE AREA INTO WORKABLE SECTIONS AND DETERMINE THE AMOUNT OF SEED NEEDED FOR EACH SECTION. APPLY ONE-HALF THE SEED WHILE MOVING BACK AND FORTH ACROSS THE AREA, MAKING A UNIFORM PATTERN; THEN APPLY THE SECOND HALF IN THE SAME WAY, BUT MOVING AT RIGHT ANGLES TO THE FIRST PASS.

COVER BROADCAST SEED BY RAKING OR CHAIN DRAGGING; THEN FIRM THE SURFACE WITH A ROLLER OR CULTIPACKER TO PROVIDE GOOD SEED CONTACT. SMALL GRAINS SHOULD BE PLANTED NO MORE THAN 1" DEEP AND GRASSES AND LEGUME SEED NO MORE THAN $\frac{1}{2}$" DEEP.

HYDROSEEDING

SURFACE ROUGHENING IS PARTICULARLY IMPORTANT WHEN HYDROSEEDING, AS A ROUGHENED SLOPE WILL PROVIDE SOME NATURAL COVERAGE FOR LIME, FERTILIZER, AND SEED. THE SURFACE SHOULD NOT BE COMPACTED OR SMOOTH. FINE SEEDBED PREPARATION IS NOT NECESSARY FOR HYDROSEEDING OPERATIONS; LARGE CLODS, STONES, AND IRREGULARITIES PROVIDE CAVITIES IN WHICH SEEDS CAN LODGE.

MIX SEED, INOCULANT IF REQUIRED, AND A SEED CARRIER WITH WATER AND APPLY AS A SLURRY UNIFORMLY OVER THE AREA TO BE TREATED. THE SEED CARRIER SHOULD BE A CELLULOSE FIBER, NATURAL WOOD FIBER OR OTHER APPROVED FIBER MULCH MATERIAL WHICH IS DYED AN APPROPRIATE COLOR TO FACILITATE UNIFORM APPLICATION OF SEED. USE THE CORRECT LEGUME INOCULANT AT 4 TIMES THE RECOMMENDED RATE WHEN ADDING INOCULANT TO A HYDROSEEDER SLURRY. THE MIXTURE SHOULD BE APPLIED WITHIN ONE HOUR AFTER MIXING TO REDUCE DAMAGE TO SEED.

FERTILIZER SHOULD NOT BE MIXED WITH THE SEED-INOCULANT MIXTURE BECAUSE FERTILIZER SALTS MAY DAMAGE SEED AND REDUCE GERMINATION AND SEEDLING VIGOR.

FERTILIZER MAY BE APPLIED WITH A HYDROSEEDER AS A SEPARATE OPERATION AFTER SEEDLINGS ARE ESTABLISHED.

LIME IS NOT NORMALLY APPLIED WITH A HYDRAULIC SEEDER BECAUSE IT IS ABRASIVE BUT IF NECESSARY IT CAN BE ADDED TO THE SEED SLURRY AND APPLIED AT SEEDING OR IT MAY BE APPLIED WITH THE FERTILIZER MIXTURE. ALSO LIME CAN BE BLOWN ONTO STEEPER SLOPES IN DRY FORM.

SPRIGGING

HYBRID BERMUDAGRASS CANNOT BE GROWN FROM SEED AND MUST BE PLANTED VEGETATIVELY. VEGETATIVE METHODS OF ESTABLISHING COMMON AND HYBRID BERMUDAGRASS, CENTIPEDEGRASS AND ZOYSIA INCLUDE SODDING, PLUGGING AND SPRIGGING (SEE SODDING PRACTICE).

WHEN SPRIGS ARE PLANTED WITH A SPRIGGING MACHINE, FURROWS SHOULD BE 4-6" DEEP AND 2 FEET APART. PLACE SPRIGS NO FARTHER THAN 2 FEET APART IN THE ROW AND SO THAT AT LEAST ONE ROOTING NODE IS IN THE FURROW.

WHEN BROADCASTING IS USED FOR SPRIG PLANTING, BROADCAST SPRIGS AT THE SPECIFIED RATE (TABLE PS-1). PRESS INTO THE TOP $\frac{1}{2}$" TO 2" OF SOIL WITH A CULTIPACKER OR WITH A DISK SET NEARLY STRAIGHT SO THAT THE SPRIGS ARE NOT BROUGHT BACK TO THE SURFACE. A MULCH TACKING MACHINE MAY BE USED TO PRESS SPRIGS INTO THE SOIL.

MULCHING

THE USE OF MULCH PROVIDES INSTANT COVER AND HELPS ENSURE ESTABLISHMENT OF VEGETATION UNDER NORMAL CONDITIONS AND IS ESSENTIAL TO SEEDING SUCCESS UNDER HARSH SITE CONDITIONS (SEE MULCHING PRACTICE). HARSH SITE CONDITIONS INCLUDE: SLOPES STEEPER THAN 3:1 AND ADVERSE SOILS (SHALLOW, ROCKY, OR HIGH IN CLAY OR SAND). AREAS WITH CONCENTRATED FLOW SHOULD BE TREATED DIFFERENTLY AND REQUIRE SOD, A HYDROMULCH FORMULATED FOR CHANNELS OR AN APPROPRIATE EROSION CONTROL BLANKET.

IRRIGATION

MOISTURE IS ESSENTIAL FOR SEED GERMINATION AND VEGETATION ESTABLISHMENT. SUPPLEMENTAL IRRIGATION CAN BE VERY HELPFUL IN ASSURING ADEQUATE STANDS IN DRY SEASONS OR TO SPEED DEVELOPMENT OF FULL COVER. IT IS A REQUIREMENT FOR ESTABLISHMENT OF VEGETATION FROM SOD AND SPRIGS AND SHOULD BE USED ELSEWHERE WHEN FEASIBLE. HOWEVER, IRRIGATION IS RARELY CRITICAL FOR LOW-MAINTENANCE VEGETATION PLANTED AT THE APPROPRIATE TIME OF THE YEAR.

WATER APPLICATION RATES MUST BE CAREFULLY CONTROLLED TO PREVENT RUNOFF. INADEQUATE OR EXCESSIVE AMOUNTS OF WATER CAN BE MORE HARMFUL THAN NO SUPPLEMENTAL WATER.

MAINTENANCE

GENERALLY, A STAND OF VEGETATION CANNOT BE DETERMINED TO BE FULLY ESTABLISHED UNTIL SOIL COVER HAS BEEN MAINTAINED FOR 1 FULL YEAR FROM PLANTING. INSPECT VEGETATED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND VEGETATE AS SOON AS POSSIBLE.

RESEEDING

INSPECT SEEDINGS MONTHLY FOR STAND SURVIVAL AND VIGOR. ALSO, INSPECT THE SITE FOR EROSION.
IF A STAND IS INADEQUATE, IDENTIFY THE CAUSE OF FAILURE (CHOICE OF PLANT MATERIALS, LIME AND FERTILIZER QUANTITIES, POOR SEEDBED PREPARATION OR WEATHER) AND TAKE CORRECTIVE ACTION. IF VEGETATION FAILS TO GROW, HAVE THE SOIL TESTED TO DETERMINE WHETHER Ph IS IN THE CORRECT RANGE OR NUTRIENT DEFICIENCY IS A PROBLEM.

STAND CONDITIONS, PARTICULARLY THE COVERAGE, WILL DETERMINE THE EXTENT OF REMEDIAL ACTIONS SUCH AS SEEDBED PREPARATION AND RESEEDING. A QUALIFIED DESIGN PROFESSIONAL SHOULD BE CONSULTED TO ADVISE ON REMEDIAL ACTIONS. CONSIDER DRILL SEEDING WHERE POSSIBLE.

ERODED AREAS SHOULD BE ADDRESSED APPROPRIATELY BY FILLING AND/OR SMOOTHING, AND REAPPLICATION OF LIME, FERTILIZER, SEED AND MULCH.

FERTILIZING

SATISFACTORY ESTABLISHMENT MAY REQUIRE FERTILIZING THE STAND IN THE SECOND GROWING SEASON. FOLLOW SOIL TEST RECOMMENDATIONS OR THE SPECIFICATIONS PROVIDED TO ESTABLISH AND MAINTAIN THE PLANTING. AFTER THE SECOND YEAR, FERTILIZING IS OFTEN NEEDED ANNUALLY OR PERIODICALLY TO MAINTAIN A HEALTH STAND AND COVER SUFFICIENT FOR EROSION CONTROL.

MOWING

MOW VEGETATION ON STRUCTURAL PRACTICES SUCH AS EMBANKMENTS AND GRASS-LINED CHANNELS TO PREVENT WOODY PLANTS FROM INVADING.

OTHER AREAS SHOULD BE MOWED TO COMPLIMENT THE USE OF THE SITE.

CERTAIN SPECIES CAN BE WEAKENED BY MOWING REGIMES THAT SIGNIFICANTLY REDUCE THEIR FOOD RESERVES STORED FOR THE NEXT GROWING SEASON: FESCUE SHOULD NOT BE MOWED CLOSE DURING THE SUMMER; SERICEA SHOULD NOT BE MOWED CLOSE IN LATE SUMMER.

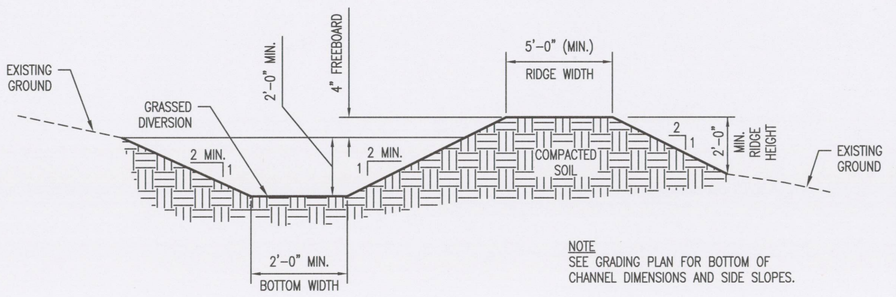
BERMUDAGRASS AND BAHIAGRASS ARE TOLERANT OF MOST MOWING REGIMES AND CAN BE MOWED OFTEN AND CLOSE, IF SO DESIRED, DURING THEIR GROWING SEASON.

PERMANENT SEEDING PS

CONSTRUCTION SPECIFICATIONS:

1. ALL TREES, BRUSH, STUMPS OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE DIVERSION.
2. THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND FREE OF IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. ALL FILLS SHALL BE MACHINE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETED DIVERSION.
4. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DIVERSION.
5. UNLESS OTHERWISE STABILIZED THE DIVERSION CHANNEL SHALL BE STABILIZED IN ACCORDANCE WITHIN 13 DAYS OF INSTALLATION IN ACCORDANCE WITH THE APPLICABLE SEEDING PRACTICE, TEMPORARY OR PERMANENT SEEDING.
6. DISTURBED AREAS DRAINING INTO THE DIVERSION SHOULD BE SEEDED AND MULCHED PRIOR TO OR AT THE TIME THE DIVERSION IS CONSTRUCTED.

MAINTENANCE
INSPECT FREQUENTLY AND AFTER EACH RAINFALL AND MAKE NECESSARY REPAIRS.



NOTE
SEE GRADING PLAN FOR BOTTOM OF CHANNEL DIMENSIONS AND SIDE SLOPES.

DIVERSION DV

N.T.S.

TOPSOILING IS THE REMOVAL OF A DESIRABLE SOIL SURFACE, REFERRED TO AS TOPSOIL, AT A SITE PRIOR TO CONSTRUCTION AND USING IT ON AREAS TO BE VEGETATED. TOPSOILING A SITE USUALLY IMPROVES THE QUALITY OF THE PLANT GROWTH MEDIUM AT THE SITE AND INCREASES THE LIKELIHOOD OF SUCCESSFUL PLANT ESTABLISHMENT AND PERFORMANCE. THIS PRACTICE APPLIES TO SITES THAT ARE TO BE DISTURBED BY EXCAVATION, COMPACTION OR FILLING, AND TO OTHER AREAS WHERE THE SUBSOIL IS UNSUITABLE FOR PLANT GROWTH.

DESIGN CRITERIA

MATERIALS

FIELD EVALUATION OF THE SITE SHOULD BE MADE TO DETERMINE IF THERE IS SUFFICIENT SURFACE SOIL OF GOOD QUALITY TO JUSTIFY STRIPPING. TOPSOIL SHALL BE FRIABLE AND LOAMY (LOAM, SANDY LOAM, SILT LOAM, SANDY CLAY LOAM, AND CLAY LOAM). IT SHALL BE RELATIVELY FREE OF DEBRIS, TRASH, STUMPS, ROCKS, ROOTS AND NOXIOUS WEEDS, AND SHALL GIVE EVIDENCE OF BEING ABLE TO SUPPORT HEALTHY VEGETATION. IT SHALL CONTAIN NO SUBSTANCE THAT IS POTENTIALLY TOXIC TO PLANT GROWTH.

TOPSOIL SHOULD MEET THE FOLLOWING CRITERIA:

- PH RANGE SHOULD BE FROM 6.0-7.0. IF PH IS LESS THAN 6.0, LIME SHOULD BE ADDED IN ACCORDANCE WITH SOIL TEST RESULTS OR IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE VEGETATIVE ESTABLISHMENT PRACTICE BEING USED.
- SOLUBLE SALTS SHALL NOT EXCEED 500 PPM.
- IF ADDITIONAL OFF-SITE TOPSOIL IS NEEDED, IT SHOULD MEET THE STANDARDS STATED ABOVE.
- THE DEPTH OF MATERIAL MEETING THE ABOVE QUALIFICATIONS SHOULD BE AT LEAST 4". SOIL FACTORS SUCH AS ROCK FRAGMENTS, SLOPE, DEPTH TO WATER TABLE, AND LAYER THICKNESS AFFECT THE EASE OF EXCAVATION AND SPREADING OF TOPSOIL.

GENERALLY, THE UPPER PART OF THE SOIL, WHICH IS RICHEST IN ORGANIC MATTER, IS MOST DESIRABLE; HOWEVER, MATERIAL EXCAVATED FROM DEEPER LAYERS MAY BE WORTH STORING IF IT MEETS THE OTHER CRITERIA LISTED ABOVE.

STRIPPING

STRIP ONLY THOSE AREAS THAT WILL BE AFFECTED BY CONSTRUCTION OR DEVELOPMENT. A NORMAL STRIPPING DEPTH IS 4-6" BUT DEEPER DEPTHS MAY BE SATISFACTORY IF THE SOIL IS SUITABLE AND UNDERCUTTING IS ALLOWABLE IN LOCATIONS SUCH AS BUILDINGS, WATER IMPOUNDMENT STRUCTURES, ROADWAYS, ETC. APPROPRIATE SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT BARRIERS, SEDIMENT BASINS, INLET PROTECTION, ETC., SHOULD BE IN PLACE BEFORE THE TOPSOIL IS STRIPPED. STRIPPING SHOULD NOT BE DONE ON AREAS INTENDED TO SUPPORT CONVENTIONAL ON-SITE EFFLUENT DISPOSAL LINES (FIELD LINES).

STOCKPILING

THE STOCKPILE LOCATION SHOULD BE OUT OF DRAINAGEWAYS AND TRAFFIC ROUTES. STOCKPILES SHOULD NOT BE PLACED ON STEEP SLOPES WHERE UNDUE EROSION WILL TAKE PLACE. MEASURES SHOULD BE TAKEN TO PREVENT EROSION OF THE STOCKPILES. THESE WOULD INCLUDE:

- MULCHING THE STOCKPILE WHEN IT IS LEFT INACTIVE FOR OVER 13 DAYS.
- PLANTING TEMPORARY VEGETATION WHEN THE STOCKPILE IS TO BE INACTIVE OVER 30 DAYS.
- COVERING THE STOCKPILE WITH PLASTIC WHENEVER THE PILES ARE SMALL AND ANY SOIL LOSS WOULD PROVIDE SEDIMENT TO DAMAGE EXISTING BUILDINGS OR FACILITIES OR ENTER WATERS.
- PLANTING PERMANENT VEGETATION WHEN THE STOCKPILE USE WILL BE INACTIVE OVER 12 MONTHS.
- IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED IN LESS THAN 14 DAYS, IT MAY BE MORE PRACTICAL TO USE A SEDIMENT BARRIER THAN AN EROSION CONTROL PRACTICE.

SITE PREPARATION

AREAS TO BE COVERED WITH TOPSOIL SHALL BE EXCAVATED, GRADED, FILLED AND SHAPED TO THE PROPER LINES, GRADES AND ELEVATIONS BEFORE TOPSOIL PLACEMENT IS STARTED.
THE SUBGRADES SHOULD BE CHECKED FOR PH AND LIMED IF IT IS LESS THAN 6.0. LIMING SHALL BE DONE IN ACCORDANCE WITH SOIL TESTS AND IN RELATION TO THE SEEDING MIXTURE TO BE PLANTED. INCORPORATE LIME TO A DEPTH OF AT LEAST 2" BY DISKING.

APPLYING TOPSOIL

THE SUBSOIL SHOULD BE DISKED OR CHISELED TO A DEPTH OF 2" OR MORE TO ENHANCE BONDING OF THE SUBSOIL AND TOPSOIL, IMMEDIATELY BEFORE PLACEMENT OF TOPSOIL. TOPSOIL SHOULD BE UNIFORMLY SPREAD TO A MINIMUM COMPACTED DEPTH OF 4". REQUIRED VOLUMES OF TOPSOIL MAY BE DETERMINED USING TABLE TSG-1.

TABLE TSG-1 VOLUME OF SOIL NEEDED FOR TOPSOILING

DEPTH TO SPREAD (INCHES)	CUBIC YARDS PER 1000 SQ. FT.	CUBIC YARDS PER ACRE
1	3.1	134
2	6.2	268
3	9.3	403
4	12.4	537
5	15.5	672
6	18.6	806

WHEN APPLYING TOPSOIL, MAINTAIN NEEDED EROSION CONTROL PRACTICES SUCH AS DIVERSIONS, GRASSED SWALES, LINED SWALES, ETC. TOPSOIL SHOULD NOT BE SPREAD WHEN IT OR THE SUBGRADE IS FROZEN OR MUDDY.

PRECAUTIONS SHOULD BE TAKEN TO PREVENT LAYERING OF THE TOPSOIL OVER THE SUBSOIL.
MIXING AND BONDING OF THE TWO SOILS SHOULD BE ENHANCED.

SETTLING OF THE TOPSOIL IS NECESSARY TO BOND THE SOILS TOGETHER, BUT EXCESSIVE COMPACTION SHOULD BE PREVENTED. LIGHT COMPACTION IS NECESSARY TO INCREASE SOIL STRENGTH, REDUCE EROSION AND ENHANCE VEGETATION ESTABLISHMENT.

EXCESSIVE COMPACTION SHOULD BE PROHIBITED AS IT INCREASES RUNOFF AND INHIBITS SEED GERMINATION AND ROOT DEVELOPMENT.

SURFACE IRREGULARITIES THAT WOULD IMPEDE DRAINAGE, INCREASE EROSION OR OTHERWISE DAMAGE THE SITE SHOULD BE REMOVED IN FINAL GRADING.

MAINTENANCE

INSPECT TOPSOILED AREAS FREQUENTLY UNTIL VEGETATION IS ESTABLISHED.

REPAIR ERODED OR DAMAGED AREAS AND REVEGETATE.

REPAIR SLOUGHING ON STEEP SLOPES - REMOVE TOPSOIL, ROUGHEN SUBGRADE AND RESPREAD TOPSOIL.
CONSULT WITH QUALIFIED DESIGN PROFESSIONAL IF DRAINAGE (WETNESS CAUSED BY SEEPAGE) OR SHALLOWNESS TO BEDROCK (LESS THAN 24") IS INVOLVED.

TOPSOILING TSG

MULCHING IS THE APPLICATION OF PLANT RESIDUES SUCH AS STRAW OR OTHER SUITABLE MATERIALS TO THE SOIL SURFACE. MULCH PROTECTS THE SOIL SURFACE FROM THE EROSIVE FORCE OF RAINDROP IMPACT AND REDUCES THE VELOCITY OF OVERLAND FLOW. IT HELPS SEEDLINGS GERMINATE AND GROW BY CONSERVING MOISTURE, PROTECTING AGAINST TEMPERATURE EXTREMES AND CONTROLLING WEEDS. MULCH ALSO MAINTAINS THE INFILTRATION CAPACITY OF THE SOIL. MULCH CAN BE APPLIED TO SEEDED AREAS TO HELP ESTABLISH PLANT COVER. IT CAN ALSO BE USED IN UNSEEDED AREAS TO PROTECT AGAINST EROSION OVER THE WINTER OR UNTIL FINAL GRADING AND SHAPING CAN BE ACCOMPLISHED EXCEPT IN AREAS WITH CONCENTRATED FLOW.

DESIGN CRITERIA

SITE PREPARATION

BEFORE MULCHING, COMPLETE THE REQUIRED SITE PREPARATION. SITE PREPARATION INCLUDES GRADING, IF NEEDED, AND SEEDBED PREPARATION AND FERTILIZING, LIMING AND SEEDING IF A PLANTING IS BEING MADE BY MEANS OTHER THAN HYDROSEEDING.

SPREADING THE MULCH

SELECT A MULCH MATERIAL BASED ON THE SITE AND PRACTICE REQUIREMENTS, AVAILABILITY OF MATERIAL, AND AVAILABILITY OF LABOR AND EQUIPMENT. TABLE MU-1 LISTS COMMONLY USED MULCHES.

MAINTENANCE: INSPECT ALL MULCHED AREAS PERIODICALLY AND AFTER RAINSTORMS FOR EROSION AND DAMAGE TO THE MULCH. REPAIR PROMPTLY AND RESTORE TO ORIGINAL CONDITION. CONTINUE INSPECTIONS UNTIL VEGETATION IS WELL ESTABLISHED. KEEP MOWER HEIGHT HIGH IF PLASTIC NETTING IS USED TO PREVENT NETTING FROM WRAPPING AROUND MOWER BLADES OR SHAFT.

TABLE MU-2 MULCHING MATERIALS AND APPLICATION RATES

MATERIAL	RATE PER ACRE AND (PER 1000 $FT.^2$)	NOTES
STRAW WITH SEED	1 $\frac{1}{2}$-2 TONS (70 LBS - 90LBS)	SPREAD BY HAND OR MACHINE TO ATTAIN 75% GROUNDCOVER; ANCHOR WHEN SUBJECT TO BLOWING.
STRAW ALONE (NO SEED)	2 $\frac{1}{2}$-3 TONS (115 LBS - 160 LBS)	SPREAD BY HAND OR MACHINE; ANCHOR WHEN SUBJECT TO BLOWING.
WOOD CHIPS	5-6 TONS (225 LBS - 270 LBS)	TREAT WITH 12 LBS. NITROGEN/TON.
BARK	35 CUBIC YARDS (0.8 CUBIC YARD)	CAN APPLY WITH MULCH BLOWER.
PINE STRAW	1-2 TONS (45 LBS - 90 LBS)	SPREAD BY HAND OR MACHINE; WILL NOT BLOW LIKE STRAW.
PEANUT HULLS	10-20 TONS (450 LBS - 900 LBS)	WILL WASH OFF SLOPES. TREAT WITH 12 LBS. NITROGEN/TON.
HECPs	0.75-2.25 TONS (35 LBS - 103 LBS)	REFER TO ECTC OR MANUFACTURER'S SPECIFICATIONS.

UNIFORMLY SPREAD ORGANIC MULCHES BY HAND OR WITH A MULCH BLOWER AT A RATE WHICH PROVIDES ABOUT 75% GROUND COVER. SPREAD HECPs UTILIZING APPROPRIATE EQUIPMENT AND AT RATES AS SPECIFIED. WHEN SPREADING STRAW MULCH BY HAND, DIVIDE THE AREA TO BE MULCHED INTO SECTION S OF APPROXIMATELY 1000 SQ. FT. AND PLACE 70-90 POUNDS OF STRAW (1$\frac{1}{2}$ TO 2 BALES) IN EACH SECTION TO FACILITATE UNIFORM DISTRIBUTION. CAUTION, AN OVER-APPLICATION OF WHEAT STRAW WILL REDUCE STAND SUCCESS - DO NOT OVER-APPLY WHEAT STRAW WHEN MULCHING A SEEDING!

WHEN STRAW MULCH IS SUBJECT TO BE BLOWN AWAY BY WIND, IT MUST BE ANCHORED IMMEDIATELY AFTER SPREADING. IT IS BEST ANCHORED WITH A MULCH ANCHORING TOOL

APPLICATION OF A COMMERCIAL TACKIFIER THROUGH A HYDROSEEDER IS OFTEN PRACTICAL FOR STEEP SLOPES AND CAN BE EFFECTIVE ON MOST SITES. BINDERS (TACKIFIERS) MAY BE APPLIED AFTER MULCH IS SPREAD OR MAY BE SPRAYED INTO THE MULCH AS IT IS BEING BLOWN ONTO THE SOIL. APPLYING STRAW AND BINDER TOGETHER IS THE MOST EFFECTIVE METHOD. LIQUID BINDERS INCLUDE AN ARRAY OF COMMERCIALLY AVAILABLE SYNTHETIC BINDERS AND ORGANIC TACKIFIERS.

IN HIGH WIND SITUATIONS LIKE ROADWAYS, CRIMPING THE MULCH IS THE BEST ALTERNATIVE AS THE USE OF MULCH BINDERS MAY STILL RESULT IN THE MULCH BEING ROLLED UP ON THE EDGE.

STRAW MULCH MAY ALSO BE ANCHORED WITH LIGHTWEIGHT PLASTIC, COTTON, JUTE, WIRE OR PAPER NETTING WHICH IS STAPLED OVER THE MULCH. THE MANUFACTURER'S RECOMMENDATIONS ON STAPLING NETTING SHOULD BE FOLLOWED.

MAINTENANCE

INSPECT ALL MULCHED AREAS PERIODICALLY, AND AFTER RAINSTORMS FOR EROSION AND DAMAGE TO THE MULCH. REPAIR PROMPTLY AND RESTORE TO ORIGINAL CONDITION. CONTINUE INSPECTIONS UNTIL VEGETATION IS WELL ESTABLISHED. KEEP MOWER HEIGHT HIGH IF PLASTIC NETTING IS USED TO PREVENT NETTING FROM WRAPPING AROUND MOWER BLADES OR SHAFT.

MULCHING MU

EROSION CONTROL NOTES:

1. EROSION CONTROL MEASURES FOR THIS PROJECT SHALL BE IN COMPLIANCE WITH THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1 AND VOLUME 2, CURRENT EDITION.

REFERENCES:

E720308-E720333
E720335-E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

Southern Company Generation
Engineering and Construction Services
FOR

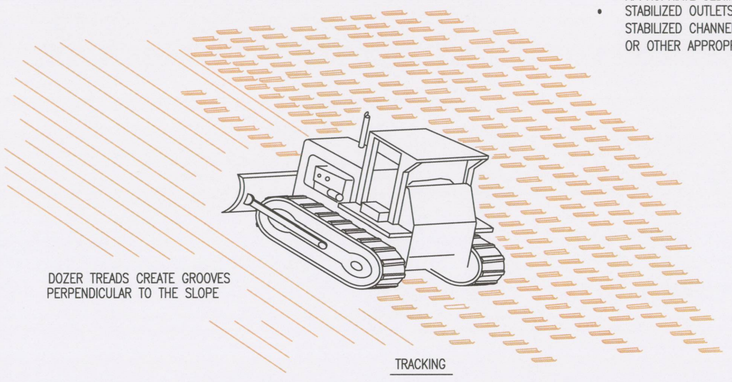
Alabama Power Company

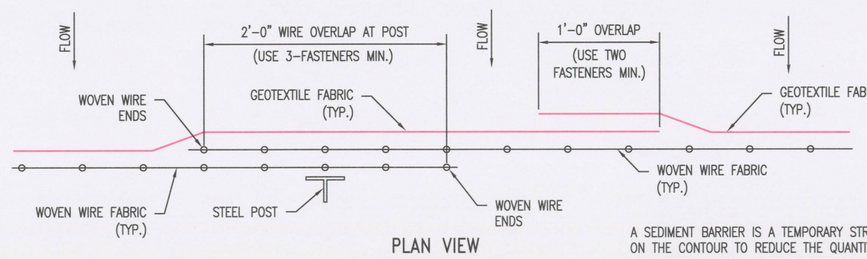
PLANT GORGAS
SITEWORK
CBMPP DETAILS
SHEET 1

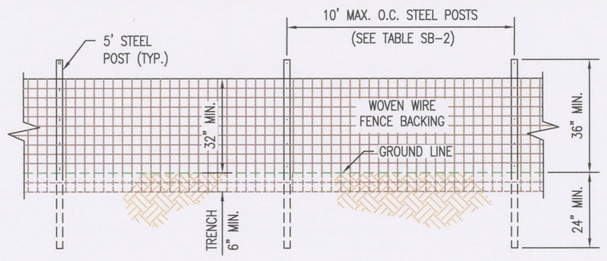
BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR	SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
DSM	THB	CRU	XXX	XXX	XXX	SSS	NONE	E720334	1	FINAL	0

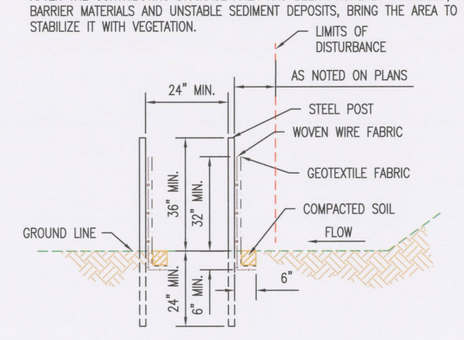
ANSI E: 44x34

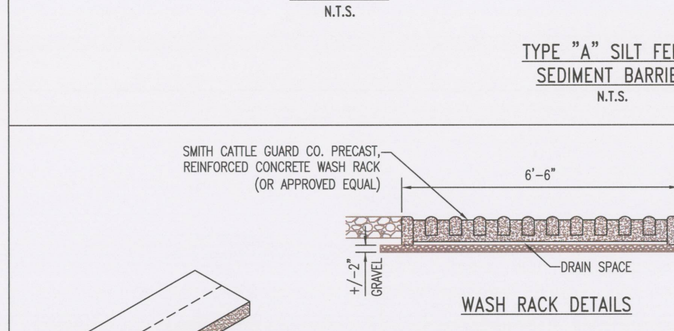
Approved

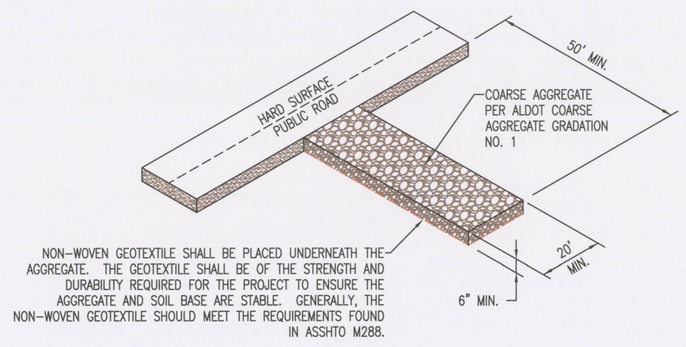












TEMPORARY SEEDING IS THE ESTABLISHMENT OF FAST-GROWING ANNUAL VEGETATION FROM SEED ON DISTURBED AREAS. TEMPORARY VEGETATION PROVIDES ECONOMICAL EROSION CONTROL FOR UP TO A YEAR AND REDUCES THE AMOUNT OF SEDIMENT MOVING OFF THE SITE.
THIS PRACTICE APPLIES WHERE SHORT-LIVED VEGETATION CAN BE ESTABLISHED BEFORE FINAL GRADING OR IN A SEASON NOT SUITABLE FOR PLANTING THE DESIRED PERMANENT SPECIES. IT HELPS PREVENT COSTLY MAINTENANCE OPERATIONS ON OTHER PRACTICES SUCH AS SEDIMENT BASINS AND SEDIMENT BARRIERS. IN ADDITION, IT REDUCES PROBLEMS OF MUD AND DUST PRODUCTION FROM BARE SOIL SURFACES DURING CONSTRUCTION. TEMPORARY OR PERMANENT SEEDING IS NECESSARY TO PROTECT EARTHEN STRUCTURES SUCH AS DIKES, DIVERSIONS, GRASS-LINED CHANNELS AND THE BANKS AND DAMS OF SEDIMENT BASINS.

DESIGN CRITERIA
PLANT SELECTION
SELECT PLANTS THAT CAN BE EXPECTED TO MEET PLANTING OBJECTIVES. TO SIMPLIFY PLANT SELECTION, USE TABLE TS-1 ON THIS DRAWING AND FIGURE TS-1, GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES, AS FOUND ON PAGE 159 IN THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1. SEEDING MIXTURES COMMONLY SPECIFIED BY THE ALABAMA DEPARTMENT OF TRANSPORTATION ARE AN APPROPRIATE ALTERNATIVE FOR PLANTINGS ON RIGHTS-OF-WAYS. **NOTE: WALKER COUNTY IS LOCATED IN THE NORTH GEOGRAPHICAL AREA FOR SPECIES ADAPTATION AND SEEDING DATES (FIGURE TS-1).**

TABLE TS-1 COMMONLY USED PLANTS FOR TEMPORARY COVER

SPECIES	SEEDING RATES/AC PLS	NORTH	CENTRAL	SOUTH
			SEEDING DATES	
MILLET, BROWNTOP, OR GERMAN	40 LBS	MAY 1–AUG 1	APR 1–AUG 15	APR 1–AUG 15
RYE	3 BU	SEP 1–NOV 15	SEP 15–NOV 15	SEP 15–NOV 15
RYEGRASS	30 LBS	AUG 1–SEP 15	SEP 1–OCT 15	SEP 1–OCT 15
SORGHUM-SUDAN HYBRIDS	40 LBS	MAY 1–AUG 1	APR 15–AUG 1	APR 1–AUG 15
SUDANGRASS	40 LBS	MAY 1–AUG 1	APR 15–AUG 1	APR 1–AUG 15
WHEAT	3 BU	SEP 1–NOV 1	SEP 15–NOV 15	SEP 15–NOV 15
COMMON BERMUDAGRASS	10 LBS	APR 1–JULY 1	MAR 15–JULY 15	MAR 1–JULY 15
CRIMSON CLOVER	10 LBS	SEP 1–NOV 1	SEP 1–NOV 1	SEP 1–NOV 1

PLS MEANS PURE LIVE SEED AND IS USED TO ADJUST SEEDING RATES. FOR EXAMPLE, TO PLANT 10 LBS PLS OF A SPECIES WITH GERMINATION OF 80% AND PURITY OF 90%, PLS=0.8X0.9=72%.
10 LBS PLS=10/0.72=13.9 LBS OF THE SPECIES TO BE PLANTED.

SITE PREPARATION AND SOIL AMENDMENTS
COMPLETE GRADING AND SHAPING BEFORE APPLYING SOIL AMENDMENTS IF NEEDED TO PROVIDE A SURFACE ON WHICH EQUIPMENT CAN SAFELY AND EFFICIENTLY BE USED TO APPLY SOIL AMENDMENTS AND ACCOMPLISH SEEDBED PREPARATION AND SEEDING.

LIME
APPLY LIME ACCORDING TO SOIL TEST RECOMMENDATIONS. IF A SOIL TEST IS NOT AVAILABLE, USE 1 TON OF AGRICULTURAL LIMESTONE OR EQUIVALENT PER ACRE ON COARSE TEXTURED SOILS AND 2 TONS PER ACRE ON FINE TEXTURED SOILS. DO NOT APPLY LIME TO ALKALINE SOILS OR TO AREAS WHICH HAVE BEEN LIMED DURING THE PRECEDING 2 YEARS. OTHER LIMING MATERIALS THAT MAY BE SELECTED SHOULD BE PROVIDED IN AMOUNTS THAT PROVIDE EQUAL VALUE TO THE CRITERIA LISTED FOR AGRICULTURAL LIME OR BE USED IN COMBINATION WITH AGRICULTURAL LIMESTONE OR SELMA CHALK TO PROVIDE EQUIVALENT VALUES TO AGRICULTURAL LIMESTONE.

FERTILIZER
APPLY FERTILIZER ACCORDING TO SOIL TEST RESULTS. IF A SOIL TEST IS NOT AVAILABLE, APPLY 8-24-24 FERTILIZER.

WHEN VEGETATION HAS EMERGED TO A STAND AND IS GROWING, 30 TO 40 LBS/ACRE (APPROXIMATELY 0.8 LBS/1000 FT^2) OF ADDITIONAL NITROGEN FERTILIZER SHOULD BE APPLIED.

NOTE: FERTILIZER CAN BE BLENDED TO MEET EXACT FERTILIZER RECOMMENDATIONS. TAKE SOIL TEST RECOMMENDATIONS TO LOCAL FERTILIZER DEALER FOR BULK FERTILIZER BLENDS. THAIS MAY BE MORE ECONOMICAL THAN BAGGED FERTILIZER.

APPLICATION OF SOIL AMENDMENTS
INCORPORATE LIME AND FERTILIZER INTO THE TOP 6" OF SOIL DURING SEEDBED PREPARATION.

SEEDBED PREPARATION
GOOD SEEDBED PREPARATION IS ESSENTIAL TO SUCCESSFUL PLANT ESTABLISHMENT. A GOOD SEEDBED IS WELL PULVERIZED, LOOSE, AND SMOOTH. IF SOILS BECOME COMPACTED DURING GRADING, LOOSEN THEM TO A DEPTH OF 6" TO 8" USING A RIPPER OR CHISEL PLOW.
IF RAINFALL HAS CAUSED THE SURFACE TO BECOME SEALED OR CRUSTED, LOOSEN IT JUST PRIOR TO SEEDING BY DISKING, RAKING, HARROWING, OR OTHER SUITABLE METHODS. WHEN HYDROSEEDING METHODS ARE USED, THE SURFACE SHOULD BE LEFT WITH A MORE IRREGULAR SURFACE OF CLODS.

PLANTING METHODS
SEEDING
EVENLY APPLY SEED USING A CYCLONE SEEDER (BROADCAST), DRILL SEEDER, CULTIPACKER SEEDER, OR HYDROSEEDER. BROADCAST SEEDING AND HYDROSEEDING ARE APPROPRIATE FOR STEEP SLOPES WHERE EQUIPMENT CANNOT OPERATE SAFELY. SMALL GRAINS SHOULD BE PLANTED NO MORE THAN 1" DEEP, AND GRASSES AND LEGUMES NO MORE THAN $\frac{1}{2}$" DEEP. SEED THAT ARE BROADCAST MUST BE COVERED BY RAKING OR CHAIN DRAGGING, AND THEN LIGHTLY FIRMED WITH A ROLLER OR CULTIPACKER.

HYDROSEEDING
SURFACE ROUGHENING IS PARTICULARLY IMPORTANT WHEN HYDROSEEDING, AS A ROUGHENED SLOPE WILL PROVIDE SOME NATURAL COVERAGE FOR LIME, FERTILIZER, AND SEED. THE SURFACE SHOULD NOT BE COMPACTED OR SMOOTH. FINE SEEDBED PREPARATION IS NOT NECESSARY FOR HYDROSEEDING OPERATIONS; LARGE CLODS, STONES, AND IRREGULARITIES PROVIDE CAVITIES IN WHICH SEEDS CAN LODGE.
MIX SEED, INOCULANT IF REQUIRED, AND A SEED CARRIER WITH WATER AND APPLY AS A SLURRY UNIFORMLY OVER THE AREA TO BE TREATED. THE SEED CARRIER SHOULD BE A CELLULOSE FIBER, NATURAL WOOD FIBER OR OTHER APPROVED FIBER MULCH MATERIAL WHICH IS DYED AN APPROPRIATE COLOR TO FACILITATE UNIFORM APPLICATION OF SEED. USE THE CORRECT LEGUME INOCULANT AT 4 TIMES THE RECOMMENDED RATE WHEN ADDING INOCULANT TO A HYDROSEEDER SLURRY. THE MIXTURE SHOULD BE APPLIED WITHIN ONE HOUR AFTER MIXING TO REDUCE DAMAGE TO SEED.
FERTILIZER SHOULD NOT BE MIXED WITH THE SEED-INOCULANT MIXTURE BECAUSE FERTILIZER SALTS MAY DAMAGE SEED AND REDUCE GERMINATION AND SEEDLING VIGOR. FERTILIZER MAY BE APPLIED WITH A HYDROSEEDER AS A SEPARATE OPERATION AFTER SEEDLINGS ARE ESTABLISHED.

MULCHING
THE USE OF APPROPRIATE MULCH PROVIDES INSTANT COVER AND HELPS ENSURE ESTABLISHMENT OF VEGETATION UNDER NORMAL CONDITIONS AND IS ESSENTIAL TO SEEDING SUCCESS UNDER HARSH SITE CONDITIONS (SEE MULCHING PRACTICE FOR GUIDANCE). HARSH SITE CONDITIONS INCLUDE THE FOLLOWING: SLOPES STEEPER THAN 3:1 AND ADVERSE SOILS (SOILS THAT ARE SHALLOW TO ROCK, ROCKY, OR HIGH IN CLAY OR SAND). AREAS WITH CONCENTRATED FLOW SHOULD BE TREATED DIFFERENTLY AND REQUIRE A HYDROMULCH FORMULATED FOR CHANNELS OR AN APPROPRIATE EROSION CONTROL BLANKET.

MAINTENANCE
RESEEDING
INSPECT SEEDINGS WEEKLY UNTIL A STAND IS ESTABLISHED AND THEREAFTER AT LEAST MONTHLY FOR STAND SURVIVAL AND VIGOR. ALSO, INSPECT THE SITE FOR EROSION.
ERODED AREAS SHOULD BE ADDRESSED APPROPRIATELY BY FILLING AND/OR SMOOTHING, AND REAPPLICATION OF LIME, FERTILIZER, SEED AND MULCH.
A STAND SHOULD BE UNIFORM AND DENSE FOR BEST RESULTS. STAND CONDITIONS, PARTICULARLY THE COVERAGE, WILL DETERMINE THE EXTENT OF REMEDIAL ACTIONS SUCH AS SEEDBED PREPARATION AND RESEEDING. A QUALIFIED DESIGN PROFESSIONAL SHOULD BE CONSULTED TO ADVISE ON REMEDIAL ACTIONS. CONSIDER DRILL SEEDING WHEN DOING A REMEDIAL PLANTING.

FERTILIZING
IF VEGETATION FAILS TO GROW, HAVE THE SOIL TESTED TO DETERMINE WHETHER pH IS IN THE CORRECT RANGE OR NUTRIENT DEFICIENCY IS A PROBLEM.
SATISFACTORY ESTABLISHMENT MAY REQUIRE REFERTILIZING THE STAND, ESPECIALLY IF THE PLANTING IS MADE EARLY IN THE PLANTING SEASON. FOLLOW SOIL TEST RECOMMENDATIONS OR THE SPECIFICATIONS PROVIDED TO ESTABLISH THE PLANTING.

MOWING
TEMPORARY PLANTINGS MAY BE MOWED AND BALED OR SIMPLY MOWED TO COMPLIMENT THE USE OF THE SITE. MILLET, SORGHUM-SUDAN HYBRIDS, SUDANGRASS, RYE AND WHEAT MAY BE MOWED, BUT NO LOWER THAN 6" (CLOSER MOVING MAY DAMAGE THE STAND).
RYEGRASS IS TOLERANT OF MOST MOWING REGIMES AND MAY BE MOWED OFTEN AND AS CLOSE AS 4" TO 6" IF THIS REGIME IS STARTED BEFORE IT ATTAINS TALL GROWTH (OVER 8").
BERMUDAGRASS IS TOLERANT OF MOST MOWING REGIMES AND CAN BE MOWED OFTEN AND CLOSE, IF SO DESIRED, DURING ITS GROWING SEASON.

TEMPORARY SEEDING TS

DUST CONTROL INCLUDES A WIDE RANGE OF TECHNIQUES THAT PREVENT OR REDUCE MOVEMENT OF WIND-BORNE SOIL PARTICLES (DUST) DURING LAND DISTURBING ACTIVITIES. THIS PRACTICE APPLIES TO CONSTRUCTION ROUTES AND OTHER DISTURBED AREAS WHERE ON-SITE AND OFF-SITE DAMAGE OR HAZARDS MAY OCCUR IF DUST IS NOT CONTROLLED.

DESIGN CRITERIA
PERMANENT METHODS:

VEGETATIVE COVER: FOR DISTURBED AREAS NOT SUBJECT TO TRAFFIC, VEGETATION PROVIDES THE MOST PRACTICAL METHOD OF DUST CONTROL. ESTABLISH VEGETATIVE COVER ACCORDING TO THE PERMANENT SEEDING OR TEMPORARY SEEDING PRACTICE

TOP SOILING: THIS ENTAILS COVERING THE SURFACE WITH LESS EROSIVE SOIL MATERIAL. SEE TOPSOILING PRACTICE FOR GUIDANCE.

STONE: STONE USED TO STABILIZE CONSTRUCTION ROADS CAN ALSO BE EFFECTIVE FOR DUST CONTROL. STONE SHOULD BE SPREAD A MINIMUM OF 6" THICK OVER CONSTRUCTION ROADS IN THE DISTURBED AREA. FOR HEAVILY TRAVELED ROADS OR ROADS SUBJECTED TO HEAVY LOADS THE STONE THICKNESS SHOULD BE 8" TO 10". A NON-WOVEN GEOTEXTILE MEETING THE REQUIREMENTS OF ASSHTO M288 SHOULD BE USED UNDER THE STONE.

TEMPORARY METHODS:

MULCHES: MULCH OFFERS A FAST, EFFECTIVE MEANS OF CONTROLLING DUST WHEN PROPERLY APPLIED. SEE MULCHING PRACTICE FOR GUIDELINES FOR PLANNING AND INSTALLING THE PRACTICE.

TEMPORARY VEGETATIVE COVER: FOR DISTURBED AREAS WHERE NO ACTIVITY IS ANTICIPATED FOR 14 DAYS OR LONGER, TEMPORARY SEEDING CAN EFFECTIVELY CONTROL DUST. ESTABLISH VEGETATIVE COVER ACCORDING TO TEMPORARY SEEDING PRACTICE GUIDELINES.

CALCIUM CHLORIDE: CALCIUM CHLORIDE MAY BE APPLIED BY MECHANICAL SPREADER AS LOOSE, DRY GRANULES OR FLAKES AT A RATE THAT KEEPS THE SURFACE MOIST BUT NOT SO HIGH AS TO CAUSE WATER POLLUTION OR PLANT DAMAGE. SITES MAY NEED TO BE RETREATED BECAUSE THE PRODUCT DEGRADES OVER TIME.

SPRAY-ON ADHESIVES: SPRAY-ON ADHESIVES MAY BE USED ON MINERAL SOILS FOR DUST CONTROL. TRAFFIC MUST BE KEPT OFF TREATED AREAS TO PREVENT THE PRODUCT FROM BECOMING INEFFECTIVE. EXAMPLES OF SPRAY-ON ADHESIVES FOR USE IN DUST CONTROL ARE LISTED IN TABLE DC-1.

TABLE DC-1 SPRAY-ON ADHESIVES FOR DUST CONTROL ON MINERAL SOIL

MATERIAL	WATER DILUTION	TYPE OF NOZZLE	APPLY GAL/AC
ANIONIC ASPHALT EMULSION	7:1	COARSE SPRAY	1,200
LATEX EMULSION	12.5:1	FINE SPRAY	235
RESIN IN WATER	4:1	FINE SPRAY	300

CHEMICAL STABILIZATION (CHS): CHEMICAL PRODUCTS MAY BE USED ON MINERAL SOILS FOR DUST CONTROL. TRAFFIC MUST BE KEPT OFF TREATED AREAS TO PREVENT THE PRODUCT FROM BECOMING INEFFECTIVE. THE MANUFACTURER OR SUPPLIER SHALL PROVIDE WRITTEN APPLICATION METHODS. THE APPLICATION METHOD SHALL ENSURE UNIFORM COVERAGE TO THE TARGET AND AVOID DRIFT TO NON-TARGET AREAS INCLUDING WATERS OF THE STATE. THE MANUFACTURER OR SUPPLIER SHALL ALSO PROVIDE WRITTEN INSTRUCTIONS TO ENSURE PROPER SAFETY, STORAGE, AND MIXING OF THE PRODUCT. REFER TO THE PLANNING CONSIDERATIONS FOR CHEMICAL STABILIZATION PRACTICE FOR PLANNING CONSIDERATION BEFORE DECIDING TO USE THIS PRODUCT.

SPRINKLING OR IRRIGATION: SPRINKLING IS ESPECIALLY EFFECTIVE FOR DUST CONTROL ON HAUL ROADS AND OTHER TRAFFIC ROUTES. SPRINKLE THE SITE UNTIL THE SURFACE IS WET. REPEAT AS NEEDED. ALSO BARE AREAS MAY BE KEPT WET WITH IRRIGATION TO CONTROL DUST AS AN EMERGENCY TREATMENT.

TILLAGE: TILLAGE IS USED TO ROUGHEN THE SITE AND BRING CLODS AND MOIST SOIL TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE THAT CAN BE USED ON LARGE OPEN DISTURBED AREAS AS SOON AS SOIL BLOWING STARTS. BEGIN TILLING ON THE WINDWARD EDGE OF THE SITE. THE DEPTH OF TILLAGE IS DETERMINED BY THE DEPTH TO MOIST SOIL AND THE AMOUNT OF MOIST SOIL DESIRED AT THE SURFACE. IN SANDY SOILS, THE DEPTH TO MOIST SOIL MAY MAKE TILLAGE IMPRACTICAL.

BARRIERS: A BOARD FENCE, WIND FENCE, SEDIMENT FENCE, HAY BALES, OR SIMILAR BARRIERS CAN CONTROL AIR CURRENTS AND BLOWING SOIL. PLACE BARRIERS PERPENDICULAR TO PREVAILING AIR CURRENTS AT INTERVALS ABOUT 15 TIMES THE BARRIER HEIGHT.

MAINTENANCE: CHECK CONSTRUCTION SITE DURING VEHICULAR TRAFFIC OR WINDY CONDITIONS TO SEE IF MEASURES ARE WORKING ADEQUATELY. MAINTAIN DUST CONTROL MEASURES CONTINUOUSLY THROUGHOUT DRY WEATHER PERIODS, UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED.

DUST CONTROL DC

LAND GRADING IS RESHAPING OF THE GROUND SURFACE TO PROVIDE SUITABLE TOPOGRAPHY FOR BUILDINGS, FACILITIES AND OTHER LAND USES, TO CONTROL SURFACE RUNOFF, AND TO MINIMIZE SOIL EROSION AND SEDIMENTATION BOTH DURING AND AFTER CONSTRUCTION. THIS PRACTICE APPLIES TO SITES WHERE THE EXISTING TOPOGRAPHY MUST BE MODIFIED TO PREPARE FOR ANOTHER LAND USE, OR WHERE ADAPTING PROPOSED DEVELOPMENT TO THE EXISTING LANDSCAPE CAN REDUCE THE EROSION POTENTIAL OF THE SITE AND THE COST OF INSTALLING EROSION AND SEDIMENT CONTROL MEASURES. IN SOME INSTANCES OTHER PRACTICES SUCH AS DIVERSIONS OR BENCHES CAN BE USED TO REDUCE THE LENGTH OF CONTINUOUS SLOPES AND REDUCE EROSION POTENTIAL.

DESIGN CRITERIA
SITE PREPARATION
A DETAILED SURVEY OF THE CONSTRUCTION SITE SHOULD BE PERFORMED BY A QUALIFIED SURVEYOR PRIOR TO GRADING PLAN DEVELOPMENT. THIS SURVEY SHOULD INCLUDE EXISTING TOPOGRAPHIC INFORMATION AT THE SITE INCLUDING EXISTING ELEVATIONS, EXISTING DRAINAGE PATTERNS, LOCATIONS OF EXISTING OVERHEAD AND UNDERGROUND UTILITIES, AND CONSTRUCTION LIMIT BOUNDARIES.

THE GRADING PLAN SHOULD REQUIRE THAT THE EXISTING TOPSOIL AT SITES TO BE GRADED BY REMOVED AS THE FIRST STEP IN THE GRADING PROCESS. THE PLAN SHOULD INCLUDE A LOCATION ON THE CONSTRUCTION SITE WHERE TOPSOIL WILL BE STOCKPILED. STOCKPILED TOPSOIL SHOULD BE PROTECTED BY TEMPORARY VEGETATION (SEE TEMPORARY VEGETATION PRACTICE) OR OTHER APPROPRIATE TEMPORARY COVER, SUCH AS PLASTIC, UNTIL IT IS USED TO COVER DISTURBED AREAS IN ADVANCE OF PERMANENT VEGETATION OF THE SITE.

THE GRADING PLAN SHOULD INCLUDE A SCHEDULE OF DISTURBANCE ACTIVITIES THAT MINIMIZES THE AREA DISTURBED AT ANY POINT IN TIME USING SEQUENCING AND STAGING CONCEPTS. IN AREAS WHERE CLEARING OF EXISTING VEGETATION IS PLANNED, THE AREA SHOULD BE CLEARED AND GRUBBED BY REMOVING TREES, VEGETATION, ROOTS AND OTHER DEBRIS SUCH AS TRASH. IN AREAS TO BE FILLED, ALL LOOSE OR WEAK SOIL AND OVERSIZED ROCKS SHOULD BE REMOVED FROM THE AREA. THE FOUNDATION OF THE AREA TO BE FILLED SHOULD CONSIST OF SOIL OR ROCK MATERIAL OF ADEQUATE STRENGTH TO SUPPORT THE PROPOSED FILL MATERIAL AND THE STRUCTURES TO BE BUILT AT THE SITE. THE EXACT DEPTH OF MATERIAL TO BE REMOVED SHOULD BE DETERMINED BY A QUALIFIED GEOTECHNICAL PROFESSIONAL ACCORDING TO ACCEPTED ENGINEERING STANDARDS.

GRADING
A PLAN FOR PLACEMENT OF FILL SHOULD BE DEVELOPED BY A QUALIFIED GEOTECHNICAL PROFESSIONAL. THE PLAN SHOULD SPECIFY THE SOURCE OF FILL MATERIALS, WHICH SHOULD BE OBTAINED ON SITE IF POSSIBLE. MATERIALS USED FOR FILL, WHEN PLACED ACCORDING TO THE PLANS AND SPECIFICATIONS, SHOULD PROVIDE SUFFICIENT STRENGTH TO SUPPORT STRUCTURES PLANNED FOR CONSTRUCTION AT THE LOCATION.

LOOSE FILL MATERIAL SHOULD BE PLACED IN LAYERS NOT EXCEEDING 9" IN THICKNESS. THE MATERIALS SHOULD BE COMPACTED TO A MOISTURE CONTENT AND TO A DRY DENSITY THAT WILL PRODUCE THE DESIGN BEARING STRENGTH REQUIRED FOR STRUCTURES PLANNED AT THE SITE. A QUALIFIED GEOTECHNICAL ENGINEER SHOULD PROVIDE FILL PLACEMENT SPECIFICATIONS USING STANDARD ACCEPTED ENGINEERING PRACTICES.
LONG AND/OR STEEP SLOPE LENGTHS CAN RESULT IN RILL AND GULLY EROSION ON SLOPES. EROSION ON THESE TYPE SLOPES CAN BE MINIMIZED BY BREAKING THE SLOPE WITH DIVERSIONS OR BENCHES (SEE DIVERSION PRACTICE). DIVERSION WIDTHS SHOULD BE COMPATIBLE WITH THE EXPECTED MAINTENANCE EQUIPMENT. CARE IS NEEDED IN LOCATING OUTLETS THAT WILL BE STABLE AND NOT CAUSE GULLY EROSION. THE FOLLOWING TABLE GIVES GENERAL GUIDANCE ON THE HORIZONTAL SPACING OF SLOPE BREAKS:

TABLE LG-1 GUIDELINES FOR SPACING SLOPE BREAKS[1]

SLOPE (H:V)	HORIZONTAL SPACING (FT)
1:1	20
2:1	40
3:1	60
4:1 AND 5:1	80
6:1 TO 9:1	120
10:1 OR FLATTER	200

[1] ADJUSTMENTS IN SPACING MAY BE MADE TO ACCOUNT FOR SOIL AND SITE CONDITIONS AND PROFESSIONAL EXPERIENCE OF THE SITE DESIGNER.

IN AREAS WHERE SEEPAGE AND GROUND WATER ARE PRESENT, SUBSURFACE DRAINS SHOULD BE INSTALLED TO IMPROVE SLOPE STABILITY OR SOIL BEARING CAPACITY (SEE SUBSURFACE DRAIN PRACTICE).

STEEP SLOPES SHOULD BE AVOIDED IF POSSIBLE. SLOPES THAT ARE TO BE VEGETATED SHOULD BE 2 HORIZONTAL TO 1 VERTICAL OR FLATTER. IF THE SLOPE IS TO BE MAINTAINED BY TRACTOR OR OTHER EQUIPMENT THE SLOPE SHOULD BE 3 HORIZONTAL TO 1 VERTICAL OR FLATTER. SLOPES SHOULD BE DESIGNED TO BLEND WITH SURROUNDING TOPOGRAPHY AS MUCH AS POSSIBLE.

EROSION CONTROL
THE GRADING PLAN SHOULD INCLUDE PROVISIONS FOR STABILIZATION OF GRADED AREAS IMMEDIATELY AFTER FINAL GRADING IS COMPLETED. ON AREAS THAT WILL HAVE NO ADDITIONAL DISTURBANCE, PERMANENT VEGETATION SHOULD BE APPLIED IMMEDIATELY TO THE SITE (SEE PERMANENT SEEDING PRACTICE) IF GRADING IS FINISHED DURING THE PLANTING SEASON. IF GRADING IS FINISHED OUTSIDE OF THE RECOMMENDED PLANTING DATES A TEMPORARY COVER SHOULD BE INSTALLED USING A TEMPORARY SEEDING OR OTHER APPROPRIATE COVER AND THE PERMANENT SEEDING PLANNED FOR THE NEXT PLANTING PERIOD. ON AREAS WHERE WORK IS TO BE INTERRUPTED OR DELAYED FOR 14 CALENDAR DAYS OR LONGER, SUCH AS TOPSOIL STOCKPILES, THE AREA SHOULD BE STABILIZED USING MULCH OR TEMPORARY SEEDING (SEE MULCHING OR TEMPORARY SEEDING PRACTICE). OTHER STABILIZATION MEASURES SUCH A HYDRAULIC MULCH OR EROSION CONTROL BLANKETS SHOULD BE USED IN EXTREME CONDITIONS, SUCH AS STEEP SLOPES AND CHANNELS.

WHERE PRACTICAL, RUNOFF FROM UNDISTURBED OFF-SITE AREAS SHOULD BE DIVERTED AROUND THE CONSTRUCTION SITE TO PREVENT EROSION ON THE DISTURBED AREAS (SEE DIVERSION PRACTICE).

SEDIMENT CONTROL
REQUIRED SEDIMENT CONTROL PRACTICES SHOULD BE INSTALLED BEFORE LAND DISTURBANCE ACTIVITIES IN THE DRAINAGE AREA OF THE SEDIMENT CONTROL PRACTICES. UNTIL DISTURBED AREAS CAN BE STABILIZED, APPROPRIATE SEDIMENT CONTROL MEASURES WILL BE MAINTAINED TO MINIMIZE SEDIMENT DELIVERY OFF-SITE. MEASURES SHOULD INCLUDE AS A MINIMUM:
- SEDIMENT BARRIERS – PLACED ALONG TOES OF SLOPES (SEE SEDIMENT BARRIER PRACTICE)
- SEDIMENT BASINS – DIVERT SEDIMENT LADEN RUNOFF TO BASINS AS NEEDED TO MINIMIZE OFF-SITE SEDIMENTATION (SEE SEDIMENT BASIN PRACTICE).
- INLET PROTECTION – WHERE SEDIMENT-LADEN RUNOFF IS DIVERTED TO ON-SITE STORMWATER DRAIN INLETS, THE INLETS SHOULD BE PROTECTED WITH AN APPROPRIATE SEDIMENT CONTROL PRACTICE.
- STABILIZED OUTLETS – ALL RUNOFF FROM THE SITE SHOULD BE CONVEYED IN STABILIZED CHANNELS (SEE GRASSED SWALE, LINED SWALE, RIP-RAP LINED SWALE, OR OTHER APPROPRIATE CHANNEL STABILIZATION).

MAINTENANCE
PERIODICALLY CHECK ALL GRADED AREAS AND THE RELATED EROSION AND SEDIMENT CONTROL PRACTICES FOR DAMAGE BY EQUIPMENT AND ESPECIALLY AFTER HEAVY RAINFALLS FOR DAMAGE BY RUNOFF. REPAIR SILT FENCES AND OTHER TEMPORARY SEDIMENT CONTROL MEASURES. CLEAN SEDIMENT OUT OF ADJACENT DIVERSIONS AND OTHER STRUCTURES AS NEEDED. REPAIR ANY FAILURES THAT OCCUR IN SURFACE MEASURES SUCH AS PLANTINGS.

LAND GRADING LG
N.T.S.

PLAN VIEW
OVERLAPPING DETAIL
N.T.S.

TABLE SB-1 SLOPE LIMITATIONS FOR SILT FENCE

LAND SLOPE (PERCENT)	MAXIMUM LENGTH OF SLOPE ABOVE FENCE (FEET)
<2	100
2 TO 5	75
5 TO 10	50
10 TO 20*	25
>20	15

*IN AREAS WHERE THE SLOPE IS GREATER THAN 10%, A FLAT AREA LENGTH OF 10 FEET BETWEEN THE TOE OF THE SLOPE TO THE FENCE SHOULD BE PROVIDED.

TABLE SB-2 POST SIZE FOR SILT FENCE

	MINIMUM LENGTH	TYPE OF POST	SIZE OF POST
TYPE A	5'	STEEL "T" POST	1.3 lb./ft. MIN.

A SEDIMENT BARRIER IS A TEMPORARY STRUCTURE USED ACROSS A LANDSCAPE MOSTLY ON THE CONTOUR TO REDUCE THE QUANTITY OF SEDIMENT THAT IS MOVING DOWNSLOPE. THE MOST COMMONLY USED BARRIER IS A SILT FENCE (A GEOTEXTILE FABRIC WHICH IS TRENCHED INTO THE GROUND AND ATTACHED TO SUPPORTING POSTS AND POSSIBLY WIRE FENCE). OTHER BARRIER MATERIALS COULD INCLUDE SAND BAGS, WATTLES, AND VARIOUS MAN-MADE MATERIALS AND DEVICES THAT CAN BE USED IN A SIMILAR MANNER AS A SILT FENCE.

NOTES:
1. THE WOVEN WIRE FENCING SHALL BE FASTENED TO THE UPSTREAM SIDE OF POSTS BY WIRE TIES.
2. GEOTEXTILE FABRIC SHALL BE SECURELY FASTENED TO THE WOVEN WIRE FENCING.
3. SILT FENCE FABRIC SHALL CONFORM TO THE REQUIREMENTS OF GEOTEXTILE MEETING THE REQUIREMENTS FOUND IN ASSHTO M288.
4. MACHINE TRENCHED GEOTEXTILE SHALL BE TRENCHED VERTICAL AT LEAST 8" DEEP.
5. STAKED TIE BACKS ON EACH END MAY BE NECESSARY TO PREVENT OVERTURNING.
6. PROVIDE A RIPRAP SPLASH PAD OR OTHER OUTLET PROTECTION DEVICE FOR ANY POINT WHERE FLOW MAY OVERTOP THE SEDIMENT FENCE.
7. THE DRAINAGE AREA BEHIND THE SILT FENCE SHOULD NOT EXCEED 1/4 ACRE PER 100 LINEAR FEET OF SILT FENCE FOR NON-REINFORCED FENCE AND 1/2 ACRE PER 100 FEET OF WIRE REINFORCED FENCE. WHEN ALL RUNOFF FROM THE DRAINAGE AREA IS TO BE STORED BEHIND THE FENCE (I.E. THERE IS NO STORMWATER DISPOSAL SYSTEM IN PLACE) THE MAXIMUM SLOPE LENGTH BEHIND THE FENCE SHOULD NOT EXCEED THOSE SHOWN IN TABLE SB-1.

MAINTENANCE
INSPECT SILT FENCES AT LEAST ONCE A WEEK AND AFTER EACH SIGNIFICANT RAIN EVENT.

MAKE REQUIRED REPAIRS IMMEDIATELY.

SHOULD THE FABRIC OF SILT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.

REMOVE SEDIMENT DEPOSITS WHEN THEY REACH 15" OR $\frac{1}{2}$ THE HEIGHT OF THE FENCE AS INSTALLED TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE.

AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED, REMOVE ALL BARRIER MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, BRING THE AREA TO GRADE AND STABILIZE IT WITH VEGETATION.

INSPECTION NOTE:
THE SILT FENCE SHALL BE INSPECTED PERIODICALLY AND PROMPTLY REPAIRED OR REPLACED AS REQUIRED. FILTER FABRIC SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT IT REDUCES THE EFFECTIVENESS OF THE FABRIC.

FRONT VIEW
N.T.S.

SIDE VIEW
(DOUBLE ROW)
N.T.S.

TYPE "A" SILT FENCE SEDIMENT BARRIER SB
N.T.S.

WASH RACK DETAILS

CONSTRUCTION EXIT WITH WASH RACK

NON-WOVEN GEOTEXTILE SHALL BE PLACED UNDERNEATH THE AGGREGATE. THE GEOTEXTILE SHALL BE OF THE STRENGTH AND DURABILITY REQUIRED FOR THE PROJECT TO ENSURE THE AGGREGATE AND SOIL BASE ARE STABLE. GENERALLY, THE NON-WOVEN GEOTEXTILE SHOULD MEET THE REQUIREMENTS FOUND IN ASSHTO M288.

GRAVEL CONSTRUCTION EXIT

DESIGN CRITERIA:

PLANNING CONSIDERATIONS:
IF THE PAD SLOPE TOWARD THE ROAD EXCEEDS 2%, A DIVERSION RIDGE 6" TO 8" HIGH WITH 3:1 SIDE SLOPES SHOULD BE CONSTRUCTED ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE ENTRANCE. THIS DIVERSION RIDGE SHOULD DIVERT SURFACE RUNOFF FROM THE PAD AWAY FROM THE ROAD AND INTO A SEDIMENT TRAP OR BASIN.

IT IS RECOMMENDED THAT THE ENTRANCE AREA BE EXCAVATED TO A DEPTH OF 3 INCHES AND BE CLEARED OF ALL VEGETATION AND ROOTS.

WASHING:
A WASHING FACILITY SHALL BE PROVIDED IF NECESSARY TO PREVENT MUD AND CAKED SOIL FROM BEING TRANSPORTED TO PUBLIC STREETS AND HIGHWAYS. IT SHALL BE CONSTRUCTED OF CONCRETE, STONE, AND/OR OTHER DURABLE MATERIALS. PROVISIONS SHALL BE PROVIDED FOR THE MUD AND OTHER MATERIAL TO BE CARRIED AWAY FROM THE WASHING FACILITY TO A SEDIMENT TRAP OR BASIN TO ALLOW FOR SETTLEMENT OF THE SEDIMENT FROM THE RUNOFF BEFORE IT IS RELEASED FROM THE SITE.

MAINTENANCE:
REMOVE LARGE CHUNKS OF MUD OR CAKED SOIL FROM CONSTRUCTION EXIT PAD DAILY TO MINIMIZE SEDIMENT BUILDUP.
INSPECT STONE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
TOP-DRESS WITH CLEAN SPECIFIED STONE AS NEEDED TO MAINTAIN EFFECTIVENESS OF THE PRACTICE.
IMMEDIATELY REMOVE MUD OR SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROAD.
REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.
REMOVE UNNEEDED EXIT PAD MATERIALS FROM AREAS WHERE PERMANENT VEGETATION WILL BE ESTABLISHED.

CONSTRUCTION EXIT PAD CEP
N.T.S.

EROSION CONTROL NOTES:
1. EROSION CONTROL MEASURES FOR THIS PROJECT SHALL BE IN COMPLIANCE WITH THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1 AND VOLUME 2, CURRENT EDITION.

REFERENCES:
E720308–E720334
E720336–E720341

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

REVISION 0 DATE 12/20/2018
ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP DETAILS
SHEET 2

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
NONE	E720335	1	FINAL	0

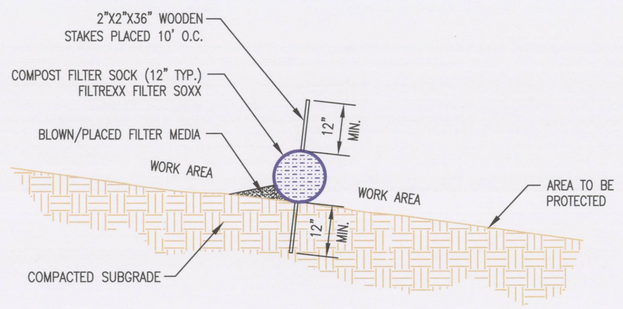
ANSI E: 44x34

Approved

CONSTRUCTION SPECIFICATIONS

THE COMPOST FILTER SOCK SHALL BE INSTALLED ACCORDING TO THIS SPECIFICATION, AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. FOR INSTALLATION OF THE COMPOST FILTER SOCK SEE DETAIL BELOW.

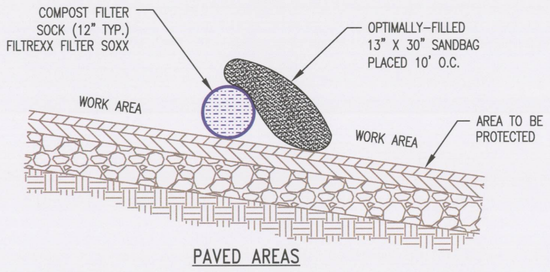
1. COMPOST FILTER SOCKS SHOULD BE INSTALLED PARALLEL TO THE BASE OF THE SLOPE OR OTHER DISTURBED AREA. IN EXTREME CONDITIONS (i.e., 2:1 SLOPES), A SECOND COMPOST FILTER SOCK SHALL BE CONSTRUCTED AT THE TOP OF THE SLOPE.
2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE COMPOST FILTER SOCK ON 10 FT (3m) CENTERS, USING 2 IN (50mm) BY 3 FT (1m) WOODEN STAKES. IN THE EVENT STAKING IS NOT POSSIBLE, i.e., WHEN COMPOST FILTER SOCKS ARE USED ON PAVEMENT, OPTIMALLY-FILLED 13" X 30" SANDBAGS SHALL BE PLACED ON AND DOWNHILL OF THE COMPOST FILTER SOCKS TO HELP STABILIZE DURING RAINFALL/RUNOFF EVENTS.
3. STAKING DEPTH FOR SAND AND SILT LOAM SOILS SHALL BE 12 IN (300mm), AND 8 IN (200mm) FOR CLAY SOILS.
4. LOOSE COMPOST MAY BE BACKFILLED ALONG THE UPSLOPE SIDE OF THE COMPOST FILTER SOCK, FILLING THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE, IMPROVING FILTRATION AND SEDIMENT RETENTION.
5. IF THE COMPOST FILTER SOCK IS TO BE LEFT AS A PERMANENT FILTER OR PART OF THE NATURAL LANDSCAPE, IT MAY BE SEEDED AT TIME OF INSTALLATION FOR ESTABLISHMENT OF PERMANENT VEGETATION. THE ENGINEER WILL SPECIFY SEED REQUIREMENTS.
6. COMPOST FILTER SOCKS ARE NOT TO BE USED IN PERENNIAL, EPHEMERAL, OR INTERMITTENT STREAMS.



GRASSED AREAS

MAINTENANCE

SEDIMENT SHALL BE REMOVED ONCE IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE BARRIER. COMPOST FILTER SOCKS SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT THE EFFECTIVENESS OF COMPOST FILTER SOCK IS REDUCED. COMPOST FILTER SOCKS SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED. ALL SEDIMENT ACCUMULATION AT THE COMPOST FILTER SOCK SHALL BE REMOVED AND PROPERLY DISPOSED OF BEFORE THE COMPOST FILTER SOCK IS REMOVED.



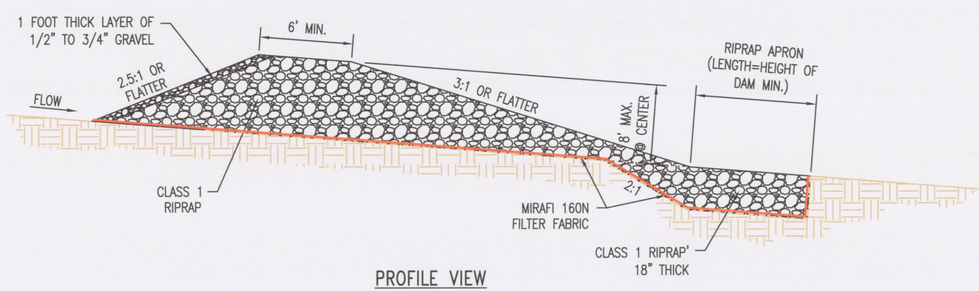
PAVED AREAS

COMPOST FILTER SOCK SEDIMENT BARRIER (SB)
N.T.S.

A ROCK FILTER IS A STONE EMBANKMENT DESIGNED TO HELP CAPTURE SEDIMENT IN NATURAL OR CONSTRUCTION DRAINAGEWAYS ON CONSTRUCTION SITES. THIS PRACTICE CAN BE USED AS A FORE BAY TO A SEDIMENT BASIN TO HELP CAPTURE COARSER PARTICLES OF SEDIMENT. IT IS USUALLY LOCATED SO THAT IT INTERCEPTS RUNOFF PRIMARILY FROM DISTURBED AREAS, IS ACCESSIBLE FOR PERIODIC SEDIMENT REMOVAL AND DOES NOT INTERFERE WITH CONSTRUCTION ACTIVITIES.

ROCK FILTER DAMS ARE NOT PERMANENT STRUCTURES. THE DESIGN LIFE OF THE STRUCTURE IS 3 YEARS OR LESS.

DESIGN CRITERIA
DRAINAGE AREA – THE DRAINAGE AREA ABOVE THE DAME SHOULD NOT EXCEED 10 ACRES.
DAM HEIGHT – THE HEIGHT OF DAM WILL BE LIMITED BY THE CHANNEL BANK HEIGHT OR 8 FEET, WHICHEVER IS LESS. THE DAM HEIGHT SHOULD ALSO NT EXCEED THE ELEVATION OF THE UPSTREAM PROPERTY LINE. WATER WILL BYPASS OVER THE TOP OF THE DAM AND THE BACK SLOPE OF THE ROCK DAM SHOULD BE DESIGNED TO BE STABLE.
SPILLWAY CAPACITY – THE TOP OF THE DAM SHOULD BE DESIGNED TO HANDLE THE PEAK RUNOFF FROM A 10 YEAR, 24 HOUR DESIGN STORM WITH A MAXIMUM FLOW DEPTH OF 1 FOOT AND FREEBOARD OF 1 FOOT. THEREFORE, THE CENTER PORTION OF THE DAM SHOULD BE AT LEAST 2 FEET LOWER THAN THE OUTER EDGES AT THE ABUTMENT.
DAM TOP WIDTH – THE MINIMUM TOP WIDTH SHOULD BE 6 FEET.
DAM SIDE SLOPES – SIDE SLOPES SHOULD BE 3:1 OR FLATTER ON THE BACK SLOPE AND 2.5:1 OR FLATTER ON THE FRONT SLOPE.
OUTLET PROTECTION – THE DOWNSTREAM TOE OF THE DAM SHOULD BE PROTECTED FROM EROSION BY PLACING LARGER STONE ON THE BACK SLOPE AND A RIPRAP APRON AT THE TOE. THE APRON SHOULD HAVE A LENGTH EQUAL TO THE HEIGHT OF THE DAM AS A MINIMUM AND LONGER IF NEEDED TO PROTECT THE TOE OF THE DAM.
LOCATION – THE DAM SHOULD BE LOCATED AS CLOSE TO THE SOURCE OF SEDIMENT AS POSSIBLE SO THAT IT WILL NOT CAUSE WATER TO BACK UP ONTO ADJOINING PROPERTY.
BASIN REQUIREMENTS – THE BASIN BEHIND THE DAM SHOULD PROVIDE A SURFACE AREA THAT MAXIMIZES THE SEDIMENT TRAPPING EFFICIENCY. THE BASIN SHOULD HAVE A SEDIMENT STORAGE CAPACITY OF 67 CUBIC YARDS PER ACRE OF DRAINAGE AREA.



PROFILE VIEW

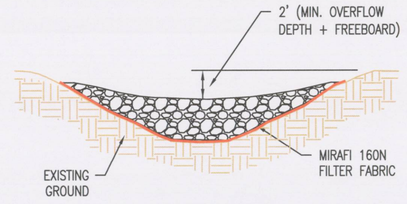
MAINTENANCE
INSPECT THE ROCK DAM AND BASIN AFTER EACH STORM EVENT.

CHECK THE DAM FOR ROCK DISPLACEMENT AND ABUTMENTS FOR EROSION AND REPAIR IMMEDIATELY WHEN REPAIR IS NEEDED. IF ROCK SIZE APPEARS TOO SMALL OR EMBANKMENT SLOPE IS TOO STEEP, REPLACE STONE WITH LARGER SIZE OR REDUCE SLOPE.

CHECK THE DRAINAGE WAY AT TOE OF DAM FOR EROSION. IF EROSION IS OCCURRING, A REPAIR INVOLVING GEOTEXTILE FABRIC (INCLUDING ANOTHER TOE-IN) AND ADDITIONAL ROCK ARE PROBABLY NEEDED TO ESTABLISH A STABLE OUTLET.

REMOVE SEDIMENT FROM THE POND RESERVOIR AREA WHEN IT ACCUMULATES TO 1/2 THE DESIGN VOLUME. IF THE BASIN DOES NOT DRAIN BETWEEN STORMS BECAUSE THE FILTER (CHOKING) STONE (SMALL GRAVEL) AND/OR GEOTEXTILE ON THE UPSTREAM FACE HAVE BECOME CLOGGED, THE FILTER SYSTEM SHOULD BE REPLACED.

ONCE THE CONSTRUCTION SITE IS PERMANENTLY STABILIZED, REMOVE THE STRUCTURE AND ANY UNSTABLE SEDIMENT. SMOOTH THE BASIN SITE TO BLEND WITH THE SURROUNDING AREA AND STABILIZE. SEDIMENT SHOULD BE PLACED IN DESIGNATED DISPOSAL AREAS AND STABILIZED.



CROSS SECTION

ROCK FILTER DAM (RD)
N.T.S.

A CHECK DAM (ALSO REFERRED TO AS A "DITCH CHECK") IS A SMALL BARRIER OR DAM CONSTRUCTED ACROSS A SWALE, DRAINAGE DITCH OR OTHER AREA OF CONCENTRATED FLOW FOR THE PURPOSE OF REDUCING CHANNEL EROSION. CHANNEL EROSION IS REDUCED BECAUSE CHECK DAMS FLATTEN THE GRADIENT OF THE FLOW CHANNEL AND SLOW THE VELOCITY OF CHANNEL FLOW. CHECK DAMS CAN BE CONSTRUCTED OF ROCK, WATTLES (SOMETIMES REFERRED TO AS TUBES OR ROLLS), SAND BAGS, OR OTHER MATERIALS THAT MAY BE ACCEPTABLE TO THE DESIGN PROFESSIONAL. CONTRARY TO POPULAR OPINION, MOST CHECK DAMS TRAP AN INSIGNIFICANT VOLUME OF SEDIMENT, AS CHECK DAMS USUALLY JUST TRAP THE COARSER GRAINED MATERIAL LEAVING THE TURBID WATER TO FLOW DOWNSTREAM.

THIS PRACTICE APPLIES IN SMALL OPEN CHANNELS AND DRAINAGEWAYS, INCLUDING TEMPORARY AND PERMANENT SWALES. CHECK DAMS ARE NOT TO BE USED IN A LIVE STREAM. SITUATIONS OF USE INCLUDE AREAS IN NEED OF PROTECTION DURING ESTABLISHMENT OF GRASS AND AREAS THAT CANNOT RECEIVE A TEMPORARY OR PERMANENT NON-ERODIBLE LINING FOR AN EXTENDED PERIOD OF TIME.

DESIGN CRITERIA
FORMAL DESIGN IS NOT REQUIRED. THE FOLLOWING STANDARDS SHALL BE USED.

DRAINAGE AREA
TEN ACRES OR LESS

MAXIMUM HEIGHT
TWO (2) FEET WHEN DRAINAGE IS LESS THAN 5 ACRES.
THREE (3) FEET WHEN DRAINAGE AREA IS 5 TO 10 ACRES.

DEPTH OF FLOW
SIX (6) INCHES WHEN DRAINAGE AREA IS LESS THAN 5 ACRES.
TWELVE (12) INCHES WHEN DRAINAGE AREA IS 5 TO 10 ACRES.
THE TOP OF DAM, PERPENDICULAR TO FLOW, SHOULD BE PARABOLIC. THE CENTER OF THE DAM SHOULD BE CONSTRUCTED LOWER THAN THE ENDS. THE ELEVATION OF THE CENTER OF THE DAM SHOULD BE LOWER THAN THE ENDS BY THE DEPTH OF FLOW LISTED ABOVE.

SIDE SLOPES
2:1 OR FLATTER.

SPACING
THE ELEVATION OF THE TOE OF THE UPSTREAM DAM SHOULD BE AT OR BELOW THE ELEVATION OF CREST OF THE DOWNSTREAM DAM. SEE "SPACING BETWEEN CHECK DAMS" DETAIL.

KEYWAY
MEASURES SHOULD BE TAKEN TO ENSURE THE FLOW DOES NOT CAUSE EROSION UNDERNEATH THE CHECK DAM. THIS IS OFTEN ACCOMPLISHED USING GEOTEXTILE UNDERNEATH THE CHECK DAM OR IN HIGHLY EROSIVE SOILS A KEYWAY LINED WITH GEOTEXTILE AND FILLED WITH ROCK. KEYWAYS IF USED SHOULD BE KEYED INTO THE CHANNEL BOTTOM AND ABUTMENTS TO A DEPTH OF 12" TO 24". THE KEYWAY WIDTH SHOULD BE AT LEAST 12".

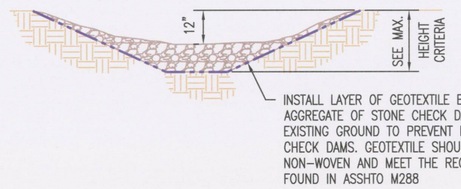
STONE CHECK DAMS:
STONE CHECK DAMS SHOULD BE CONSTRUCTED OF CLASS I RIP RAP PER ALDOT STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION. MECHANICAL OR HAND PLACEMENT SHALL BE REQUIRED TO ENSURE COMPLETE COVERAGE OF ENTIRE WIDTH OF DITCH OR SWALE AND THAT CENTER OF DAM IS LOWER THAN EDGES.

MAINTENANCE
INSPECT THE CHECK DAM FOR ROCK DISPLACEMENT AND ABUTMENTS FOR EROSION AROUND THE ENDS OF THE DAM AFTER EACH SIGNIFICANT RAINFALL EVENT. IF THE ROCK APPEARS TOO SMALL, ADD ADDITIONAL STONE AND USE A LARGER SIZE.

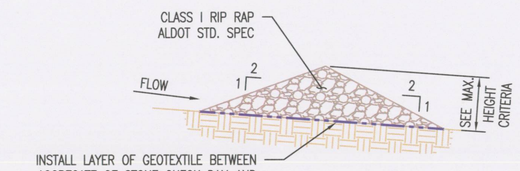
INSPECT THE CHANNEL AFTER EACH SIGNIFICANT RAINFALL EVENT. IF CHANNEL EROSION EXCEEDS EXPECTATIONS, CONSULT WITH THE DESIGN PROFESSIONAL AND CONSIDER ADDING ANOTHER CHECK DAM TO REDUCE CHANNEL FLOW GRADE.

SEDIMENT SHOULD BE REMOVED IF IT REACHES A DEPTH OF ½ THE ORIGINAL DAM HEIGHT. IF THE AREA BEHIND THE DAM FILLS WITH SEDIMENT, THERE IS A GREATER LIKELIHOOD THAT WATER WILL FLOW AROUND THE END OF THE CHECK DAM AND CAUSE THE PRACTICE TO FAIL.

CHECK DAMS MAY BE REMOVED WHEN THEIR USEFUL LIFE HAS BEEN COMPLETED. THE AREA WHERE CHECK DAMS ARE REMOVED SHOULD BE SEEDED AND MULCHED IMMEDIATELY UNLESS A DIFFERENT TREATMENT IS PRESCRIBED. IN SOME INSTANCES, CHECK DAMS SHOULD BE LEFT AS A PERMANENT MEASURE TO SUPPORT CHANNEL STABILITY.

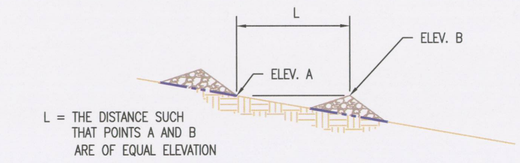


DITCH/SWALE ELEVATION
N.T.S.



SIDE ELEVATION
N.T.S.

NOTE:
USE WHERE INDICATED ON PLANS AND AS REQUIRED. CHECK DAMS ARE NOT TO BE USED IN LIVE STREAMS.



SPACING BETWEEN CHECK DAMS
N.T.S.

CHECK DAM (CD)
N.T.S.

EROSION CONTROL BLANKETS ARE USED TO AID IN CONTROLLING EROSION ON CRITICAL AREAS BY PROVIDING A PROTECTIVE COVER MADE OF STRAW, JUTE, WOOD OR OTHER PLANT FIBERS; PLASTIC NYLON, PAPER OR COTTON. THIS PRACTICE IS BEST UTILIZED ON SLOPES AND CHANNELS WHERE THE EROSION HAZARD IS HIGH, AND PLANT GROWTH IS LIKELY TO BE SLOW TO PROVIDE ADEQUATE PROTECTIVE COVER. EROSION CONTROL BLANKETS ARE TYPICALLY USED AS AN ALTERNATIVE TO MULCHING BUT CAN ALSO BE USED TO PROVIDE STRUCTURAL EROSION PROTECTION. SOME IMPORTANT FACTORS IN THE CHOICE OF A BLANKET ARE: SOIL CONDITIONS, STEEPNESS OF SLOPE, LENGTH OF SLOPE, TYPE AND DURATION OF PROTECTION REQUIRED TO ESTABLISH DESIRED VEGETATION, AND PROBABLE SHEER STRESS.

DESIGN CRITERIA
GENERAL
ALL BLANKETS SHALL BE NONTOXIC TO VEGETATION AND TO THE GERMINATION OF SEED AND SHALL NOT BE INJURIOUS TO THE UNPROTECTED SKIN OF HUMANS. EROSION CONTROL PRODUCTS SHALL BE OF SUFFICIENT STRENGTH TO HOLD THE PREPARED GROUND AND, IF APPLICABLE, COVER MATERIAL (MULCH, SOD, ETC.) IN PLACE UNTIL AN ACCEPTABLE GROWTH OF NATURAL OR PLANTED MATERIAL IS ESTABLISHED.

EROSION CONTROL PRODUCTS SHALL BE IDENTIFIED BY A CLASSIFICATION DESIGNATION (CLASS 1.A, 1.B, 1.C, ETC.) WHERE THE CLASSIFICATION IS BASED ON THE PHYSICAL PROPERTIES OF THE PRODUCT.

TABLE ECB-1 TEMPORARY EROSION CONTROL BLANKET CLASSES AND APPLICATIONS

CLASS	APPLICATION
1.C	DESIGNED FOR USE ON GEOTECHNICALLY STABLE SLOPES WITH GRADIENTS UP TO 3:1 AND CHANNELS WITH SHEAR STRESSES UP TO 1.5 POUNDS PER SQUARE FOOT.

CLASS DESIGNATIONS AND DURABILITY
EROSION CONTROL PRODUCTS SHALL HAVE THE CONFIGURATIONS AND DURABILITY AS SHOWN IN TABLES ECB-3 AND ECB-4.

TABLE ECB-3 TYPICAL CONFIGURATION AND DURABILITY OF TEMPORARY EROSION CONTROL BLANKETS

CLASS DESIGNATION	USUAL CONFIGURATION	TYPICAL DURABILITY
1.C ULTRA-SHORT TERM SINGLE NET EROSION CONTROL BLANKET OR OPEN WEAVE TEXTILE	AN EROSION CONTROL BLANKET COMPOSED OF PROCESSED DEGRADABLE NATURAL AND/OR POLYMER FIBERS MECHANICALLY BOUND TOGETHER BY A SINGLE RAPIDLY DEGRADING, SYNTHETIC OR NATURAL FIBER NETTING TO FORM A CONTINUOUS MATRIX. OR AN OPEN WEAVE TEXTILE COMPOSED OF PROCESSED RAPIDLY DEGRADING NATURAL OR POLYMER YARNS OR TWINES WOVEN INTO A CONTINUOUS MATRIX.	3 MONTHS

PRODUCT PLACEMENT
THE EROSION CONTROL PRODUCT SHOULD BE PLACED IMMEDIATELY AFTER COMPLETION OF THE PREPARATION OF THE AREA WHERE THE PRODUCT WILL BE PLACED.
FOLLOW THE MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OR USE THE FOLLOWING INSTRUCTIONS. IF THERE IS A CONFLICT, FOLLOW THE MANUFACTURER'S RECOMMENDATIONS. STRIPS SHALL BE ROLLED OUT PARALLEL TO THE DIRECTION OF FLOW, IN FLUMES AND DITCHES. ON STEEP SLOPES, STRIPS SHALL BE ROLLED OUT IN THE DIRECTION OF FLOW TO REDUCE RILL EROSION. WHEN 2 OR MORE STRIPS ARE REQUIRED TO COVER AN AREA, THEY SHALL OVERLAP AT LEAST 3" (75 MM); HOWEVER, SOME TYPE BLANKETS WILL NOT REQUIRE LAPPING BUT ARE TO BE BUTTED TOGETHER AND STAPLED WITH HALF OF EACH STAPLE LOCATED IN EACH OF THE ADJOINING BLANKETS. ENDS OF STRIPS SHALL OVERLAP AT LEAST 6" (150 MM) WITH THE UPGRADE SECTION ON TOP. THE UPSLOPE END (ANCHOR SLOT) OF EACH STRIP SHALL BE BURIED IN 6" (150 MM) VERTICAL SLOTS, AND SOIL TAMPED FIRMLY AGAINST IT. WHEN, IN THE OPINION OF THE QUALIFIED DESIGN PROFESSIONAL, THAT CONDITIONS WARRANT, ANY OTHER EDGE EXPOSED TO EXCESSIVE FLOW SHALL BE BURIED AS NOTED ABOVE. THE EROSION CONTROL PRODUCT SHALL BE SPREAD EVENLY AND SMOOTHLY, AND MOST IMPORTANTLY, SHALL BE IN CONTACT WITH THE SOIL AT ALL POINTS. THE PRODUCT SHOULD NOT BE STRETCHED TIGHT IN SUCH A MANNER THAT THE MATERIAL "TENTS" OVER THE SOIL SURFACE. IF THE MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OF THE EROSION CONTROL PRODUCT ARE DIFFERENT THAT THOSE GIVEN HERE, THE CONTRACTOR WILL BE REQUIRED TO FOLLOW THE MORE STRINGENT OF THE TWO.

TABLE ECB-5 MINIMUM PHYSICAL REQUIREMENTS FOR EROSION CONTROL BLANKETS

CLASS	MINIMUM TENSILE STRENGTH (POUNDS/FT.) (ASTM D 4594) [1]	MINIMUM PERMISSIBLE SHEAR STRESS (POUNDS/SQ. FT.) (ASTM D 6460) [2, 5]	MAXIMUM "C" FACTOR FOR TEMPORARY PRODUCTS (ASTM D 6459) [3, 5]	UV STABILITY (MINIMUM % TENSILE RETENTION) FOR PERMANENT PRODUCTS (ASTM D 4355) (500 HOUR EXP.)	MINIMUM THICKNESS (INCHES) FOR PERMANENT PRODUCTS (ASTM D 6525) [4]
1.C	50	1.50	0.15 @ 3:1	0.15 @ 3:1	N/A

1 MINIMUM AVERAGE ROLL VALUES, MACHINE DIRECTION. FOR TURF REINFORCEMENT MATS USED IN FIELD CONDITIONS WITH HIGH LOADING AND/OR HIGH SURVIVABILITY REQUIREMENTS TENSILE STRENGTHS OF 3000 POUNDS/FT OR GREATER.
2 MINIMUM SHEAR STRESS THE ROLLED EROSION CONTROL PRODUCTS OR TURF REINFORCEMENT MATS CAN SUSTAIN WITHOUT PHYSICAL DAMAGE OR EXCESS EROSION (>.5" OF SOIL LOSS) DURING A 30 MINUTE FLOW EVENT IN LARGE SCALE TESTING. THESE PERFORMANCE TEST VALUES SHOULD BE SUPPORTED BY PERIODIC BENCH SCALE TESTING UNDER SIMILAR TEST CONDITIONS AND FAILURE CRITERIA USING EROSION CONTROL TECHNOLOGY COUNCIL TEST METHOD NO. 3. FOR TEMPORARY PRODUCTS THE PERMISSIBLE SHEAR STRESS LEVELS WERE ESTABLISHED FOR EACH CLASS BASED ON HISTORICAL EXPERIENCE WITH PRODUCTS CHARACTERIZED BY MANNING'S ROUGHNESS COEFFICIENTS IN THE RANGE OF 0.03 TO 0.05.
3 "C" FACTOR CALCULATED AS RATIO OF SOIL LOSS FROM ROLLED EROSION CONTROL PRODUCT PROTECTED SLOPE (TESTED AT THE SPECIFIED GRADIENT) TO SOIL LOSS FROM UNPROTECTED (CONTROL) PLOT IN LARGE SCALE TESTING. THESE PERFORMANCE TEST VALUES SHOULD BE SUPPORTED BY PERIODIC BENCH SCALE TESTING UNDER SIMILAR TEST CONDITIONS AND FAILURE CRITERIA USING EROSION CONTROL TECHNOLOGY COUNCIL TEST METHOD NO.2.
4 MINIMUM AVERAGE ROLL VALUES.
5 OTHER LARGE SCALE TEST METHODS MAY BE DETERMINED ACCEPTABLE.

CHECK SLOTS SHALL BE PLACES SO THAT ONE CHECK SLOT, JUNCTION SLOT, OR ANCHOR SLOT OF THE EROSION CONTROL PRODUCT OCCURS EVERY 50 FEET (15 M) OF SLOPE. CHECK SLOTS SHALL BE MADE BY BURYING A TIGHT FOLD OF THE PRODUCT VERTICALLY IN THE SOIL A MINIMUM OF 6" (150 MM) DEEP, AND TAMPING AND STAPLING THE FOLD IN PLACE. IF THE MANUFACTURER'S RECOMMENDATIONS FOR THE INSTALLATION OF CHECK SLOTS ARE DIFFERENT THAN THOSE GIVEN HERE, THE CONTRACTOR WILL BE REQUIRED TO FOLLOW THE MORE STRINGENT OF THE TWO.

EACH STRIP SHALL BE STAPLED IN 3 ROWS, AT EACH EDGE AND THE CENTER, WITH STAPLES SPACED NOT MORE THAN 3 FEET (900 MM) LONGITUDINALLY. CHECK SLOTS AND ENDS OF STRIPS SHALL BE STAPLED AT 9" (225 MM) INTERVALS ACROSS THEIR WIDTH.

FOR TEMPORARY BLANKETS, STAPLES SHOULD BE U-SHAPED WIRE WITH AN 11 GAUGE THICKNESS OR GREATER. STAPLES SHOULD BE OF SUFFICIENT THICKNESS FOR SOIL PENETRATION WITHOUT UNDUE DISTORTION. THE LEGS OF THE STAPLES SHALL BE AT LEAST 6" LONG WITH A CROWN OF 1". APPROPRIATE BIODEGRADABLE STAPLES CAN BE USED IN LIEU OF WIRE STAPLES.

PERMANENT BLANKETS SHALL BE ANCHORED IN ONE OF TWO WAYS. BLANKETS CAN BE ANCHORED USING SOUND WOOD STAKES, 1" BY 3" STOCK SAWN IN A TRIANGULAR SHAPE. THE LENGTH OF THE STAKES SHALL BE FROM 12" TO 18" DEPENDING UPON THE SOIL COMPACTION AT THE SITE. STAKES SHALL BE INSTALLED ON 4 FEET CENTERS ALONG EACH EDGE OF THE BLANKET. BLANKETS CAN ALSO BE ANCHORED USING U-SHAPED STAPLES OF 11 GAUGE STEEL OR GREATER WITH A MINIMUM LEG LENGTH OF 8" AND A 2" CROWN.

MAINTENANCE
INSPECT AFTER STORM EVENTS UNTIL VEGETATION IS ESTABLISHED FOR EROSION OR UNDERMINING BENEATH THE BLANKETS. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE BLANKET, ADD TAMPED SOIL AND RESEED; THEN RESECURE THE BLANKETS.

IF BLANKETS SHOULD BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY.

EROSION CONTROL BLANKET (ECB)
N.T.S.

EROSION CONTROL NOTES:
1. EROSION CONTROL MEASURES FOR THIS PROJECT SHALL BE IN COMPLIANCE WITH THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1 AND VOLUME 2, CURRENT EDITION.

REFERENCES:
E720308-E720335
E720337-E720341

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP DETAILS
SHEET 3

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004
GYPSUM POND CLOSURE

REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
NONE	E720336	1	FINAL	0

Approved

ANSI E: 44x34

THIS PRACTICE IS DESIGNED TO PREVENT EROSION AT THE OUTLET OF A CHANNEL OR CONDUIT BY REDUCING THE VELOCITY OF FLOW AND DISSIPATING THE ENERGY. OUTLET PROTECTION MEASURES USUALLY CONSIST OF A RIPRAP-LINED APRON, A REINFORCED CONCRETE FLUME WITH CONCRETE BAFFLES, A REINFORCED CONCRETE BOX WITH CHAMBERS OR BAFFLES AND POSSIBLY PRE-MANUFACTURED PRODUCTS. THIS PRACTICE APPLIES WHEREVER HIGH VELOCITY DISCHARGE MUST BE RELEASED ON ERODIBLE MATERIAL.

DESIGN CRITERIA
STRUCTURALLY LINED APRONS AT THE OUTLETS OF PIPES AND PAVED CHANNEL SECTIONS SHALL BE DESIGNED ACCORDING TO THE FOLLOWING CRITERIA:

CAPACITY
THE STRUCTURALLY LINED APRON SHOULD HAVE THE CAPACITY TO CARRY THE PEAK STORMFLOW FROM THE 25-YEAR 24-HOUR FREQUENCY STORM OR THE STORM SPECIFIED IN STATE LAWS OR LOCAL ORDINANCES OR THE DESIGN DISCHARGE OF THE WATER CONVEYANCE STRUCTURE, WHICHEVER IS GREATEST.

TAILWATER DEPTH
THE DEPTH OF THE TAILWATER IMMEDIATELY BELOW THE PIPE OUTLET MUST BE DETERMINED FOR THE DESIGN CAPACITY OF THE PIPE. MANNING'S EQUATION MAY BE USED TO DETERMINE TAILWATER DEPTH. MANNING'S EQUATION MAY BE FOUND IN THE PRACTICE GRASS SWALES. IF THE TAILWATER DEPTH IS LESS THAN HALF THE DIAMETER OF THE OUTLET PIPE, IT SHALL BE CLASSIFIED AS A MINIMUM TAILWATER CONDITION. IF THE TAILWATER DEPTH IS GREATER THAN HALF THE PIPE DIAMETER, IT SHALL BE CLASSIFIED AS A MAXIMUM TAILWATER CONDITION. PIPES WHICH OUTLET ONTO FLAT AREAS, WITH NO DEFINED CHANNEL, MAY BE ASSUMED TO HAVE A MINIMUM TAILWATER CONDITION.

APRON LENGTH
THE APRON LENGTH SHOULD BE DETERMINED FROM FIGURE OP-2 OR OP-3 FOUND IN THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233, ACCORDING TO THE TAILWATER CONDITION.

APRON THICKNESS
THE APRON THICKNESS SHOULD BE DETERMINED BY THE MAXIMUM STONE SIZE (DMAX), WHEN THE APRON IS LINED WITH RIPRAP. THE MAXIMUM STONE SIZE SHALL BE 1.5 X d_{50} (MEDIAN STONE SIZE), AS DETERMINED FROM FIGURE OP-2 OR OP-3 FOUND IN THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233. THE APRON THICKNESS SHALL BE 1.5 X DMAX.

WHEN THE APRON IS LINED WITH CONCRETE, THE MINIMUM THICKNESS OF THE CONCRETE SHALL BE 4".

APRON WIDTH
IF THE PIPE DISCHARGES DIRECTLY INTO A WELL-DEFINED CHANNEL, THE APRON SHOULD EXTEND ACROSS THE CHANNEL BOTTOM AND UP THE CHANNEL BANKS TO AN ELEVATION ONE FOOT ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS THE LEAST.

IF THE PIPE DISCHARGES ONTO A FLAT AREA WITH NO DEFINED CHANNEL, THE WIDTH OF THE APRON SHALL BE DETERMINED AS FOLLOWS:

- THE UPSTREAM END OF THE APRON, ADJACENT TO THE PIPE, SHOULD HAVE A WIDTH 3 TIMES THE DIAMETER OF THE OUTLET PIPE.
- FOR A MINIMUM TAILWATER CONDITION, THE DOWNSTREAM END OF THE APRON SHOULD HAVE A WIDTH EQUAL TO THE PIPE DIAMETER PLUS THE LENGTH OF THE APRON OBTAINED FROM THE FIGURES.
- FOR A MAXIMUM TAILWATER CONDITION, THE DOWNSTREAM END SHALL HAVE A WIDTH EQUAL TO THE PIPE DIAMETER PLUS 0.4 TIMES THE LENGTH OF THE APRON FROM FIGURES OP-2 OR OP-3. (SEE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233)

BOTTOM GRADE
THE APRON SHALL BE CONSTRUCTED WITH NO SLOPE ALONG ITS LENGTH (0.0% GRADE). THE INVERT ELEVATION OF THE DOWNSTREAM END OF THE APRON SHALL BE EQUAL TO THE ELEVATION OF THE INVERT OF THE RECEIVING CHANNEL. THERE SHALL BE NO OVERFALL AT THE END OF THE APRON.

SIDE SLOPE
IF THE PIPE DISCHARGES INTO A WELL-DEFINED CHANNEL, THE SIDE SLOPES OF THE CHANNEL SHALL NOT BE STEEPER THAN 2:1 (HORIZONTAL:VERTICAL).

ALIGNMENT
THE APRON SHALL BE LOCATED SO THAT THERE ARE NO BENDS IN THE HORIZONTAL ALIGNMENT.

GEOTEXTILE
WHEN RIPRAP IS USED TO LINE THE APRON, GEOTEXTILE SHOULD BE USED AS A SEPARATOR BETWEEN THE GRADED STONE, THE SOIL SUBGRADE, AND THE ABUTMENTS. GEOTEXTILE SHOULD BE PLACED IMMEDIATELY ADJACENT TO THE SUBGRADE WITHOUT ANY VOIDS BETWEEN THE FABRIC AND THE SUBGRADE. THE GEOTEXTILE WILL PREVENT THE MIGRATION OF SOIL PARTICLES FROM THE SUBGRADE INTO THE GRADED STONE. THE GEOTEXTILE SHALL BE OF THE STRENGTH AND DURABILITY REQUIRED FOR THE PROJECT TO ENSURE THE AGGREGATE AND SOIL BASE ARE STABLE. GENERALLY, THE NON-WOVEN GEOTEXTILE SHOULD MEET THE REQUIREMENTS FOUND IN ASSHTO M288.

MATERIALS
THE APRON MAY BE LINED WITH LOOSE ROCK RIPRAP, GROUTED RIPRAP, OR CONCRETE. THE MEDIAN SIZED STONE FOR RIPRAP SHOULD BE DETERMINED FROM THE CURVES ON FIGURE OP-2 AND OP-3 ACCORDING TO THE TAILWATER CONDITION. (SEE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233)

AFTER THE MEDIAN STONE SIZE IS DETERMINED, THE GRADATION OF ROCK TO BE USED SHOULD BE SPECIFIED USING TABLES OP-2 AND OP-3. TABLE OP-2 IS USED TO DETERMINE THE WEIGHT OF THE MEDIAN STONE SIZE (d_{50}). USING THIS MEDIAN WEIGHT, A GRADATION CAN BE SELECTED FROM TABLE OP-3, WHICH SHOWS THE COMMERCIALLY AVAILABLE RIPRAP GRADATIONS AS CLASSIFIED BY THE ALABAMA DEPARTMENT OF TRANSPORTATION.

STONE FOR RIPRAP SHOULD CONSIST OF FIELD STONE OR ROUGH UNHEWN QUARRY STONE OF APPROXIMATELY RECTANGULAR SHAPE. THE STONE SHOULD BE HARD AND ANGULAR AND OF SUCH QUALITY THAT IT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING AND IT SHALL BE SUITABLE IN ALL OTHER RESPECTS FOR THE PURPOSE INTENDED. THE SPECIFIC GRAVITY OF THE INDIVIDUAL STONES SHOULD BE AT LEAST 2.5.

WHEN THE APRON IS LINED WITH CONCRETE, THE CONCRETE SHOULD HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 3000 POUNDS PER SQUARE INCH. AMERICAN CONCRETE INSTITUTE GUIDELINES SHOULD BE USED TO DESIGN CONCRETE STRUCTURES AND REINFORCEMENT. AS A MINIMUM, THE CONCRETE SHOULD BE REINFORCED WITH STEEL WELDED WIRE FABRIC.

MAINTENANCE
INSPECT RIPRAP OUTLET STRUCTURES AFTER HEAVY RAINS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE OR IF STONES HAVE BEEN DISLODGED. CHECK CONCRETE STRUCTURES FOR CRACKS AND MOVEMENT. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

TABLE OP-2 SIZE OF RIPRAP STONES

WEIGHT	MEAN SPHERICAL DIAMETER (FEET)	RECTANGULAR SHAPE LENGTH	RECTANGULAR SHAPE WIDTH, HEIGHT (FT)
50	0.8	1.4	0.5
100	1.1	1.75	0.6
150	1.3	2.0	0.67
300	1.6	2.6	0.9
500	1.9	3.0	1.0
1000	2.2	3.7	1.25
1500	2.6	4.7	1.5
2000	2.75	5.4	1.8
4000	3.6	6.0	2.0
6000	4.0	6.9	2.3
8000	4.5	7.6	2.5
20000	6.1	10.0	3.3

TABLE OP-3 GRADED RIPRAP

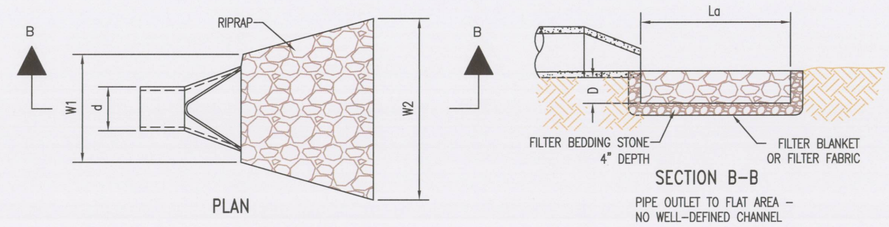
CLASS	WEIGHT (LBS.) d_{10}	d_{15}	d_{25}	d_{50}	d_{75}	d_{90}
1	10	–	–	50	–	100
2	10	–	–	80	–	200
3	–	25	–	200	–	500
4	–	–	50	500	1000	–
5	–	–	200	1000	–	2000

NOTES:
1. La IS THE LENGTH OF THE RIPRAP APRON.
2. D = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6".
3. IN A WELL-DEFINED CHANNEL, EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.

OUTLET PROTECTION (OP)
N.T.S.

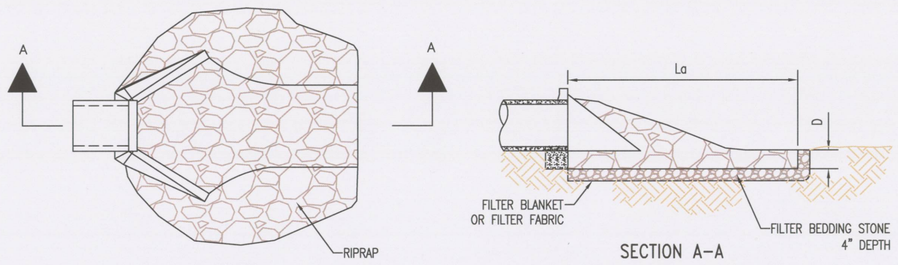
OUTLET PROTECTION RIPRAP DETAILS

Outlet Protection Number	Location	La	W1	W2	D	RipRap Class	Filter Bedding Stone
1	SW Discharge Pipe	55	9	58	1.5	1	ALDOT No. 467 Aggregate



PLAN

SECTION B-B
PIPE OUTLET TO FLAT AREA – NO WELL-DEFINED CHANNEL



PLAN

SECTION A-A
PIPE OUTLET TO WELL-DEFINED CHANNEL

DEFINITION
A TEMPORARY PROTECTIVE DEVICE FORMED AT OR AROUND AN INLET TO A STORM DRAIN TO TRAP SEDIMENT.

PURPOSE
TO PREVENT SEDIMENT FROM ENTERING A STORM DRAINAGE SYSTEM PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA DRAINING TO THE INLET.

CONDITIONS
ALL STORM DRAIN DROP INLETS THAT RECEIVE RUNOFF FROM DISTURBED AREAS UNLESS OTHERWISE NOTED.

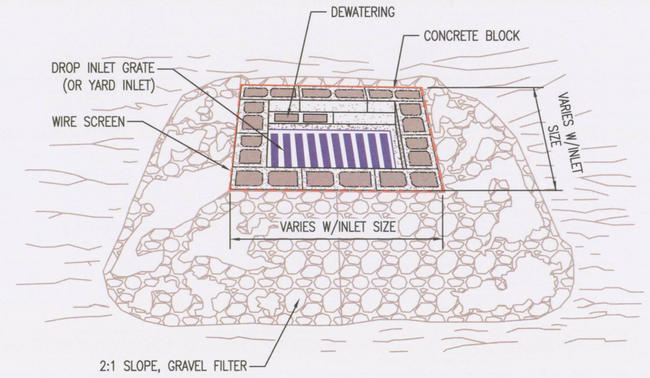
CONSTRUCTION SPECIFICATIONS
EXCAVATED INLET SEDIMENT TRAP
AN EXCAVATION MAY BE CREATED AROUND THE INLET SEDIMENT TRAP TO PROVIDE ADDITIONAL SEDIMENT STORAGE. THE TRAP SHALL BE SIZED TO PROVIDE A MINIMUM STORAGE CAPACITY CALCULATED AT THE RATE OF 67 CUBIC YARDS PER ACRE OF DRAINAGE AREA. A MINIMUM DEPTH OF 1.5 FEET FOR SEDIMENT STORAGE SHOULD BE PROVIDED. SIDE SLOPES SHALL NOT BE STEEPER THAN 2:1.

SEDIMENT TRAPS MAY BE CONSTRUCTED ON NATURAL GROUND SURFACE, ON AN EXCAVATED SURFACE, OR ON MACHINE COMPACTED FILL, PROVIDED THEY HAVE A NON-ERODIBLE OUTLET.

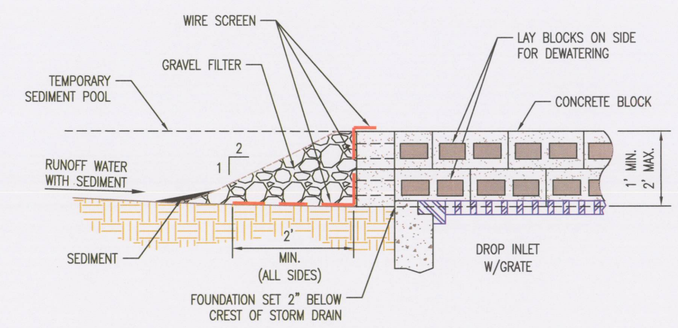
BLOCK AND GRAVEL DROP INLET PROTECTION
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE. AS SHOWN IN THE DETAIL, ONE BLOCK IS PLACED ON EACH SIDE OF THE STRUCTURE ON ITS SIDE IN THE BOTTOM ROW TO ALLOW POOL DRAINAGE. THE FOUNDATION SHOULD BE EXCAVATED AT LEAST 2 INCHES BELOW THE CREST OF THE STORM DRAIN. THE BOTTOM ROW OF BLOCKS IS PLACED AGAINST THE EDGE OF THE STORM DRAIN FOR LATERAL SUPPORT AND TO AVOID WASHOUTS WHEN OVERFLOW OCCURS. IF NEEDED, LATERAL SUPPORT MAY BE GIVEN TO SUBSEQUENT ROWS BY PLACING 2" X 4" WOOD STUDS THROUGH BLOCK OPENINGS. HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2 INCH OPENINGS SHALL BE FITTED OVER ALL BLOCK OPENINGS TO HOLD GRAVEL IN PLACE. CLEAN GRAVEL SHOULD BE PLACED 2 INCHES BELOW THE TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER AND SMOOTHED TO AN EVEN GRADE. DOT #57 STONE WASHED STONE IS RECOMMENDED.

NOTES:
1. HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2 INCH OPENINGS SHALL BE FITTED OVER ALL BLOCK OPENINGS TO HOLD GRAVEL IN PLACE.
2. THE FOUNDATION SHOULD BE EXCAVATED AT LEAST 2 INCHES BELOW THE CREST OF THE STORM DRAIN. THE FIRST ROW OF BLOCKS WILL BE PLACED HERE FOR LATERAL SUPPORT.
3. ONE BLOCK (AS SHOWN) IS TO BE PLACED ON EACH SIDE OF THE STRUCTURE ON ITS SIDE IN THE BOTTOM ROW TO ALLOW FOR POOL DRAINAGE.

MAINTENANCE:
1. INSPECT, CLEAR, AND/OR REPAIR TRAP AT THE END OF EACH WORKING DAY.
2. DO NOT REMOVE INLET PROTECTION AND WASH SEDIMENT INTO THE STORM DRAIN.
3. REMOVE SEDIMENT FROM THE TRAP AND STABILIZE IT WITH VEGETATION.
4. REMOVE ALL MATERIALS AND ANY UNSTABLE SOIL ONCE THE CONTRIBUTING DRAINAGE AREA HAS BEEN ADEQUATELY STABILIZED.
5. APPROPRIATELY STABILIZE ALL BARE AREAS AROUND THE INLET.



BLOCK AND GRAVEL PERSPECTIVE



BLOCK & GRAVEL SECTION

BLOCK AND GRAVEL INLET PROTECTION (BIP)
N.T.S.

EROSION CONTROL NOTES:
1. EROSION CONTROL MEASURES FOR THIS PROJECT SHALL BE IN COMPLIANCE WITH THE ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1 AND VOLUME 2, CURRENT EDITION.

REFERENCES:
E720308-E720336
E720338-E720341

NOTES:
1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
DSM	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP DETAILS
SHEET 4

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
NONE	E720337	1	FINAL	0

Approved

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

N 1331000 | N 1330500 | N 1330000 | N 1329500

E 586500 | E 586000 | E 585500 | E 585000

OHE

GRAVEL ROAD

FENCE

CONCRETE SLURRY FLUME

BUILDING

PROCESS PIPE

36" HDPE PIPE

18" HDPE PIPE

5'ø HDPE RISER

CD — STONE CHECK DAM

RD — ROCK FILTER DAM

BIP — BLOCK AND GRAVEL INLET PROTECTION

SB — DBL ROW TYPE A SILT FENCE SEDIMENT BARRIER

CEP — 25' WIDE X 50' LONG CONSTRUCTION EXIT PAD

MATCH LINE (SEE DWG. E720339)

EROSION CONTROL LEGEND

- CEP — CONSTRUCTION EXIT PAD
- SB — SEDIMENT BARRIER (TYPE "A" SILT FENCE)
- RS — RIPRAP SWALE
- RD — ROCK FILTER DAM
- CD — STONE CHECK DAM
- BIP — BLOCK AND GRAVEL INLET PROTECTION

REFERENCES:

E720308–E720337
E720339–E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP INITIAL PHASE
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720338	1	FINAL	0

Approved

ANSI E: 44x34

STATE PLANE
NAD27 WEST ZONE

N 1331000 N 1330500 N 1330000 N 1329500

E 586500 E 586000 E 585500 E 585000

MATCH LINE (SEE DWG. E720341)

SB DBL ROW TYPE A SILT FENCE SEDIMENT BARRIER

CEP 25' WIDE X 50' LONG CONSTRUCTION EXIT PAD

SB DBL ROW TYPE A SILT FENCE SEDIMENT BARRIER

SB DBL ROW TYPE A SILT FENCE SEDIMENT BARRIER

EROSION CONTROL LEGEND

- CEP — CONSTRUCTION EXIT PAD
- SB — SEDIMENT BARRIER (TYPE "A" SILT FENCE)
- RS — RIPRAP SWALE
- RD — ROCK FILTER DAM
- CD — STONE CHECK DAM
- BIP — BLOCK AND GRAVEL INLET PROTECTION
- LG — LAND GRADING
- DC — DUST CONTROL
- MU — MULCHING
- TS — TEMPORARY SEEDING
- PS — PERMANENT SEEDING
- SB — SEDIMENT BARRIER (COMPOST FILTER SOCK)

REFERENCES:

E720308–E720339
E720341

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004

GYPSUM POND CLOSURE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

Southern Company Generation
Engineering and Construction Services
FOR

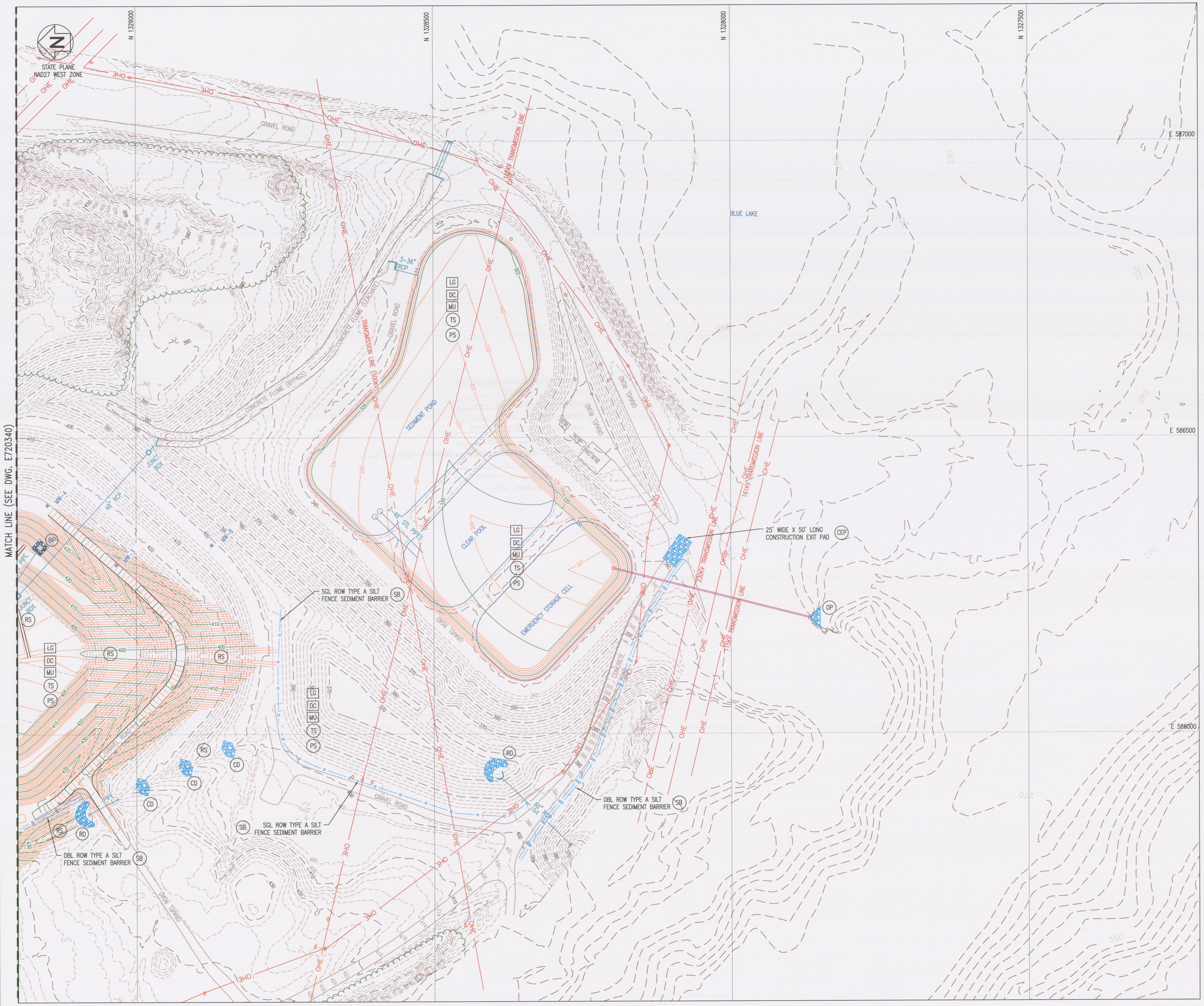
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP INTERMEDIATE AND FINAL PHASE
SHEET 1

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720340	1	FINAL	0

Approved

ANSI E: 44x34



EROSION CONTROL LEGEND

- CEP — CONSTRUCTION EXIT PAD
- SB — SEDIMENT BARRIER (TYPE "A" SILT FENCE)
- RS — RIPRAP SWALE
- RD — ROCK FILTER DAM
- CD — STONE CHECK DAM
- BIP — BLOCK AND GRAVEL INLET PROTECTION
- LG — LAND GRADING
- DC — DUST CONTROL
- MU — MULCHING
- TS — TEMPORARY SEEDING
- PS — PERMANENT SEEDING
- SB — SEDIMENT BARRIER (COMPOST FILTER SOCK)
- OP — STONE OUTLET PROTECTION

REFERENCES:

E720308–E720340

NOTES:

1. SEE DRAWING E720308 FOR TITLE SHEET AND DRAWING INDEX.
2. SEE DRAWING E720309 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

Southern Company Generation
Engineering and Construction Services
FOR
Alabama Power Company

PLANT GORGAS
SITEWORK
CBMPP INTERMEDIATE AND FINAL PHASE
SHEET 2

REVISION	DATE
0	12/20/2018

ISSUED FOR CONSTRUCTION

MWO: APC590792
PROJECT ID: GOR18004 — GYPSUM POND CLOSURE

REVISION	DATE

BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
AES	THB	CRU	XXX	XXX	XXX	SSS

SCALE	DRAWING NUMBER	SHEET	CONT'D	REV
1"=60'	E720341	1	FINAL	0

Approved

ANSI E: 44x34

APPENDIX 11

ADJACENT PROPERTY OWNERS

No other landowners adjoin the surveyed facility boundary for this CCR Unit.