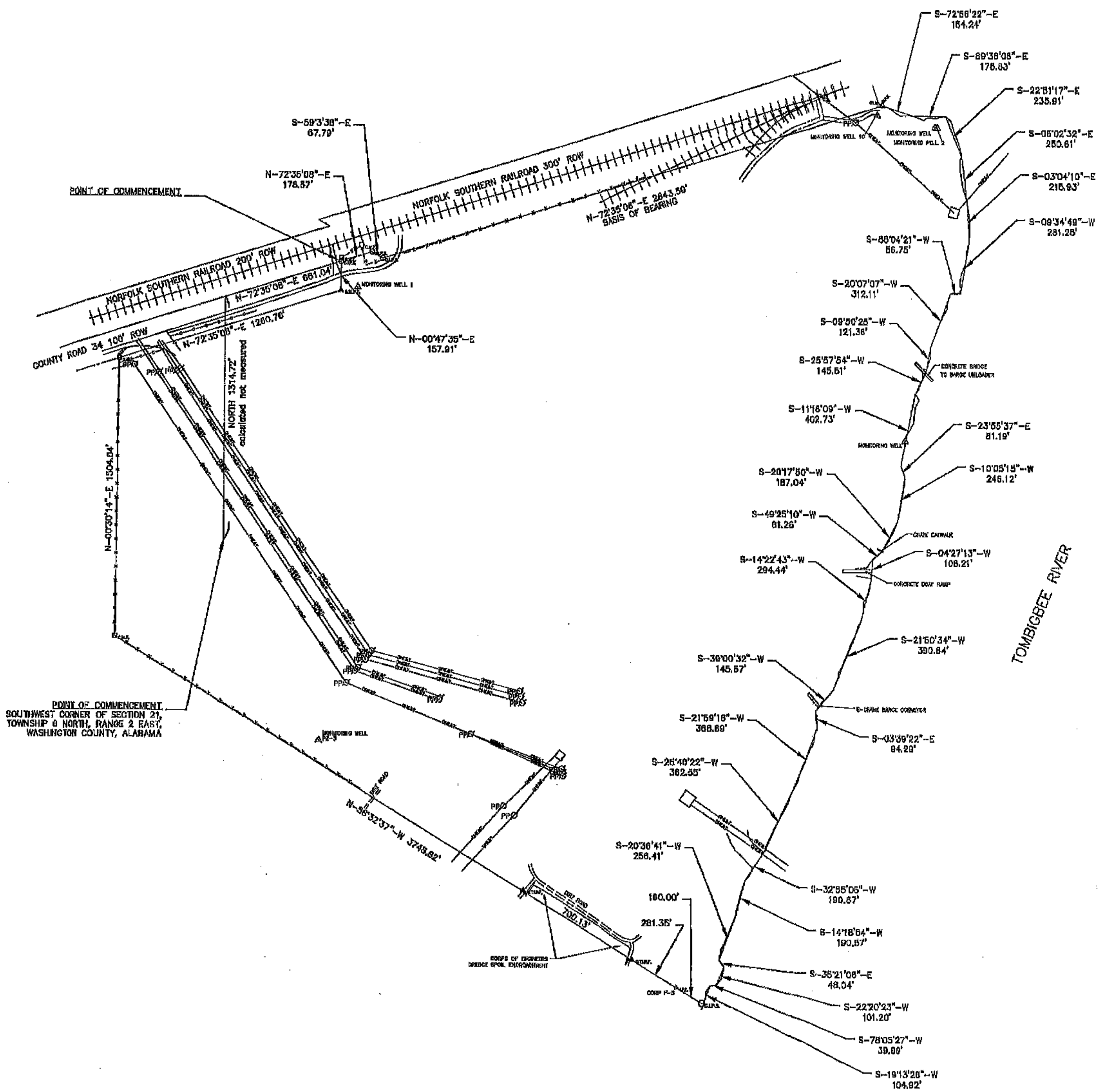
POWERSOUTH®
ENERGY COOPERATIVE

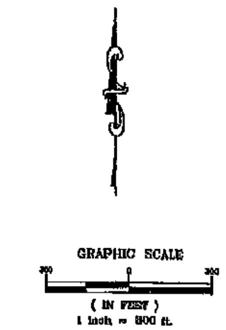
On-Site Control Points

Please see attached boundary survey for control points on-site to provide for accurate horizontal and vertical control for facility construction, operation and closure and post-closure.



LEGEND

- INDICATES 5/8" CAPPED IRON PIN FOUND
- INDICATES 5/8" CAPPED IRON PIN SET
- INDICATES CRIMPED TOP IRON PIN FOUND
- INDICATES OPEN TOP IRON PIN FOUND
- INDICATES REBAR FOUND
- INDICATES CONCRETE MONUMENT FOUND
- INDICATES AXLE FOUND
- INDICATES CHAIN LINK FENCE
- INDICATES WOOD FENCE
- INDICATES WIRE FENCE
- OHE — INDICATES OVERHEAD ELECTRIC LINES
- PP — INDICATES POWER POLE
- (ACT.) INDICATES ACTUAL MEASURE
- (REC.) INDICATES RECORD MEASURE



NOTES:

1.) Type of Survey: Boundary. No improvements were located except those shown hereon. Information used to prepare this survey is as follows: Book 201, Page 108; Book 144, Page 419; Book 146, Page 369; Book 140, Page 330; Book 132, Page 280; Book 195, Page 124; Book 129, Page 289; Book 208, Page 144; Book 201, Page 114; Book 332, Page 326; Previous surveys that were provided by client.
2.) Bearing Basis: All bearing are referenced to Alabama State Plane Coordinates West Zone established by using RTK GPS dialed to Trimble Continuous Operating Reference Station Network scale factor =0.999933331.
3.) Field Dates: September 20, 2018; October 31, 2018; November 5, 2018.
4.) Street Address: N/A
5.) No attempt was made by the Surveyor to locate underground improvements or environmentally sensitive conditions.
6.) This survey done without the benefit of a Title Search.

Description of Survey:

Commencing at the Southwest corner of Section 21, Township 6 North, Range 2 East, Washington County, Alabama; thence run North, 1314.72 feet to a point on the South right-of-way of Norfolk Southern Railroad; thence run N-72°35'08"-E along said South right-of-way of Norfolk Southern Railroad, 861.04 feet to a 5/8" capped rebar (Thompson Engineering), the Point of Beginning; thence continue N-72°35'08"-E along said South right-of-way of Norfolk Southern Railroad, 178.57 feet to a 5/8" capped rebar (Thompson Engineering); thence run S-59°53'38"-E along said South right-of-way of Norfolk Southern Railroad, 67.79 feet to a 5/8" capped rebar (Thompson Engineering); thence run N-72°35'08"-E along said South right-of-way of Norfolk Southern Railroad, 2843.69 feet to a 5/8" capped rebar (Thompson Engineering) being a point on the meanders of the Tombigbee River; thence run Southerly and Westerly along said meanders of the Tombigbee River the following courses: S-72°58'22"-E, 184.24 feet; S-89°38'06"-E, 178.83 feet; S-22°51'17"-E, 235.91 feet; S-06°52'32"-E, 250.81 feet; S-03°04'10"-E, 215.93 feet; S-09°34'49"-W, 281.25 feet; S-88°04'21"-W, 88.75 feet; S-20°07'07"-W, 312.11 feet; S-09°50'25"-W, 121.36 feet; S-25°57'54"-W, 145.51 feet; S-11°16'09"-W, 402.73 feet; S-23°55'37"-E, 61.19 feet; S-10°05'15"-W, 246.12 feet; S-28°17'50"-W, 187.04 feet; S-49°25'10"-W, 61.26 feet; S-04°27'13"-W, 108.21 feet; S-14°22'43"-W, 244.94 feet; S-21°50'34"-W, 390.64 feet; S-39°00'32"-W, 145.67 feet; S-03°39'22"-E, 94.29 feet; S-21°59'16"-W, 368.69 feet; S-25°40'22"-W, 362.55 feet; S-32°55'06"-W, 190.67 feet; S-14°16'54"-W, 190.57 feet; S-20°36'41"-W, 256.41 feet; S-35°21'06"-E, 48.04 feet; S-22°20'23"-W, 101.20 feet; S-78°05'27"-W, 39.69 feet; S-19°13'26"-W, 104.92 feet to a 5/8" capped rebar (Thompson engineering); thence run N-58°32'37"-W leaving said meanders of the Tombigbee River, 3748.82 feet to a concrete monument; thence run N-00°30'14"-E, 1504.04 feet to a point on the South right-of-way of County Road 34 (Carson Road) marked by a 5/8" capped rebar (Thompson Engineering); thence run N-72°35'08"-E along said South right-of-way of County Road 34 (Carson Road), 1260.76 feet to a 1" open top iron pipe; thence run N-00°47'36"-E, 157.91 feet to the Point of Beginning, containing 317.31 acres, more or less.

I state that all parts of this survey and drawing have been completed in accordance with the requirements of the Standards of Practice for Land Surveying in the State of Alabama to the best of my knowledge, information and belief.

Johnny E. Holley, PLS
Alabama License Number 23660

November 14, 2018
Date

THIS DRAWING REPRESENTS DESIGNS PREPARED BY THOMPSON ENGINEERING FOR SPECIFIC USE ON THIS PROJECT AND IS NOT TO BE COPIED, REPRODUCED, OR ALTERED WITHOUT THE EXPRESSED WRITTEN CONSENT OF THE THOMPSON ENGINEERING REPRESENTATIVE AUTHORIZED TO APPROVE THIS USE. UNAUTHORIZED USE IS SUBJECT TO LEGAL ACTION UNDER STATE AND FEDERAL LAW.

REVISION NO.	DESCRIPTION	DATE	BY

POWERSOUTH ENERGY COOPERATIVE
2027 EAST THREE NOTCH STREET ANDALUSIA, ALABAMA

thompson ENGINEERING
2970 COTTAGE HILL RD., STE. 190
MOBILE, ALABAMA 36606
TEL: (251) 666-2443
FAX: (251) 666-6422

LOWMAN POWER PLANT
LEROY, ALABAMA

BOUNDARY SURVEY

SCALE:	DRAWN BY:	APPROVED BY:	DATE:	JOB NO.:	DRAWING NO.	FILE:
1" = 300'	JEH	G.A.S.	NOVEMBER 2018	18-1102-0066	PLANT LOWMAN BOUNDARY LINE.DWG	

PowerSouth® Energy Cooperative

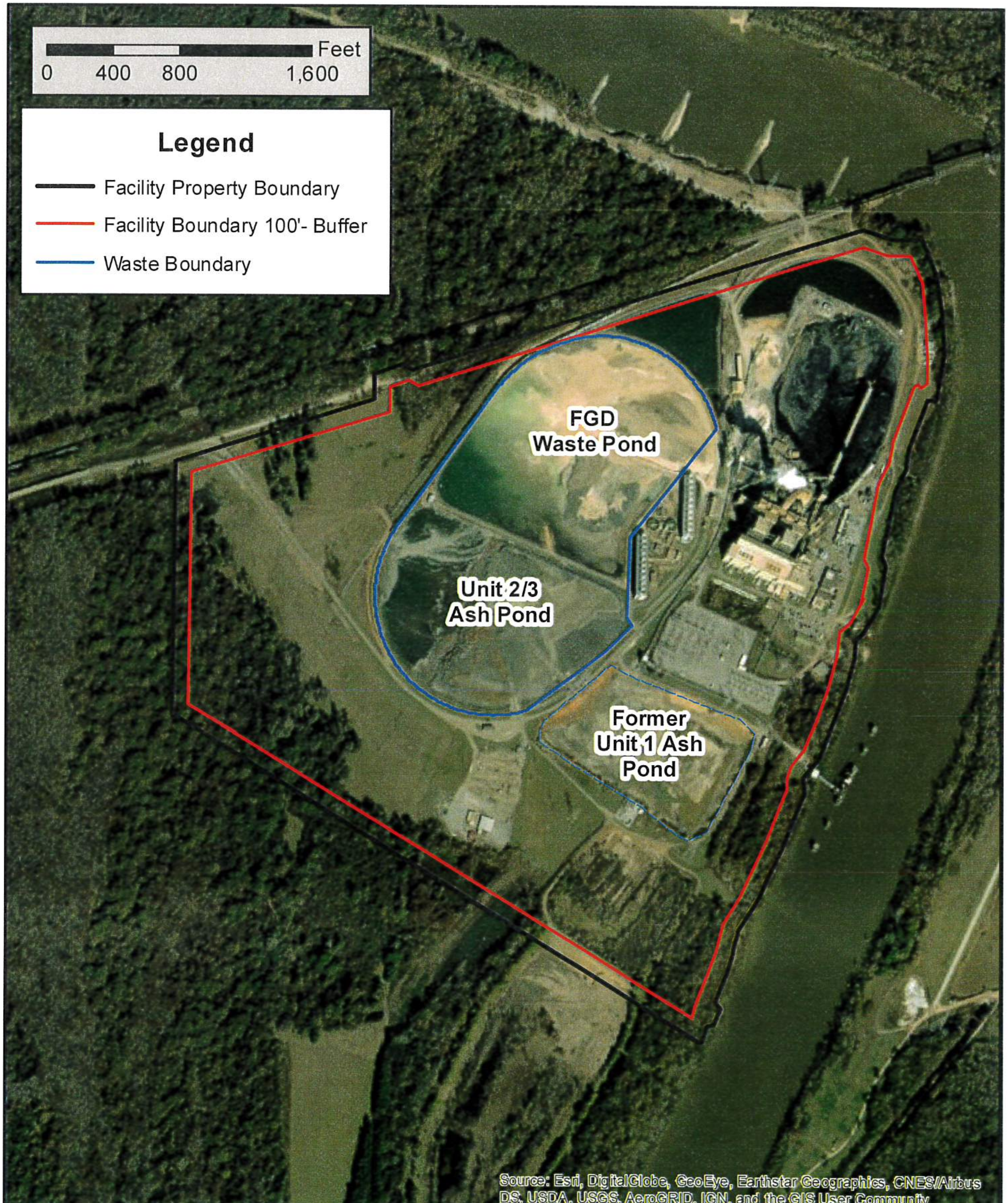
Construction Quality Assurance Plan (CQAP)

Please see written CCR Impoundment Closure and Post Closure Plan for CQAP for all components of the final cover system.

PowerSouth®
ENERGY COOPERATIVE

Topographical Maps

Please see History of Construction documents for existing ground surface elevation and initial disposal area elevation. See final closure plan for final disposal area elevation. Map showing buffer zone attached.



Facility Layout Map **Charles R. Lowman Power Plant**	CDG Engineering. Environmental. Answers.	Sheet No. 1	Drawn By: JRA Checked By: RDW Date: November 2020

Charles R. Lowman Power Plant
Leroy, AL

CCR Fugitive Dust Control Plan

Revised October 16, 2015

CDG Engineers and Associates, Inc.
1840 East Three Notch St.
Andalusia, AL 36421
| cdge.com

Table of Contents

Engineer's Certification

1. **Introduction** 1
2. **Plan Objectives** 1
3. **CCR Fugitive Dust Reduction Procedures** 1
4. **Periodic Inspections** 2
5. **Periodic Review** 3
   5.1 Evaluation through Activity Review 3
   5.2 Evaluation through Public Input Review 3
6. **Revisions to the Plan** 3
7. **Public Input** 3
8. **Annual CCR Fugitive Dust Control Report** 3
9. **Record Keeping** 3

CCR Fugitive Dust Control Plan

Engineer's Certification

I certify that the CCR Fugitive Dust Control Plan presented herein meets the requirements of Section 257.80, subsets (a) through (d), of Title 40 of the Code of Federal Regulations as amended upon the date of this certification.

Scott W. Trott, P.E.
CDG Engineer's and Associates, Inc.
1830 Hartford Highway
Dothan, AL 36301
(334) 488-3617
Alabama Registration Number 31542

ALABAMA LICENSED No. 31542 PROFESSIONAL ENGINEER SCOTT W. TROTT

10/16/2015

CCR Fugitive Dust Control Plan

1. Introduction

The Charles R. Lowman Power Plant campus is located in Leroy, AL and is owned and operated by PowerSouth Energy Cooperative. The power generation facility is comprised of three coal fired generating units capable of producing 551 megawatts of power. The facility contains infrastructure for storing coal combustion residuals (CCR) including fly ash, bottom ash, and gypsum produced from flue gas desulfurization (FGD). Each material is unique and is managed to account for site conditions and the material's characteristics.

2. Plan Objectives

The CCR Fugitive Dust Control Plan (Plan) identifies PowerSouth's control measures and practices to minimize and control CCR products from becoming airborne at the facility in compliance with Section 257.80 of the CCR regulations. The plan defines the following:

- Potential sources for CCR fugitive dust emissions;
- Procedures to control CCR fugitive dust emissions;
- Procedures to receive and log citizen complaints received by the operator;
- Outline annual reporting requirements; and
- Record keeping practices.

3. CCR Fugitive Dust Reduction Procedures

Measures are utilized to limit the potential for CCR fugitive dust emissions from the defined sources. These control methods, outlined herein, are specific to the source and the best management practices for each area.

- **Storage Impoundments**

  CCR is stored within specific impoundments present at the facility. Materials stored include gypsum fly ash, and bottom ash. CCR is stored within the impoundments with water incorporation as well as dry stacked.

- **Fly Ash Storage Silos**

  Dry fly ash is stored in enclosed silos on site.

Storage Impoundments	
Control Measures	• Daily maintenance of water coverage and water incorporation for non-dry stacked CCR – CCR products stored within the impoundments and not dry stacked shall remain submerged or wet as may be required to prevent wind erosion. In wet ponds, water coverage levels and incorporation shall be inspected on a daily basis. • Stack height management for dry stacked CCR – Dry stacked CCR within the impoundments shall be maintained not to exceed twelve feet above the adjacent top of berm height where and when practical. • Surface-wetting of dry stacked CCR – Water shall be applied to the surface of the dry stacked CCR as needed to prevent wind erosion of the material. Frequency of water application will be responsive to site-specific conditions, with any areas more prone to dusting to be wetted more frequently.

Fly Ash Storage Silos	
Control Measures	• Limit fall height – The height at which the fly ash enters into the storage silo will be maintained at the minimum height practical. • Maintenance of Silo coverage – Storage silos shall remain closed when not actively being loaded or unloaded. • Materials level – The level of fly ash stored in the silos shall be maintained such that the silos are not overfilled. • Loading technique – Loading of material into transport vehicles so that material remains below the cargo compartment limits and that covers are properly in place as applicable.

4. Periodic Inspections

Periodic inspection activities will serve to monitor the effectiveness of the control plan and changes in conditions as they relate to each individual potential emission source as well as each control measure. An overview of the periodic inspection items are presented in Table 4.1.1.

Table 4.1.1

Inspection Items for Each Potential Emission Source

Potential Emission Source	Inspection Items
Storage Impoundments	• Visually inspect water coverage, incorporation, and need for surface application • Inspect height of stacked materials
Fly Ash Storage Silos	• Monitor for CCR dust outside of silo limits • Visually inspect to ensure that silos remain closed when not actively loading or unloading

5. Periodic Review

The Plan shall be evaluated as needed based upon both facility activity related to Plan components as well as through evaluation of public comment. Based upon these reviews as well as changing conditions or operations, Plan revisions may be initiated as needed.

5.1 Evaluation through Activity Review

Inspection logs shall be periodically reviewed to ensure that the prescribed control measures are effectively minimizing fugitive emissions.

5.2 Evaluation through Public Input Review

The Plan will also be evaluated for effectiveness by reviewing the public input received and logged.

6. Revisions to the Plan

The Plan shall serve as a living, flexible document to best reflect the needs of the facility. From time to time, conditions may exist which will require the Plan to be modified to be most applicable and effective. As an example, changes in facility operations at the facility may initiate the need for changes or a new potential emission source may be introduced. Additionally, certain modifications may be identified as being advantageous based on operational experience. The content and timing of plan revisions will be responsive to available information regarding the effectiveness of this Plan.

7. Public Input

Public input may be submitted through mail or phone. Public input shall be directed to PowerSouth Public Relations, as follows:

PowerSouth Energy Cooperative
ATTN: Public Relations
2027 East Three Notch Street
Andalusia, AL 36421
(334) 427-3000

8. Annual CCR Fugitive Dust Control Report

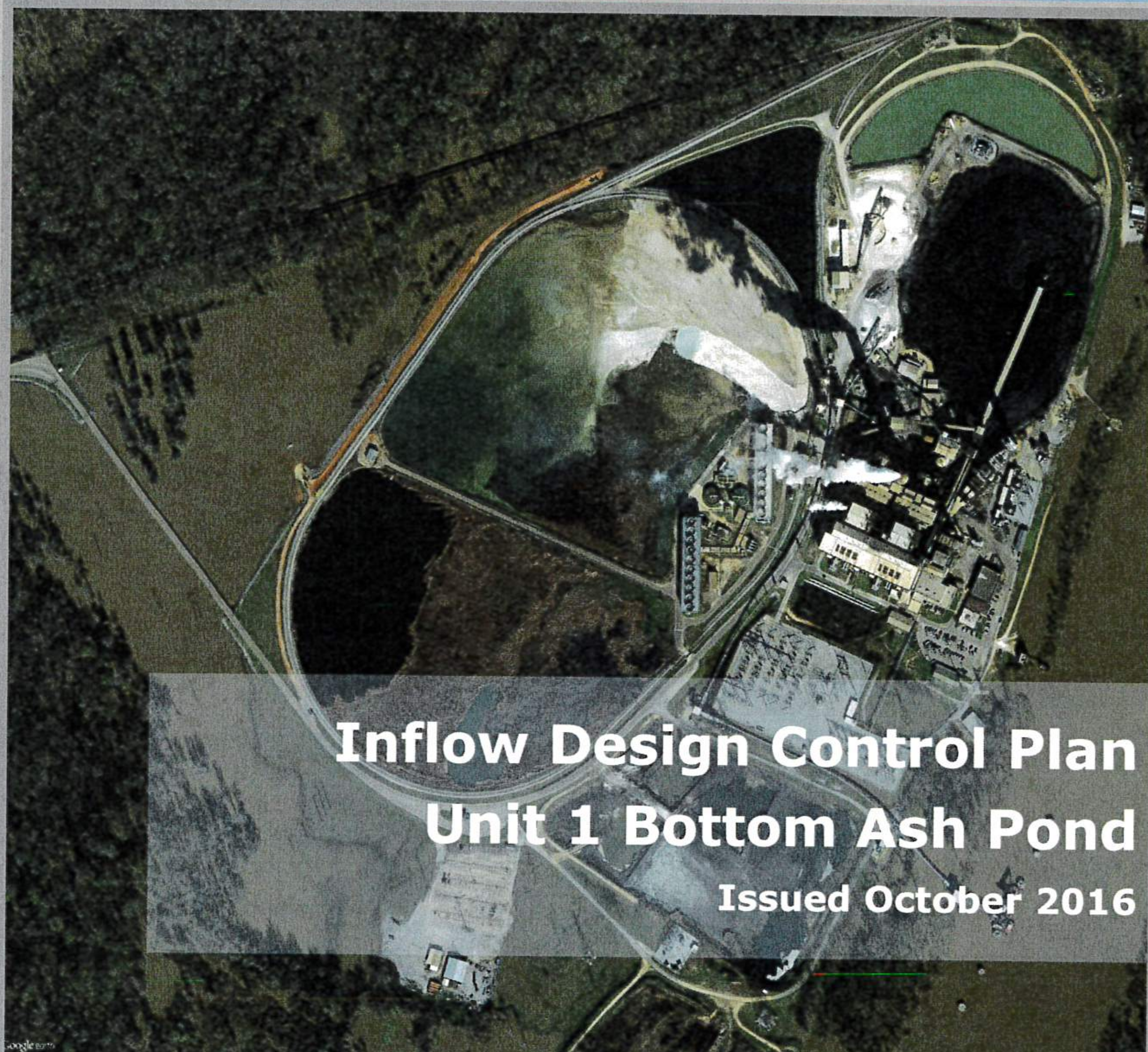
The Annual CCR Fugitive Dust Control Report (Annual Report) will be compiled each year to outline activities related to CCR fugitive dust control at the facility.

9. Record Keeping

Records of all activities related to CCR fugitive dust emission observation and management shall be logged and records shall be maintained in accordance with Section 257.80 of Title 40 of the Code of Federal Regulations.

PowerSouth
Energy Cooperative

Charles R. Lowman Power Plant Leroy, AL



Inflow Design Control Plan
Unit 1 Bottom Ash Pond

Issued October 2016

CDG Engineers and Associates, Inc.
1840 East Three Notch St.
Andalusia, AL 36421
| cdge.com

POWERSOUTH
ENERGY COOPERATIVE

REPORT
Inflow Design Control Plan
Unit 1 Bottom Ash Pond
Charles R. Lowman Power Plant

October 2016

CDG
Engineering. Environmental. Answers.

ALABAMA LICENSED ... R. DANIEL WELLS
10/15/16

TABLE OF CONTENTS

1.0 SCOPE OF SERVICES 2
2.0 PROJECT DESCRIPTION 2
3.0 MODEL VARIABLES AND ASSUMPTIONS 3
3.1 Identification of Design Storm Inflow 3
3.1.1 Unit 1 Bottom Ash Pond Additional Inflows 3
3.2 Characterization of Abstractions 4
3.2.1 Pond Detention 4
3.2.2 Other abstraction values 4
3.3 Selection of Run-off Model 4
3.4 Identification and Characterization Impoundment Structures 5
3.4.1 Unit 1 Bottom Ash Pond Intake/Decant Structures 5
3.4.2 Supplemental Structures 5
3.4.3 Downstream Hydraulic Structures 5
4.0 SCENARIOS AND RESULTS 6
4.1 Scenario 1-Normal Operations 6
4.1.1 Scenario 1 Flow Diagram 6
4.1.2 Scenario 1 Results 6
4.2 Scenario 2-Abnormal Operations 7
4.2.1 Scenario 2 Flow Diagram 7
4.2.2 Scenario 2 Results 7
5.0 SUMMARY AND CONCLUSIONS 8

APPENDIXES

Appendix A-Scenario 1 Results

Appendix B-Scenario 2 Results

Appendix C-NOAA Atlas 14 Information

1.0 SCOPE OF SERVICES

PowerSouth Energy Cooperative (PowerSouth) requested CDG Engineers and Associates, Inc. (CDG) to perform analysis of Inflow Design Flood Controls in accordance with 257.82 of EPA's Disposal of Coal Combustion Residuals from Electric Utilities (CCR rule). In association with this scope of services, CDG performed Hydrologic and Hydraulic Capacity modeling of the plants CCR impoundments and downstream hydraulic structures.

This report is the summary of the modeling efforts intended to meet the requirements of the "Inflow Design Flood Control System Plan" for the Unit 1 Bottom Ash Pond. The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were investigated: Unit 1 Bottom Ash Pond, Unit 2/3 Bottom Ash Pond, and the Scrubber Waste Pond. As per the Rule CCR surface impoundments must:

1. "Adequately manage flow into the CCR surface impoundment during and following the peak discharge of the inflow design flood" (257.82(a)(1))

2. "Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood" (257.82(a)(2))

3. "Discharge from the CCR unit must be handled in accordance with the surface water requirements under 257.3-3." (257.82(b))

2.0 PROJECT DESCRIPTION

The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were analyzed: Unit 1 Bottom Ash Pond, Unit 2/3 Bottom Ash Pond, and Scrubber Waste Pond. Although not subject to the CCR rule, the Process Waste Pond is included in this analysis as a downstream hydraulic structure due to its involvement in the Plant's water balance. The plant has several valving mechanisms that can direct process flows into and out of the individual impoundments. For the purpose of this analysis, flow from each impoundment goes to a single other impoundment. Scenarios were created to represent normal and abnormal operating conditions. The flow order to each pond is shown in Figure 2.1 below.

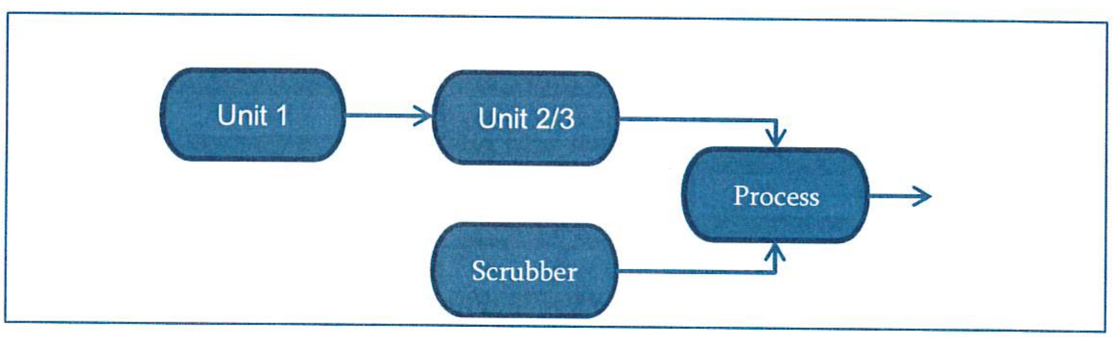


Figure 2.1-Impoundments Flow Order

3.0 MODEL VARIABLES AND ASSUMPTIONS

3.1 Identification of Design Storm Inflow

As per the "Hazard Potential Classification Assessment" each of the impoundments has a hazard classification of "Significant," requiring that the impoundments be analyzed for the 1000-yr flood.

Based on a review of topographic information provided by PowerSouth, it is evident that each impoundment has a contributing drainage shed that is primarily the impoundment itself. Therefore, the rainfall inflow for each impoundment is the volume of rainfall that accumulates in each drainage shed during the inflow design flood event. These rainfall inflows are tied to a specific impoundment and storm duration and therefore do not change between model scenarios. The 72hr-1000yr flood event was modeled for the rainfall event. Per the NOAA Atlas 14 the total rainfall for this event is 21.2 inches. An SCS Type III distribution was used to model this total rainfall depth over a 72 hour period. Figure 3.1 shows the cumulative rainfall depth curve. A copy of the NOAA Atlas 14 data can be seen in Appendix C.

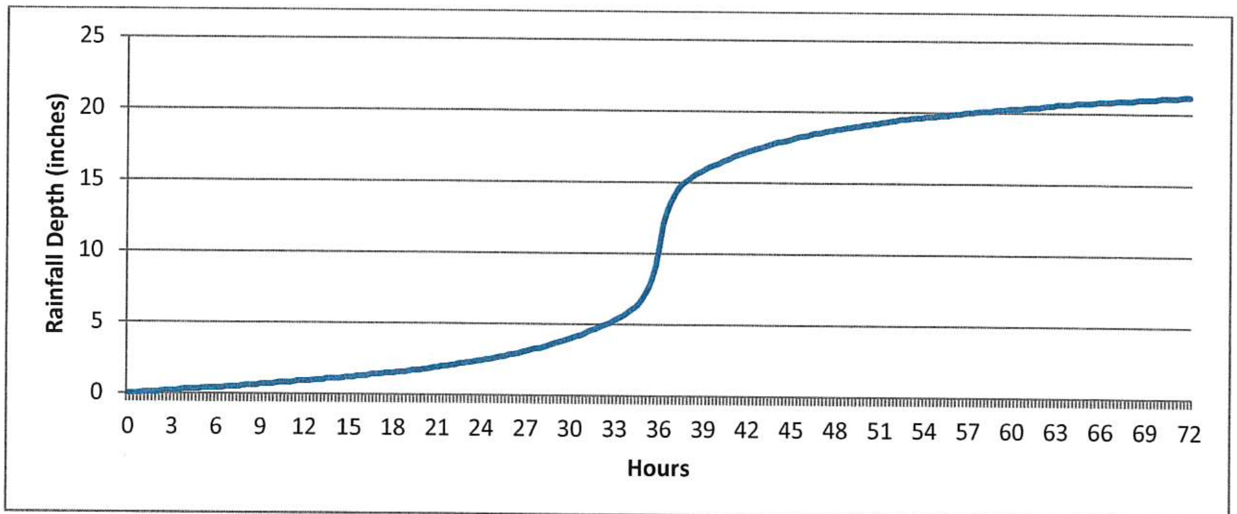


Figure 3.1- 72hr-1000yr Cumulative Rainfall Depth Curve

3.1.1 Unit 1 Bottom Ash Pond Additional Inflows

There is one plant inflows into Unit 1 Bottom Ash Pond. This inflow is the Unit 1 Bottom Ash Sluice inflow. The rate is 2,900 gpm and occurs twice a day for 45 minutes for each event. This flow is a closed loop where water is drawn from and pumped into ponds at the same rate. Therefore, this flow equals a net flow of zero and is not inputted into the models.

3.2 Characterization of Abstractions

3.2.1 Pond Detention

In developing the geometric modeling parameters for this project, CDG relied on topographic information obtained in conjunction with construction plans prepared by Stanley Engineering Company circa 1965, for work at the plant. Table 3.1 shows the stage-storage information used for modeling.

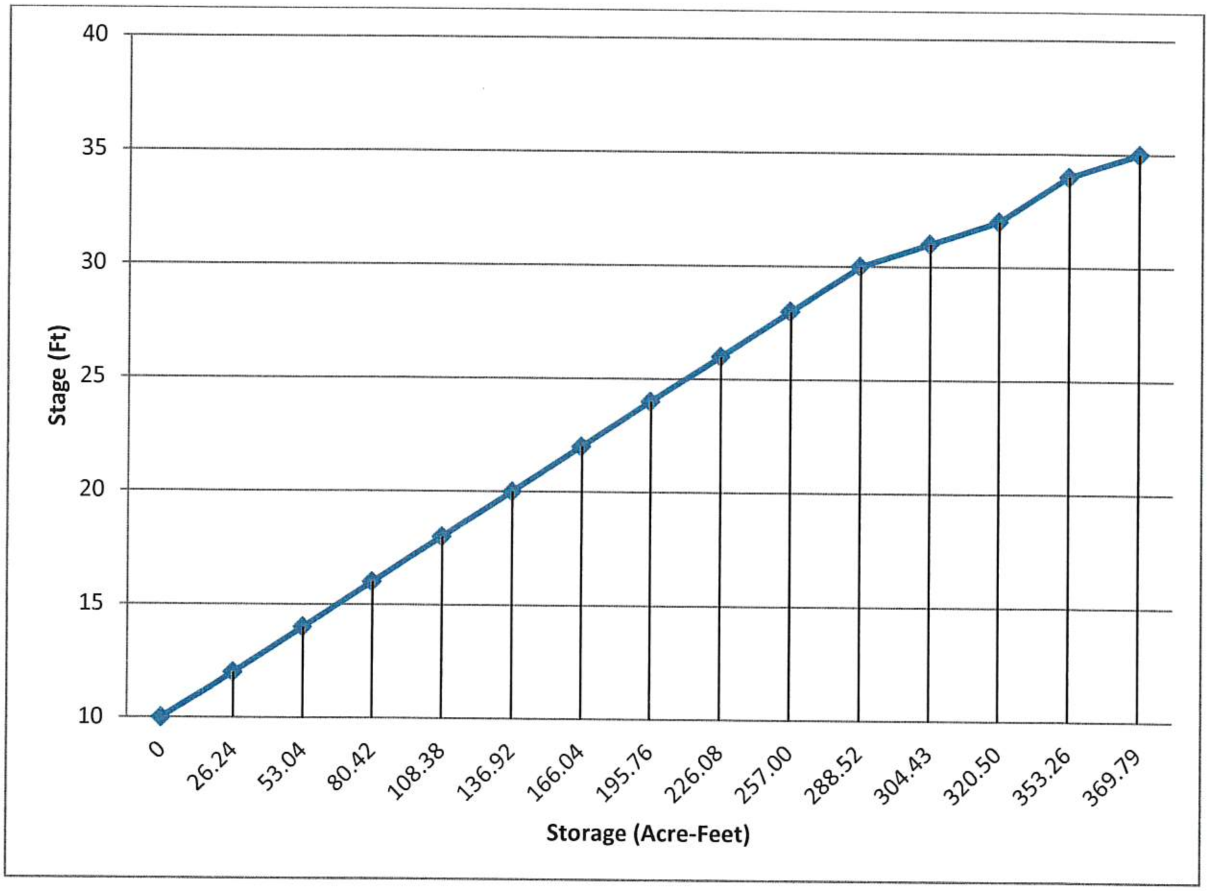


Figure 3.2- Unit 1 Bottom Ash Stage-Storage Curve

The normal pool elevation for the Unit 1 Bottom Ash Pond is 31.00.

3.2.2 Other abstraction values

As mentioned in Section 3.1 the drainage catchments for Ponds are mainly the ponds themselves. The pond has a normal pool elevation and because of the standing water the catchment is considered mainly impervious with a CN value of 98 or higher. No evapo-transporation or infiltration was considered in the modeling efforts.

3.3 Selection of Run-off Model

The US Army Corps of Engineers Hydrologic Modeling System 4.2 (HEC-HMS) was chosen for use in this modeling effort. HEC-HMS is a widely known, used, and trusted modeling software for complete processing of dendritic watershed systems. This software is also compatible with other associated studies at the site and is used for large scale hydrologic and hydraulic modeling of the Tombigbee River.

3.4 Identification and Characterization Impoundment Structures

3.4.1 Unit 1 Bottom Ash Pond Intake/Decant Structures

As stated earlier, each pond is drained and flow is conveyed via pumping systems. The pumping rates, “pump on” elevations, and “pump off” elevations were provided by PowerSouth. For this analysis, a “pump on” elevation of normal pool was used.

The Unit 1 Bottom Ash Decant structure is known as the Unit 1 Intake. The Unit 1 Intake consists of two suction lift pumps with a normal operating flow of 800 gpm (1.78 cfs). The pumps are fed by two floating intake hoses that allow for the removal of liquids from the laminar portion of the impounded waters.

3.4.2 Supplemental Structures

During high rainfall events, mobile suction lift pumps are utilized at the site to supplement permanent intake structures. These pumps are used in instances of existing pump or pond maintenance.

3.4.3 Downstream Hydraulic Structures

The Unit 1 Bottom Ash Pond is drained solely by pumping. As shown in Figure 2.1 all liquids extracted from the Unit 1 Bottom Ash Pond are discharged to the Unit 2/3 Ash Pond. The Owner has informed us that all liquids which are pumped to downstream hydraulic structures are handled in accordance with the surface water requirements under 257.3-3.

4.0 SCENARIOS AND RESULTS

4.1 Scenario 1-Normal Operations

4.1.1 Scenario 1 Flow Diagram

Scenario 1 assumes that all the pond pumps are fully operational and that each pond has its contributing rainfall inflow. The figure below illustrates the flows for this scenario.

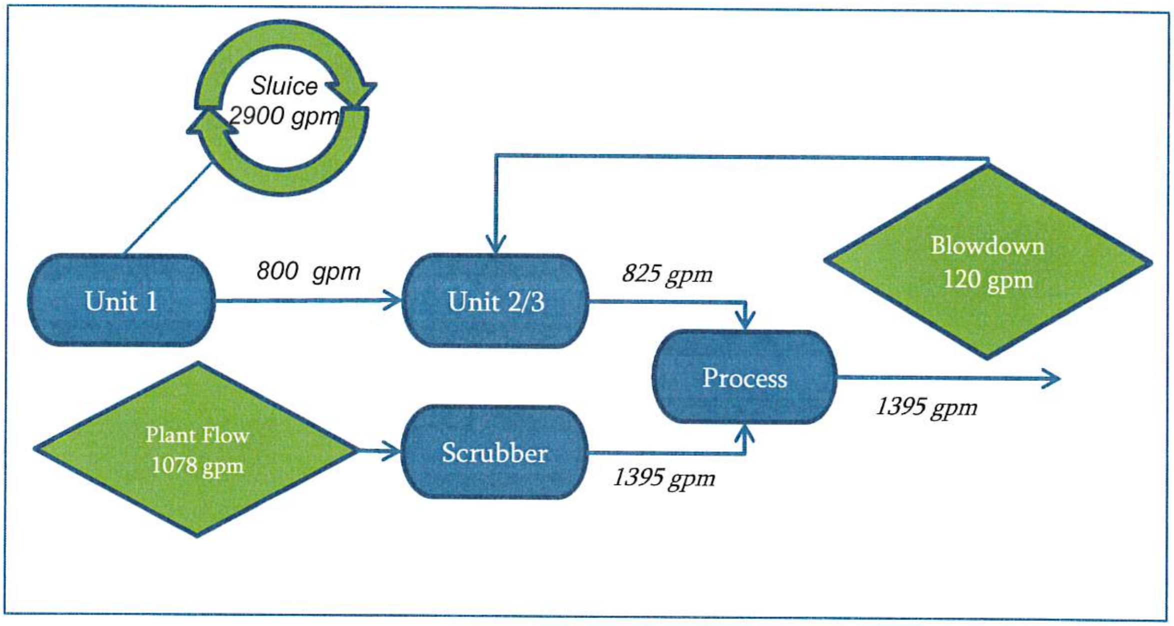


Figure 4.1-Scenario 1 Flow Diagram

4.1.2 Scenario 1 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The table below shows the results from the hydraulic model.

Table 4.1-Scenario 1-Unit 1 Bottom Ash Pond Maximum Hydraulic Grades

Impoundment Name	Pound Overtopping Elevation.	Max HGL	Time to Max HGL	Total Drawdown Time	Pass/Fail
	(feet)	(feet)	(hours)	(days)	
Unit 1 Bottom Ash	35.0	32.4	53	9.0	Pass

The total drawdown time shown in Table 4.1 is defined as the time from the beginning of the model to the time where the impoundment returns to the normal pool elevation.

4.2 Scenario 2-Abnormal Operations

4.2.1 Scenario 2 Flow Diagram

Scenario 2 is intended to represent abnormal operations at the facility such as a loss of power, pumping failure, or other similar conditions. For this scenario a pumping failure is assumed. Since all the ponds rely on pumping systems for outflow a failure would mean that the impoundments could not discharge inflows. It also means that the plant would not be producing an inflow because its operations would be ceased. Therefore, the only impoundment inflows are from the 72hr inflow design flood event itself. The figure below illustrates the flows for this scenario.

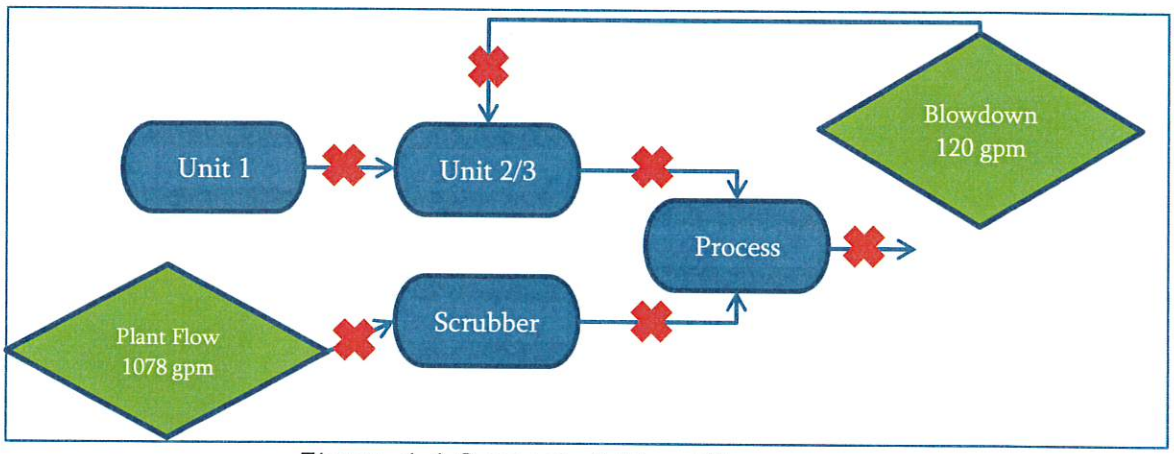


Figure 4.4-Scenario 2 Flow Diagram

4.2.2 Scenario 2 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The model determined that the Unit 1 Bottom Ash Pond does not overtop during this scenario. The maximum hydraulic grade can be found in the following table.

Table 4.2-Scenario 2 Maximum Hydraulic Grades

Impoundment Name	Max HGL	Pond Overtopping Elevation.	Pass/Fail
Unit 1 Bottom Ash	32.8	35.0	Pass

5.0 SUMMARY AND CONCLUSIONS

The conclusions presented in this report are based upon currently accepted engineering principles, practices, and standards in the area where the services were provided. No other warranty, expressed or implied, is made. The findings in this report were developed from engineering calculations performed to meet the standards of the CCR Rule. Plant operation information was provided by the owner.

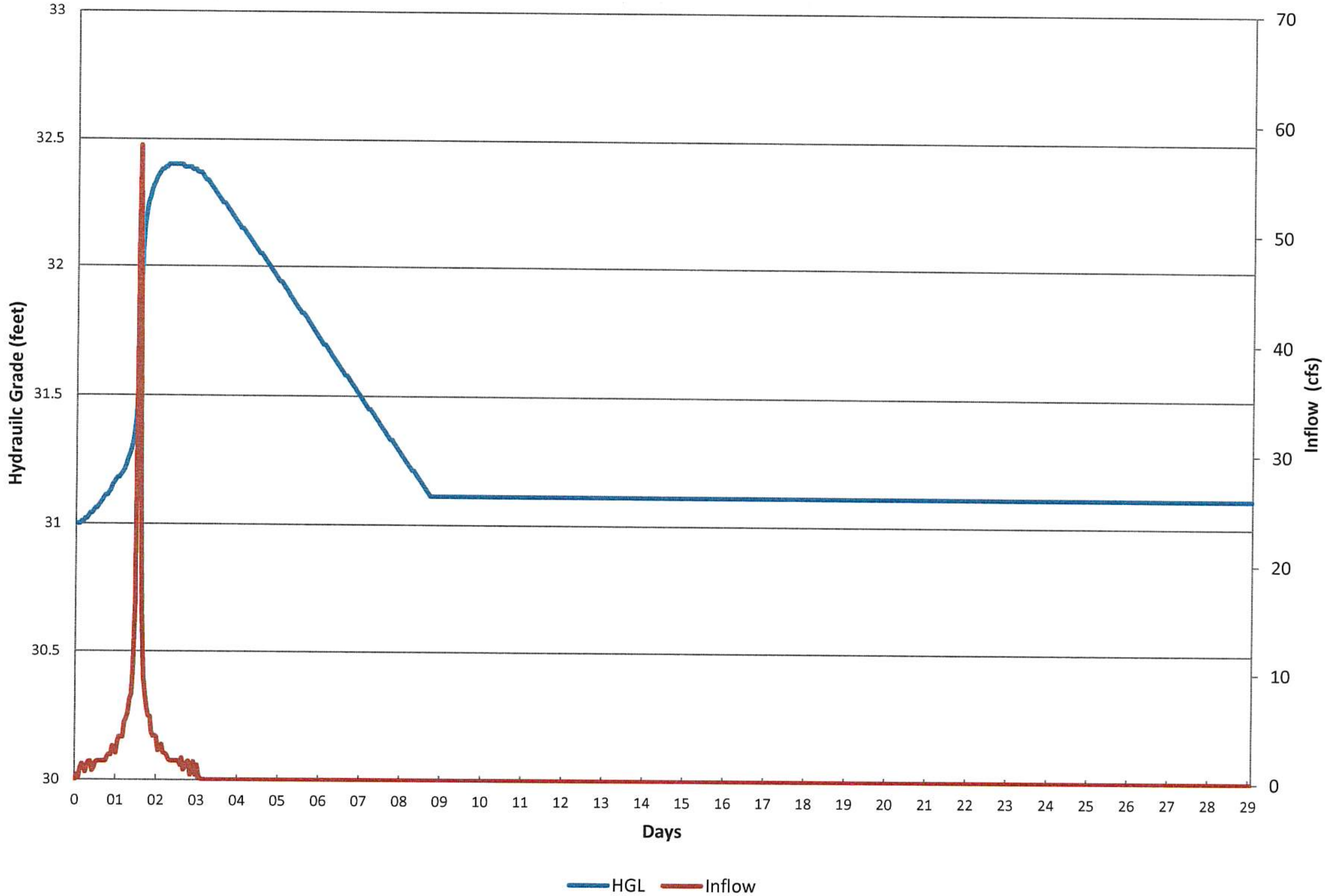
In conclusion, as per this report and supporting documents Unit 1 Bottom Ash Pond at the Charles R. Lowman Power Plant meets the requirements for inflow design flood controls as per the CCR Rule. This document and its Attachments are intended to meet the requirements of the Initial Inflow Design Flood Control System Plan as per 257.82.

Appendix A

Scenario 1 Results

Figure A.1-Unit 1 Bottom Ash HGL and Inflow Graph

Figure A.1-Scenario 1, Unit 1 HGL and Inflow

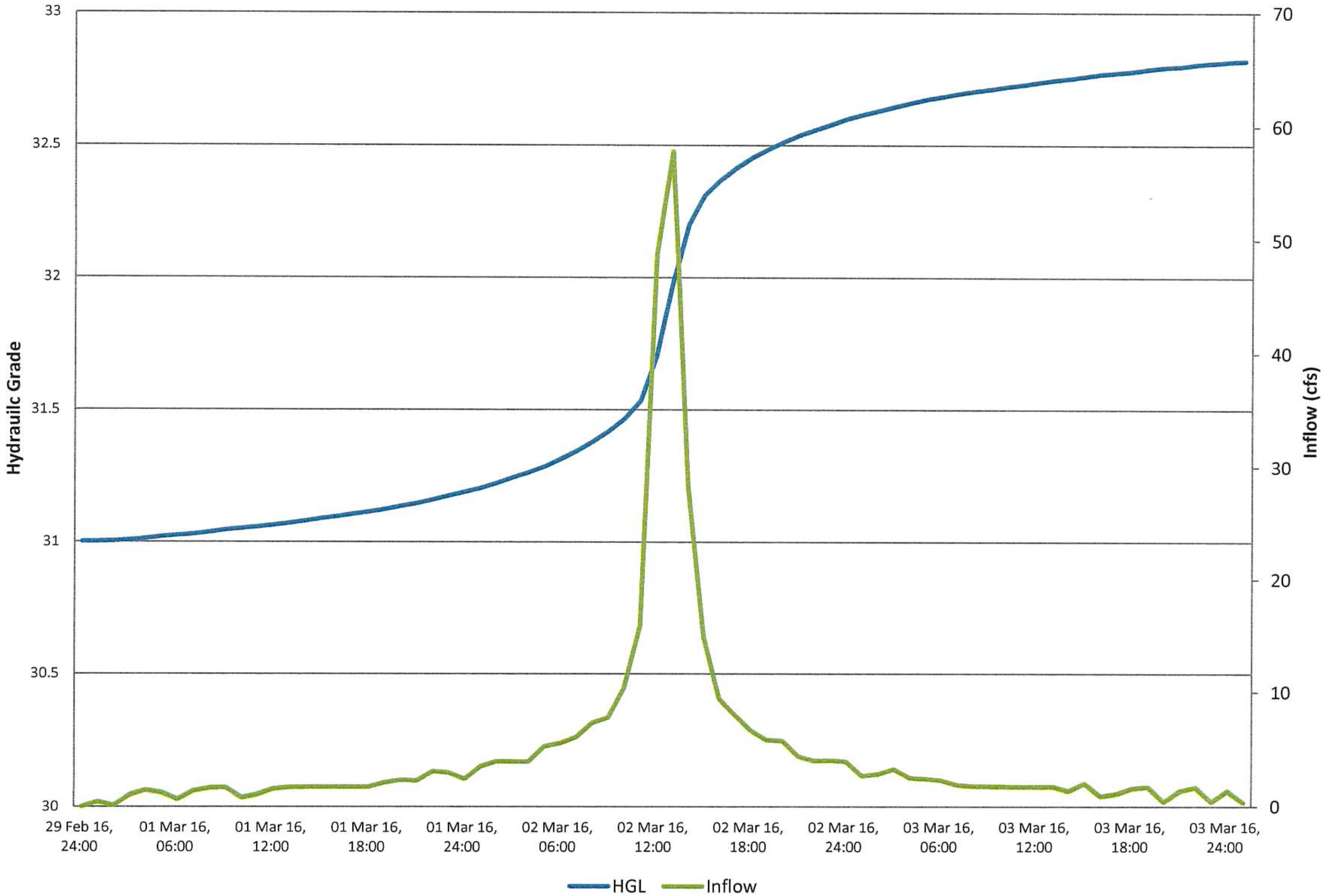


Appendix B

Scenario 2 Results

Figure B.1-Unit 1 Bottom Ash HGL and Inflow Graph

Figure B.1-Scenario 2, Unit 1 HGL and Inflow



Appendix C

NOAA Atlas 14 Information

NOAA Atlas 14, Volume 9, Version 2 JACKSON
Station ID: 01-4193
Location name: Jackson, Alabama, US*
Latitude: 31.5250°, Longitude: -87.9278°
Elevation:
Elevation (station metadata): 220 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.531** (0.449-0.629)	**0.606** (0.512-0.719)	**0.731** (0.615-0.869)	**0.834** (0.697-0.997)	**0.976** (0.783-1.21)	**1.09** (0.849-1.37)	**1.20** (0.897-1.55)	**1.31** (0.934-1.75)	**1.46** (0.993-2.01)	**1.57** (1.04-2.21)
10-min	**0.777** (0.658-0.920)	**0.888** (0.750-1.05)	**1.07** (0.900-1.27)	**1.22** (1.02-1.46)	**1.43** (1.15-1.77)	**1.59** (1.24-2.00)	**1.75** (1.31-2.27)	**1.92** (1.37-2.56)	**2.14** (1.46-2.95)	**2.30** (1.52-3.24)
15-min	**0.948** (0.802-1.12)	**1.08** (0.915-1.28)	**1.30** (1.10-1.55)	**1.49** (1.25-1.78)	**1.74** (1.40-2.16)	**1.94** (1.51-2.44)	**2.14** (1.60-2.77)	**2.34** (1.67-3.13)	**2.61** (1.77-3.60)	**2.81** (1.85-3.95)
30-min	**1.40** (1.18-1.66)	**1.60** (1.36-1.90)	**1.95** (1.64-2.31)	**2.23** (1.86-2.67)	**2.62** (2.10-3.24)	**2.93** (2.29-3.68)	**3.23** (2.42-4.18)	**3.54** (2.52-4.74)	**3.96** (2.69-5.46)	**4.27** (2.82-6.01)
60-min	**1.86** (1.57-2.20)	**2.12** (1.79-2.51)	**2.56** (2.15-3.04)	**2.96** (2.47-3.53)	**3.53** (2.85-4.42)	**4.01** (3.14-5.08)	**4.51** (3.39-5.88)	**5.04** (3.61-6.78)	**5.79** (3.95-8.03)	**6.38** (4.21-8.97)
2-hr	**2.32** (1.97-2.73)	**2.63** (2.23-3.09)	**3.18** (2.69-3.75)	**3.68** (3.09-4.37)	**4.45** (3.62-5.55)	**5.09** (4.02-6.44)	**5.79** (4.38-7.53)	**6.54** (4.72-8.78)	**7.61** (5.24-10.5)	**8.48** (5.64-11.9)
3-hr	**2.61** (2.23-3.06)	**2.94** (2.50-3.44)	**3.55** (3.01-4.17)	**4.13** (3.48-4.88)	**5.04** (4.14-6.31)	**5.83** (4.64-7.39)	**6.70** (5.11-8.73)	**7.66** (5.56-10.3)	**9.05** (6.27-12.5)	**10.2** (6.80-14.2)
6-hr	**3.15** (2.70-3.66)	**3.53** (3.02-4.11)	**4.27** (3.64-5.00)	**5.00** (4.23-5.87)	**6.16** (5.09-7.69)	**7.18** (5.75-9.06)	**8.31** (6.38-10.8)	**9.57** (6.99-12.8)	**11.4** (7.96-15.7)	**12.9** (8.69-17.9)
12-hr	**3.73** (3.21-4.31)	**4.22** (3.63-4.89)	**5.15** (4.42-5.99)	**6.04** (5.14-7.05)	**7.42** (6.16-9.17)	**8.62** (6.92-10.8)	**9.93** (7.66-12.8)	**11.4** (8.35-15.1)	**13.5** (9.45-18.4)	**15.2** (10.3-20.9)
24-hr	**4.30** (3.72-4.94)	**4.95** (4.28-5.69)	**6.12** (5.27-7.06)	**7.19** (6.15-8.33)	**8.81** (7.32-10.8)	**10.2** (8.21-12.6)	**11.7** (9.03-14.8)	**13.3** (9.78-17.4)	**15.6** (11.0-21.0)	**17.4** (11.9-23.8)
2-day	**4.86** (4.23-5.54)	**5.64** (4.90-6.45)	**7.04** (6.09-8.06)	**8.30** (7.14-9.56)	**10.2** (8.50-12.3)	**11.8** (9.53-14.4)	**13.5** (10.5-17.0)	**15.3** (11.3-19.9)	**17.9** (12.7-23.9)	**19.9** (13.7-27.0)
3-day	**5.26** (4.59-5.98)	**6.07** (5.29-6.91)	**7.52** (6.53-8.58)	**8.84** (7.63-10.1)	**10.8** (9.07-13.1)	**12.5** (10.2-15.3)	**14.3** (11.2-18.0)	**16.2** (12.1-21.1)	**19.0** (13.5-25.4)	**21.2** (14.6-28.7)
4-day	**5.62** (4.91-6.37)	**6.44** (5.62-7.31)	**7.91** (6.88-9.00)	**9.26** (8.00-10.6)	**11.3** (9.47-13.6)	**13.0** (10.6-15.8)	**14.8** (11.6-18.6)	**16.8** (12.6-21.7)	**19.6** (14.0-26.2)	**21.9** (15.1-29.5)
7-day	**6.59** (5.79-7.43)	**7.46** (6.54-8.42)	**8.99** (7.85-10.2)	**10.4** (9.00-11.8)	**12.4** (10.5-14.8)	**14.1** (11.6-17.1)	**16.0** (12.6-19.9)	**17.9** (13.4-23.0)	**20.7** (14.9-27.4)	**22.9** (15.9-30.7)
10-day	**7.45** (6.56-8.37)	**8.36** (7.35-9.40)	**9.94** (8.70-11.2)	**11.3** (9.87-12.8)	**13.4** (11.3-15.9)	**15.1** (12.4-18.1)	**16.9** (13.3-20.9)	**18.8** (14.1-24.0)	**21.5** (15.4-28.3)	**23.6** (16.4-31.5)
20-day	**9.83** (8.70-11.0)	**10.9** (9.60-12.1)	**12.6** (11.1-14.1)	**14.1** (12.3-15.9)	**16.3** (13.7-19.0)	**18.0** (14.8-21.4)	**19.7** (15.6-24.1)	**21.6** (16.3-27.2)	**24.1** (17.4-31.4)	**26.1** (18.3-34.6)
30-day	**11.8** (10.5-13.2)	**13.0** (11.6-14.5)	**15.0** (13.3-16.7)	**16.7** (14.6-18.7)	**19.0** (16.1-22.0)	**20.8** (17.2-24.5)	**22.6** (18.0-27.5)	**24.5** (18.6-30.7)	**27.0** (19.6-35.0)	**29.0** (20.4-38.2)
45-day	**14.5** (12.9-16.0)	**15.9** (14.2-17.6)	**18.3** (16.2-20.3)	**20.2** (17.8-22.6)	**22.9** (19.4-26.4)	**24.9** (20.6-29.2)	**26.9** (21.4-32.4)	**28.9** (21.9-36.0)	**31.5** (22.9-40.5)	**33.4** (23.6-43.9)
60-day	**16.7** (14.9-18.5)	**18.5** (16.5-20.4)	**21.3** (18.9-23.6)	**23.5** (20.8-26.2)	**26.5** (22.5-30.4)	**28.8** (23.8-33.6)	**30.9** (24.7-37.2)	**33.1** (25.2-41.0)	**35.8** (26.1-45.8)	**37.7** (26.8-49.5)

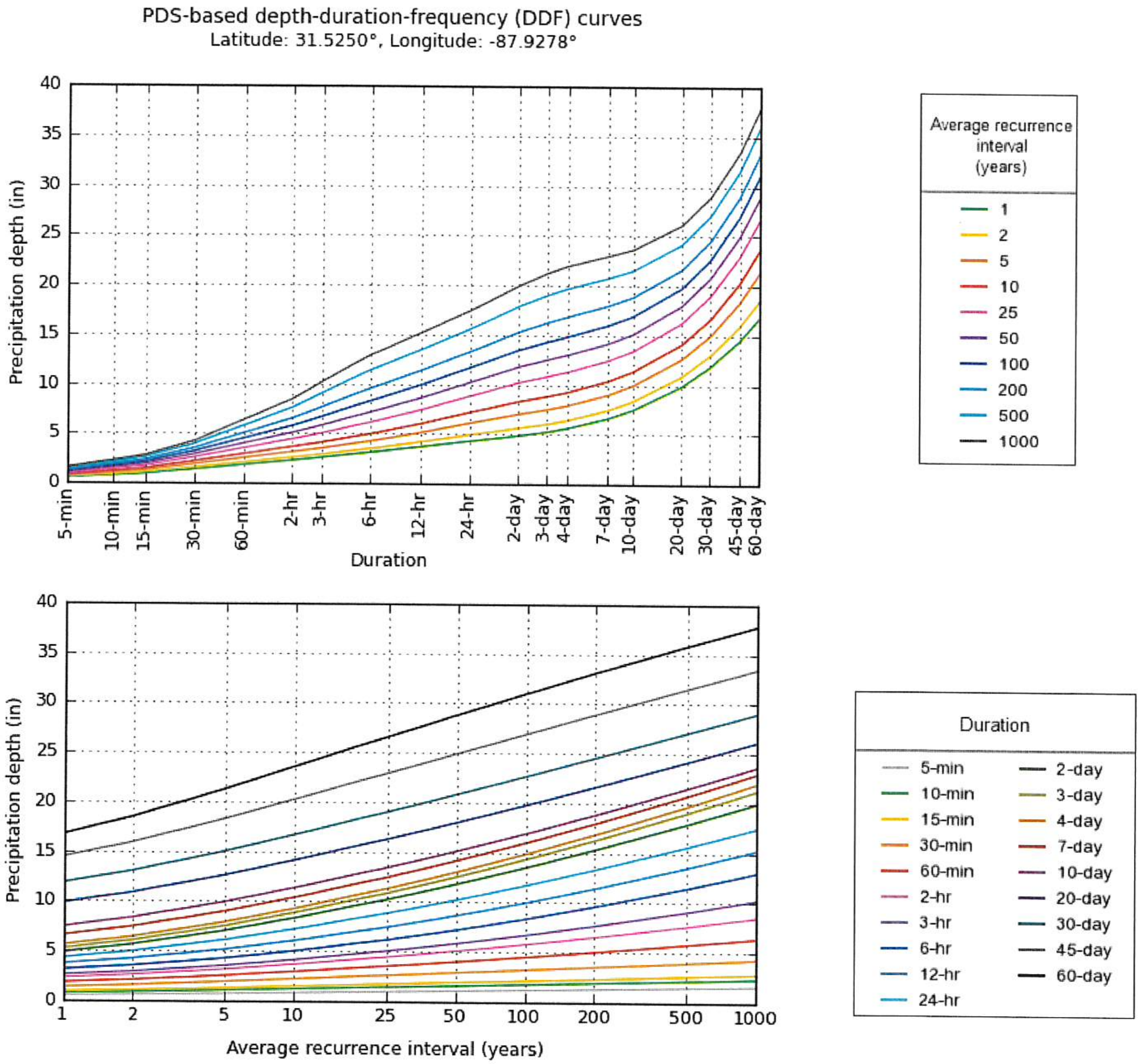
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical



NOAA Atlas 14, Volume 9, Version 2

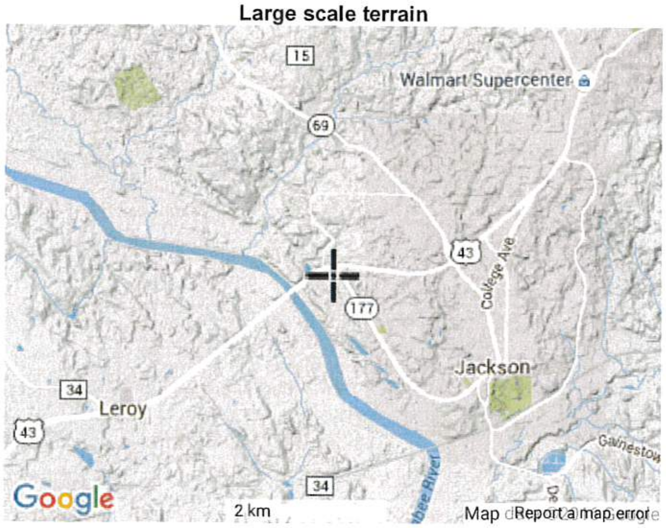
Created (GMT): Fri Feb 26 01:03:45 2016

[Back to Top](#)

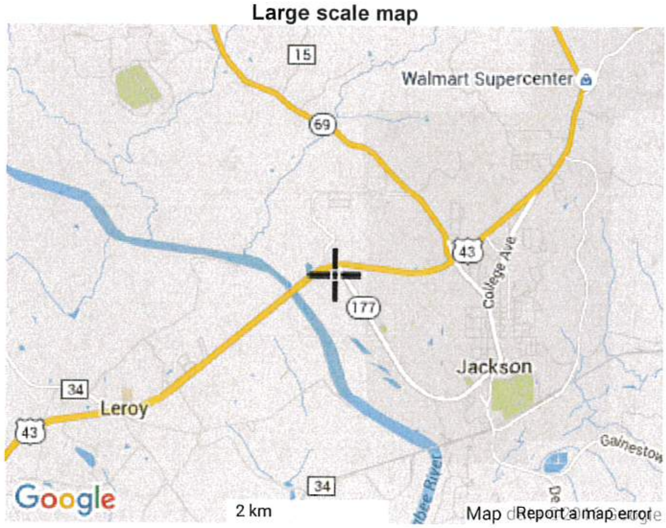
Maps & aerials

Small scale terrain

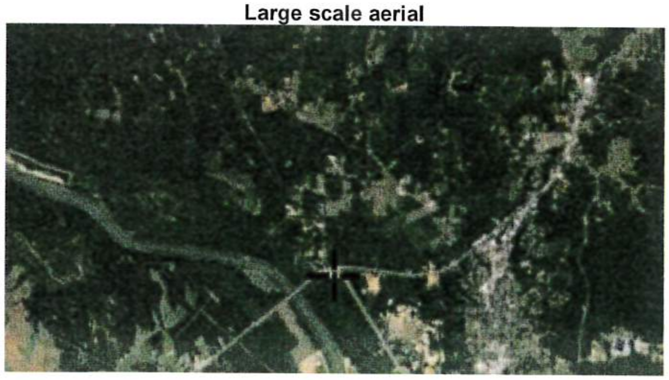
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

PowerSouth
ENERGY COOPERATIVE

Charles R. Lowman Power Plant Leroy, AL

Inflow Design Control Plan
Unit 2/3 Bottom Ash Pond

Issued October 2016

CDG Engineers and Associates, Inc.
1840 East Three Notch St.
Andalusia, AL 36421
| cdge.com

POWERSOUTH
ENERGY COOPERATIVE

REPORT
Inflow Design Control Plan
Unit 2/3 Bottom Ash Pond
Charles R. Lowman Power Plant

October 2016

CDG
Engineering. Environmental. Answers.

10/15/16

TABLE OF CONTENTS

1.0 SCOPE OF SERVICES 2
2.0 PROJECT DESCRIPTION 2
3.0 MODEL VARIABLES AND ASSUMPTIONS 3
3.1 Identification of Design Storm Inflow 3
3.1.1 Additional Inflows 3
3.2 Characterization of Rainfall Abstractions 4
3.3 Selection of Run-off Model 4
3.4 Identification and Characterization of Intake or Decant Structures 5
3.4.1 Unit 2/3 Bottom Ash Pond Intake/Decant Structures 5
3.4.2 Supplemental Structures 5
3.4.3 Downstream Hydraulic Structures 5
4.0 SCENARIOS AND RESULTS 6
4.1 Scenario 1-Normal Operations 6
4.1.1 Scenario 1 Flow Diagram 6
4.1.2 Scenario 1 Results 6
4.2 Scenario 2-Abnormal Operations 7
4.2.1 Scenario 2 Flow Diagram 7
4.2.2 Scenario 2 Results 7
5.0 SUMMARY AND CONCLUSIONS 8

APPENDIXES

Appendix A-Scenario 1 Results

Appendix B-Scenario 2 Results

Appendix C-NOAA Atlas 14 Information

1.0 SCOPE OF SERVICES

PowerSouth Energy Cooperative (PowerSouth) requested CDG Engineers and Associates, Inc. (CDG) to perform analysis of Inflow Design Flood Controls in accordance with 257.82 of EPA's Disposal of Coal Combustion Residuals from Electric Utilities (CCR rule). In association with this scope of services, CDG performed Hydrologic and Hydraulic Capacity modeling of the plants CCR impoundments and downstream hydraulic structures.

This report is the summary of the modeling efforts intended to meet the requirements of the "Inflow Design Flood Control System Plan" for the Unit 2/3 Bottom Ash Pond. The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were investigated: Unit 1 Bottom Ash Pond, Unit 2/3 Bottom Ash Pond, and the Scrubber Waste Pond. As per the Rule CCR surface impoundments must:

1. "Adequately manage flow into the CCR surface impoundment during and following the peak discharge of the inflow design flood" (257.82(a)(1))

2. "Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood" (257.82(a)(2))

3. "Discharge from the CCR unit must be handled in accordance with the surface water requirements under 257.3-3." (257.82(b))

2.0 PROJECT DESCRIPTION

The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were analyzed: Unit 1 Bottom Ash Pond , Unit 2/3 Bottom Ash Pond, and Scrubber Waste Pond. Although not subject to the CCR rule, the Process Waste Pond is included in this analysis as a downstream hydraulic structure due to its involvement in the Plant's water balance. The plant has several valving mechanisms that can direct process flows into and out of the individual impoundments. For the purpose of this analysis, flow from each impoundment goes to a single other impoundment. Scenarios were created to represent normal and abnormal operating conditions. The flow order to each pond is shown in Figure 2.1 below.

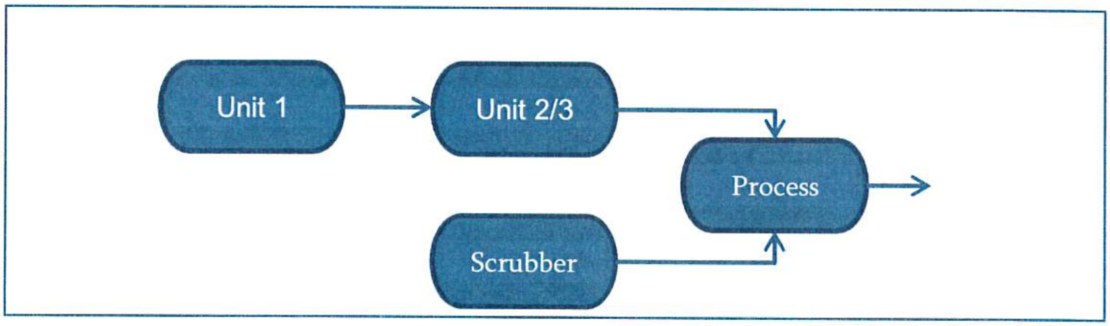


Figure 2.1-Impoundments Flow Order

3.0 MODEL VARIABLES AND ASSUMPTIONS

3.1 Identification of Design Storm Inflow

As per the "Hazard Potential Classification Assessment" each of the impoundments has a hazard classification of "Significant," requiring that the impoundments be analyzed for the 1000-yr flood.

Based on a review of topographic information provided by PowerSouth, it is evident that each impoundment has a contributing drainage shed that is primarily the impoundment itself. Therefore, the rainfall inflow for each impoundment is the volume of rainfall that accumulates in each drainage shed during the inflow design flood event. These rainfall inflows are tied to a specific impoundment and storm duration and therefore do not change between model scenarios. The 72hr-1000yr flood event was modeled for the rainfall event. Per the NOAA Atlas 14 the total rainfall for this event is 21.2 inches. An SCS Type III distribution was used to model this total rainfall depth over a 72 hour period. Figure 3.1 shows the cumulative rainfall depth curve. A copy of the NOAA Atlas 14 data can be seen in Appendix C.

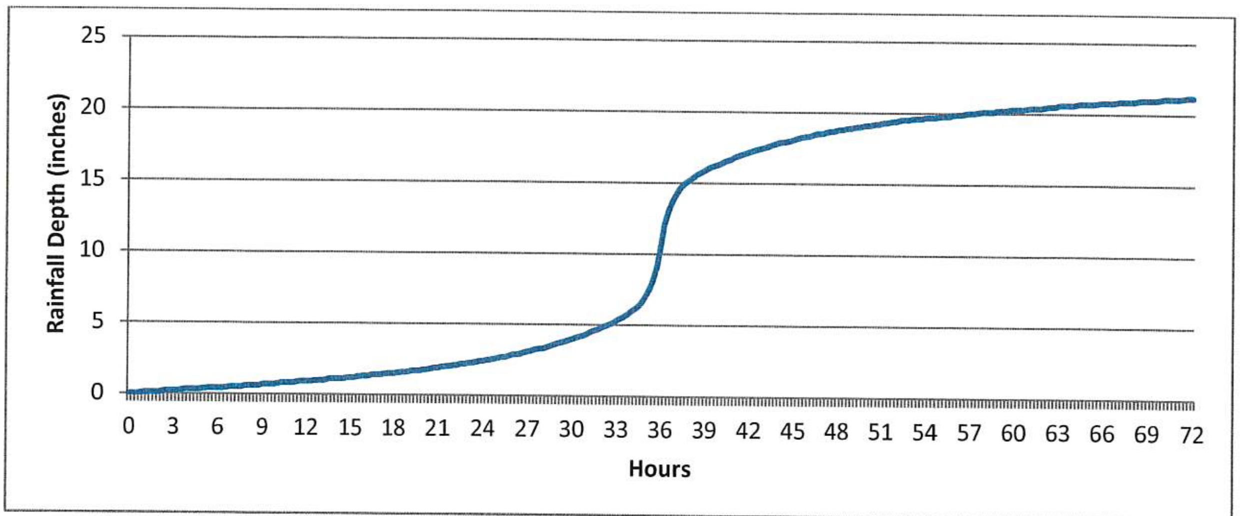


Figure 3.1- 72hr-1000yr Cumulative Rainfall Depth Curve

3.1.1 Additional Inflows

There are two plant inflows into the Unit 2/3 Bottom Ash Pond. The first is the Unit 2/3 Bottom Ash Sluice inflow. This rate is 2,900 gpm and occurs twice a day for 45 minutes for each. This flow is a closed loop where water is drawn from and pumped into ponds at the same rate. Therefore, this flow equals a net flow of zero and is not inputted into the models. The second plant inflow is the Unit 2/3 Cooling Tower Blowdown. This flow is a continuous flow of 120 gpm into the Unit 2/3 Pond during plant operations and is therefore modeled continuously over the entire simulation period.

3.2 Characterization of Rainfall Abstractions

In developing the geometric modeling parameters for this project, CDG relied topographic information in conjunction with construction plans prepared by Burns & McDonnell circa 1979, for work at the plant. Table 3.1 shows the stage-storage information used for modeling.

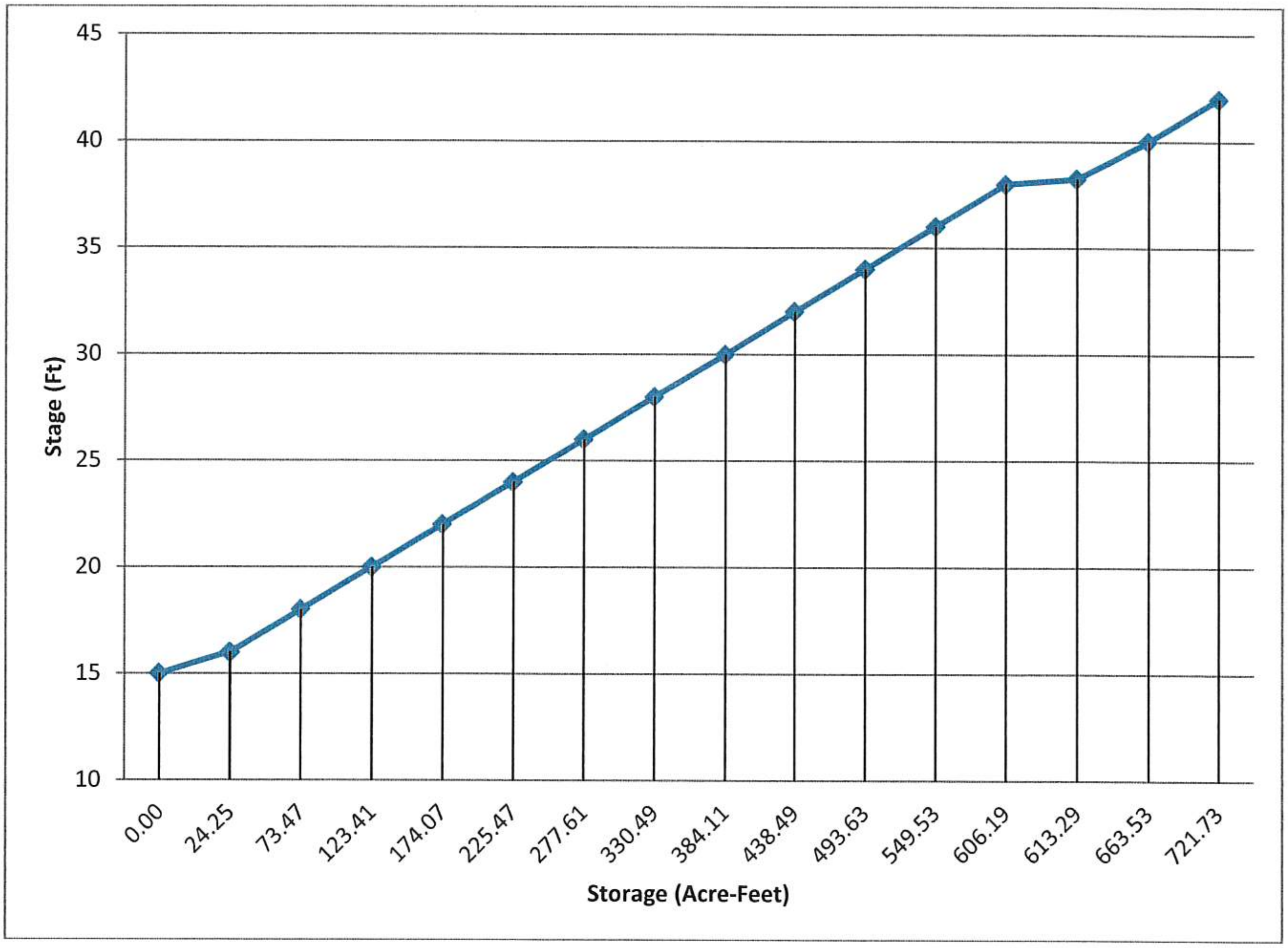


Figure 3.2- Unit 2/3 Bottom Ash Stage-Storage Curve

The normal pool elevation for the Unit 2/3 Bottom Ash Pond is 38.25. For the purposes of this model no infiltration was considered for the ponds.

3.3 Selection of Run-off Model

The US Army Corps of Engineers Hydrologic Modeling System 4.2 (HEC-HMS) was chosen for use in this modeling effort. HEC-HMS is a widely known, used, and trusted modeling software for complete processing of dendritic watershed systems. This software is also compatible with other associated studies at the site and is used for large scale hydrologic and hydraulic modeling of the Tombigbee River.

3.4 Identification and Characterization of Intake or Decant Structures

3.4.1 Unit 2/3 Bottom Ash Pond Intake/Decant Structures

As stated earlier, each pond is drained and flow is conveyed via pumping systems. The pumping rates, "pump on" elevations, and "pump off" elevations were provided by PowerSouth. For this analysis, a "pump on" elevation of normal pool was used.

The Unit 2/3 Bottom Ash Intake structure is an enclosed pumping facility. The water from the pond passes over a weir structure and into a concrete sump structure. The water is then pumped out of the sump and into the Scrubber Waste Pond. The Unit 2/3 Intake consists of two suction lift pumps with a normal operating flow of 825 gpm (1.84 cfs). Ponds are drained by pumping systems and do not have identified gravity spillways.

3.4.2 Supplemental Structures

During high rainfall events, mobile suction lift pumps are utilized at the site to supplement permanent intake structures. These pumps are used in instances of existing pump or pond maintenance.

3.4.3 Downstream Hydraulic Structures

The Unit 2/3 Bottom Ash Pond is drained solely by pumping. As shown in Figure 2.1 all liquids extracted from the Unit 2/3 Bottom Ash Pond is discharged to the Process Waste Pond. The Owner has informed us that all liquids which are pumped to downstream hydraulic structures are handled in accordance with the surface water requirements under 257.3-3.

4.0 SCENARIOS AND RESULTS

4.1 Scenario 1-Normal Operations

4.1.1 Scenario 1 Flow Diagram

Scenario 1 assumes that all the pond pumps are fully operational and that each pond has its contributing rainfall inflow. It also assumes that the Unit 2/3 Cooling Tower Blowdown inflow goes to the Unit 2/3 Bottom Ash Pond. The figure below illustrates the flows for this scenario.

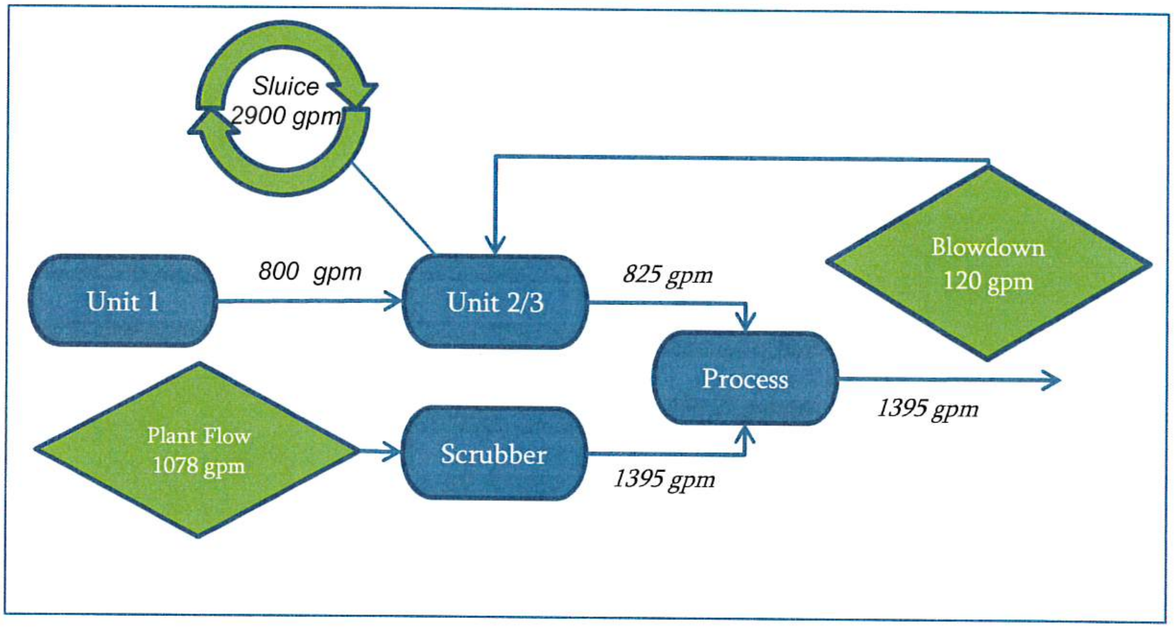


Figure 4.1-Scenario 1 Flow Diagram

4.1.2 Scenario 1 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The table below shows the results from the hydraulic model.

Table 4.1-Scenario 1-Unit 2/3 Bottom Ash Pond Maximum Hydraulic Grades

Impoundment Name	Pound Overtopping Elevation.	Max HGL	Time to Max HGL	Total Drawdown Time	Pass/Fail
	(feet)	(feet)	(hours)	(days)	
Unit 2/3 Bottom Ash	42.0	40.3	199	24.0	Pass

The total drawdown time shown in Table 4.1 is defined as the time from the beginning of the model to the time where the impoundment returns to the normal pool elevation.

4.2 Scenario 2-Abnormal Operations

4.2.1 Scenario 2 Flow Diagram

Scenario 2 is intended to represent abnormal operations at the facility such as a loss of power, pumping failure, or other similar conditions. For this scenario a pumping failure is assumed. Since all the ponds rely on pumping systems for outflow a failure would mean that the impoundments could not discharge inflows. It also means that the plant would not be producing an inflow because its operations would be ceased. Therefore, the only impoundment inflows are from the 72hr inflow design flood event itself. The figure below illustrates the flows for this scenario.

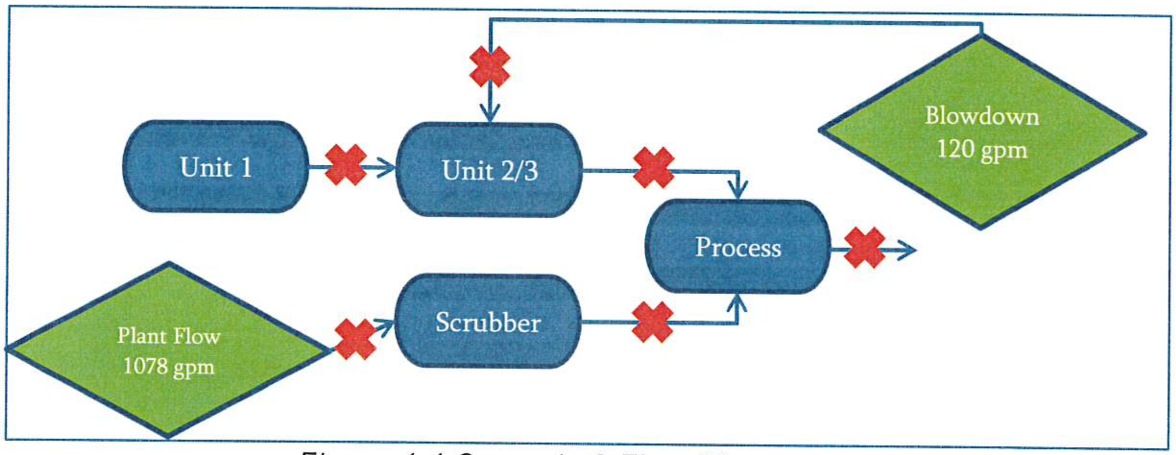


Figure 4.4-Scenario 2 Flow Diagram

4.2.2 Scenario 2 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The model determined that the Unit 2/3 Bottom Ash Pond does not overtop during this scenario. The maximum hydraulic grade can be found in the following table.

Table 4.2-Scenario 2 Maximum Hydraulic Grades

Impoundment Name	Max HGL	Pond Overtopping Elevation.	Pass/Fail
Unit 2/3 Bottom Ash	40.0	42.0	Pass

5.0 SUMMARY AND CONCLUSIONS

The conclusions presented in this report are based upon currently accepted engineering principles, practices, and standards in the area where the services were provided. No other warranty, expressed or implied, is made. The findings in this report were developed from engineering calculations performed to meet the standards of the CCR Rule. Plant operation information was provided by the owner.

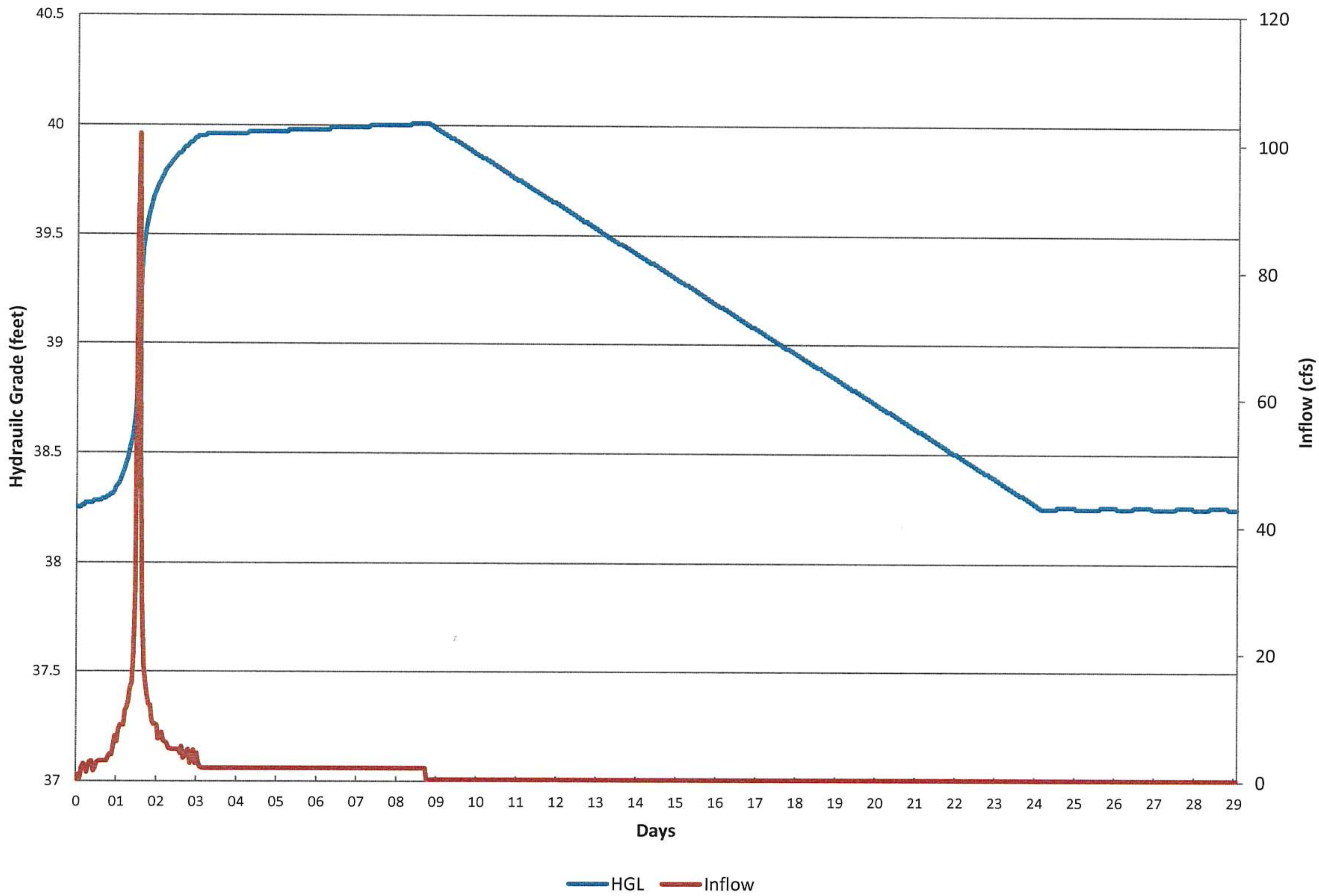
In conclusion, as per this report and supporting documents Unit 2/3 Bottom Ash Pond at the Charles R. Lowman Power Plant meets the requirements for inflow design flood controls as per the CCR Rule. This document and its Attachments are intended to meet the requirements of the Initial Inflow Design Flood Control System Plan as per 257.82.

Appendix A

Scenario 1 Results

Figure A.1-Unit 2/3 Bottom Ash HGL and Inflow Graph

Figure A.1-Scenario 1, Unit 2/3 Bottom Ash HGL and Inflow

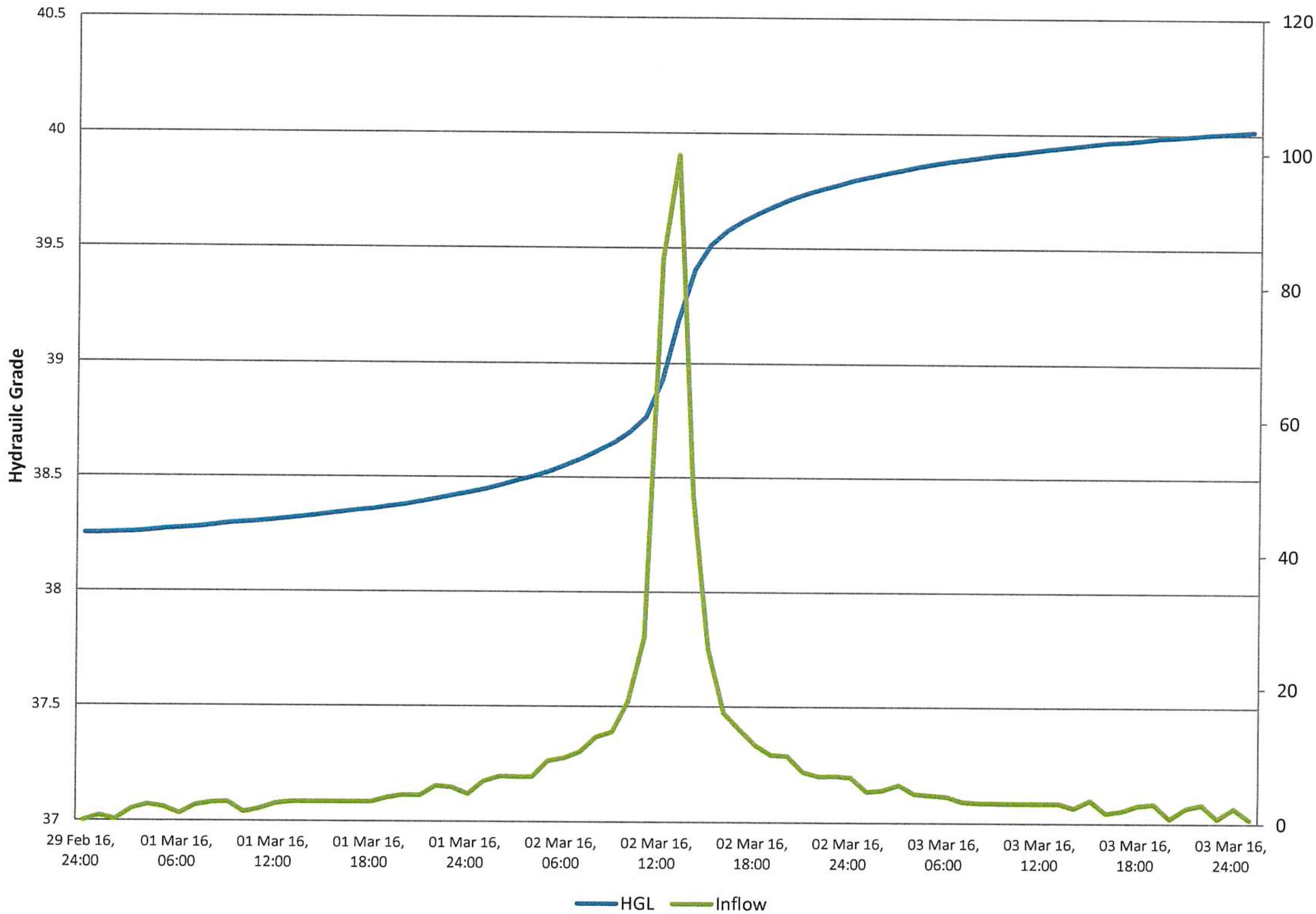


Appendix B

Scenario 2 Results

Figure B.1-Unit 2/3 Bottom Ash HGL and Inflow Graph

Figure B.1-Scenario 2, Unit 2/3 HGL and Inflow



Appendix C

NOAA Atlas 14 Information

NOAA Atlas 14, Volume 9, Version 2 JACKSON
Station ID: 01-4193
Location name: Jackson, Alabama, US*
Latitude: 31.5250°, Longitude: -87.9278°
Elevation:
Elevation (station metadata): 220 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.531 (0.449-0.629)	0.606 (0.512-0.719)	0.731 (0.615-0.869)	0.834 (0.697-0.997)	0.976 (0.783-1.21)	1.09 (0.849-1.37)	1.20 (0.897-1.55)	1.31 (0.934-1.75)	1.46 (0.993-2.01)	1.57 (1.04-2.21)
10-min	0.777 (0.658-0.920)	0.888 (0.750-1.05)	1.07 (0.900-1.27)	1.22 (1.02-1.46)	1.43 (1.15-1.77)	1.59 (1.24-2.00)	1.75 (1.31-2.27)	1.92 (1.37-2.56)	2.14 (1.46-2.95)	2.30 (1.52-3.24)
15-min	0.948 (0.802-1.12)	1.08 (0.915-1.28)	1.30 (1.10-1.55)	1.49 (1.25-1.78)	1.74 (1.40-2.16)	1.94 (1.51-2.44)	2.14 (1.60-2.77)	2.34 (1.67-3.13)	2.61 (1.77-3.60)	2.81 (1.85-3.95)
30-min	1.40 (1.18-1.66)	1.60 (1.36-1.90)	1.95 (1.64-2.31)	2.23 (1.86-2.67)	2.62 (2.10-3.24)	2.93 (2.29-3.68)	3.23 (2.42-4.18)	3.54 (2.52-4.74)	3.96 (2.69-5.46)	4.27 (2.82-6.01)
60-min	1.86 (1.57-2.20)	2.12 (1.79-2.51)	2.56 (2.15-3.04)	2.96 (2.47-3.53)	3.53 (2.85-4.42)	4.01 (3.14-5.08)	4.51 (3.39-5.88)	5.04 (3.61-6.78)	5.79 (3.95-8.03)	6.38 (4.21-8.97)
2-hr	2.32 (1.97-2.73)	2.63 (2.23-3.09)	3.18 (2.69-3.75)	3.68 (3.09-4.37)	4.45 (3.62-5.55)	5.09 (4.02-6.44)	5.79 (4.38-7.53)	6.54 (4.72-8.78)	7.61 (5.24-10.5)	8.48 (5.64-11.9)
3-hr	2.61 (2.23-3.06)	2.94 (2.50-3.44)	3.55 (3.01-4.17)	4.13 (3.48-4.88)	5.04 (4.14-6.31)	5.83 (4.64-7.39)	6.70 (5.11-8.73)	7.66 (5.56-10.3)	9.05 (6.27-12.5)	10.2 (6.80-14.2)
6-hr	3.15 (2.70-3.66)	3.53 (3.02-4.11)	4.27 (3.64-5.00)	5.00 (4.23-5.87)	6.16 (5.09-7.69)	7.18 (5.75-9.06)	8.31 (6.38-10.8)	9.57 (6.99-12.8)	11.4 (7.96-15.7)	12.9 (8.69-17.9)
12-hr	3.73 (3.21-4.31)	4.22 (3.63-4.89)	5.15 (4.42-5.99)	6.04 (5.14-7.05)	7.42 (6.16-9.17)	8.62 (6.92-10.8)	9.93 (7.66-12.8)	11.4 (8.35-15.1)	13.5 (9.45-18.4)	15.2 (10.3-20.9)
24-hr	4.30 (3.72-4.94)	4.95 (4.28-5.69)	6.12 (5.27-7.06)	7.19 (6.15-8.33)	8.81 (7.32-10.8)	10.2 (8.21-12.6)	11.7 (9.03-14.8)	13.3 (9.78-17.4)	15.6 (11.0-21.0)	17.4 (11.9-23.8)
2-day	4.86 (4.23-5.54)	5.64 (4.90-6.45)	7.04 (6.09-8.06)	8.30 (7.14-9.56)	10.2 (8.50-12.3)	11.8 (9.53-14.4)	13.5 (10.5-17.0)	15.3 (11.3-19.9)	17.9 (12.7-23.9)	19.9 (13.7-27.0)
3-day	5.26 (4.59-5.98)	6.07 (5.29-6.91)	7.52 (6.53-8.58)	8.84 (7.63-10.1)	10.8 (9.07-13.1)	12.5 (10.2-15.3)	14.3 (11.2-18.0)	16.2 (12.1-21.1)	19.0 (13.5-25.4)	21.2 (14.6-28.7)
4-day	5.62 (4.91-6.37)	6.44 (5.62-7.31)	7.91 (6.88-9.00)	9.26 (8.00-10.6)	11.3 (9.47-13.6)	13.0 (10.6-15.8)	14.8 (11.6-18.6)	16.8 (12.6-21.7)	19.6 (14.0-26.2)	21.9 (15.1-29.5)
7-day	6.59 (5.79-7.43)	7.46 (6.54-8.42)	8.99 (7.85-10.2)	10.4 (9.00-11.8)	12.4 (10.5-14.8)	14.1 (11.6-17.1)	16.0 (12.6-19.9)	17.9 (13.4-23.0)	20.7 (14.9-27.4)	22.9 (15.9-30.7)
10-day	7.45 (6.56-8.37)	8.36 (7.35-9.40)	9.94 (8.70-11.2)	11.3 (9.87-12.8)	13.4 (11.3-15.9)	15.1 (12.4-18.1)	16.9 (13.3-20.9)	18.8 (14.1-24.0)	21.5 (15.4-28.3)	23.6 (16.4-31.5)
20-day	9.83 (8.70-11.0)	10.9 (9.60-12.1)	12.6 (11.1-14.1)	14.1 (12.3-15.9)	16.3 (13.7-19.0)	18.0 (14.8-21.4)	19.7 (15.6-24.1)	21.6 (16.3-27.2)	24.1 (17.4-31.4)	26.1 (18.3-34.6)
30-day	11.8 (10.5-13.2)	13.0 (11.6-14.5)	15.0 (13.3-16.7)	16.7 (14.6-18.7)	19.0 (16.1-22.0)	20.8 (17.2-24.5)	22.6 (18.0-27.5)	24.5 (18.6-30.7)	27.0 (19.6-35.0)	29.0 (20.4-38.2)
45-day	14.5 (12.9-16.0)	15.9 (14.2-17.6)	18.3 (16.2-20.3)	20.2 (17.8-22.6)	22.9 (19.4-26.4)	24.9 (20.6-29.2)	26.9 (21.4-32.4)	28.9 (21.9-36.0)	31.5 (22.9-40.5)	33.4 (23.6-43.9)
60-day	16.7 (14.9-18.5)	18.5 (16.5-20.4)	21.3 (18.9-23.6)	23.5 (20.8-26.2)	26.5 (22.5-30.4)	28.8 (23.8-33.6)	30.9 (24.7-37.2)	33.1 (25.2-41.0)	35.8 (26.1-45.8)	37.7 (26.8-49.5)

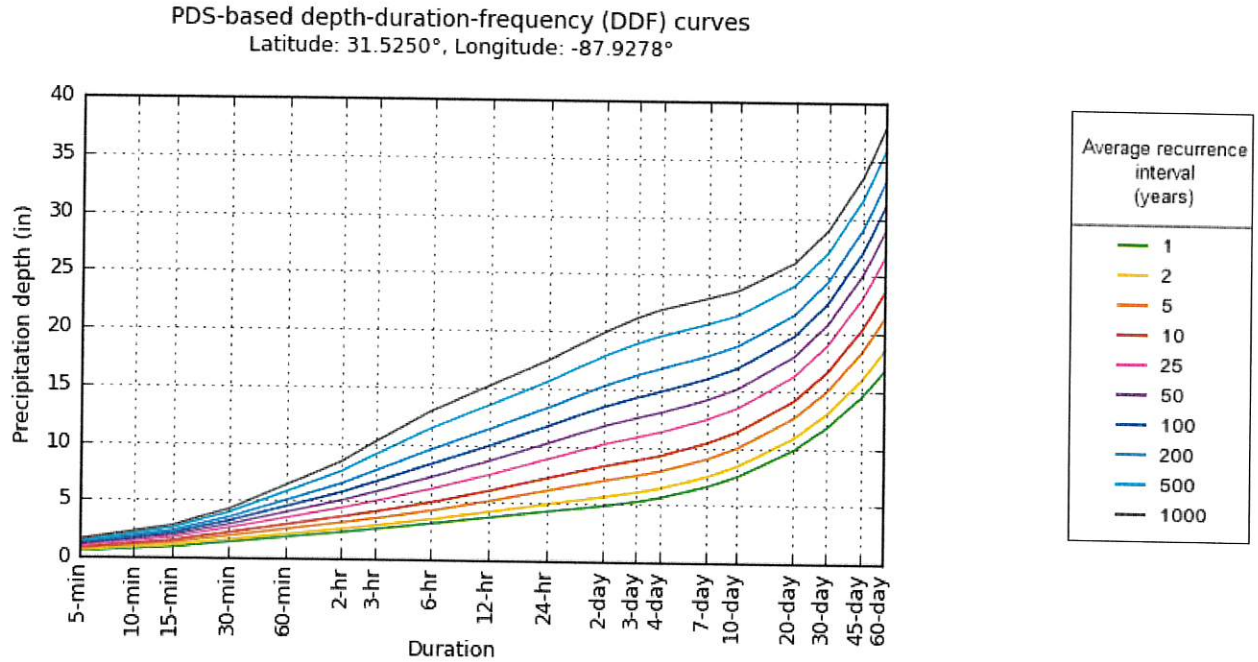
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

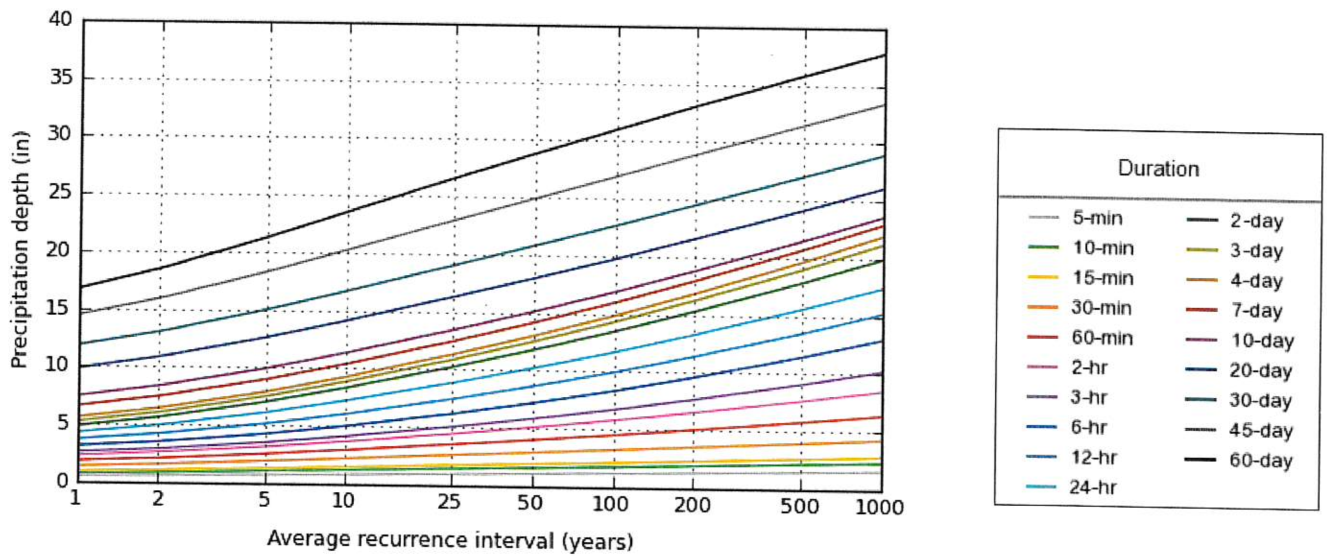
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical





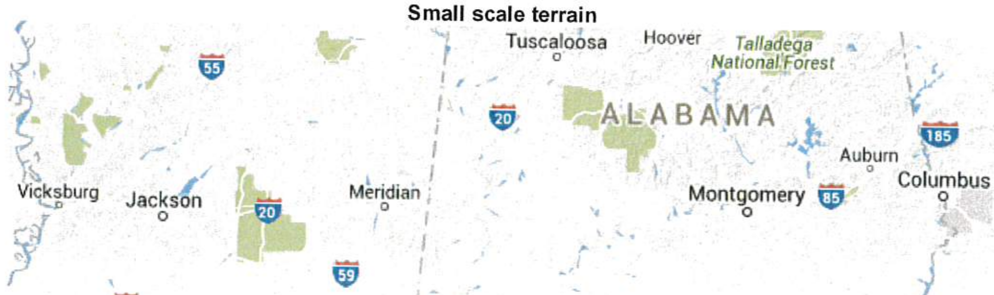
NOAA Atlas 14, Volume 9, Version 2

Created (GMT): Fri Feb 26 01:03:45 2016

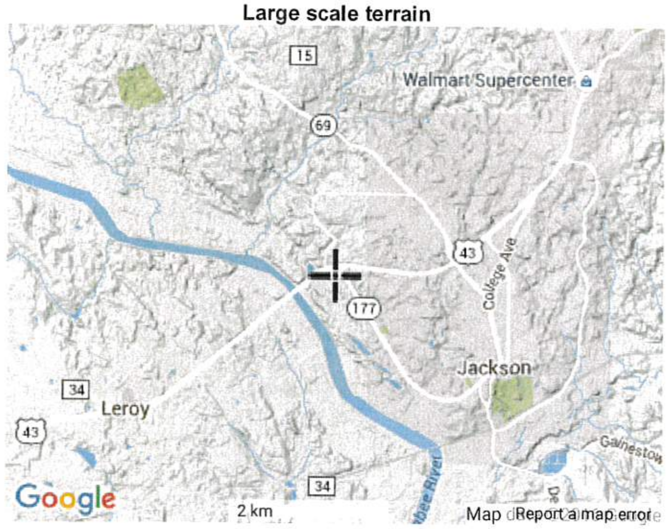
Back to Top

Maps & aerials

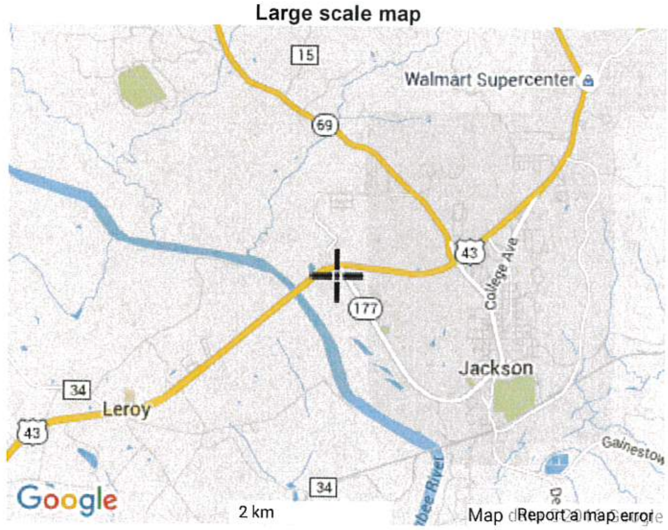
Small scale terrain



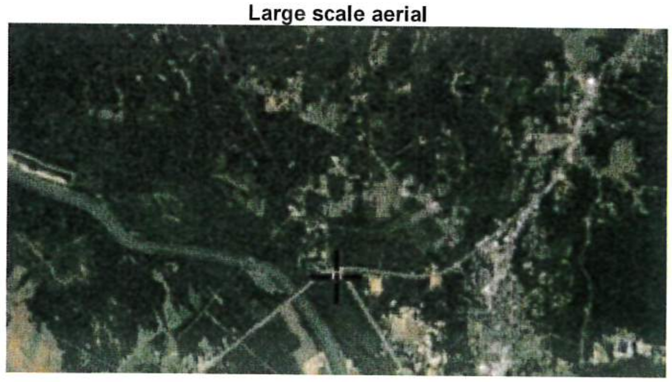
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

PowerSouth
ENERGY COOPERATIVE

Charles R. Lowman
Power Plant
Leroy, AL

Inflow Design Control Plan
Scrubber Waste Pond

Issued October 2016

CDG Engineers and Associates, Inc.
1840 East Three Notch St.
Andalusia, AL 36421
| cdge.com

PowerSouth
Energy Cooperative

<u>REPORT</u>
Inflow Design Control Plan
Scrubber Waste Pond
Charles R. Lowman Power Plant

October 2016

CDG
Engineering. Environmental. Answers.

10/15/16

TABLE OF CONTENTS

1.0 SCOPE OF SERVICES 2
2.0 PROJECT DESCRIPTION 2
3.0 MODEL VARIABLES AND ASSUMPTIONS 3
3.1 Identification of Design Storm Inflow 3
3.1.1 Additional Inflows 3
3.2 Characterization of Rainfall Abstractions 4
3.3 Selection of Run-off Model 4
3.4 Identification and Characterization of Intake or Decant Structures 5
3.4.1 Scrubber Waste Pond Intake/Decant Structures 5
3.4.2 Supplemental Intake Structures 5
3.4.3 Downstream Hydraulic Structures 5
4.0 SCENARIOS AND RESULTS 6
4.1 Scenario 1-Normal Operations 6
4.1.1 Scenario 1 Flow Diagram 6
4.1.2 Scenario 1 Results 6
4.2 Scenario 2-Abnormal Operations 7
4.2.1 Scenario 2 Flow Diagram 7
4.2.2 Scenario 2 Results 7
5.0 SUMMARY AND CONCLUSIONS 8

APPENDIXES

Appendix A-Scenario 1 Results

Appendix B-Scenario 2 Results

Appendix C-NOAA Atlas 14 Information

1.0 SCOPE OF SERVICES

PowerSouth Energy Cooperative (PowerSouth) requested CDG Engineers and Associates, Inc. (CDG) to perform analysis of Inflow Design Flood Controls in accordance with 257.82 of EPA's Disposal of Coal Combustion Residuals from Electric Utilities (CCR rule). In association with this scope of services, CDG performed Hydrologic and Hydraulic Capacity modeling of the plants CCR impoundments and downstream hydraulic structures.

This report is the summary of the modeling efforts intended to meet the requirements of the "Inflow Design Flood Control System Plan" for the Scrubber Waste Pond. The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were investigated: Unit 1 Bottom Ash Pond, Unit 2/3 Bottom Ash Pond, and the Scrubber Waste Pond. As per the Rule CCR surface impoundments must:

1. "Adequately manage flow into the CCR surface impoundment during and following the peak discharge of the inflow design flood" (257.82(a)(1))

2. "Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood" (257.82(a)(2))

3. "Discharge from the CCR unit must be handled in accordance with the surface water requirements under 257.3-3." (257.82(b))

2.0 PROJECT DESCRIPTION

The Charles R. Lowman Power Plant in Leroy, AL has three CCR impoundments that were analyzed: Unit 1 Bottom Ash Pond, Unit 2/3 Bottom Ash Pond, and Scrubber Waste Pond. Although not subject to the CCR rule, the Process Waste Pond is included in this analysis as a downstream hydraulic structure due to its involvement in the Plant's water balance. The plant has several valving mechanisms that can direct process flows into and out of the individual impoundments. For the purpose of this analysis, flow from each impoundment goes to a single other impoundment. Scenarios were created to represent normal and abnormal operating conditions. The flow order to each pond is shown in Figure 2.1 below.

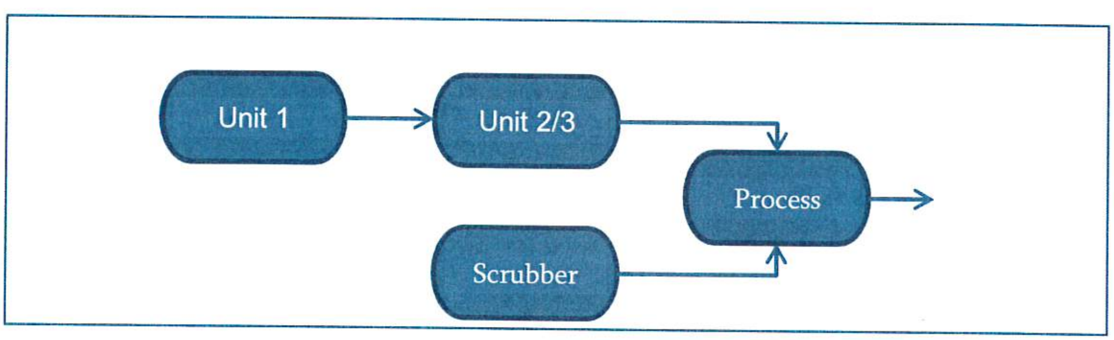


Figure 2.1-Impoundments Flow Order

3.0 MODEL VARIABLES AND ASSUMPTIONS

3.1 Identification of Design Storm Inflow

As per the "Hazard Potential Classification Assessment" each of the impoundments has a hazard classification of "Significant," requiring that the impoundments be analyzed for the 1000-yr flood.

Based on a review of topographic information provided by PowerSouth, it is evident that each impoundment has a contributing drainage shed that is primarily the impoundment itself. Therefore, the rainfall inflow for each impoundment is the volume of rainfall that accumulates in each drainage shed during the inflow design flood event. These rainfall inflows are tied to a specific impoundment and storm duration and therefore do not change between model scenarios. The 72hr-1000yr flood event was modeled for the rainfall event. Per the NOAA Atlas 14 the total rainfall for this event is 21.2 inches. An SCS Type III distribution was used to model this total rainfall depth over a 72 hour period. Figure 3.1 shows the cumulative rainfall depth curve. A copy of the NOAA Atlas 14 data can be seen in Appendix C.

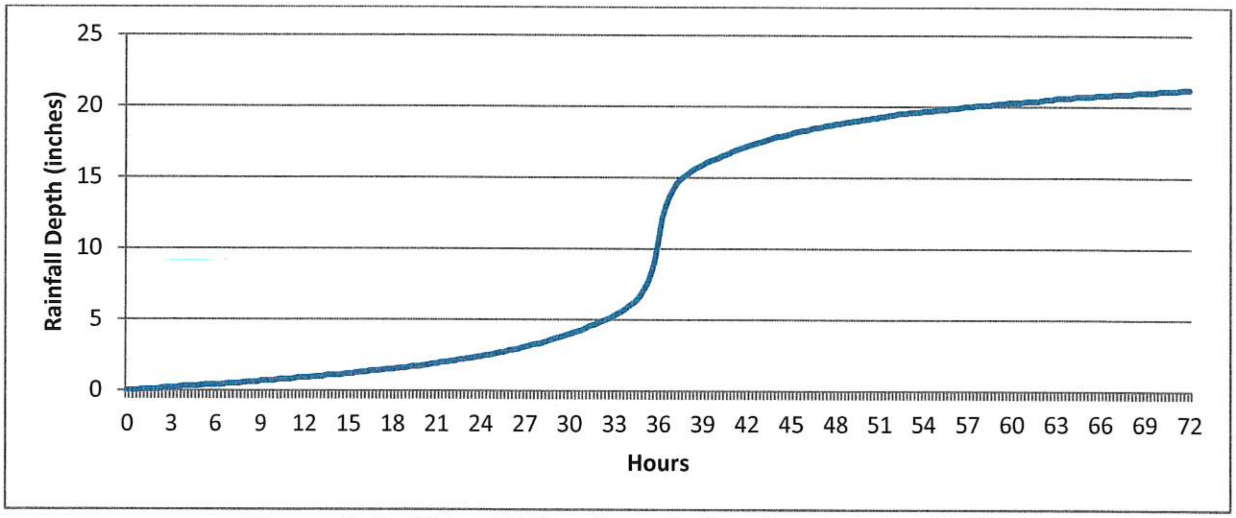


Figure 3.1- 72hr-1000yr Cumulative Rainfall Depth Curve

3.1.1 Additional Inflows

Scrubber Waste Pond inflows consists of several plant operation flows. During operations the flow is a continuous 1,078 gpm into the Scrubber Waste Pond.

3.2 Characterization of Rainfall Abstractions

In developing the geometric modeling parameters for this project, CDG relied topographic information in conjunction with construction plans prepared by Burns & McDonnell circa 1979, for work at the plant. Table 3.1 shows the stage-storage information used for modeling.

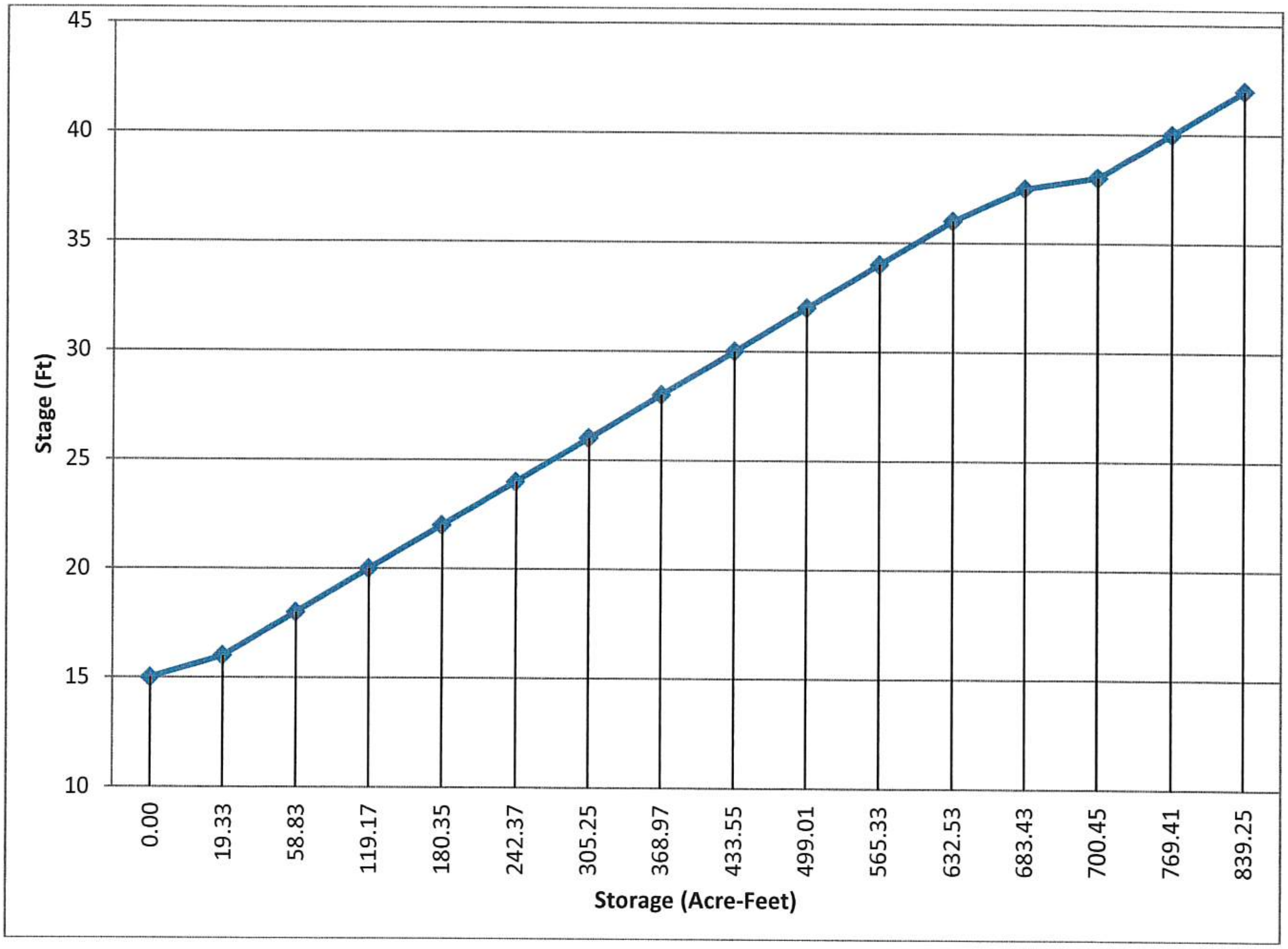


Figure 3.2- Scrubber Waste Pond Stage-Storage Curve

The normal pool elevation for the Scrubber Waste Pond is 37.50. For the purposes of this model no infiltration was considered for the ponds.

3.3 Selection of Run-off Model

The US Army Corps of Engineers Hydrologic Modeling System 4.2 (HEC-HMS) was chosen for use in this modeling effort. HEC-HMS is a widely known, used, and trusted modeling software for complete processing of dendritic watershed systems. This software is also compatible with other associated studies at the site and is used for large scale hydrologic and hydraulic modeling of the Tombigbee River.

3.4 Identification and Characterization of Intake or Decant Structures

3.4.1 Scrubber Waste Pond Intake/Decant Structures

As stated earlier, each pond is drained and flow is conveyed via pumping systems. The pumping rates, "pump on" elevations, and "pump off" elevations were provided by PowerSouth. For this analysis, a "pump on" elevation of normal pool was used.

The Scrubber Waste Intake consists of two suction lift pumps with a normal operating flow of 1395 gpm (3.11 cfs). The pumps are fed by two floating intake hoses that allow for the removal of liquids from the laminar portion of the impounded waters. Ponds are drained by pumping systems and do not have identified gravity spillways.

3.4.2 Supplemental Intake Structures

During high rainfall events, mobile suction lift pumps are utilized at the site to supplement permanent intake structures. These pumps are used in instances of existing pump or pond maintenance.

3.4.3 Downstream Hydraulic Structures

The Scrubber Waste Pond is drained solely by pumping. As shown in Figure 2.1 all liquids extracted from the Scrubber Waste Pond is discharged to the Process Waste Pond. The Owner has informed us that all liquids which are pumped to downstream hydraulic structures are handled in accordance with the surface water requirements under 257.3-3.

4.0 SCENARIOS AND RESULTS

4.1 Scenario 1-Normal Operations

4.1.1 Scenario 1 Flow Diagram

Scenario 1 assumes that all the pond pumps are fully operational and that each pond has its contributing rainfall inflow. It also assumes that the plant inflows go to the Scrubber Waste Pond. The figure below illustrates the flows for this scenario.

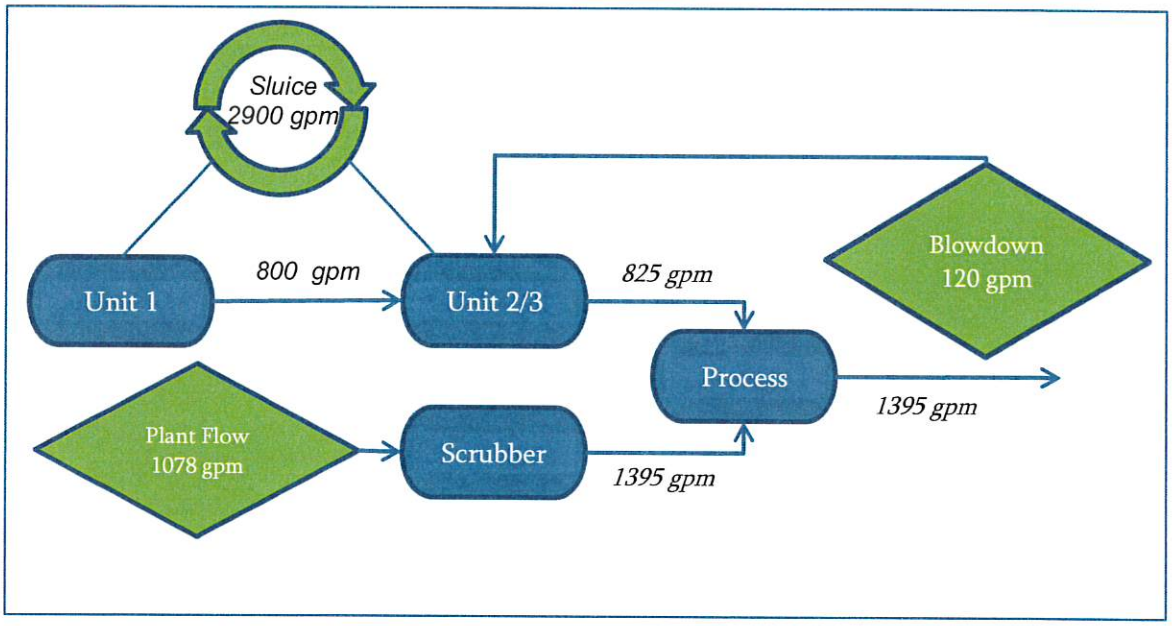


Figure 4.1-Scenario 1 Flow Diagram

4.1.2 Scenario 1 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The table below shows the results from the hydraulic model.

Table 4.1-Scenario 1-Scrubber Waste Pond Maximum Hydraulic Grades

Impoundment Name	Pound Overtopping Elevation.	Max HGL	Time to Max HGL	Total Drawdown Time	Pass/Fail
	(feet)	(feet)	(hours)	(days)	
Scrubber Waste	42.0	39.2	80	10.0	Pass

The total drawdown time shown in Table 4.1 is defined as the time from the beginning of the model to the time where the impoundment returns to the normal pool elevation.

4.2 Scenario 2-Abnormal Operations

4.2.1 Scenario 2 Flow Diagram

Scenario 2 is intended to represent abnormal operations at the facility such as a loss of power, pumping failure, or other similar conditions. For this scenario a pumping failure is assumed. Since all the ponds rely on pumping systems for outflow a failure would mean that the impoundments could not discharge inflows. It also means that the plant would not be producing an inflow because its operations would be ceased. Therefore, the only impoundment inflows are from the 72hr inflow design flood event itself. The figure below illustrates the flows for this scenario.

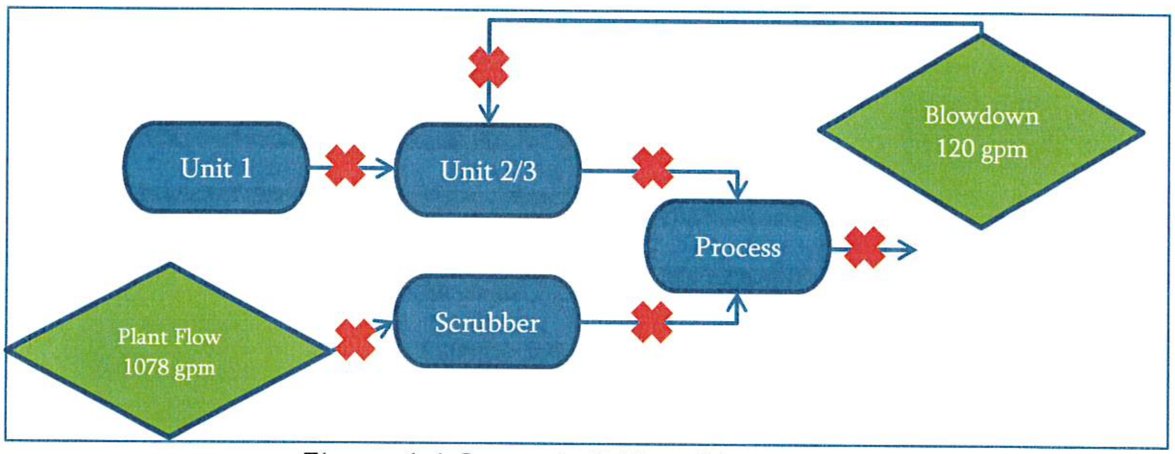


Figure 4.4-Scenario 2 Flow Diagram

4.2.2 Scenario 2 Results

This scenario was modeled using HEC-HMS 4.2 with the above listed variables. The model determined that the Scrubber Waste Pond does not overtop during this scenario. The maximum hydraulic grade can be found in the following table.

Table 4.2-Scenario 2 Maximum Hydraulic Grades

Impoundment Name	Max HGL	Pond Overtopping Elevation.	Pass/Fail
Scrubber Waste	39.3	42.0	Pass

5.0 SUMMARY AND CONCLUSIONS

The conclusions presented in this report are based upon currently accepted engineering principles, practices, and standards in the area where the services were provided. No other warranty, expressed or implied, is made. The findings in this report were developed from engineering calculations performed to meet the standards of the CCR Rule. Plant operation information was provided by the owner.

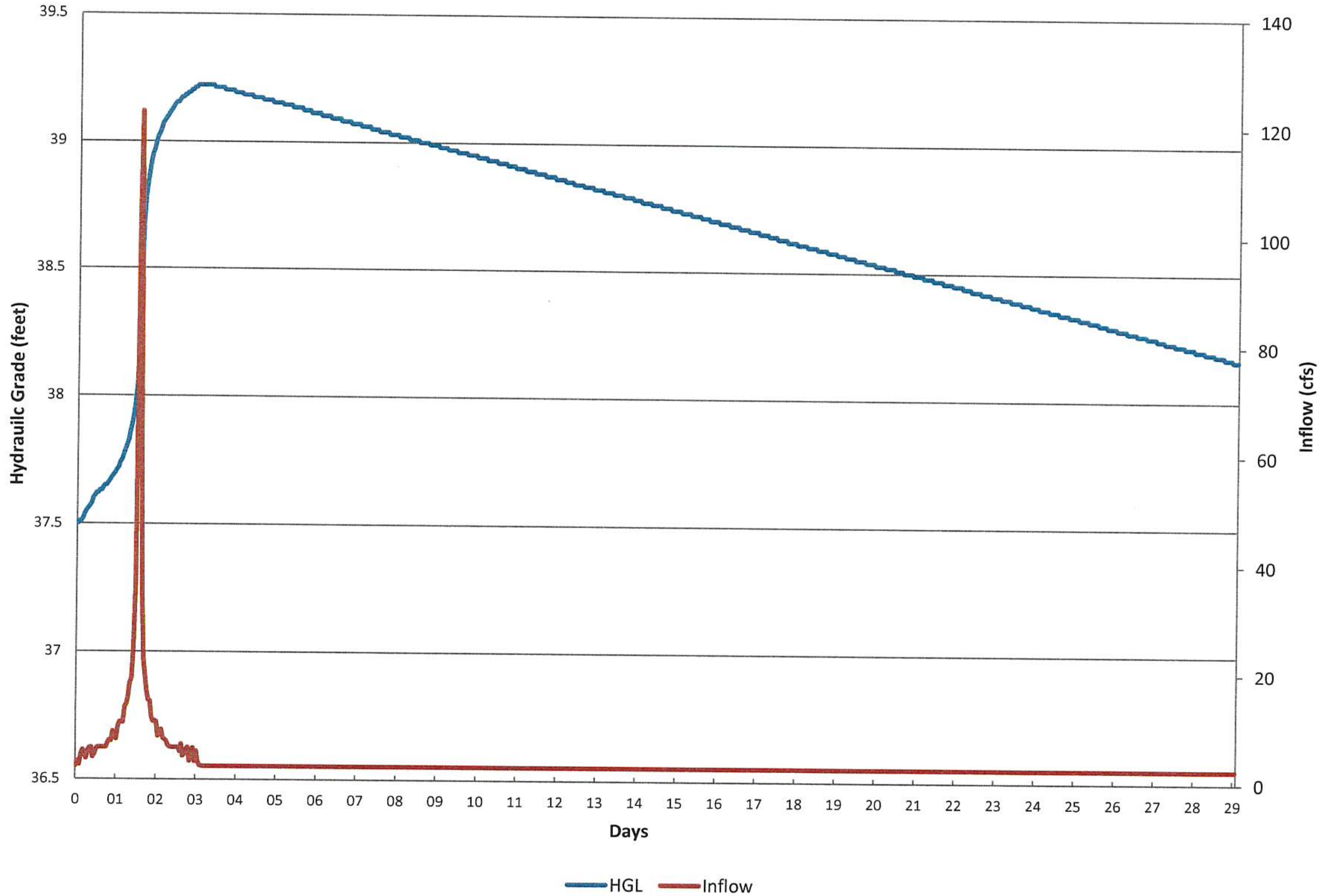
In conclusion, as per this report and supporting documents Scrubber Waste Pond at the Charles R. Lowman Power Plant meets the requirements for inflow design flood controls as per the CCR Rule. This document and its Attachments are intended to meet the requirements of the Initial Inflow Design Flood Control System Plan as per 257.82.

Appendix A

Scenario 1 Results

Figure A.1-Scrubber Waste Pond HGL and Inflow Graph

Figure A.1-Scenario 1, Scrubber Waste HGL and Inflow

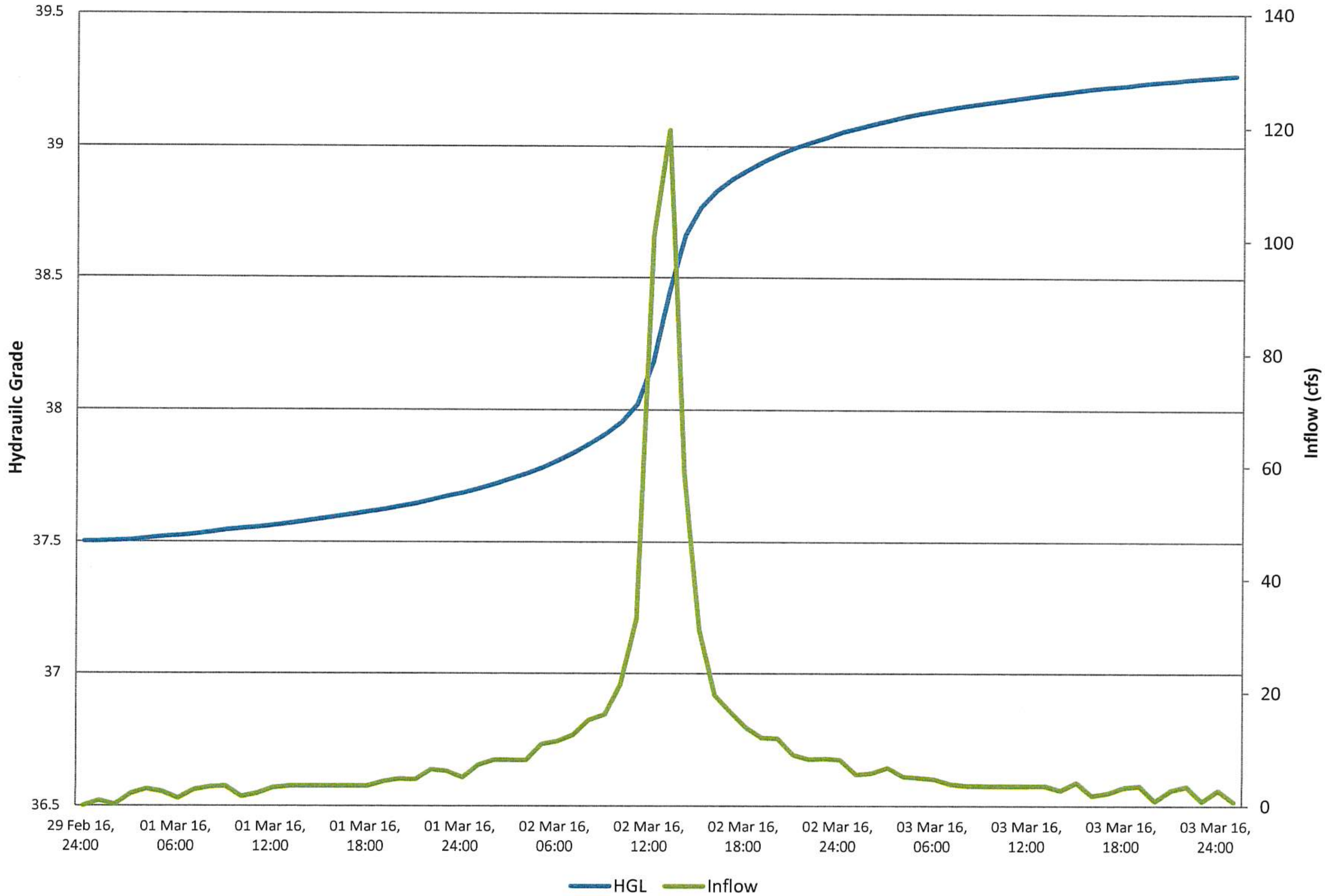


Appendix B

Scenario 2 Results

Figure B.1-Scrubber Waste Pond HGL and Inflow Graph

Figure B.1-Scenario 2, Scrubber Waste HGL and Inflow



Appendix C

NOAA Atlas 14 Information

NOAA Atlas 14, Volume 9, Version 2 JACKSON
Station ID: 01-4193
Location name: Jackson, Alabama, US*
Latitude: 31.5250°, Longitude: -87.9278°
Elevation:
Elevation (station metadata): 220 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.531 (0.449-0.629)	0.606 (0.512-0.719)	0.731 (0.615-0.869)	0.834 (0.697-0.997)	0.976 (0.783-1.21)	1.09 (0.849-1.37)	1.20 (0.897-1.55)	1.31 (0.934-1.75)	1.46 (0.993-2.01)	1.57 (1.04-2.21)
10-min	0.777 (0.658-0.920)	0.888 (0.750-1.05)	1.07 (0.900-1.27)	1.22 (1.02-1.46)	1.43 (1.15-1.77)	1.59 (1.24-2.00)	1.75 (1.31-2.27)	1.92 (1.37-2.56)	2.14 (1.46-2.95)	2.30 (1.52-3.24)
15-min	0.948 (0.802-1.12)	1.08 (0.915-1.28)	1.30 (1.10-1.55)	1.49 (1.25-1.78)	1.74 (1.40-2.16)	1.94 (1.51-2.44)	2.14 (1.60-2.77)	2.34 (1.67-3.13)	2.61 (1.77-3.60)	2.81 (1.85-3.95)
30-min	1.40 (1.18-1.66)	1.60 (1.36-1.90)	1.95 (1.64-2.31)	2.23 (1.86-2.67)	2.62 (2.10-3.24)	2.93 (2.29-3.68)	3.23 (2.42-4.18)	3.54 (2.52-4.74)	3.96 (2.69-5.46)	4.27 (2.82-6.01)
60-min	1.86 (1.57-2.20)	2.12 (1.79-2.51)	2.56 (2.15-3.04)	2.96 (2.47-3.53)	3.53 (2.85-4.42)	4.01 (3.14-5.08)	4.51 (3.39-5.88)	5.04 (3.61-6.78)	5.79 (3.95-8.03)	6.38 (4.21-8.97)
2-hr	2.32 (1.97-2.73)	2.63 (2.23-3.09)	3.18 (2.69-3.75)	3.68 (3.09-4.37)	4.45 (3.62-5.55)	5.09 (4.02-6.44)	5.79 (4.38-7.53)	6.54 (4.72-8.78)	7.61 (5.24-10.5)	8.48 (5.64-11.9)
3-hr	2.61 (2.23-3.06)	2.94 (2.50-3.44)	3.55 (3.01-4.17)	4.13 (3.48-4.88)	5.04 (4.14-6.31)	5.83 (4.64-7.39)	6.70 (5.11-8.73)	7.66 (5.56-10.3)	9.05 (6.27-12.5)	10.2 (6.80-14.2)
6-hr	3.15 (2.70-3.66)	3.53 (3.02-4.11)	4.27 (3.64-5.00)	5.00 (4.23-5.87)	6.16 (5.09-7.69)	7.18 (5.75-9.06)	8.31 (6.38-10.8)	9.57 (6.99-12.8)	11.4 (7.96-15.7)	12.9 (8.69-17.9)
12-hr	3.73 (3.21-4.31)	4.22 (3.63-4.89)	5.15 (4.42-5.99)	6.04 (5.14-7.05)	7.42 (6.16-9.17)	8.62 (6.92-10.8)	9.93 (7.66-12.8)	11.4 (8.35-15.1)	13.5 (9.45-18.4)	15.2 (10.3-20.9)
24-hr	4.30 (3.72-4.94)	4.95 (4.28-5.69)	6.12 (5.27-7.06)	7.19 (6.15-8.33)	8.81 (7.32-10.8)	10.2 (8.21-12.6)	11.7 (9.03-14.8)	13.3 (9.78-17.4)	15.6 (11.0-21.0)	17.4 (11.9-23.8)
2-day	4.86 (4.23-5.54)	5.64 (4.90-6.45)	7.04 (6.09-8.06)	8.30 (7.14-9.56)	10.2 (8.50-12.3)	11.8 (9.53-14.4)	13.5 (10.5-17.0)	15.3 (11.3-19.9)	17.9 (12.7-23.9)	19.9 (13.7-27.0)
3-day	5.26 (4.59-5.98)	6.07 (5.29-6.91)	7.52 (6.53-8.58)	8.84 (7.63-10.1)	10.8 (9.07-13.1)	12.5 (10.2-15.3)	14.3 (11.2-18.0)	16.2 (12.1-21.1)	19.0 (13.5-25.4)	21.2 (14.6-28.7)
4-day	5.62 (4.91-6.37)	6.44 (5.62-7.31)	7.91 (6.88-9.00)	9.26 (8.00-10.6)	11.3 (9.47-13.6)	13.0 (10.6-15.8)	14.8 (11.6-18.6)	16.8 (12.6-21.7)	19.6 (14.0-26.2)	21.9 (15.1-29.5)
7-day	6.59 (5.79-7.43)	7.46 (6.54-8.42)	8.99 (7.85-10.2)	10.4 (9.00-11.8)	12.4 (10.5-14.8)	14.1 (11.6-17.1)	16.0 (12.6-19.9)	17.9 (13.4-23.0)	20.7 (14.9-27.4)	22.9 (15.9-30.7)
10-day	7.45 (6.56-8.37)	8.36 (7.35-9.40)	9.94 (8.70-11.2)	11.3 (9.87-12.8)	13.4 (11.3-15.9)	15.1 (12.4-18.1)	16.9 (13.3-20.9)	18.8 (14.1-24.0)	21.5 (15.4-28.3)	23.6 (16.4-31.5)
20-day	9.83 (8.70-11.0)	10.9 (9.60-12.1)	12.6 (11.1-14.1)	14.1 (12.3-15.9)	16.3 (13.7-19.0)	18.0 (14.8-21.4)	19.7 (15.6-24.1)	21.6 (16.3-27.2)	24.1 (17.4-31.4)	26.1 (18.3-34.6)
30-day	11.8 (10.5-13.2)	13.0 (11.6-14.5)	15.0 (13.3-16.7)	16.7 (14.6-18.7)	19.0 (16.1-22.0)	20.8 (17.2-24.5)	22.6 (18.0-27.5)	24.5 (18.6-30.7)	27.0 (19.6-35.0)	29.0 (20.4-38.2)
45-day	14.5 (12.9-16.0)	15.9 (14.2-17.6)	18.3 (16.2-20.3)	20.2 (17.8-22.6)	22.9 (19.4-26.4)	24.9 (20.6-29.2)	26.9 (21.4-32.4)	28.9 (21.9-36.0)	31.5 (22.9-40.5)	33.4 (23.6-43.9)
60-day	16.7 (14.9-18.5)	18.5 (16.5-20.4)	21.3 (18.9-23.6)	23.5 (20.8-26.2)	26.5 (22.5-30.4)	28.8 (23.8-33.6)	30.9 (24.7-37.2)	33.1 (25.2-41.0)	35.8 (26.1-45.8)	37.7 (26.8-49.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

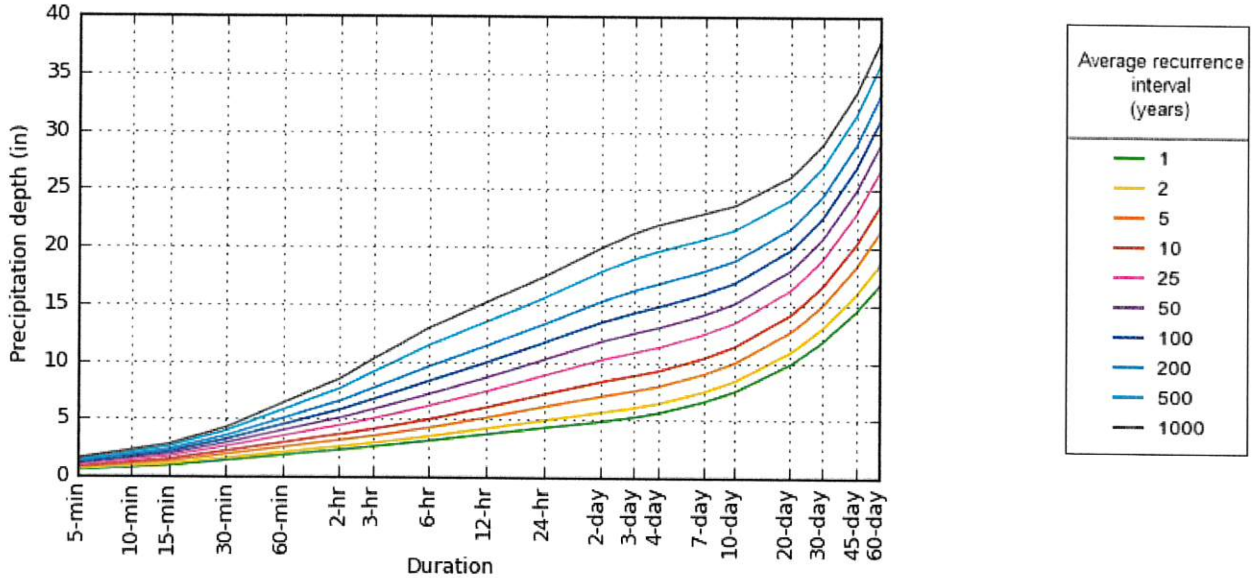
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

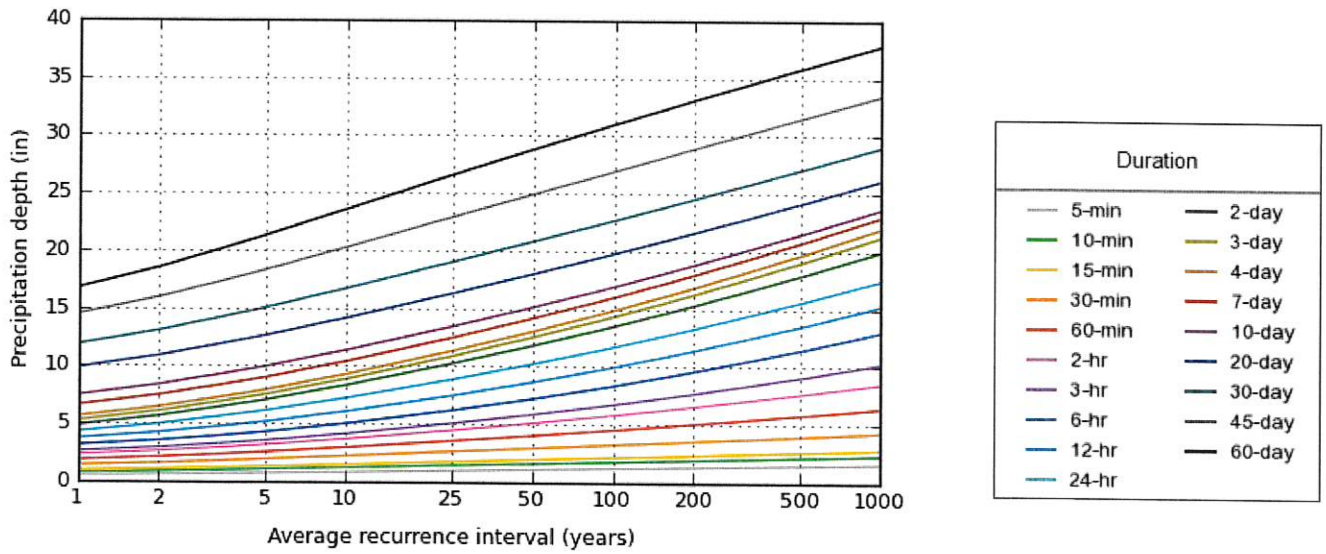
Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 31.5250°, Longitude: -87.9278°





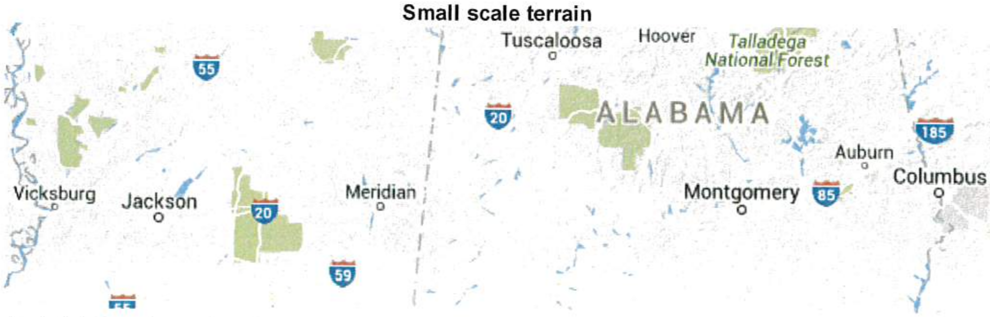
NOAA Atlas 14, Volume 9, Version 2

Created (GMT): Fri Feb 26 01:03:45 2016

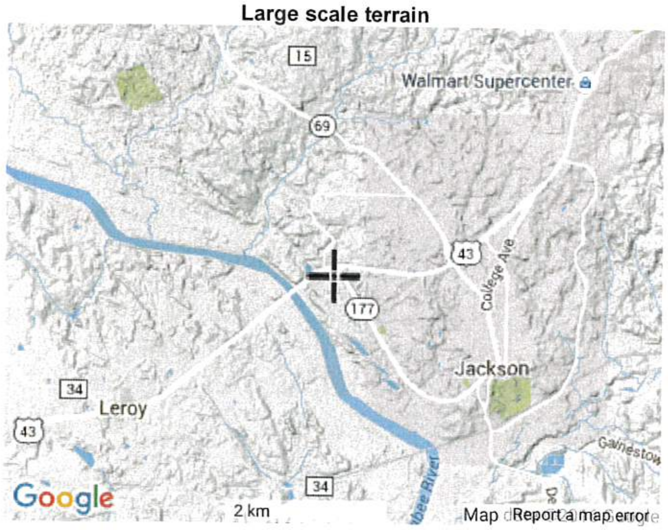
Back to Top

Maps & aerials

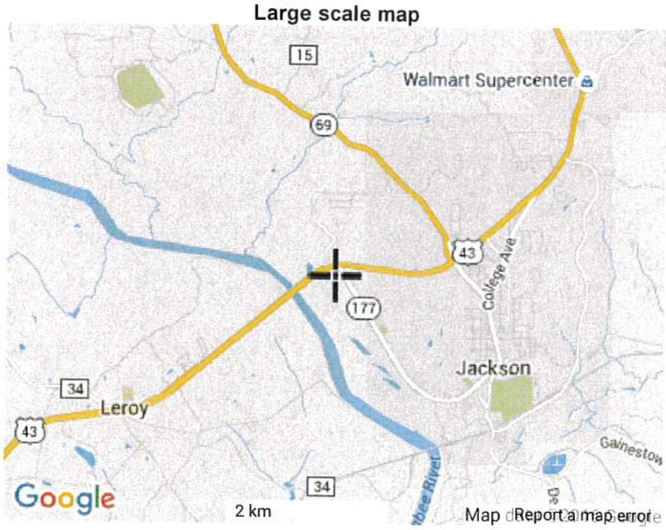
Small scale terrain



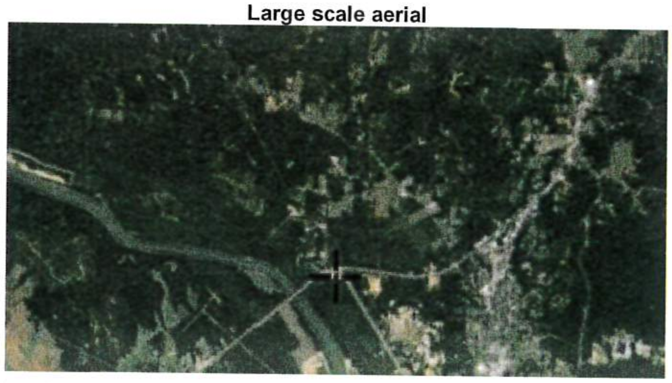
Large scale terrain

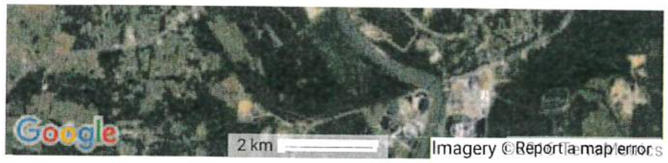


Large scale map



Large scale aerial





Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

POWERSOUTH®
ENERGY COOPERATIVE
A Touchstone Energy® Cooperative

Keith Stephens, Ph.D.
MANAGER, ENVIRONMENTAL SERVICES DEPARTMENT

Received: 3/23/2021

March 23, 2021

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

Re: **Revisions to Groundwater Monitoring and Statistical Analysis Plans**
PowerSouth Energy Cooperative Charles R. Lowman Power Plant

Mr. Story,

PowerSouth is in receipt of the Department's February 11, 2021 letter providing comments and recommendations concerning the Groundwater Sampling and Analysis Plan (GWSAP) and Statistical Analysis Plan (SAP) previously submitted for review as part of the permit application for the Coal Combustion Residuals (CCR) impoundments at the Charles R. Lowman Power Plant. Attached to this letter please find revised copies of the GWSAP and SAP for the Lowman facility. Each of the Departments comments and recommendations are also addressed below in the order they were enumerated in the February 2021 letter.

1.) Based on the information provided, periodic water levels in the shallow aquifer fluctuate greater than 20 feet and are influenced by the stage of the Tombigbee River. Additional potentiometric surface maps should be constructed using water levels measured at specific times of low groundwater water elevations and high groundwater water elevations. Also, it is requested that historic high and low groundwater elevations be indicated on the subsurface diagrams.

Two additional figures (Figure 5B and Figure 5C) have been added to the revised GWSAP that illustrate the interpreted historic high and historic low potentiometric surfaces observed over the period of site characterization and groundwater compliance monitoring at the Lowman facility. The geologic profile sections in Figure 3B and Figure 3C have been revised to show the historic high and historic low groundwater levels within each of the monitoring wells along the transects A – AA and B – BB. These profiles also show the typical range of groundwater fluctuations based on the groundwater level data distribution analysis shown in Figure 4.

2.) Cross section A-AA should be extended past BVD-407, to include MW-10. Also, there appears to be a discrepancy with MW-14A on cross section B-BB.

Figure 3B of the GWSAP has been revised to extend the geologic cross-section profile to include monitoring well MW-10. GWSAP Figure 3C has also been revised to correct the mis-labeling of monitoring well MW-4 along the B – BB transect.

3.) *It is recommended that the facility identify all approved monitoring variances within the GWSAP.*

Appendix G has been added to the revised GWSAP and contains a copy of the variance request submitted to the Department by PowerSouth Energy Cooperative on August 18, 2020 regarding the establishment of groundwater protection standards (GWPS) for cobalt, lead, lithium, and molybdenum, the exclusion of boron from the Appendix IV list of constituents, allowance of the final grade of the cover system to be lower than 5% or greater than 25%, and the extension for operation of the CCR management unit. Section 7.5 of the GWSAP has been revised to include a reference to Appendix G.

4.) *The monitoring well network specified in the SAP differs from the monitoring well network discussed in Section 4.0 of the GWSAP. It is recommended that the Plans be updated to include the current monitoring well network.*

Section 1.0 of the SAP has been revised to include an updated list of the monitoring wells in the current groundwater monitoring network at the Lowman facility.

5.) *In Section 2.2, the SAP states that the background-derived Prediction Limits will be updated during each semi-annual event for the detection monitoring program; however, Section 5.3.1 of the Unified Guidance states that "adding individual observations to background can introduce subtle trends that might go undetected and ultimately reduce the statistical power of formal monitoring tests." Therefore, it is recommended that the updating of background occur approximately every 2 years to ensure that "enough new measurements have been collected to allow a two-sample statistical comparison between the existing background data and a potential set of newer data."*

Section 2.2 of the SAP has been revised to reflect a schedule for updating background that is in alignment with the recommended timeline in Section 5.3.1 of the Unified Guidance.

If you have any questions or if you require additional information to complete your review, please do not hesitate to contact Dustin Kilcrease at (334) 427-3368 or dustin.kilcrease@powersouth.com.

Sincerely,

Keith Stephens, Ph.D.
Manager, Environmental Services Department

GROUNDWATER SAMPLNG AND ANALYSIS PLAN

Charles R. Lowman Power Plant
Leroy, Washington County, Alabama

PREPARED FOR:
PowerSouth Energy Cooperative
Andalusia, Alabama

DATE
March 2021
(Revised)

PREPARED BY:
CDG Engineers & Associates, Inc.
1840 E. Three Notch St.
Andalusia, AL 36420

CHARLES R. LOWMAN POWER PLANT
GROUNDWATER MONITORING SYSTEM
CERTIFICATION STATEMENT

I certify under penalty of law that I am a registered professional engineer experienced in hydrogeologic investigations and environmental remediation. I am familiar with the groundwater monitoring requirements under 40 CFR 257.91 and ADEM Admin Code r. 335-13-15-.06(2) and have reviewed the groundwater monitoring network associated with the regulated Coal Combustion Residual (CCR) management units at the Charles R. Lowman Power Plant facility. Pursuant to 40 CFR 257.91(f) and ADEM Admin Code r. 335-13-15-.06(2)(b)3., I hereby certify that, in my professional opinion, the design and construction of the multi-unit monitoring network meets the performance standards specified under 40 CFR 257.91(a) and ADEM Admin Code r. 335-13-15-.06(2)(a). The number, spacing and depths of the monitoring wells is based on site-specific conditions determined through a comprehensive hydrogeologic evaluation conducted at the facility. The monitoring wells have been constructed in accordance with the specifications under 40 CFR 257.91(e) and ADEM Admin Code r. 335-13-15-.06(2)(e), and the construction details for each well have been documented in the facility operating record as required under 40 CFR 257.91(e)(1) and ADEM Admin Code r. 335-13-15-.06(2)(e)4.

The information submitted herein, to the best of my knowledge and belief, is true accurate, and complete. I am aware that there are significant penalties for submitting false information.

ALABAMA LICENSED No. 32719 PROFESSIONAL ENGINEER JAMES ALAN BARCK

James Alan Barck, PE
State of Alabama Registration No. 32719

3-11-21
Date

TABLE OF CONTENTS

Section		Page
1.0	Introduction	1
2.0	Site Background	2
3.0	Hydrogeologic Setting	2
4.0	Monitoring Well Network	3
4.1	Soil Boring Procedures	4
4.2	Monitoring Well Construction	5
4.3	Aquifer Testing	6
4.4	Seasonal Groundwater Fluctuation and Movement	6
4.5	Interconnection of Aquifers	8
5.0	Groundwater Sampling Procedures	8
5.1	Sampling Frequency	9
5.2	Field Instrument Calibration	9
5.3	Equipment Decontamination	9
5.4	Static Water Level Measurements	10
5.5	Pre-Sample Purging	10
5.6	Field Parameter Measurements	11
5.7	Sample Collection	12
5.8	Sample Labeling	12
5.9	Sample Preservation and Handling	12
5.10	Chain of Custody Documentation	13
5.11	Field Quality Assurance/ Quality Control Procedures	14
5.11.1	Field Blank	14
5.11.2	Field Duplicate	14
5.11.3	Rinsate Blank	15
5.11.4	Sample Packing and Shipment	15
5.11.5	Field Data Validation Procedures	15
6.0	Laboratory Analytical Procedures	16
6.1	Limits of Quantitation	16

6.2 Limits of Detection 16
6.3 Method Blanks 16
6.4 Matrix Spike and Matrix Spike Duplicate Samples 17
7.0 Groundwater Data Evaluation 17
7.1 Establishing Background 17
7.2 Detection Monitoring Analytical Requirements 17
7.3 Statistical Evaluation of Groundwater Analytical Results 18
7.4 Verification Resampling 19
7.5 Assessment Monitoring Analytical Requirements 19
7.6 Comparison to Groundwater Protection Standards 20
7.7 Corrective Action 21
8.0 Reporting 21
9.0 References 22

TABLES

Table 1 Well Elevation Data
Table 2 Groundwater Test Method Summary

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map with Well Locations
Figure 3 Geologic Cross-Sections
Figure 4 Groundwater Level Fluctuation Range
Figure 5 Predominant Potentiometric Surface for Uppermost Aquifer

APPENDICES

Appendix A Borehole Logs
Appendix B Laboratory Soil Results
Appendix C Aquifer Test Data
Appendix D Water Level Data 2014 through 2019
Appendix E Example Field Sampling Log Form
Appendix F Example Chain of Custody Form
Appendix G Variance Request Letter

1.0 INTRODUCTION

The following Groundwater Sampling and Analysis Plan (GWSAP) details the sampling procedures designed to collect representative samples from the groundwater aquifer beneath the Charles R. Lowman Generating facility, and the analytical procedures and QA/QC controls needed to produce reliable data. The provisions outlined in the GWSAP are consistent with the requirements in USEPA's *Disposal of Coal Combustion Residuals* (CCR) *from Electric Utilities* (Final Rule; Federal Register Vol. 80, No. 74, 21302-21501) as published on April 17, 2015. This GWSAP has been developed in accordance with the requirements of 40 CFR Part 257 as amended, ADEM Admin Code 335-13-15, and the EPA Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA, 2009). This GWSAP includes the following elements:

- Monitoring Well Construction
- Sample collection
- Field analytical procedures
- Sample preservation and shipping
- Chain-of-custody control
- Quality Assurance Project Plan
  - Field
  - Laboratory

The groundwater monitoring activities discussed in this GWSAP are to be conducted throughout the active life and post-closure period of the regulated coal combustion residuals (CCR) management units located at the Lowman facility.

2.0 SITE BACKGROUND

The Charles R. Lowman Power Plant is a coal-fired generating facility located along the west bank of the Tombigbee River near the community of Leroy in Washington County, Alabama (Figure 1). Construction of Unit #1 was completed in the late 1960s with Units #2 and #3 being competed in late 1970s. The main power plant consists of the three generating units, coal off-loading and storage facilities, and on-site coal ash and process waste impoundments (Figure 2). The regulated CCR units at the Lowman facility consist of the Unit #1 Ash Pond, the Unit #2/3 Ash Pond, and the Flue-Gas Desulfurization waste (FGD) pond as shown in Figure 2.

3.0 HYDROGEOLOGIC SETTING

The Lowman facility is located within the Alluvial-Deltaic Plain district of the East Gulf Coastal Plain physiographic section. The Alluvial-Deltaic Plain district is characterized by broad flat flood plain and terraces within the valleys of the Tombigbee and Alabama River systems. The topography of the area surrounding the site is relatively flat with a maximum relief of less than 20 feet. The facility is located at an elevation of approximately 45 feet above mean sea level (amsl) and about 40 feet above the base-flow level of the Tombigbee River. The Lowman facility is located within the alluvial valley along the west bank of the Tombigbee River. The site geology is dominated by Quaternary fluvial channel and terrace deposits.

The sedimentary units beneath the facility consist of fining upward sequence of interbedded clays, clayey sand, sand and gravel to a depth of approximately 65 to 75 feet. These units unconformably overlie marine sediments comprised of limestone and clay most likely attributable to the Marianna Limestone and Bucatunna Clay of the Oligocene-age Vicksburg Group (Mancini and Tew, 1988). Boreholes completed to the depth of the limestone underlying the facility indicate that this unit occurs at a depth of between 85 to 100 feet and is separated from the overlying alluvial sediments by a dense marine mudstone approximately 20 feet in thickness. A borehole log for a recent geotechnical boring conducted on the north side of the Lowman Facility (BVD 407) which illustrated a typical profile through the alluvial sediments is included in Appendix A. Interpreted geologic cross-sections showing the encountered alluvial sediments and their relationship to the underlying marine sediments are provided in Figures 3A through 3C.

During hydrogeologic investigation activities conducted at the Lowman facility, saturated conditions indicative of the upper saturated zone were encountered at depths ranging from approximately 5 to 30 feet below ground surface. Throughout the period of the study, static groundwater levels have been observed to fluctuate over a range of up to 28 feet with the greatest magnitude in fluctuations being within those wells and piezometers located closest to the river. Figure 4 illustrates the observed range of water level fluctuations with the wells at the facility since the initiation of site characterization activities.

There are a number of factors that influence the direction of groundwater flow within the upper saturated zone beneath the facility. The greatest of these being the Tombigbee River which borders the site to east. Due to the effects of the river stage on groundwater levels within the alluvial aquifer beneath the facility, the magnitude a gradient within the alluvial aquifer has been observed to vary significantly throughout the seasonal hydraulic cycle. Figure 5 illustrates what could be considered the typical potentiometric surface for the shallow aquifer based on an interpretation of the historical groundwater level dataset. The methodology for establishing the predominant potentiometric gradient within the alluvial aquifer is discussed in more detail in the following sections.

4.0 MONITORING WELL NETWORK

Monitoring wells have been constructed in accordance with the standards and procedures detailed in the RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA, 1992). The current monitoring network at the Charles R. Lowman site consists of 27 Type II monitoring wells and 2 piezometers located as shown in Figure 2. The well network has been established as a multi-unit monitoring network to include the Unit #1 Ash Pond, the Unit #2/3 Ash Pond, and the FGD pond CCR units. Borehole logs showing construction details for each of these monitoring points are included in Appendix A.

4.1 Soil Boring Procedures

In October 2013, a network of groundwater piezometers was installed at the Charles R. Lowman Generating facility as part of a hydrogeologic investigation of the site. The locations for the piezometers were selected to provide a distribution of data points around the various CCR management units on the site. The piezometers were constructed in a manner that they could subsequently be utilized for groundwater monitoring.

The soil borings for the piezometers were performed with a truck-mounted drilling rig using hollow-stem auger drilling and soil sampling techniques. As each boring was advanced a continuous core of the encountered sediments was recovered in 5-foot sections through the use of split-barrel samplers. As each core section was retrieved it was opened and described in the field by the site geologist with respect to physical characteristics, recovered interval and the presence of groundwater. Representative sections of each core were retained for further analysis. In addition to the cores, undisturbed samples were collected using thin-walled sampling tubes (Shelby Tubes) to allow for the laboratory analysis of in-place bulk density and porosity. A total of 50 core and Shelby tube samples were submitted for laboratory analysis. The results of the laboratory soil physical properties analyses are included in Appendix B.

In February and April 2016 five additional monitoring wells MW-6, MW-9, MW-11, MW-13, and MW-14 were installed to ensure adequate characterization of the uppermost aquifer beneath the facility. Three supplemental wells MW-5A, MW-12A, and MW-14A were installed in August 2016 to provide sufficient vertical coverage to allow for groundwater monitoring over the full range of seasonal groundwater level fluctuations within the upper saturated zone.

Nine additional monitoring wells (MW-13A and MW-15 through MW-23) were installed during subsequent investigation activities conducted in 2019. Borehole logs for each of these wells are included in Appendix A.

4.2 Monitoring Well Construction

Each borehole was advanced until visual indications of groundwater were encountered. In most cases the borehole was then advanced from 8 to 10 feet beyond that point to ensure sufficient depth to allow for seasonal groundwater fluctuations. Each borehole was then completed as a Type II groundwater monitoring well. The locations of the installed monitoring wells are shown in Figure 2.

The Type II monitoring wells were constructed of 2-inch diameter slotted Schedule 40 PVC screen and solid riser installed through the center of the hollow-stem augers prior to their removal from the borehole. The screened intervals within the installed monitoring well ranged from 10 to 15 feet in length. As the augers were withdrawn from the borehole a filter pack consisting of 20/40 silica sand was emplaced around the screen to a level of at least 2 feet above the top of the screened interval. A 2-foot annular seal consisting of hydrated bentonite pellets was emplaced above the top of the filter pack. The remainder of the borehole annulus was grouted with a bentonite / Portland cement mix to within one foot of the surface. All of the monitoring wells with the exception of MW-4 were fitted with a 4” x 4” aluminum standing manway set into a 2’ x 2’ concrete pad. Protective steel bollards were placed around each piezometer with the exception of MW-4. MW-4 is located within an area of the facility that is designated as a helicopter landing zone in the event of a medical evacuation. As such, it was fitted with a flush-mounted steel manway set into a concrete pad so as not to present a hazard to emergency flight operations. The construction details for each monitoring well are shown on the borehole logs included in Appendix A.

Following completion, each well was developed by surging and bailing using new disposable PVC bailers to remove sediment and turbid groundwater generated during the installation process. The spatial coordinates, ground elevation, and top of casing elevation relative to mean sea level for each well was determined through a professional survey. The spatial coordinates were established based on the Alabama West State Plane System (SPCS83) with elevations being established relative to the NAVD83 survey datum. The top of casing elevations for each well are summarized in Table 1 along with the total depth and calculated bottom elevations.

4.3 Aquifer Testing

To determine the hydraulic conductivity of the alluvial aquifer beneath the Lowman facility aquifer drawdown testing was conducted on seven of the installed monitoring wells. The aquifer testing was performed using a 12-volt submersible pump accompanied by a pressure -logging transducer lowered into each well. The transducer was suspended one foot below the bottom of the pump via a stainless steel cable attached to the pump and the entire assembly was suspended so that the transducer level would be approximately 1.5 feet above the bottom of the well. Prior to installation, the data logger was programmed to record pressure data at 10 second intervals.

To monitor the progress of the test, manual water level measurements were taken at periodic intervals using an electronic water level indicator. After lowering the pump and transducer assembly into the well, the water level was monitored until it had returned to the static level measured before the beginning of the test. The submersible pump was then turned on and the pumping rate was measured throughout the test along with the corresponding draw-down of the water level within the piezometer. Once the water level drawdown had stabilized, the pump was shut off and the rebound of the water level within the piezometer was monitored until it had returned to the static level measured prior to the beginning of the test. The pump assembly was then removed from the piezometer and the pressure data from the transducer was downloaded.

To evaluate the results of the aquifer test, the AQTESOLV© for Windows software was used to process the recorded pressure data. Figure 10 shows a typical plot of the displacement vs time for the recovery interval of the aquifer test conducted on MW-1. The slope of the best-fit line through that portion of the data representing the time interval between the maximum initial displacement and 90% recovery of the aquifers static water level is interpreted as the hydraulic conductivity (K) of the aquifer. The calculated K values ranged from 6.045×10^{-5} cm/sec to 1.769×10^{-4} cm/sec. Results of the aquifer test calculations are included in Appendix C.

4.4 Seasonal Groundwater Fluctuation and Movement

During the initial hydrogeologic investigation conducted at the Lowman facility beginning in 2013 a Mini Diver® data-logging transducer was installed in each of the piezometers/ monitoring wells. The transducers were programed to record the hydrostatic pressure of the water column within the wells every 6 hours. To allow the hydrostatic pressure readings to be corrected for barometric pressure, atmospheric pressure data was recorded by a separate transducer placed within the protective manway of monitoring well MW-5. The pressure data from the transducers was recovered at each site visit over the course of the hydrogeologic study. The transducers continued to operate until they were removed from the wells in June 2019 thus providing a continuous log of the seasonal groundwater level fluctuations over the period from December 21, 2013 through June 5, 2019. A graphical presentation of the level data for each piezometer/monitoring well is provided in Appendix D.

Using periodic manual water level measurements collected from the wells, the top of casing elevation established for each well, and contemporaneous transducer pressure readings, the relative elevation of the transducer within the well could be established. Using the transducer elevations, a potentiometric elevation could then be calculated for each baro-compensated hydrostatic pressure reading.

Shown in Figure 4 are box and whisker plots of the calculated groundwater elevation data for each of the original 14 site wells over the period between December 2013 and June 2019. The plots show the range of fluctuations, the interquartile range, the population mean (x) and median (-) values. Figure 5A illustrates a potentiometric surface map of the shallow alluvial aquifer constructed using the median water level elevation for each well as established from Figure 4. Figure 5B illustrates the interpreted historic high groundwater potentiometric surface and was generated based on the water level measurements collected on March 23, 2020 during the March 2020 semi-annual monitoring event. Figure 5C illustrates the interpreted historic low potentiometric surface and is based on water level measurements collected from the existing site wells on November 28, 2016. The range of groundwater fluctuations is also illustrated on the geologic cross-sections shown in Figures 3B through 3F.

The surface depicted in Figure 5A could reasonable be interpreted to represent the localized predominant groundwater surface for the alluvial aquifer. As interpreted from Figure 5A, the predominant groundwater gradient beneath the Lowman facility is to the east. Based on the groundwater level data analysis shown in Figure 4 and the predominant potentiometric surface illustrated in Figure 5A it can be seen that the monitoring wells MW-1 and MW-2 are consistently hydraulically upgradient of the regulated CCR units at the Lowman Facility.

4.5 Interconnection of Aquifers

The sedimentary units beneath the facility consist of a complex system of interbedded clays, clayey sand and sand to a depth of approximately 65 to 75 feet. These units overlie bedrock comprised of dense marine mudstone and limestone. The underlying limestone is most likely attributable to the Marianna Limestone of the Tertiary age Oligocene Series. Interpreted geologic cross-sections showing the encountered alluvial sediments and their relationship to the underlying marine sediments are provided in Figures 3a through 3c.

Borings completed during previous geotechnical investigations at the Lowman facility (BVD 407, Appendix A) indicate that the limestone is separated from the surficial alluvial aquifer by a dense marine clay or mudstone unit approximately 20 feet in thickness. Piezometers completed within the limestone demonstrate that groundwater within the unit occurs under confined conditions with potentiometric levels greater than the surface elevation of the facility in many cases. This would indicate that the marine clay acts as an upper confining unit for the limestone aquifer and likewise a lower confining unit for the alluvial aquifer above. With the limestone aquifer being under positive hydraulic pressure, there would logically be a very low risk of downward migration of soluble contaminants from the alluvial aquifer to the limestone aquifer even should the thickness of the marine clay not be laterally consistent across the facility.

5.0 GROUNDWATER SAMPLING PROCEDURES

All monitoring wells at the Lowman facility are equipped with dedicated submersible bladder pumps. The dedicated bladder pumps installed in each of the facility monitoring wells are designed to be durable and low maintenance. However, if during any sampling event, a pump fails, it will be removed and a replacement pump will be used to sample the well. A replacement pump will be kept in stock at the site in order to be readily available if needed to replace failed equipment. Any sampling equipment or procedural changes occurring during the sampling event will be documented on field sampling log and subsequently in the operating records for the facility.

5.1 Sampling Frequency

Groundwater sampling activities at the Charles R. Lowman facility will be conducted on a semi-annual basis with groundwater samples being collected during the months of March and September of each year. Should re-sampling be required, groundwater samples will be collected within 30 days of receiving the analytical results from the semi-annual detection monitoring event. Resampling will be conducted following the same procedures required for semi-annual sample collection.

5.2 Field Instrument Calibration

Normal laboratory procedures are to be followed in measuring field parameters; that is, all field instruments are to be properly calibrated in the field before being used. Prior to initial use and as necessary throughout each sampling event, the field instruments will be properly calibrated according to the specifications and procedures specified by the manufacturer of the equipment being used. Calibration of the instruments will be performed at a minimum frequency of once per day prior to beginning each day's sampling activities. The calibration standards used will be appropriate for the range of values expected or historically observed for the groundwater beneath the facility. The date and time of all meter calibrations are to be recorded in the field sampling log.

5.3 Equipment Decontamination

Any equipment that will come into contact with the groundwater samples will be thoroughly decontaminated prior to initial use and between sampling locations. The decontamination procedures will consist of a wash using a solution of distilled water and Alconox soap followed by a rinse with distilled water. The flow-thru cell and multi-probe sonde will be disassembled after each use and the individual components decontaminated separately. During decontamination care will be taken not to damage the membranes on the pH, DO, and ReDox probes. To ensure that proper decontamination is being accomplished, a rinsate blank will be collected and submitted for laboratory analysis as described below.

5.4 Static Water Level Measurements

Based on the previously conducted hydro-geological evaluation of the Charles R. Lowman it is evident that seasonal water level fluctuations of greater than 20 feet can occur in the shallow aquifer beneath the facility. It is also evident that the water level in the shallow aquifer is directly related to the stage of the Tombigbee River and can vary by as much as several feet on a daily basis. To allow for an accurate interpretation of the groundwater flow within the shallow aquifer during each sampling event, a complete set of static water level measurements will be obtained from all of the site monitoring wells during a single 24-hour period.

A portable electronic water-level probe will be used to measure the depth to groundwater below the top of the well casing. Groundwater levels will be measured to at least the nearest 0.01 foot and recorded on the field sampling forms. The top of casing elevation relative to mean sea level has been established by a survey conducted by a licensed surveyor. Based on the top of casing elevation and the measured water level, a groundwater elevation at each monitoring well can be calculated to allow for an interpretation of the direction and magnitude of the hydraulic gradient within the upper saturated zone beneath the facility at the time of sampling.

Because the stage of the Tombigbee River can have a significant influence on the water levels within the upper saturated zone beneath the facility, the stage of the river at the time of each semi-annual sampling event should be recorded in the field sampling log. The river stage is monitored by a USGS gaging station (USGS 02470050) located at the Lowman Power Plant.

5.5 Pre-Sample Purging

To ensure that samples collected from the well are representative of the water in the formation each of the monitoring wells will be properly purged prior to sampling. This will be accomplished through the removal of groundwater from the well until the field parameters pH, specific conductance, temperature, and Redox potential have stabilized.

Each of the monitoring wells at the Lowman facility is equipped with a dedicated pneumatic bladder pump and tubing. Prior to collection of groundwater samples each well will be purged using low-flow sampling techniques. During the well purging activities, physical and chemical properties of the groundwater will be monitored using a flow-thru cell equipped with a multi-probe sonde connected to a properly calibrated field instrument.

Under low flow rate conditions, the field parameters should stabilize after the removal of at least one well volume of groundwater. The final purge volumes will be dependent upon the stabilization of the field parameters measured during purging. Field parameters will be considered stabilized when three successive measurements of pH and specific conductivity vary by no more than 10 percent and the turbidity of the groundwater is less than 5 NTUs. The purge data will be included in the field notes for the sampling event. An example of a groundwater field sampling log form can be found in Appendix D.

All monitoring wells will be sampled using the dedicated bladder pumps installed in each well. The pump is not to be turned off until all required samples have been collected. Dedicated sampling tube will be used at each well. This tube will be rinsed with distilled water and attached to the pump discharge nozzle on the wellhead. The sampling tubing will then be attached to the bottom port on the flow-tru cell to ensure that the cell remains completely filled with water throughout the purging and sampling activities

The pumping rate will be adjusted to produce a consistent flow of water and to minimize the amount of drawdown in the well. The pumping rate will be measured periodically and recorded in the field sampling field log.

5.6 Field Parameter Measurements

Six field parameters - temperature, pH, dissolved oxygen (DO), oxidation/reduction potential (ReDOX), specific conductivity(SpC), and turbidity will be continuously monitored during the purging and sampling of each well through the use of a flow-thru cell and multi-probe sonde. Periodic values for these parameters will be recorded in the field sample log for each well.

5.7 Sample Collection

Samples must be collected so that no foreign material is introduced into the sample and no material of interest escapes from the sample prior to analysis. Groundwater sampling procedures will conform to the protocols of EPA SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Table 2 outlines the analytical parameters and SW-846 methodology to be used for the groundwater monitoring program at the Charles R. Lowman facility.

In the field, groundwater will be collected directly into the appropriate containers and preserved as specified in accordance with SW-846 protocols (see Table 2). Standard laboratory practice is to provide the sampling kits with the containers pre-preserved as appropriate for the required analytical procedures. Also listed in Table 2 are the maximum holding times for each parameter per the SW-846 requirements.

5.8 Sample Labeling

Prior to sample collection a permanent adhesive label will be affixed to each sample container. The label will be completed with the site name, well number, time and date of sample collection and the initials of the individual collecting the sample. Sample containers may be prelabeled prior to mobilizing to the field.

5.9 Sample Preservation and Handling

All samples are to be collected, preserved, and handled in accordance with EPA's SW-846. The analysis of the collected groundwater samples will be performed by an off-site third-party laboratory services provider. Prior to each sampling event the site project manager will contact the analytical laboratory and provide notification of the anticipated schedule for sample collection as well as the number of samples to be collected, the required analyses to be performed, and the required turn-around time for sample results. The analytical laboratory will provide sampling kits consisting of the necessary sample containers with the appropriate preservatives required for the analytical methods to be performed along with shipping containers. In addition to the well samples, the sampling kits will include containers for the collection of a field blank, a rinsate blank, and a field duplicate as discussed in the QA/QC section.

5.10 Chain of Custody Documentation

Upon receipt of the kits, field personnel should complete an inventory of the contents to confirm that the containers are adequate for the number of wells and specified analytes and contain the proper preservative. Sample containers may be pre-labeled prior to being transported to the site. The individual sample containers are not to be opened until used in the field. Up until the time of use, sample kits are to be stored in a secure location that is under the direct control of the site project manager.

All collected samples are to remain in the custody of the site project manager until they are delivered to the laboratory or are transferred to the custody of a common carrier for shipment to the laboratory. In cases where samples leave the direct control of the site project manager, such as shipment to a laboratory by a common carrier (FedEx, UPS, etc.), a custody seal will be placed on the shipping container or on the individual sample bottles to ensure that the samples have not been opened or otherwise disturbed during transportation.

To establish and maintain the documentation necessary to trace sample possession from the time of collection, a chain of custody record will be completed and will accompany the samples. The chain of custody documentation will contain the following information:

- Unique sample identifier
- Date and time of sample collection
- Sample type (soil, groundwater, air, etc.)
- Number of containers per sample
- Parameters requested for analysis
- The signature of the site project manager responsible for collecting the samples

- The name, signature and affiliation of each person who had direct control of the samples

It will not be necessary to obtain the signature of common carrier personnel if the custody seal on the shipping container remains intact. An example of a chain of custody form is included in Appendix E.

5.11 Field Quality Assurance/ Quality Control Procedures

To verify that the sample collection and handling process has not affected the quality or integrity of the samples, a minimum of one field blank, one field duplicate and one rinsate blank will be collected during each sampling event. The results of the analysis of the blanks will not be used to correct the groundwater data. If contaminants are found in the blanks, an attempt to identify the source of contamination will be initiated and corrective action, including re-sampling if necessary, will be evaluated.

5.11.1 Field Blank

For the purposes of the groundwater monitoring program at the Lowman facility a field blank will consist of a set of sample containers filled at the monitoring well site using deionized water. The field blank will be submitted for laboratory analysis of the constituents being analyzed under the current monitoring program. The frequency of field blank collection and submittal will be a minimum of one per sampling event.

5.11.2 Field Duplicate

For the purposes of the groundwater monitoring program at the Lowman facility a field duplicate will be a second set of sample containers taken from a single well at the same time as the standard sample from that location. In collecting the field duplicate, the sample containers for both the standard sample and the duplicate will be filled sequentially. The field duplicate will be labeled in such a manner that it is submitted blind to the laboratory for analysis without any indications of the well from which it was collected. A minimum of one field duplicate will be collected per sampling event.

5.11.3 Rinsate Blank

To ensure that proper decontamination of the sampling equipment is being accomplished a rinsate blank will be collected during each sampling event. For the purposes of the groundwater monitoring program at the Lowman facility the rinsate blank will be collected by allowing deionized water to pass through the flow-thru cell and multi-probe sonde assembly. Prior to the collection of the rinsate blank the flow-thru cell assembly will be properly decontaminated according to the procedures discussed above. The rinsate will be directly decanted into the appropriate sample containers.

5.11.4 Sample Packing and Shipment

Once all of the samples are collected and prepared and the chain-of-custody forms are completed, the samples will be prepared for shipment to the analytical laboratory. Insulated sample shipping containers will be used to provide adequate protection for the samples and to maintain the samples at a constant temperature at or below 4°C. Each shipping container will be supplied by the analytical laboratory with a temperature blank to ensure that the samples have been maintained at the proper temperature.

Each shipping container will be equipped with an inner water proof liner into which the samples will be placed along with a sufficient volume of ice to cool and maintain the temperature of the sample while in transit to the analytical laboratory. The inner liner will be secured in such a manner as to prevent fluids from leaking from the shipping container while in transit to the laboratory. The completed chain-of-custody forms will be placed inside the shipping container and the container will be sealed with shipping tape and secured with a custody seal. The containers will be shipped by express service to the contract laboratory for analysis.

5.11.5 Field Data Validation Procedure

After completing a sampling program, the field data package (field logs, calibration records, chain of custody forms, etc.) will be reviewed for completeness and accuracy. Some of the items considered in the Field Data Package Validation Procedure include but are not limited to the following:

- A completeness review of field data contained on water sampling logs;
- A verification that sample blanks were properly prepared, identified, and analyzed;
- A check on field analyses for equipment calibration and condition; and
- A review of chain of custody forms for proper completion, signatures of field personnel and the laboratory sample custodian, and dates.

6.0 LABORATORY ANALYTICAL PROCEDURES

All analytical procedures will comply with EPA SW-846 EPA *Test Methods for Evaluating Solid Waste - Physical/Chemical Methods,* as updated and other EPA-approved methods. The monitoring program constituents, along with recommended test methods and PQLs, are listed in Table 2. Alternate methods may be used if they have the same or lower PQL. Methods with higher PQLs will be considered if the concentration of the parameter is such that an alternate test method with a higher PQL will provide the same result.

6.1 Limits of Quantitation (LOQs)

Laboratory-specific LOQs will be used as the reporting limits (RLs) for quantified detections of required monitoring constituents. Laboratory LOQs should be reported with the sample results.

6.2 Limits of Detection (LODs)

Laboratory-specific LODs will be used as the RLs for estimated detections of required monitoring constituents. Constituents detected at concentrations above the LOD but below the LOQ will be reported as estimated with a qualifying “J” flag on the laboratory certificates of analysis. Laboratory LODs should be reported with the sample results.

6.3 Method Blanks

Laboratory method blanks are used during the analytical process to detect any laboratory-introduced contamination that may occur during analysis. A minimum of one method blank will be analyzed by the laboratory per sample batch.

6.4 Matrix Spike and Matrix Spike Duplicate Samples

A matrix spike/matrix spike duplicate sample will be run with every sample batch. The relative percent difference between the spike and the spike duplicate sample should be less than 20 percent. Higher values may indicate matrix interference. Changes in detection limits due to matrix problems or interferences that may affect detection limits for individual samples will be noted in the final analytical report.

7.0 GROUNDWATER DATA EVALUATION

Evaluation of the groundwater data will be completed as discussed in the following subsections. These criteria represent a conservative approach to groundwater analysis and incorporate appropriate statistical and other evaluation methodologies. A more in-depth discussion of the statistical methods to be employed for data analysis is provided in the Lowman Power Plant Statistical Analysis Plan (Groundwater Stats Consulting, 2021).

7.1 Establishing Background

As required for existing facilities under 40 CFR 257.94(b) and ADEM Admin. Code r. 335-15-13-.06(5), the background concentrations of each of the analytical constituents will be established by the collection of eight independent samples from each of the facility's monitoring wells. Sampling for background concentrations was conducted between January 2017 and October 2017. Throughout the groundwater monitoring program, a review will be conducted periodically to determine if background concentrations should be updated. The EPA's Unified Guidance recommends this review be conducted at a frequency of 2 to 3 years.

7.2 Detection Monitoring Analytical Requirements

Upon initiation of the groundwater monitoring program detail in the GWSAP, representative samples will be collected from each of the groundwater monitoring wells at the Lowman facility on a semi-annual basis and submitted for laboratory analysis of the constituents listed in Appendix III to 40 CFR Part 257 and ADEM Admin. Code r 335-13-15. The constituents listed in Appendix III include:

- Boron
- Calcium
- Chloride
- Fluoride
- Sulfate
- Total Dissolved Solids

Groundwater pH is also included under Appendix III, however this parameter will be determined by measurements made in the field at the time of groundwater sample collection using a properly calibrated pH meter.

7.3 Statistical Evaluation of Groundwater Analytical Results

As required under 40 CFR 257.93(f) and ADEM Admin. Code r. 335-13-15-.06(4)(f) the analytical results of each of the Appendix III constituents will be compared to the established background concentration for that constituent using one or more of the approved statistical methods detail in the Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA, 2009). The statistical method(s) used for the evaluation will be appropriate for the distribution of the data.

In accordance with 40 CFR 257.93(f)(6) and ADEM Admin. Code r. 335-13-15-.06(4)(f)6 the selected statistical test to be used to evaluate the groundwater monitoring data at the Lowman facility will be a prediction interval or tolerance interval method as allowed under 40 CFR 257.93(f)(3) and ADEM Admin. Code r. 335-13-15-.06(4)(f)3, unless this test is inappropriate for the background data set. It may be necessary to employ more than one statistical method to evaluate the data. The appropriate statistical method will be performed on each individual constituent in each monitoring well following each semi-annual sampling event.

If one or more alternative statistical tests are used, an adequate number of independent samples for the statistical method will be collected within the compliance period such that the level of significance for individual well comparison will be no less than 0.01 and no less than 0.05 for multiple comparisons for any statistical test.

7.4 Verification Resampling

If it should be determined that a statistically significant increase (SSI) above background is indicated for one or more of the required analytical constituents, resampling of the groundwater from the affected well for that particular constituent will be performed within a period not to exceed 30 days. If the results of the resample do not indicate an SSI then a second resample will be collected within a period of 30 days. If the results of the second resample also do not indicate an SSI then the initial result will be considered a false positive and detection monitoring will continue. If the results of either of the resamples indicate an SSI the initial result will be considered valid and will be reported as an SSI above background.

7.5 Assessment Monitoring Analytical Requirements

If it should be determined after resampling, that one or more of the constituents listed under Appendix III are present at a concentration that represents a statistically significant increase above background, then Assessment Monitoring must be initiated. Under Assessment Monitoring, analysis for the constituents listed in Appendix IV to 40 CFR Part 257 and ADEM Admin. Code r. 335-13-15 will be required in addition to the Appendix III constituents. The constituents in Appendix IV include:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Fluoride
- Lead

- Lithium
- Mercury
- Molybdenum
- Selenium
- Thallium
- Combined Radium 226 and 228

For each of the constituents listed in Appendix IV, a groundwater protection standard (GWPS) will be established. The GWPS will be the greater of either the published maximum contaminant level (MCL) for that constituent or the background level of that constituent as determined from the statistical evaluation procedures discussed above. On April 15, 2019 PowerSouth received approval of a variance request which allow the use of values published under 40 CFR 257.95(h)(2) for Cobalt, Lead, Lithium, and Molybdenum as MCLs for these constituents along with the removal of Boron from the Appendix IV list. The values for these constituents along with the removal of Boron from the Appendix IV constituent list have been subsequently addressed in a comprehensive variance request submitted to the ADEM Solid Waste Branch on August 18, 2020. A copy of the August 2020 comprehensive variance request is included in Appendix G.

7.6 Comparison to Groundwater Protection Standards

Following the establishment of GWPS under the Assessment Monitoring Program, detected constituents will be statistically compared to the approved GWPS using one of the methods discussed below.

If the GWPS for a constituent is derived from the facility background concentration, then the groundwater monitoring data will be compared directly to the GWPS using a value-to-value comparison. If the established GWPS is derived from an MCL, then the groundwater monitoring data may be compared to the GWPS statistically and/or using a value-to-value procedure.

Based on the above criteria, groundwater monitoring data will initially be compared to established GWPS via a value-to-value comparison. If a GWPS is exceeded during the value-to-value comparison for any parameter, a verification re-sample may be collected. The results from the verification re-sample will be compared to the GWPS via a value-to-value comparison. If the GWPS is derived from an MCL, two additional groundwater samples for the suspect constituent(s) may be collected to facilitate a statistical comparison to the GWPS.

To perform a statistical comparison, a minimum of four samples must be collected. Once data have been received for the four samples, then the lower confidence interval can be calculated and compared to the GWPS.

7.7 Corrective Action

If it should be determined that any of the constituents listed under Appendix IV exceed their respective GWPS then it will be necessary to initiate an Assessment of Corrective Measures (ACM) as required under 40 CFR 257.96 and ADEM Admin. Code r. 335-13-15-.06(7) and to implement a corrective action program as required under 40 CFR 257.98 and ADEM Admin. Code r. 335-13-15-.06(9). During corrective action groundwater monitoring will continue to be conducted according to the procedures and schedule discussed above.

8.0 REPORTING

An annual groundwater monitoring report will be prepared in accordance with the requirements of 40 CFR 257.90(e) and ADEM Admin. Code r. 335-13-15-.06(1)(f).

The annual report will include at a minimum:

- A discussion of the current status of the groundwater monitoring program at the Lowman facility.
- A discussion of any circumstances that occurred during the current period that required changes or deviations from the established groundwater monitoring program.
- A determination of the groundwater flow direction and gradient beneath the facility.
- A discussion of the current groundwater monitoring results.
- Recommendations for changes or additional actions to be taken during future monitoring activities.

- A tabulation of current and historical groundwater monitoring data.
- Copies of the laboratory analytical reports for the current period.
- Copies of the field sampling logs for the current period.

The annual groundwater monitoring report will be completed and available for review no later than January 31 of each year.

In accordance with the requirements of ADEM Admin. Code 335-13-15-.06(6)(d)1, PowerSouth will submit a notification to ADEM within 14 days of the initial detection of any of the constituents found in Appendix IV to ADEM Admin. Code r. 335-13-15. A copy of the notification will also be placed in the operating record for the Lowman Facility.

9.0 REFERENCES

ADEM, 2017, Alabama Environmental Investigation and Remediation Guidance (AEIRG), 112p.

EPA, 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance, EPA 530-R-09-007, 888p.

Groundwater Stats Consulting, 2021, PowerSouth Energy Cooperative Lowman Power Plant Statistical Analysis Plan, 121p.

Mancini, Earnest A. and Berry H. Tew Jr.,1988, Paleogene Stratigraphy and Biostratigraphy of Southern Alabama: Field Trip Guidebook for the GCAGS-GC/ SEPM 38th Annual Convention, 63p.

TABLES

TABLE 1
MONITORING WELL DATA
Charles R. Lowman Power Plant
Leroy, Alabama

Well/ Piezometer Number.	Casing Elevation ft-amsl	Total Depth ft - btc	Bottom Elevation ft-amsl
MW-1 (BG)	29.17	24.30	4.87
MW-2 (BG)	38.18	36.47	1.71
MW-3*	28.55	24.58	3.97
MW-4	36.40	28.32	8.08
MW-5	37.41	29.35	8.06
MW-5A	37.23	39.02	-1.79
PZ-6	49.30	44.30	5.00
MW-6	30.14	29.26	0.88
MW-7	34.20	32.65	1.55
MW-8	32.91	37.68	-4.77
MW-9	32.63	29.01	3.62
MW-10	34.14	41.46	-7.32
PZ-11R	44.75	47.31	-2.56
MW-11	45.29	43.10	2.19
MW-12	43.31	38.42	4.89
MW-12A	43.39	46.31	-2.92
MW-13	42.26	29.25	13.01
MW-13A	41.61	62.90	-21.29
MW-14	38.56	29.48	9.08
MW-14A	38.50	38.98	-0.48
MW-15	31.51	33.18	-1.67
MW-16	34.70	42.23	-7.53
MW-17	36.23	41.70	-5.47
MW-18	32.64	53.03	-20.39
MW-19	50.76	53.13	-2.37
MW-20	30.01	33.41	-3.40
MW-21	30.00	36.45	-6.45
MW-22	30.24	33.55	-3.31
MW-23	38.86	43.85	-4.99

BG - Monitoring Wells MW-1 and MW-2 are the designated background groundwater monitoring locations.

TABLE 2
GROUNDWATER TEST METHODS SUMMARY
Charles R. Lowman Power Plant
Leroy, Alabama

Constituent	Test Method	Sample Container	Sample Preservative[(1)]	Holding Time	Practical Quantitation Limit	Units
Appendix III						
Boron	6020	250 ml plastic	HNO_3	6 months	0.021	mg/L
Calcium	6020	250 ml plastic	HNO_3	6 months	0.13	mg/L
Chloride	SM 4500	250 ml plastic	None	28 days	0.60	mg/L
Fluoride	SM 4500	125 ml plastic	None	28 days	0.032	mg/L
pH	Field Measurement					SU
Sulfate	SM 4500	250 ml plastic	None	28 days	1.4	mg/L
Total Dissolved Solids	2540C	1 liter plastic	None	7 days	3.4	mg/L
Appendix IV						
Antimony	6020	250 ml plastic	HNO_3	6 months	0.001	mg/L
Arsenic	6020	250 ml plastic	HNO_3	6 months	0.00046	mg/L
Barium	6020	250 ml plastic	HNO_3	6 months	0.00049	mg/L
Beryllium	6020	250 ml plastic	HNO_3	6 months	0.00034	mg/L
Cadmium	6020	250 ml plastic	HNO_3	6 months	0.00034	mg/L
Chromium	6020	250 ml plastic	HNO_3	6 months	0.0011	mg/L
Cobalt	6020	250 ml plastic	HNO_3	6 months	0.00040	mg/L
Fluoride	SM 4500	250 ml plastic	None	28 days	0.032	mg/L
Lead	6020	250 ml plastic	HNO_3	6 months	0.00035	mg/L
Lithium	6020	250 ml plastic	HNO_3	6 months	0.0032	mg/L
Mercury	7470A	250 ml plastic	HNO_3	28 days	0.000070	mg/L
Molybdenum	6020	250 ml plastic	HNO_3	6 months	0.00085	mg/L
Selenium	6020	250 ml plastic	HNO_3	6 months	0.00024	mg/L
Thallium	6020	250 ml plastic	HNO_3	6 months	0.000085	mg/L
Radium-226	9315	1/2 gallon plastic	HNO_3	6 months	0.0602	pCi/L
Radium-228	9320	1/2 gallon plastic	HNO_3	6 months	0.0455	pCi/L

(1) - All Samples to be Maintained at or below 4°C

FIGURES

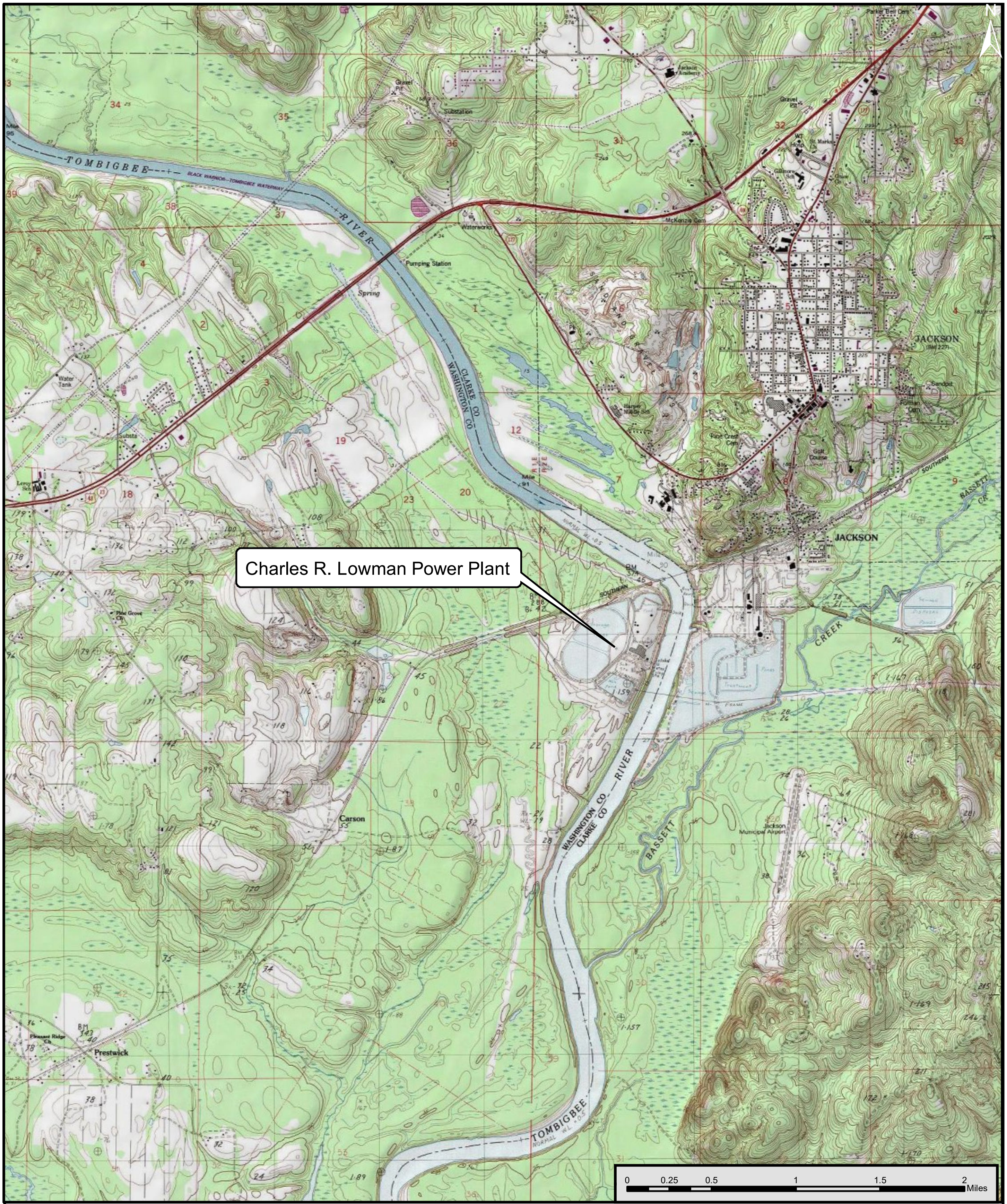


Figure 1 - Site Location Map

Charles R. Lowman Power Plant
PowerSouth Energy Cooperative
Leroy, AL

CDG
Engineering. Environmental. Answers.

Figure 2 - Site Map with Well Locations

Charles R. Lowman Power Plant
Leroy, AL

CDG
Engineering. Environmental. Answers.

N

Drawn By:	**LKY**
Checked by:	**JAB**
Date:	**JAN 2020**

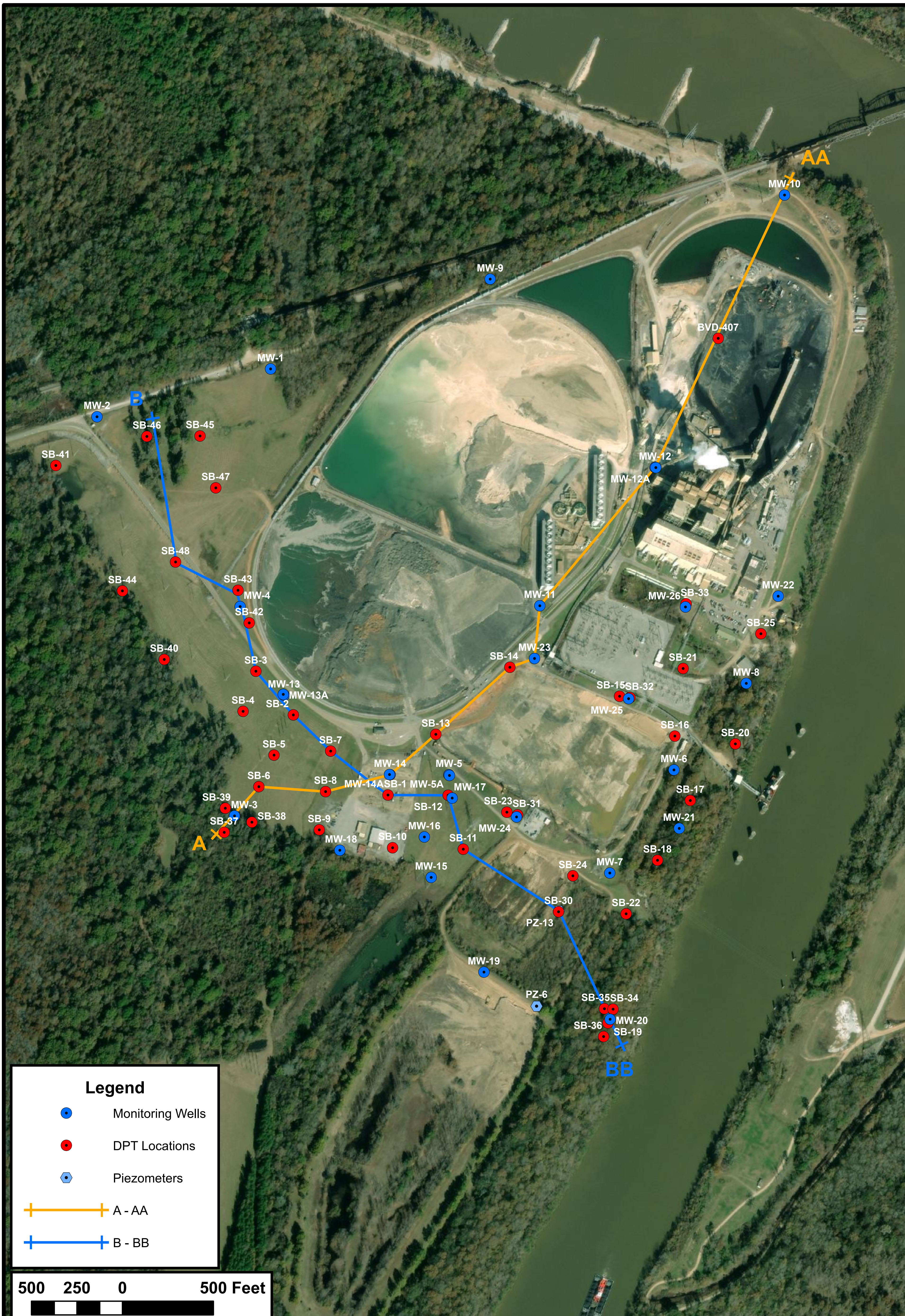


Figure 3A - Cross-Section Alignments

Charles R. Lowman Power Plant
Leroy, AL

CDG
Engineering. Environmental. Answers.

N

Drawn By:	GAM
Checked by:	JAB
Date:	Feb 2021

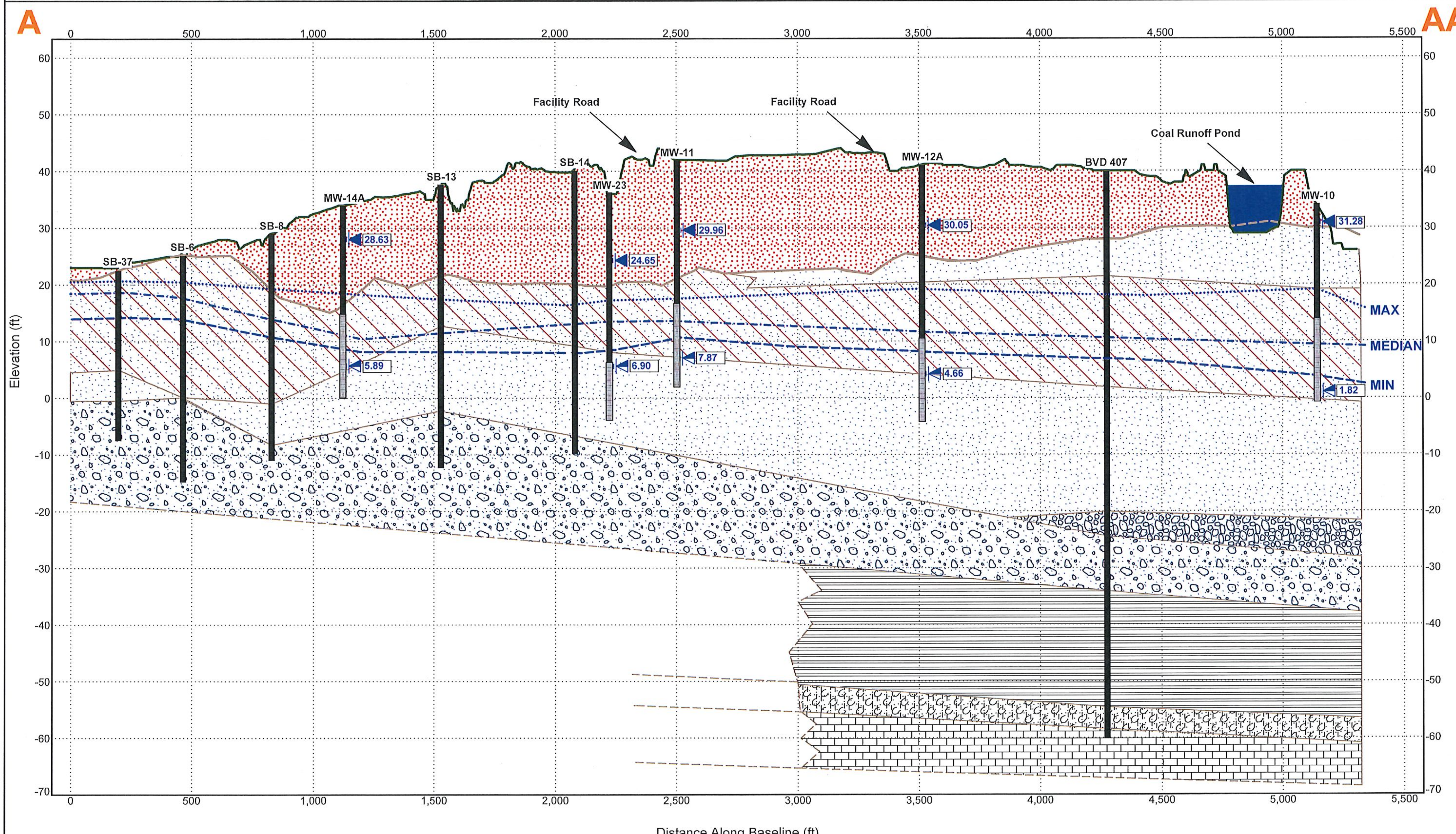
CDG Engineers & associates
CDG Engineers & Associates
1841 E. Three Notch Street
Andalusia, Alabama 36421
Telephone: (334) 222-9431

FIGURE: 3B
SUBSURFACE DIAGRAM: A-AA

CLIENT Powersouth Energy Cooperative
PROJECT LOCATION Leroy, Alabama
PROJECT NAME Lowman DPT
DRAFTED BY GAM
REVISION FEB21

LEGEND

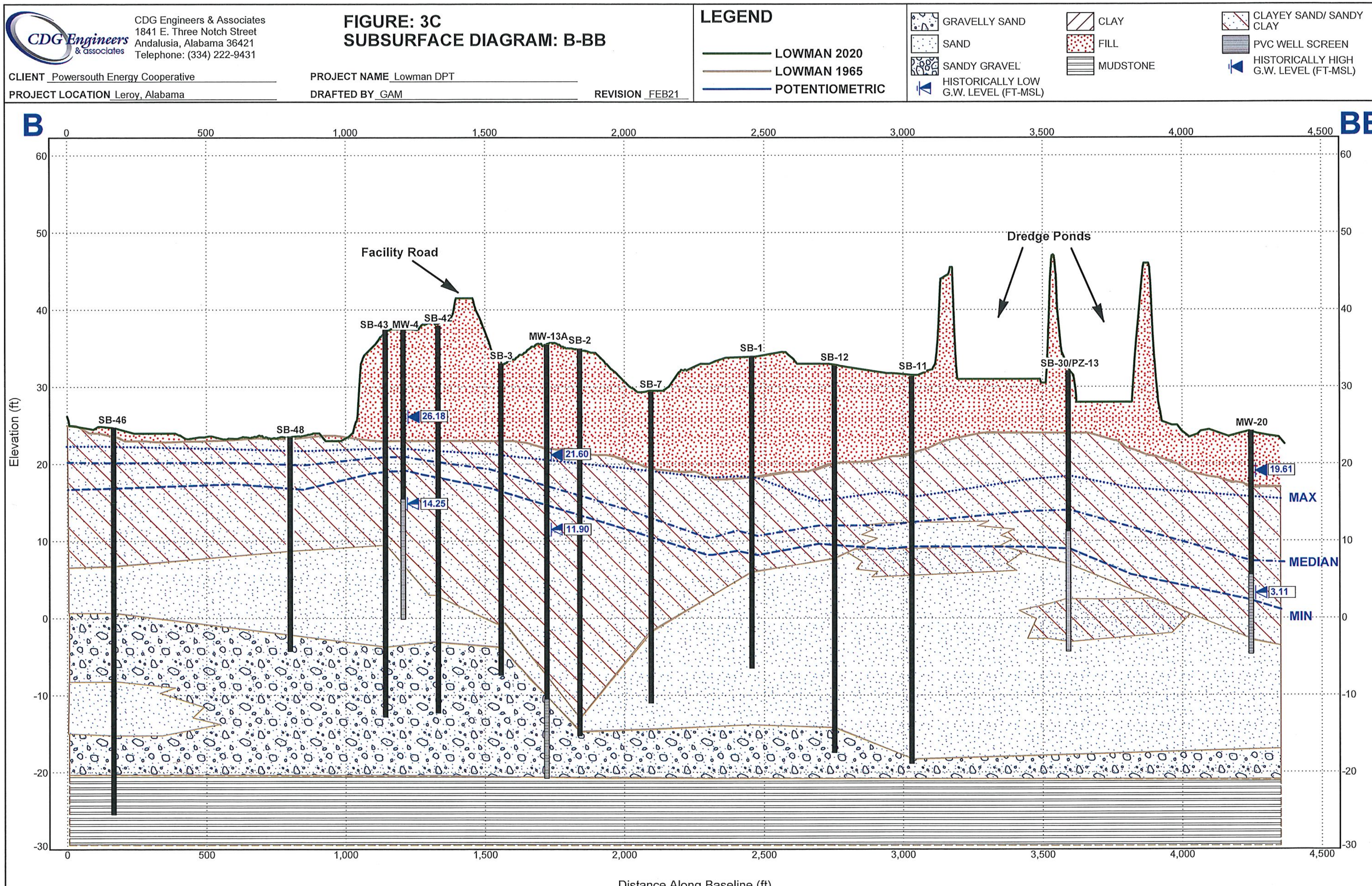
- LOWMAN 2020
- LOWMAN 1965
- POTENTIOMETRIC
- FILL
- LIMESTONE
- SANDY GRAVEL
- WATER
- SAND
- CLAYEY SAND/ SANDY CLAY
- GRAVELLY SAND
- HISTORICALLY HIGH G.W. LEVEL (FT-MSL)
- PVC WELL SCREEN
- SILTY SAND
- MUDSTONE
- HISTORICALLY LOW G.W. LEVEL (FT-MSL)



CDG Engineers & Associates
1841 E. Three Notch Street
Andalusia, Alabama 36421
Telephone: (334) 222-9431

FIGURE: 3C
SUBSURFACE DIAGRAM: B-BB

CLIENT Powersouth Energy Cooperative
PROJECT LOCATION Leroy, Alabama
PROJECT NAME Lowman DPT
DRAFTED BY GAM
REVISION FEB21



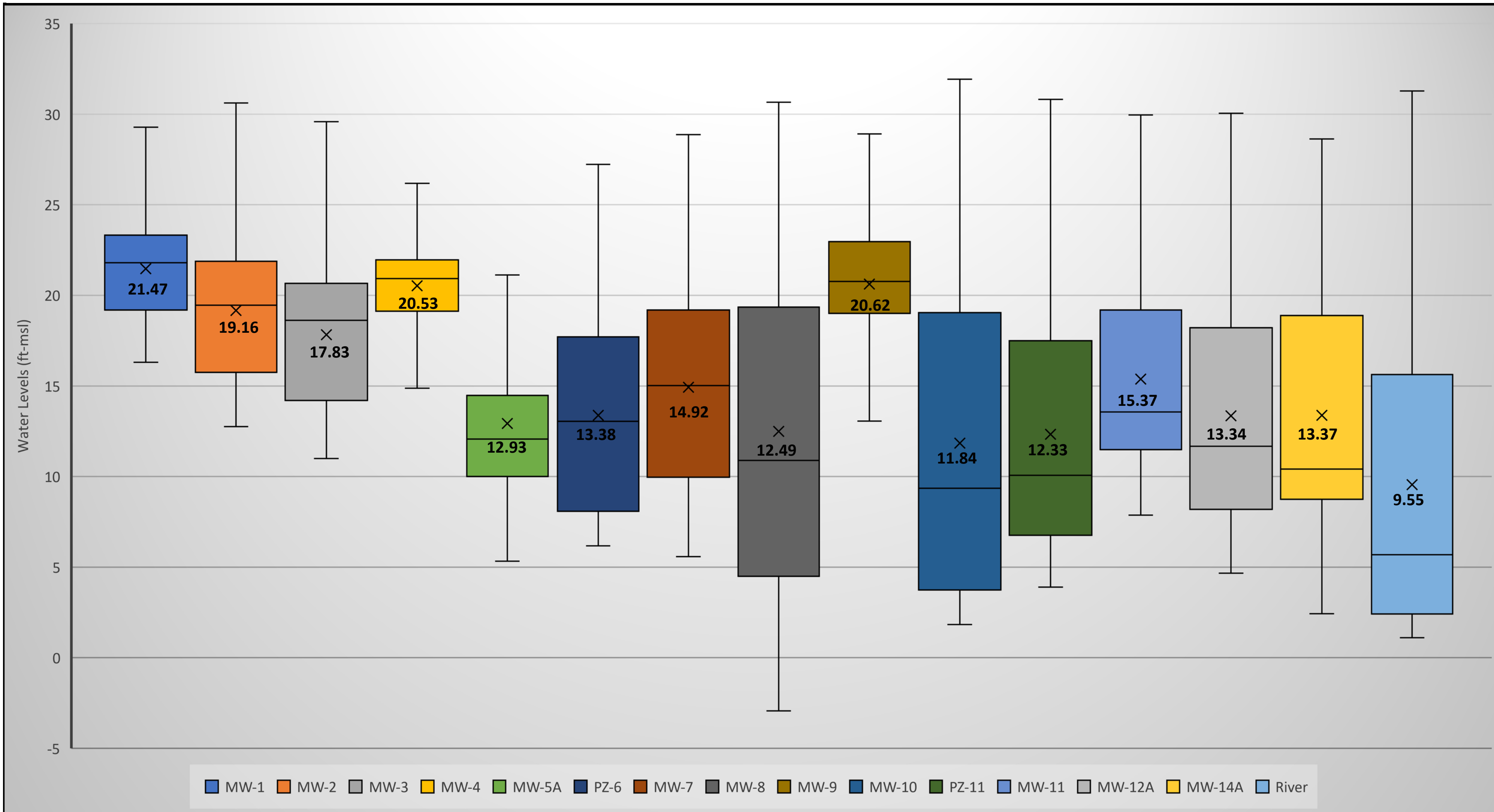


Figure 4: Groundwater Fluctuation Range 12/21/13 - 6/5/19

Charles R. Lowman Power Plant Leroy, AL

CDG Engineering. Environmental. Answers.

Drawn By: **GAM**

Checked By: **JAB**

Date: **August 2020**

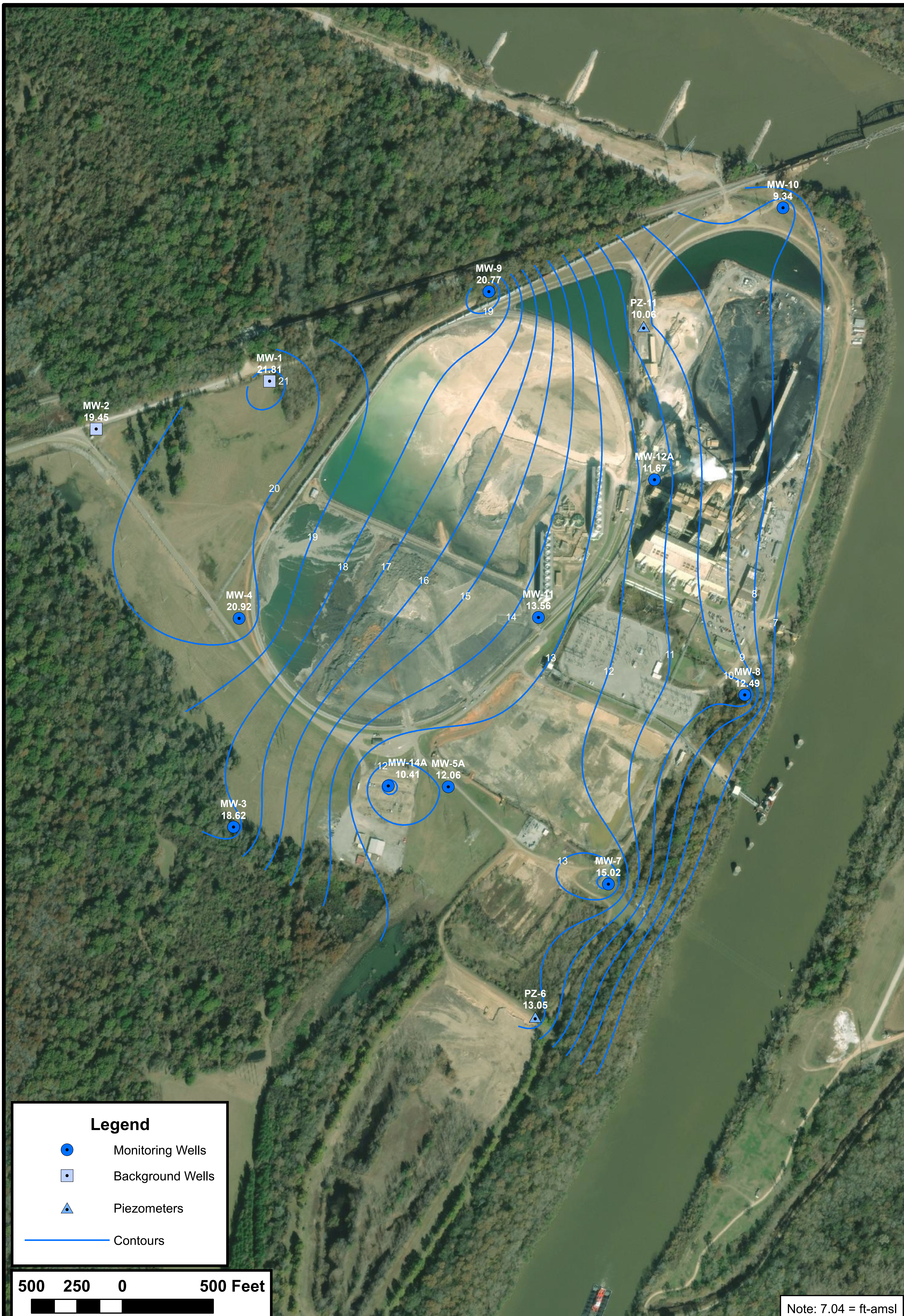


Figure 5A: Predominant Potentiometric Surface

Charles R. Lowman Power Plant
Leroy, AL

CDG Engineering. Environmental. Answers.

N

Drawn By:	GAM
Checked by:	JAB
Date:	August 2020

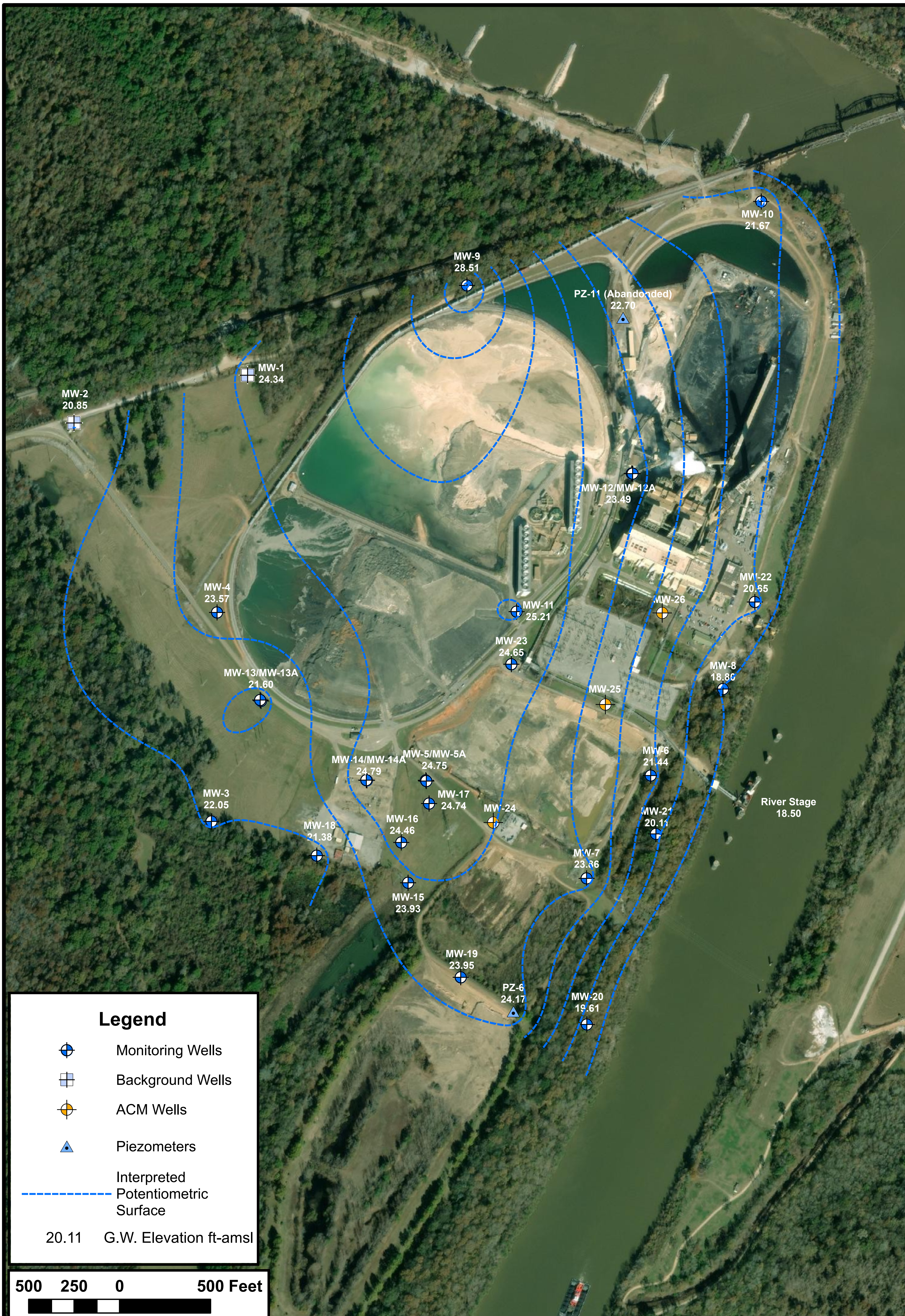


Figure 5B: Historically High Potentiometric Surface Map
March 23, 2020

Charles R. Lowman Power Plant
Leroy, AL

CDG
Engineering. Environmental. Answers.

Drawn By:	**GAM**
Checked by:	**JAB**
Date:	**Feb 2021**

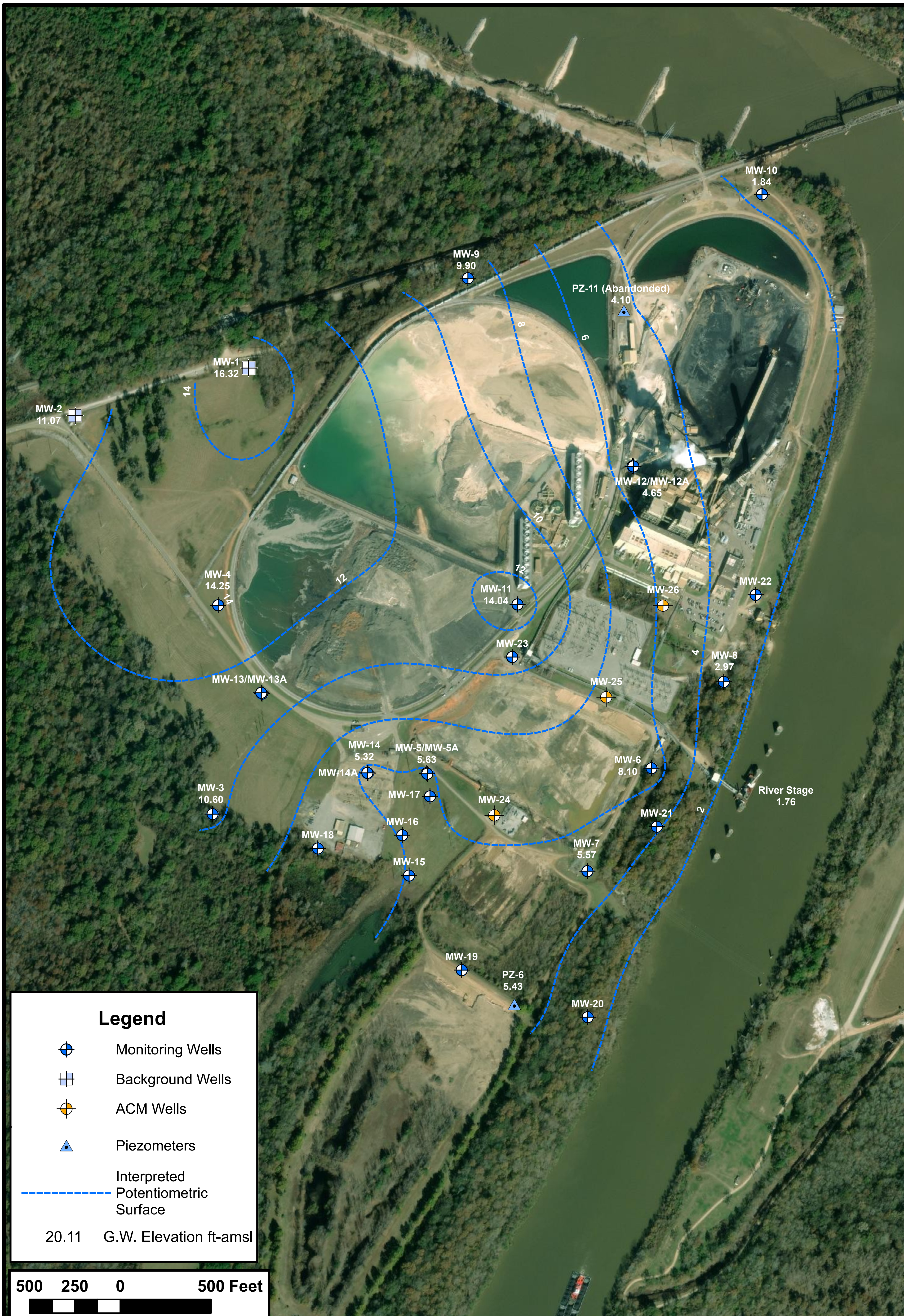


Figure 5C: Historically Low Potentiometric Surface Map November 28, 2016

Charles R. Lowman Power Plant
Leroy, AL

CDG
Engineering. Environmental. Answers.

N

Drawn By:	GAM
Checked by:	JAB
Date:	Feb 2021

APPENDIX A

BOREHOLE LOGS

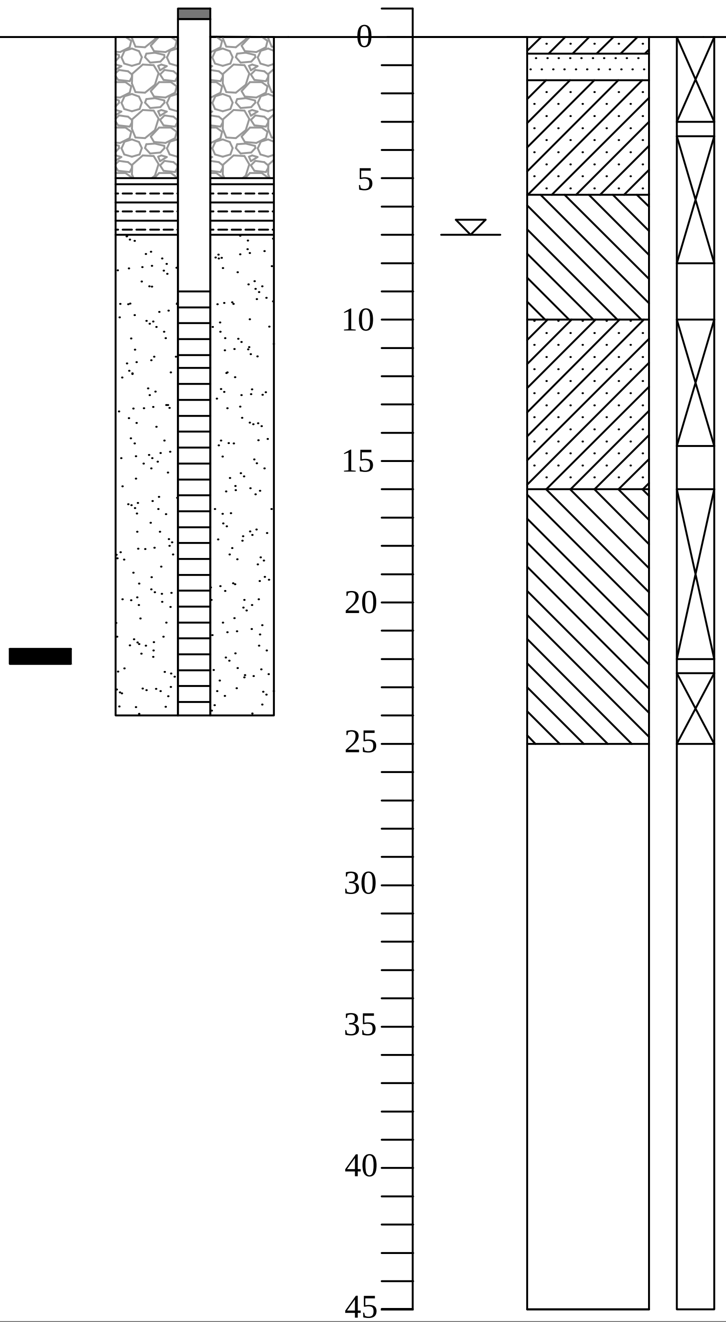
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth
Sheet 1 of 1	
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 28.17 Casing Elev.: 29.17
Location: Lowman Power Plant	Groundwater Elevation: 22.19
Hole Number: MW-1	Datum Elevation: MSL
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 24'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 10-14-13 Date Completed: 10-14-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 16.5'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



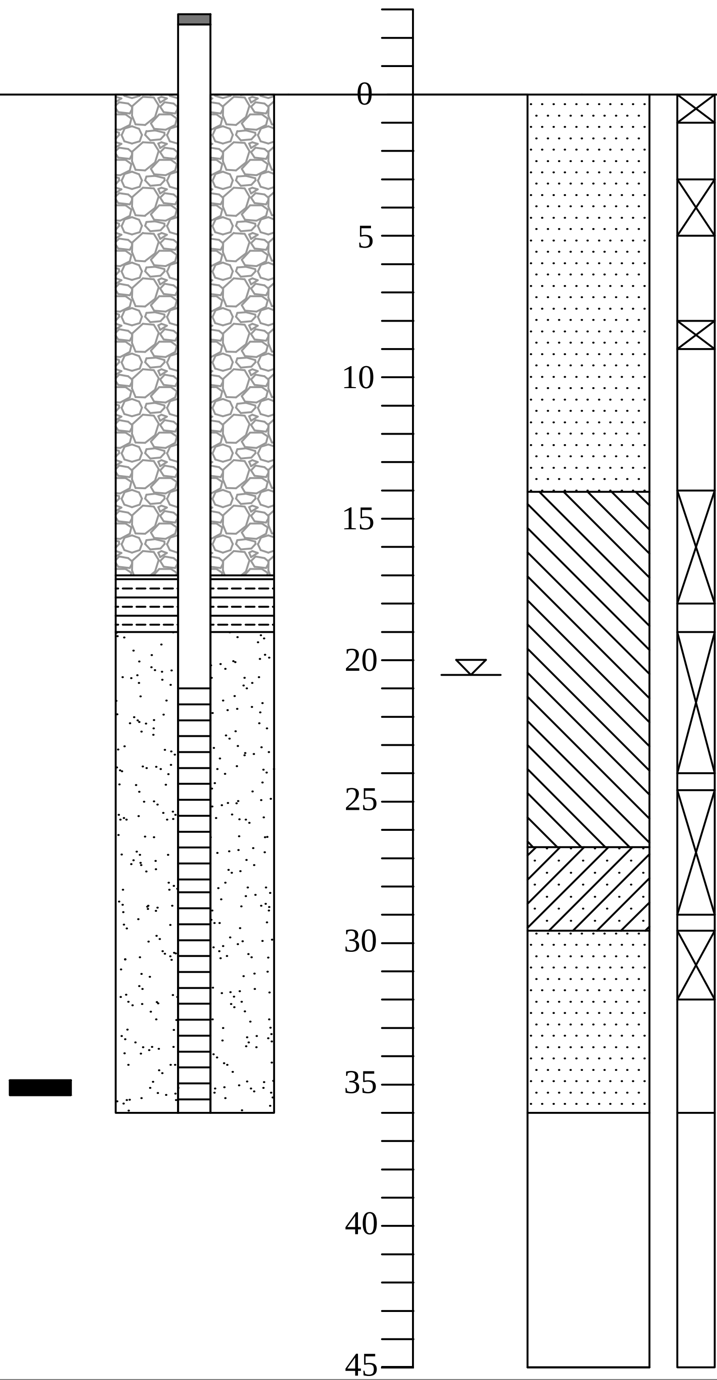
Description of Materials	USCS
Top soil, clayey sand down to 0.5 ft., deep brown, cohesive, plastic, then sand to 1.2 ft., fine-grained, pale brown, loose, 1.2 to 2.5 ft. - clayey sand with gravel (<5%), banded deep reddish-brown and dark gray and reddish-brown, cohesive, moderately plastic, moist, (20% clay)	SC SP SC
Clayey sand with interbedded sand down to 4.5 ft., loose to moderately cohesive, wet, medium-grained sand with 20% clay in beds, 4.5 to 6.5 - clay, dark gray with reddish-brown banding, plastic, <10% sand, wet	SC CL
Clayey sand, mottled pale gray and light reddish-brown, medium-grained sand with 10% clay content, cohesive, moderately plastic, wet	SC
Silty clay, light gray with reddish-brown banding, massive, plastic, <10% sand/silt, wet	CL
Clay, dark gray with dark brown and reddish-brown mottling (10%), plastic, (sticky), wet	CL

BOREHOLE LOG

CDG Engineering. Environmental. Answers.
1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 35.26	Casing Elev.: 38.18
Location: Lowman Power Plant	Groundwater Elevation: 17.62	
Hole Number: MW-2	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 36'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-15-13	Date Completed: 10-15-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 19'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval



Description of Materials	USCS
Sand with gravel, light reddish-brown, loose, 20% 1/4" - 1/2" gravel (fill material)	SP
Gravelly sand with interbedded gravelly clayey sand, fill, loose to cohesive, light reddish-brown	SP
Gravelly sand, very coarse-grained, loose, light reddish-brown, fill, dark sandy clay in shoe of sampler with deep reddish-brown clayey sand below, moist	SP
Silty clay, dark gray, plastic, <2% sand content, wet, massive	CL
Clay, gray with reddish-brown mottling, massive, plastic, <2% sand content, wet	CL
Sandy clay grading to clayey sand at 25.5 ft., gray mottled reddish-brown grading to reddish-brown mottled gray, massive, 10% medium-grained sand at top of core and 70 to 80% at base, wet	CL SC
Sand, fine-grained, loose, light brown, saturated	SP

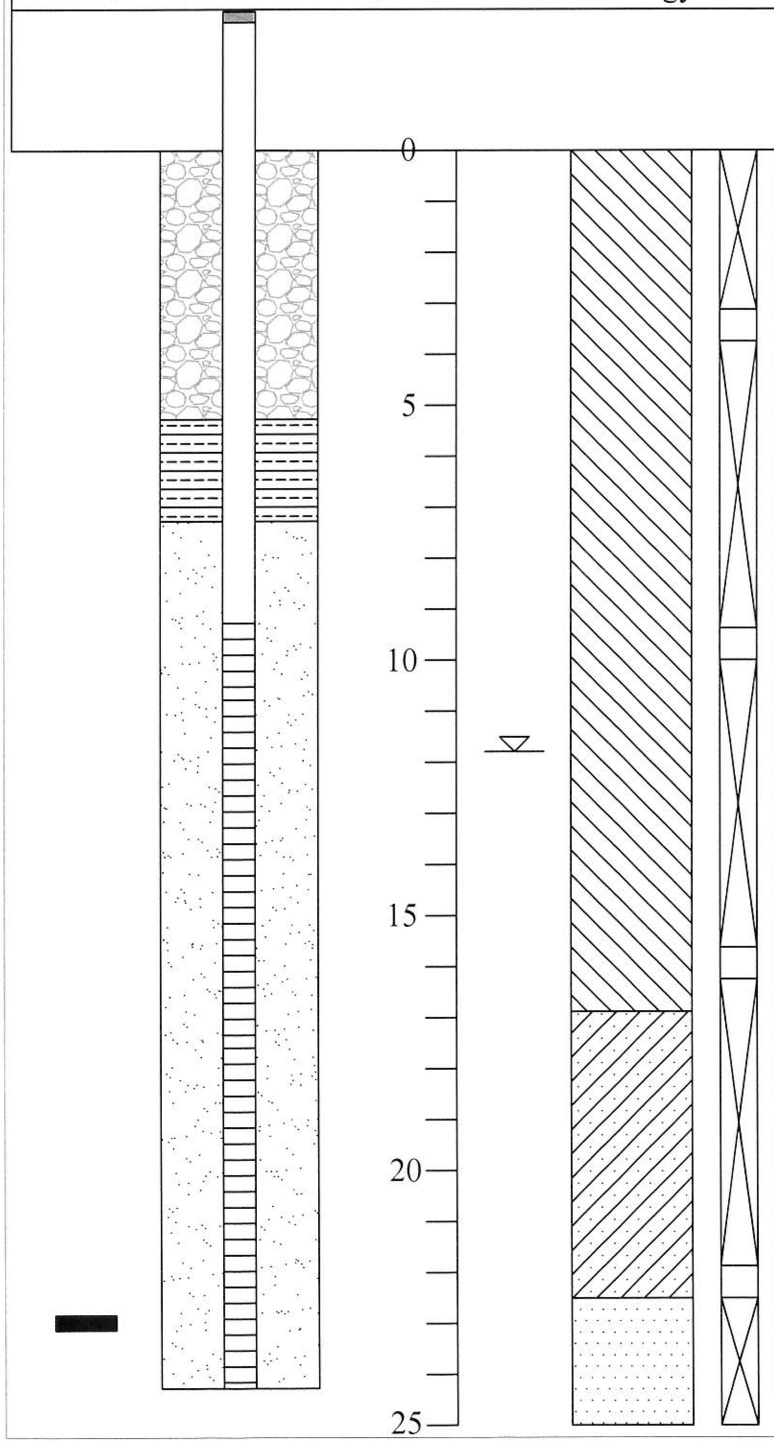
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061321201	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 24.71	Casing Elev.: 28.55
Location: Leroy, Washington County, AL	Groundwater Elevation: 16.70	
Hole Number: PZ-3	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 24'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-15-13	Date Completed: 10-15-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 18'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Sandy clay, dark brown with reddish-gray mottling, stiff, cohesive, plastic, moist to wet, <5% sand	CL
Clay, varied light reddish-brown and gray and light brown then light brown and reddish-brown mottling, stiff, plastic, <2% sand content, wet	CL
Clay, varied light reddish-brown and gray and light brown then light brown and reddish-brown mottling, massive, cohesive, stiff, plastic, wet	CL
Clay grading to clayey sand at 13.5 ft., banded pale gray and reddish-brown, fine to very fine-grained, clay decreasing to 10% at base, wet	CL SC
Sand, light brown, loose, fine-grained, saturated	SP

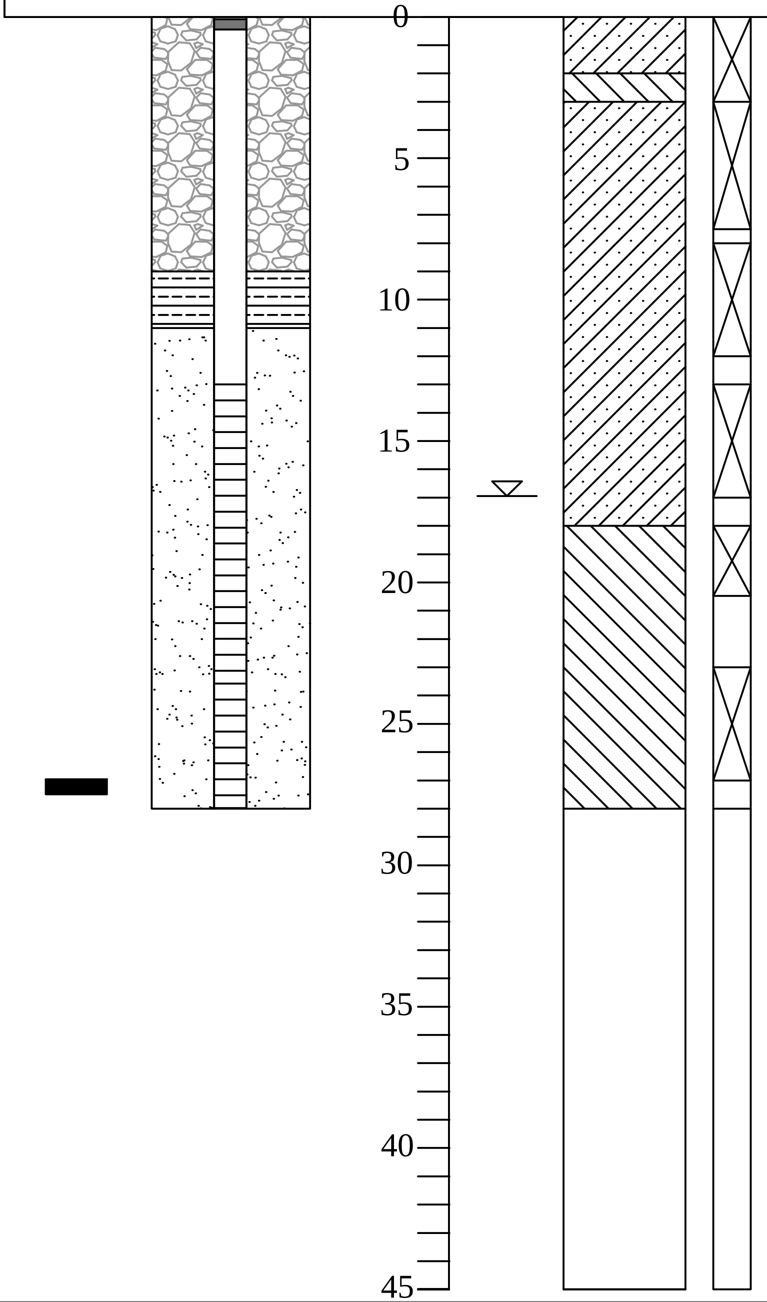
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 36.62 — Casing Elev.: 36.40
Location: Lowman Power Plant	Groundwater Elevation: 19.28
Hole Number: MW-4	Datum Elevation: MSL
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 28'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 10-15-13 — Date Completed: 10-15-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 23'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
6" topsoil, 0.5 to 2 ft. - clayey sand, varied reddish-brown and gray, loose, grading to sandy clay with gravel, cohesive, plastic, moist	SC / CL
Clayey sand, gray, plastic, fine-grained, massive, with occasional pebble and wood debris, wet	SC
Clayey sand, gray, massive, fine-grained, non-plastic, moderately cohesive, wet, occasional pebble	SC
Clayey sand, gray, massive, fine to very fine-grained micaceous sand, 10% clay content, cohesive, slightly plastic, wet, clay content varies from 15 to 20% in 4 to 6" beds throughout	SC
Clay with sandy clay, grading to light brown with gray mottling, stiff, plastic, wet	CL
Sandy clay/clayey sand, cohesive, plastic, fine to very fine-grained, mottled reddish-brown and gray, saturated	CL

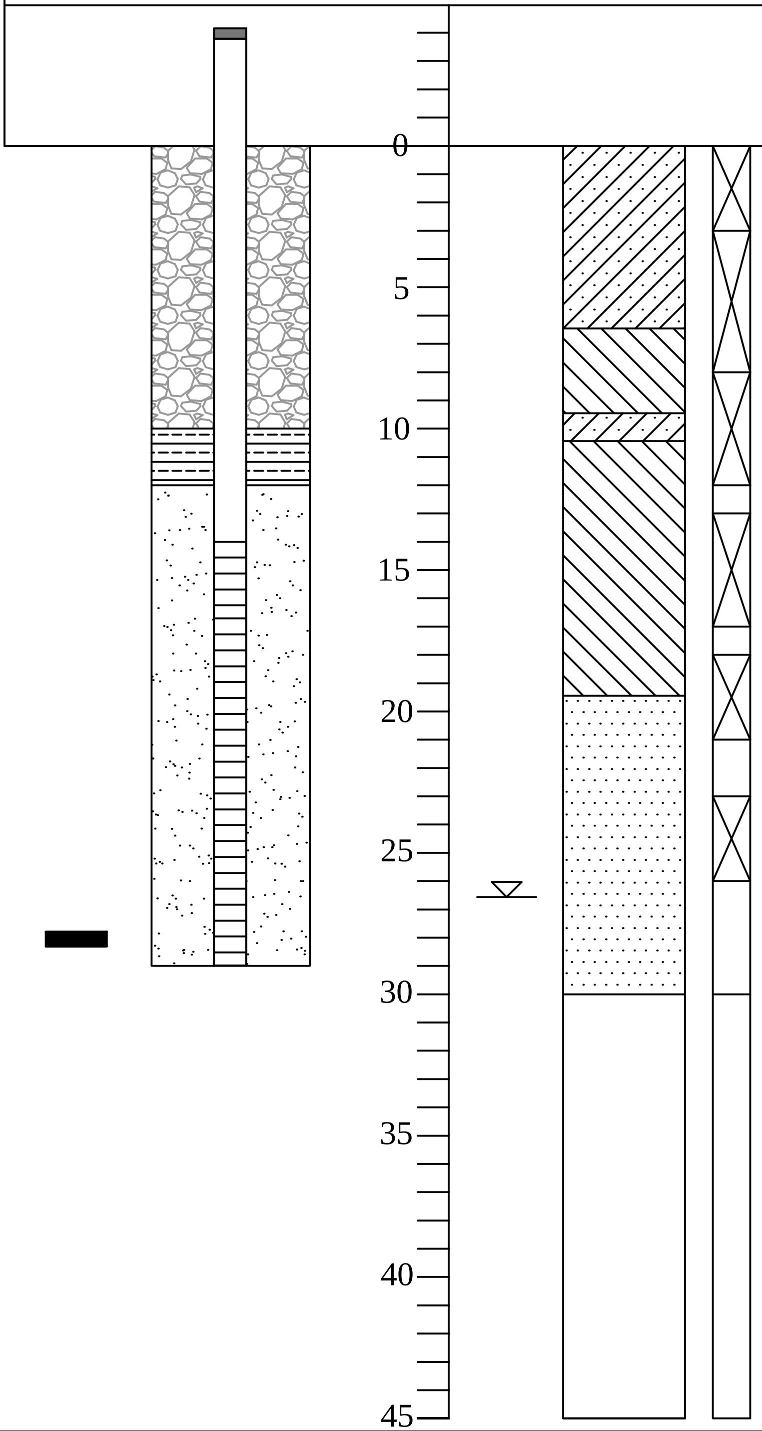
BOREHOLE LOG

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Engineering. Environmental. Answers.

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 33.32	Casing Elev.: 37.41
Location: Lowman Power Plant	Groundwater Elevation: 10.85	
Hole Number: MW-5	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 29'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-15-13	Date Completed: 10-15-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 20.5'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval



Description of Materials	USCS
Clayey sand, dark brown mottled gray, cohesive, moderately plastic to plastic, fine to medium-grained sand, moist	SC
Clayey sand, light brown interbedded with sand, reddish-brown grading to dark gray sandy clay at 6.5 ft., sandy clay, plastic, very fine-grained sand (50%), massive, wet	SC CL
Sandy clay/clayey sand down to 9.5 ft., 9.5 to 10.5 ft. - clayey sand, fine-grained, micaeous, cohesive, non-plastic, 10.5 ft. - sharp contact with sandy clay, dark gray, cohesive, plastic, wet, plant debris	CL SC
Sandy clay grading to clay, gray, plastic, <5% sand	CL
Sandy clay grading to sand/clayey sand at 19.5 ft., 19.5 to 21.5 ft. - cohesive, slightly plastic, saturated sand, fine to very fine-grained, <5% clay content	CL SP
Sand, loose, fine-grained, saturated	SP

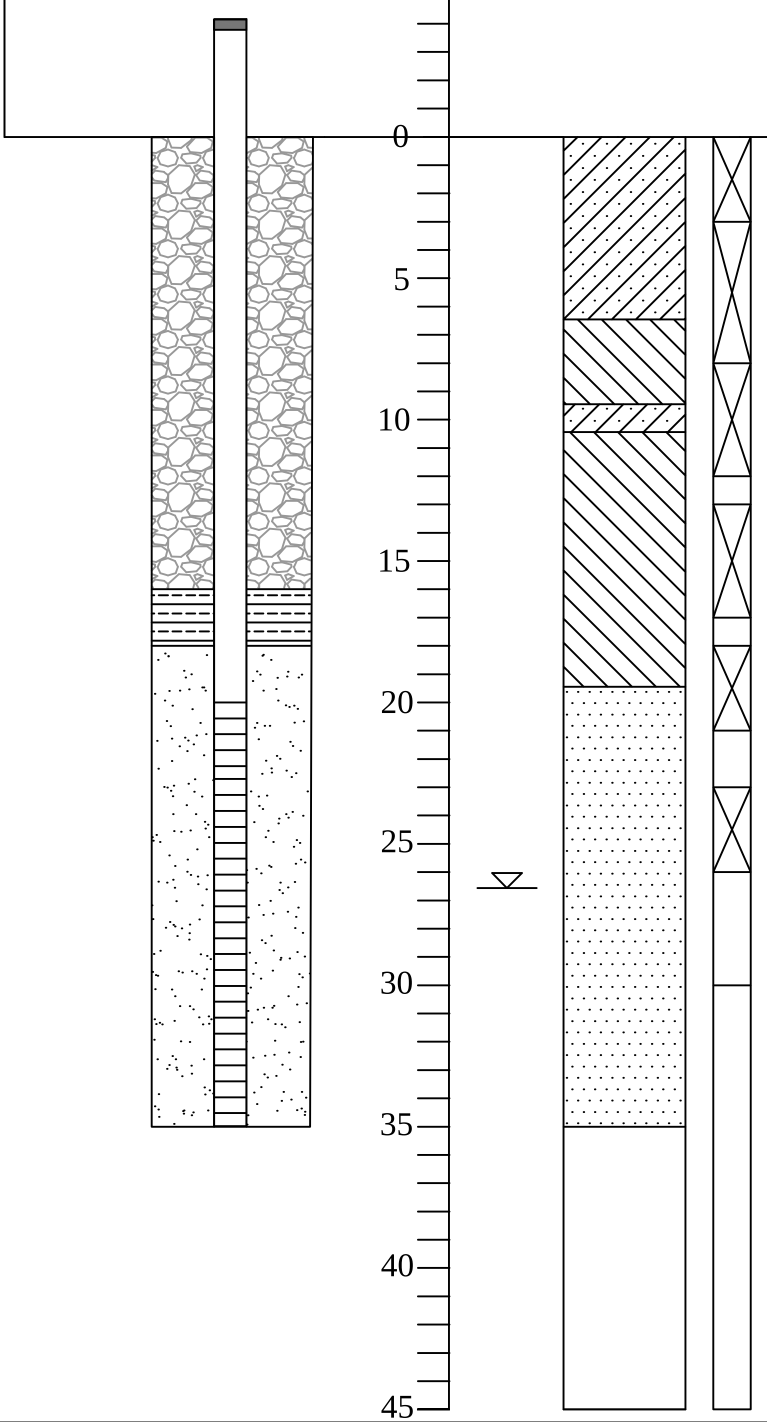
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 33.32 — Casing Elev.: 37.23
Location: Lowman Power Plant	Groundwater Elevation: 8.22
Hole Number: MW-5A	Datum Elevation: MSL
Driller: Heath Holmes	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 35'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 8-2-16 — Date Completed: 8-2-16
Remarks: 15 Feet = Screen Length	Total Core Recovery: 20.5'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval



Description of Materials	USCS
Clayey sand, dark brown mottled gray, cohesive, moderately plastic to plastic, fine to medium-grained sand, moist	SC
Clayey sand, light brown interbedded with sand, reddish-brown grading to dark gray sandy clay at 6.5 ft., sandy clay, plastic, very fine-grained sand (50%), massive, wet	SC CL
Sandy clay/clayey sand down to 9.5 ft., 9.5 to 10.5 ft. - clayey sand, fine-grained, micaeous, cohesive, non-plastic, 10.5 ft. - sharp contact with sandy clay, dark gray, cohesive, plastic, wet, plant debris	CL SC
Sandy clay grading to clay, gray, plastic, <5% sand	CL
Sandy clay grading to sand/clayey sand at 19.5 ft., 19.5 to 21.5 ft. - cohesive, slightly plastic, saturated sand, fine to very fine-grained, <5% clay content	CL SP
Sand, loose, fine-grained, saturated	SP

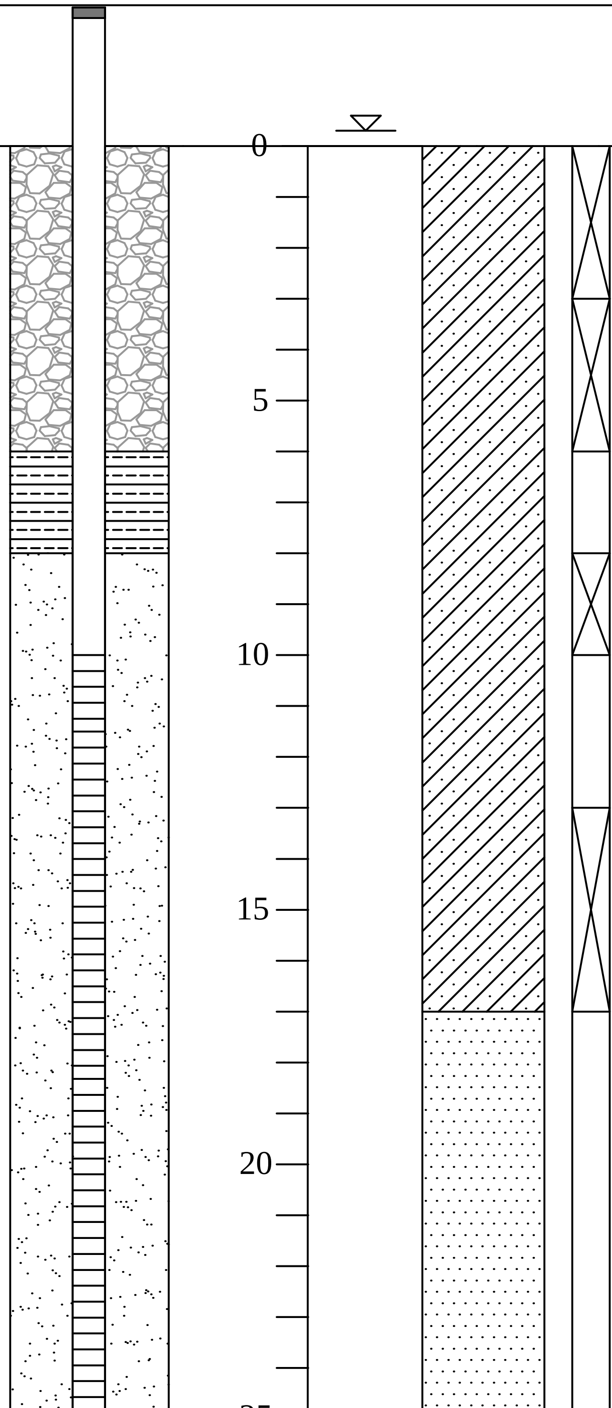
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 26.43 Casing Elev.: 30.14
Location: Leroy, Washington County, AL	Groundwater Elevation: 26.80
Hole Number: MW-6	Datum Elevation: MSL
Driller: Andy Jones	Size and Type of Auger: 8.25" O.D.
Total Depth of Boring: 25'	Size and Type of Sampler: 3" Core Barrel
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T
Remarks: 15 Feet = Screen Length	Date Started: 2-23-16 / Date Completed: 2-23-16

PID (ppm) | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Clayey sand, brown, cohesive, moderately plastic, medium-grained, wet	SC
Clayey sand, brown mottled dark gray and gray, cohesive, plastic, wet	SC
Clayey sand, brown mottled reddish-brown and gray, cohesive, plastic, wet	SC
Clayey sand, brown mottled reddish-brown and gray, cohesive, plastic, wet	SC
Clayey sand with interbedded coarse-grained sand, cohesive, plastic to slightly plastic, gray, wet to saturated	SC
Sand, coarse-grained, cohesive, plastic to slightly plastic, gray, wet to saturated	SP

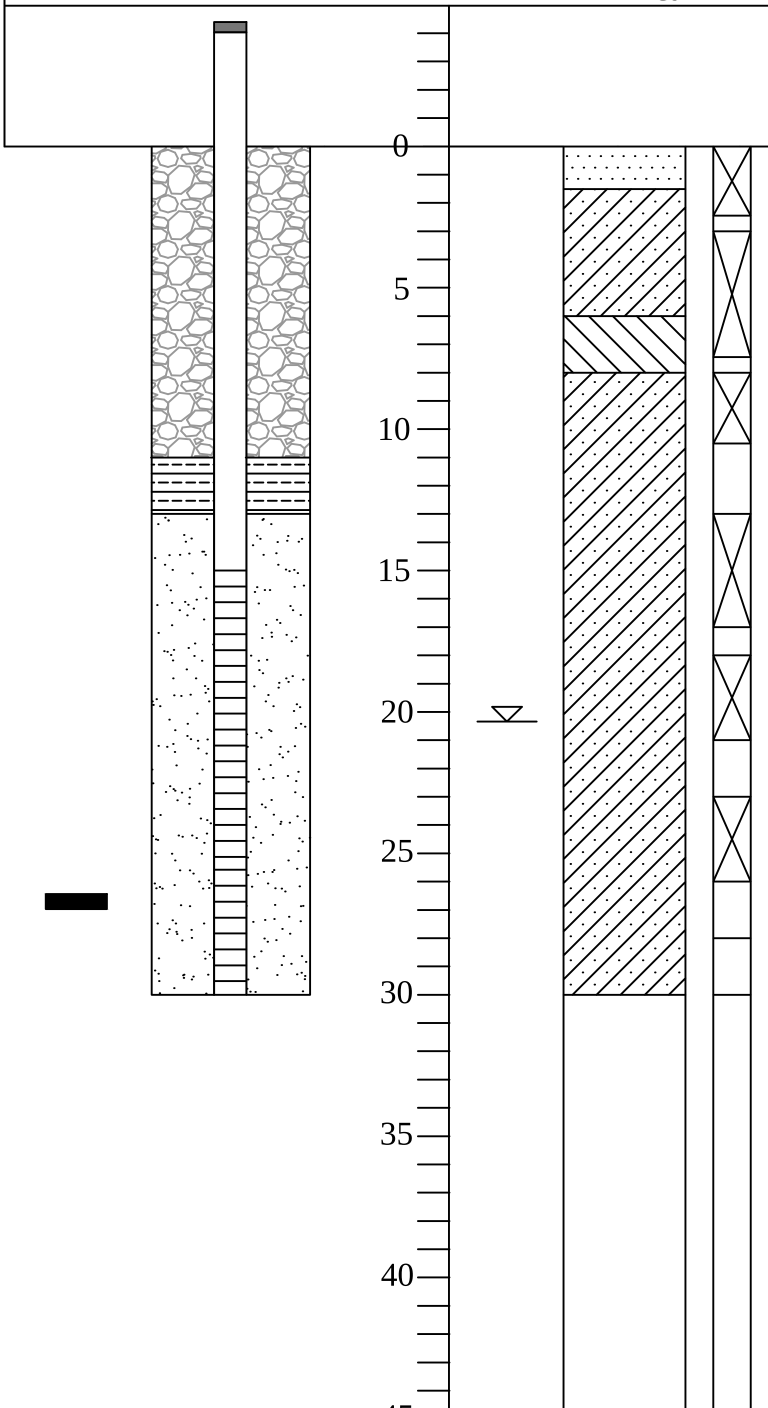
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 29.93 — Casing Elev.: 34.20
Location: Lowman Power Plant	Groundwater Elevation: 9.67
Hole Number: MW-7	Datum Elevation: MSL
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 30'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 10-16-13 — Date Completed: 10-16-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 15.5'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Sand down to 1.5 ft., pale brown and reddish-brown, loose, medium-grained, moist, 1.5 to 2.5 ft. - clayey sand, dark gray, cohesive, moderately plastic, fine to medium-grained, wet	SP SC
Clayey sand, dark gray, grading to sandy clay at 6 ft., cohesive, slightly plastic, wet	SC CL
Clayey sand/sandy clay, dark gray becoming gray and reddish-brown at 12 ft., fine-grained, cohesive, plastic, wet to saturated	SC
Clayey sand with interbedded sand, brown to pale brown, banded / thinly bedded, fine-grained, micaceous, loose to moderately cohesive, slightly plastic, wet	SC
Clayey sand, light brown to brown banded reddish-brown, cohesive, moderately plastic to loose across interval, fine to medium-grained micaceous sand, saturated	SC
Clayey sand with interbedded sandy clay, gray mottled brown, cohesive, plastic, (sandy clay - loose to slightly cohesive, clayey sand, non-plastic, medium to fine-grained, saturated, bedded 0.5 ft. between clay and clayey sand	SC

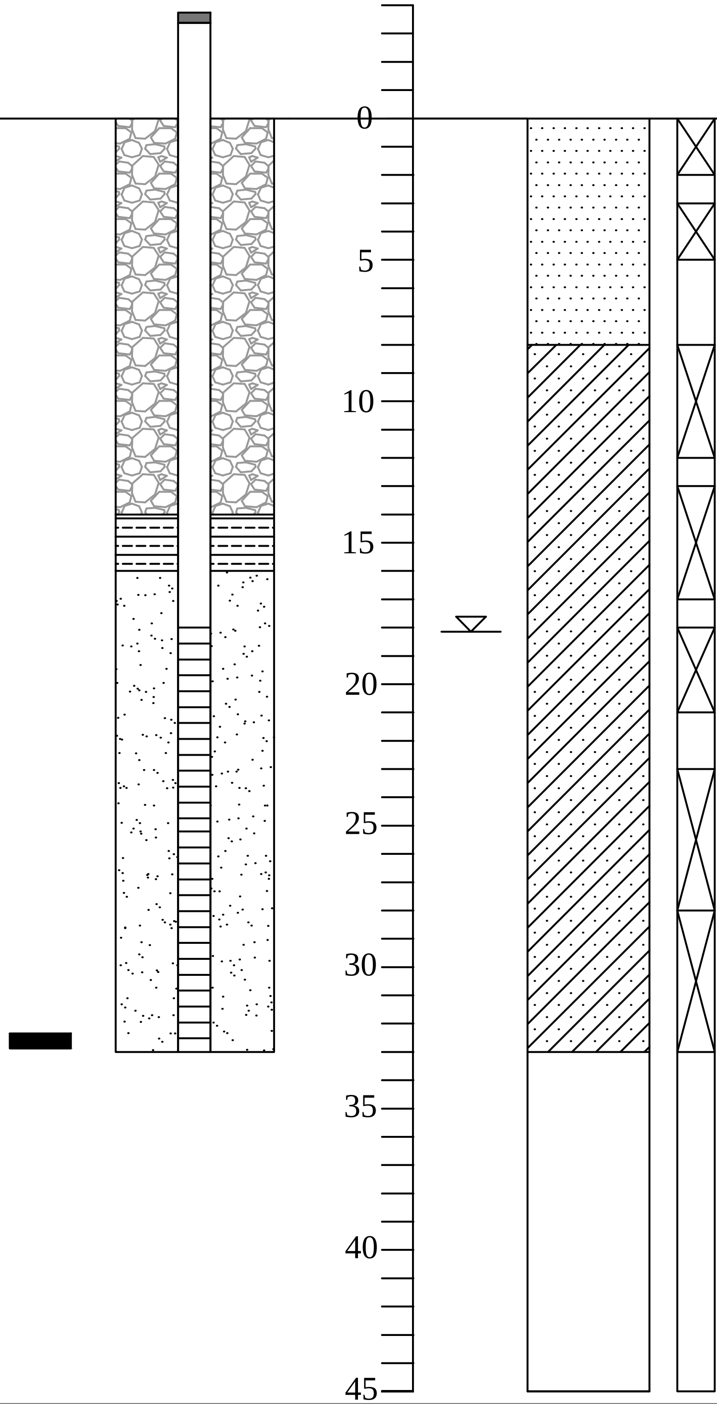
BOREHOLE LOG

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Engineering. Environmental. Answers.

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 29.07 — Casing Elev.: 32.91
Location: Lowman Power Plant	Groundwater Elevation: 10.85
Hole Number: MW-8	Datum Elevation: MSL
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 33'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 10-16-13 — Date Completed: 10-16-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 25'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Top soil, dark brown, then sand, light brown, loose, medium-grained, moist	SP
Sand, pale brown and light brown, loose, medium-grained, banded / bedded, moist to wet	SP
Clayey sand with minor interbedded sandy clay lenses, light brown banded pale brown and reddish-brown, cohesive, moderately plastic, wet, fine to medium-grained, micaceous sand	SC
Interbedded clayey sand and sand and sandy clay lenses (0.5 to 0.8 ft. thickness with sharp contact), loose to cohesive, moderately plastic along clay lenses, medium to fine-grained micaceous sand, saturated	SC
Interbedded clayey sand and sand and sandy clay down to 20.5 ft., 20.5 to 21 ft. - clayey sand with interbedded sand, gray and pale gray, lose to cohesive, moderately plastic in clayey bed, saturated	SC
Clayey sand with interbedded clay and sand lenses, dark gray with pale gray sand, cohesive, moderately plastic, major beds of clay at 25 ft. and 27 to 27.8 ft., saturated	SC
Clayey sand with interbedded sandy clay, dark gray with occasional light gray lenses of fine to very fine-grained sand, cohesive, plastic, wet to saturated, sand lense from 30 to 30.8 ft. and 32 to 32.4 ft.	SC

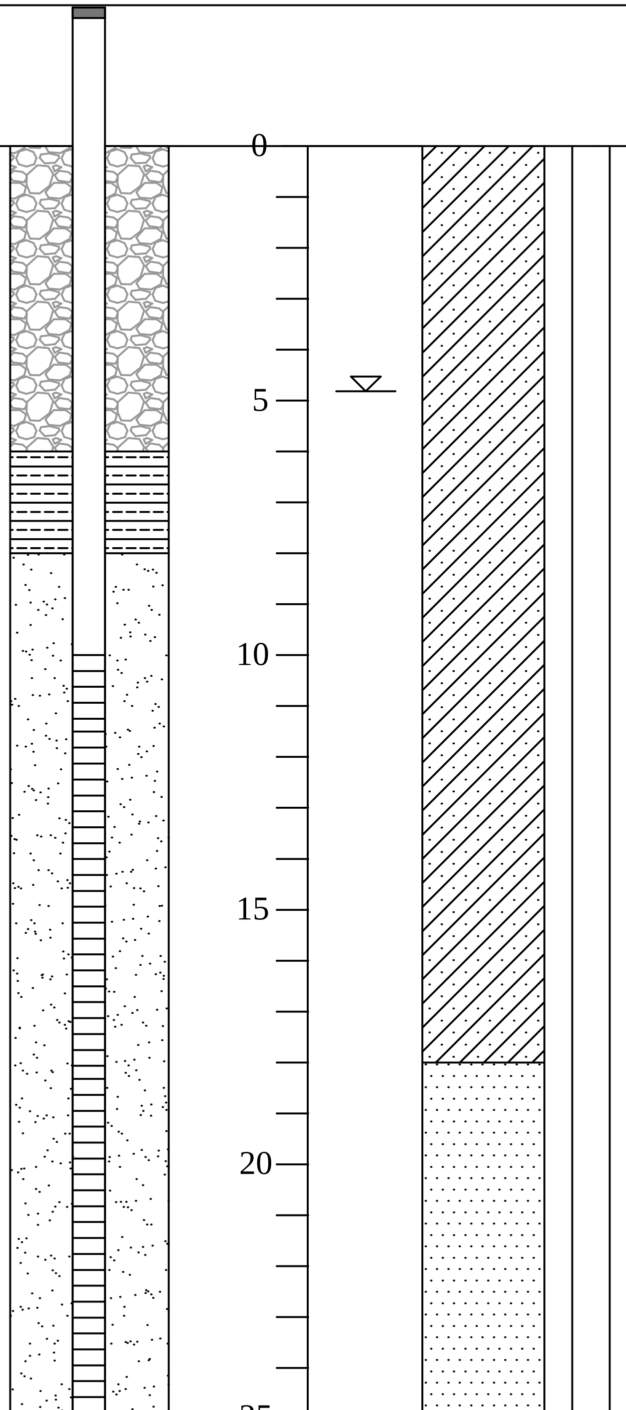
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 29.39 Casing Elev.: 32.63
Location: Leroy, Washington County, AL	Groundwater Elevation: 24.55
Hole Number: MW-9	Datum Elevation: MSL
Driller: Andy Jones	Size and Type of Auger: 8.25" O.D.
Total Depth of Boring: 25'	Size and Type of Sampler: 3" Core Barrel
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T
Remarks: 15 Feet = Screen Length	Date Started: 2-23-16 — Date Completed: 2-23-16

PID (ppm) | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Clayey sand with gravel, brown, cohesive, plastic to non-plastic	SC
Clayey sand, light brown, cohesive to loose, medium to coarse-grained, moist to wet	SC
Clayey sand, dark gray, cohesive, plastic, medium-grained, wet to saturated	SC
Clayey sand, dark gray, cohesive, plastic, medium-grained, wet to saturated	SC
Clayey sand, deep red, cohesive, moderately plastic to plastic, medium to coarse-grained, (20% clay), wet	SC
Clayey sand, deep gray and reddish-gray, plastic, wet	SC
Clayey sand, gray, wet, medium-grained	SC

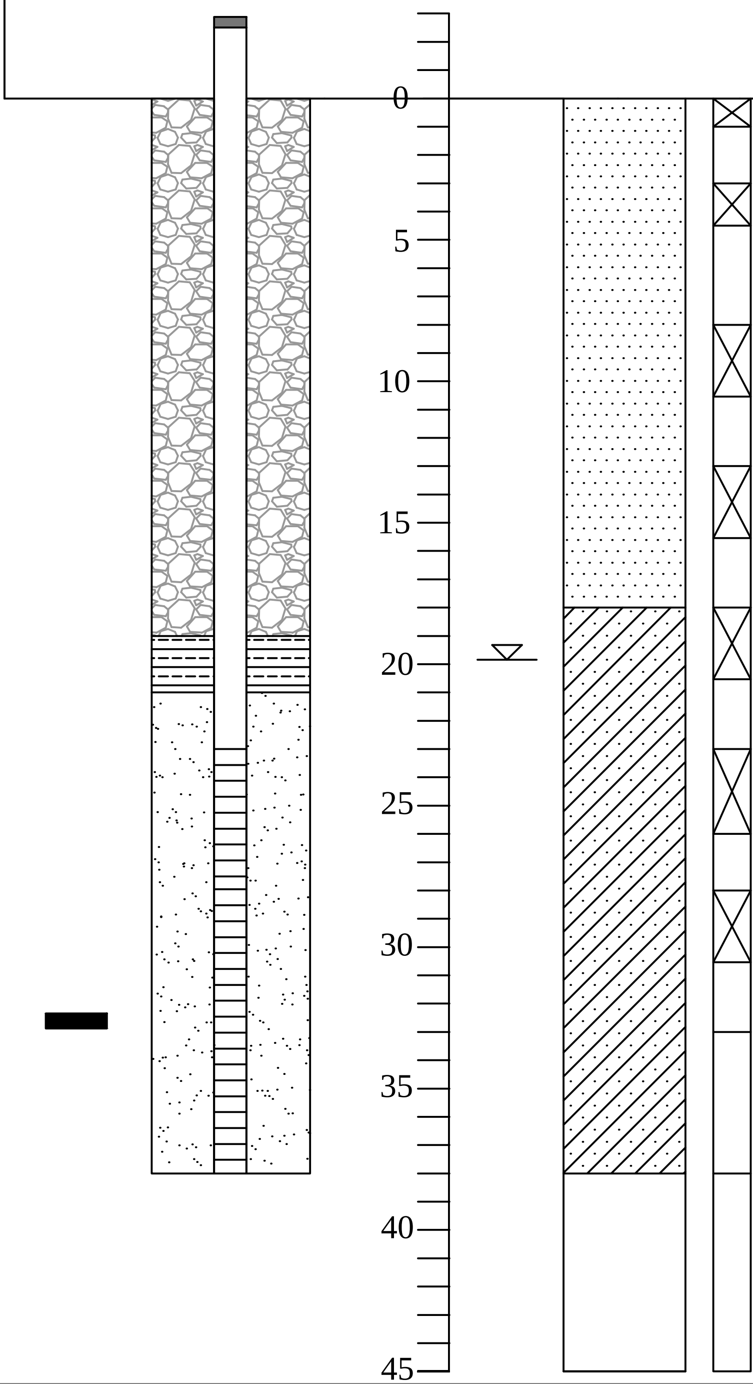
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 31.23	Casing Elev.: 34.14
Location: Lowman Power Plant	Groundwater Elevation: 11.37	
Hole Number: MW-10	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 38'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-17-13	Date Completed: 10-17-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 15.5'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Sand/clayey sand, pale brown banded brown and gray, loose to cohesive, non-plastic, moist	SP
Sand with clayey sand interval at 3.8 to 4.3 ft., sand - pale brown with brown banding, loose, fine to medium-grained, clayey sand - brown, cohesive, moderately plastic, fine to medium-grained	SP
Sand with interbedded clayey sand, light brown banded brown and reddish-brown, loose to cohesive in clayey beds, moist, non-plastic	SP
Sand with interbedded clayey sand, light brown banded brown and reddish-brown, loose to cohesive in clayey beds, moist, non-plastic	SP
Clayey sand, brown with pale brown and gray banding, cohesive, slightly plastic, fine to medium-grained, wet	SC
Clayey sand with interbedded sand, light brown banded pale gray and reddish-brown, loose in sand intervals, clayey sand intervals - cohesive, plastic, fine-grained, saturated	SC
Clayey sand with interbedded sand, dark gray with light gray sand, wood debris in lower 0.8 ft. of section, plastic clayey sand, loose sand, very fine to fine-grained, saturated	SC
No recovery	

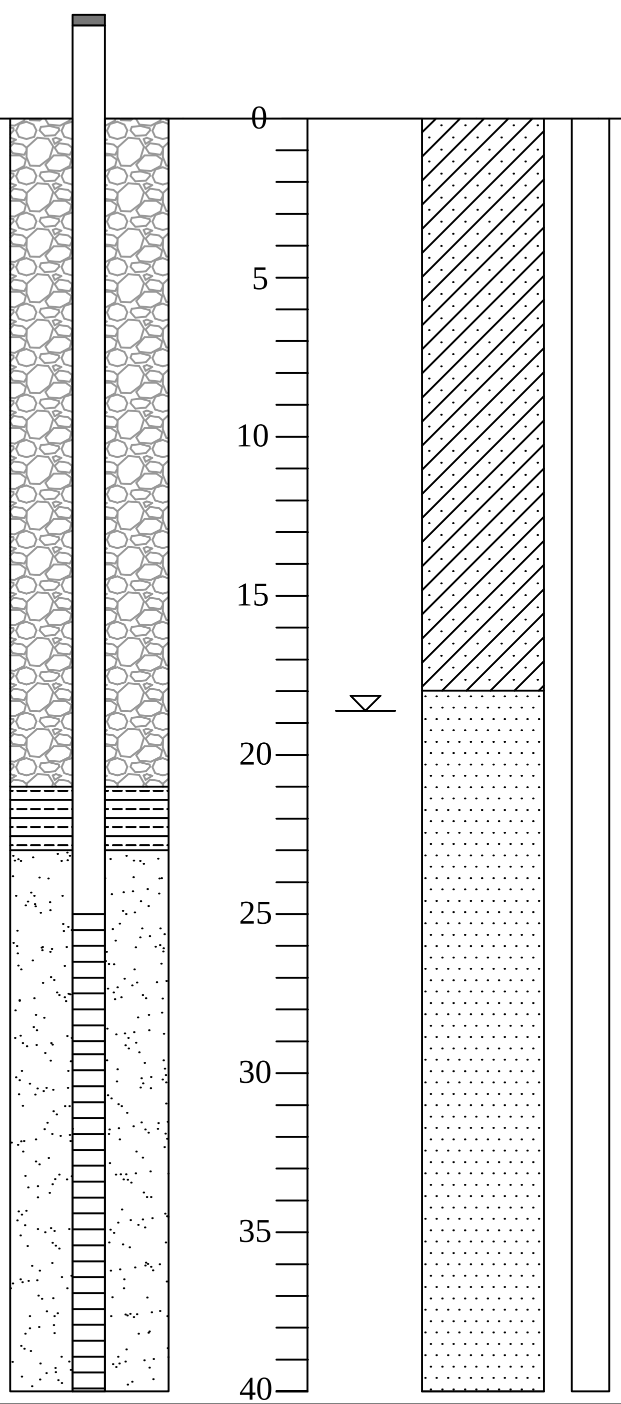
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 42.02 Casing Elev.: 45.29
Location: Leroy, Washington County, AL	Groundwater Elevation: 23.35
Hole Number: MW-11	Datum Elevation: MSL
Driller: Andy Jones	Size and Type of Auger: 8.25" O.D.
Total Depth of Boring: 40'	Size and Type of Sampler: 3" Core Barrel
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T
Remarks: 15 Feet = Screen Length	Date Started: 2-24-16 — Date Completed: 2-24-16

PID (ppm) | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



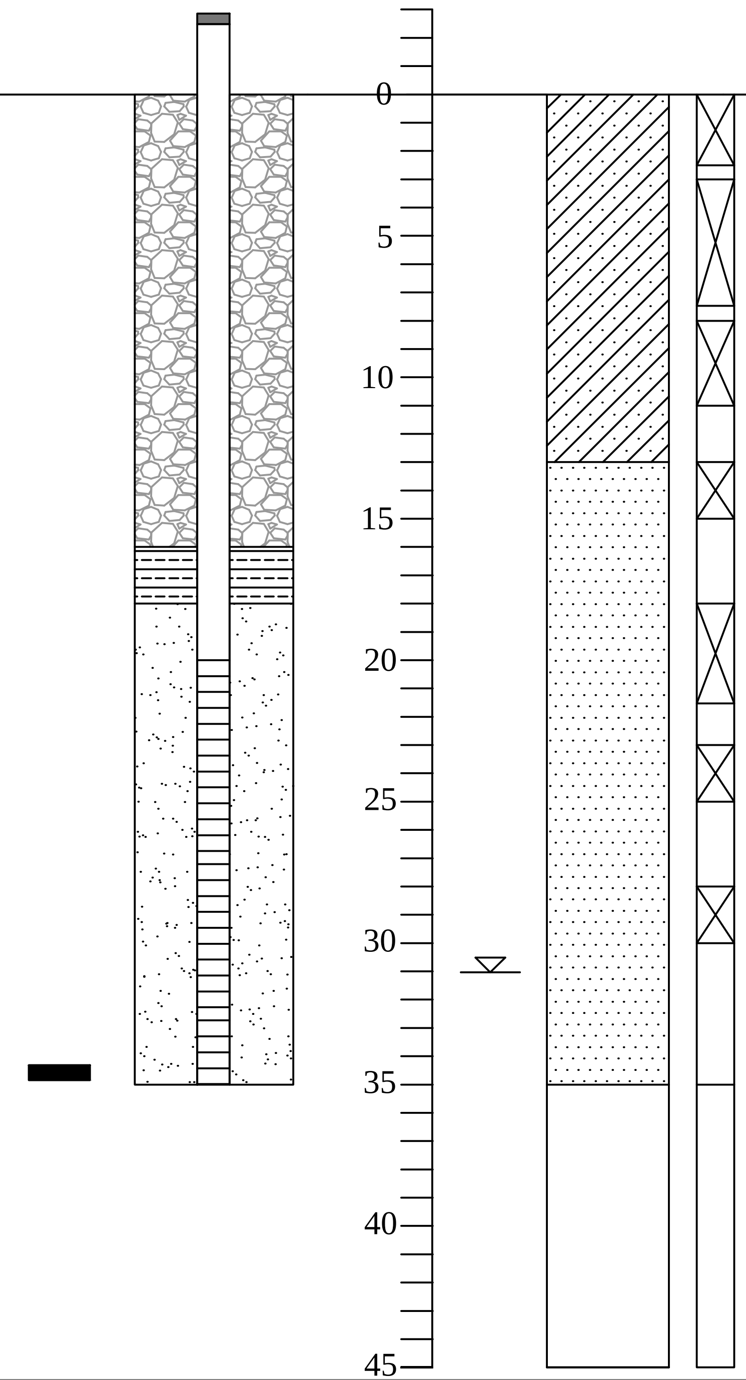
Description of Materials	USCS
Clayey sand with debris, dark gray, loose	SC
Clayey sand with gravel, reddish-brown, loose, coarse-grained, (10-20% of 1/2"-1/4" gravel)	SC
Clayey sand with gravel, deep reddish-brown, loose to slightly cohesive, non-plastic, very coarse-grained, (20% of 1/4"-1/2" gravel)	SC
Clayey sand with gravel, deep reddish-brown, loose to slightly cohesive, non-plastic, very coarse-grained, (20% of 1/4"-1/2" gravel), grading to light reddish-brown, gravel content increasing to 30-35%, wet	SC
Sand with gravel, light reddish-brown, coarse-grained, 5% of 1/4" gravel, loose, wet	SP

BOREHOLE LOG

CDG
Engineering. Environmental. Answers.
1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 40.40	Casing Elev.: 43.31
Location: Lowman Power Plant	Groundwater Elevation: 9.45	
Hole Number: MW-12	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 35'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-18-13	Date Completed: 10-18-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 19.5'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval



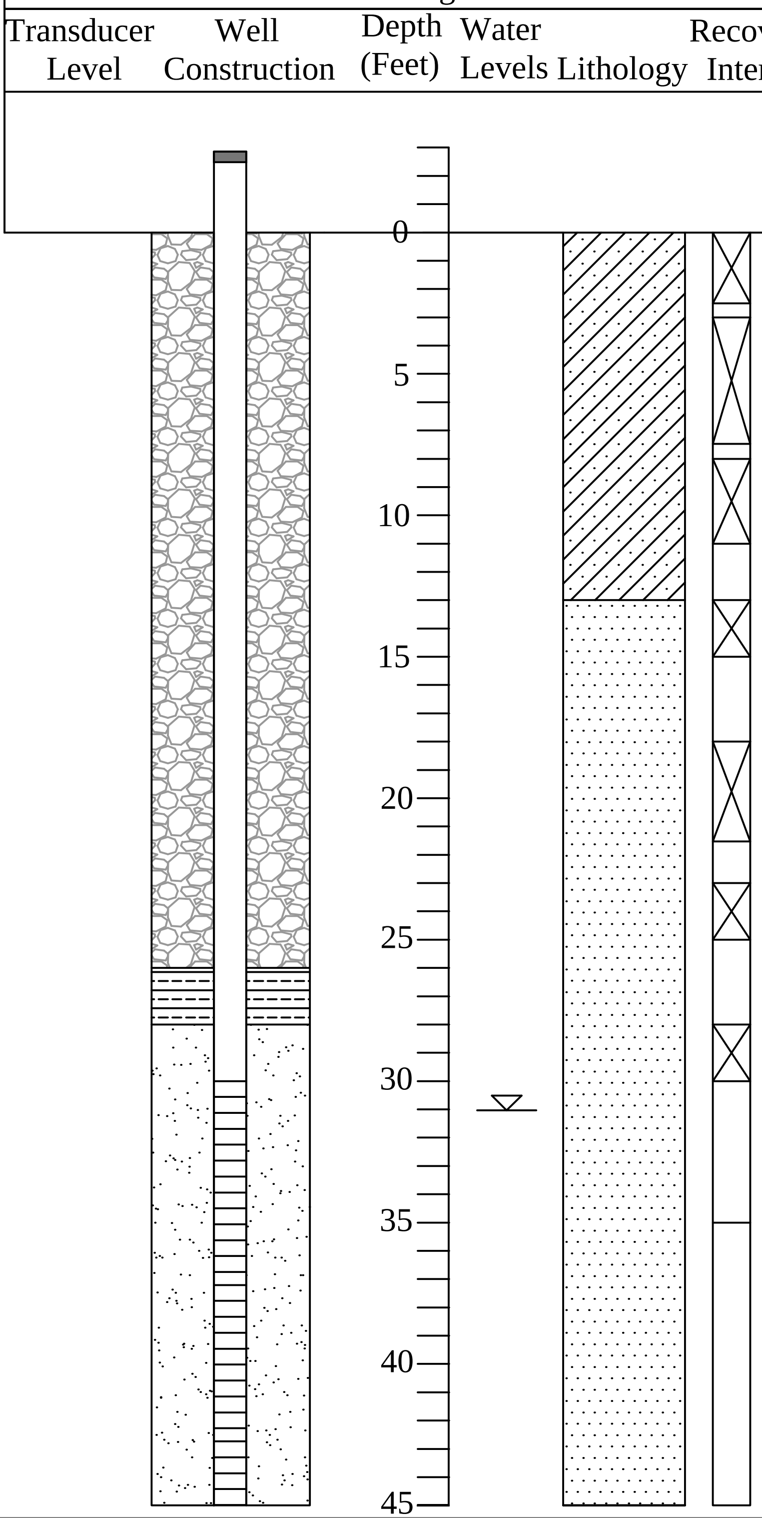
Description of Materials	USCS
Clayey sand with gravel, reddish-brown with gray mottling, cohesive, non-plastic, medium to coarse-grained, (1/4" gravel)	SC
Clayey sand with gravel down to 3.8 ft., 3.8 to 6.2 ft. - clayey sand, stiff, plastic, fine-grained, dark gray and brown, 6.2 to 7.5 ft. - sand/clayey sand, gray to dark gray, cohesive, non-plastic, fine to medium-grained, wet	SC
Clayey sand, gray, moderately cohesive to loose, non-plastic, fine-grained, wet, massive	SC
Sand, banded/bedded reddish-brown and dark brown and gray, medium-grained, loose to slightly cohesive, non-plastic, saturated	SP
Sand, light brown banded reddish-brown, loose to slightly cohesive, fine-grained, wet to saturated	SP
Sand with minor interbedded clayey sand, light brown banded brown, loose to slightly cohesive, fine-grained, wet	SP
Sand interbedded with clayey sand, light brown to pale brown, loose to slightly cohesive, wet to saturated, fine-grained	SP

BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 40.40 Casing Elev.: 43.39
Location: Lowman Power Plant	Groundwater Elevation: 6.39
Hole Number: MW-12A	Datum Elevation: MSL
Driller: Heath Holmes	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 45'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 8-2-16 — Date Completed: 8-2-16
Remarks: 15 Feet = Screen Length	Total Core Recovery: 19.5'



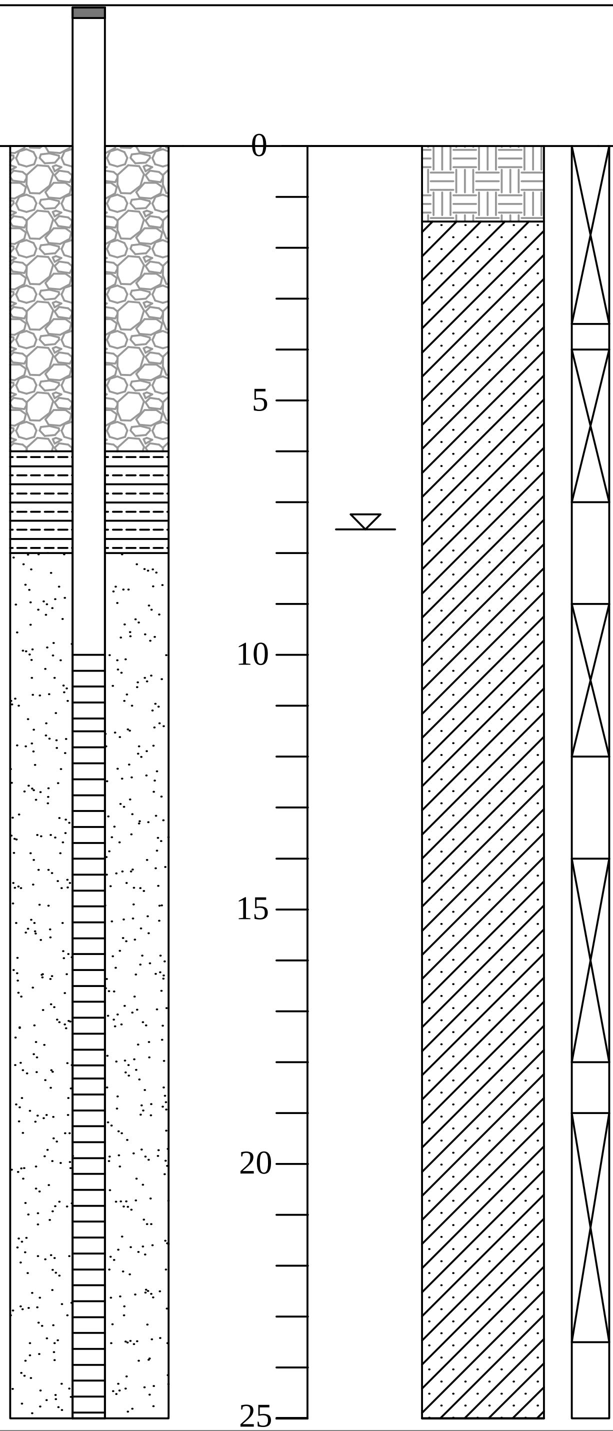
Description of Materials	USCS
Clayey sand with gravel, reddish-brown with gray mottling, cohesive, non-plastic, medium to coarse-grained, (1/4" gravel)	SC
Clayey sand with gravel down to 3.8 ft., 3.8 to 6.2 ft. - clayey sand, stiff, plastic, fine-grained, dark gray and brown, 6.2 to 7.5 ft. - sand/clayey sand, gray to dark gray, cohesive, non-plastic, fine to medium-grained, wet	SC
Clayey sand, gray, moderately cohesive to loose, non-plastic, fine-grained, wet, massive	SC
Sand, banded/bedded reddish-brown and dark brown and gray, medium-grained, loose to slightly cohesive, non-plastic, saturated	SP
Sand, light brown banded reddish-brown, loose to slightly cohesive, fine-grained, wet to saturated	SP
Sand with minor interbedded clayey sand, light brown banded brown, loose to slightly cohesive, fine-grained, wet	SP
Sand interbedded with clayey sand, light brown to pale brown, loose to slightly cohesive, wet to saturated, fine-grained	SP

BOREHOLE LOG

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 38.93	Casing Elev.: 42.26
Location: Leroy, Washington County, AL	Groundwater Elevation: 31.40	
Hole Number: MW-13	Datum Elevation: MSL	
Driller: Heath Holmes	Size and Type of Auger: 8.25" O.D.	
Total Depth of Boring: 25'	Size and Type of Sampler: 5' Core Barrel	
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T	
Remarks: 15 Feet = Screen Length	Date Started: 4-7-16	Date Completed: 4-7-16

PID (ppm)	Well Construction	Depth (Feet)	Water Levels	Lithology	Recovered Interval	Description of Materials	USCS

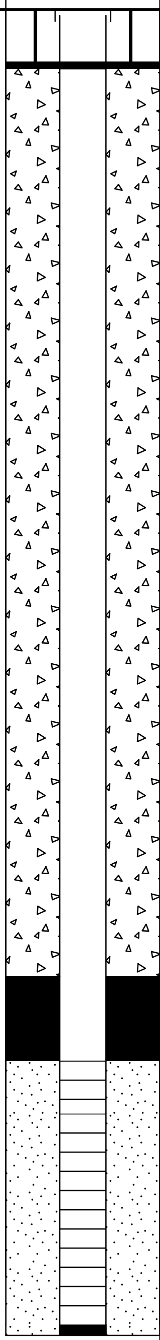
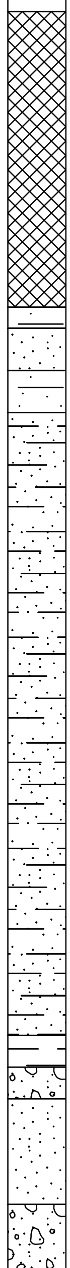


Description of Materials	USCS
Top soil, sandy loam	
Clayey sand, brown, cohesive, slightly plastic, moist, medium-grained, mottled structure	SC
Sand and gravel, red, coarse-grained, loose, wet 4.8 ft. - interbedded clayey sand and sandy clay, dark gray, plastic, wood debris, fine to medium-grained sand	SC
Interbedded clayey sand and sandy clay, wet to saturated, dark gray, plastic	SC
Clayey sand with gravel and wood debris, then sharp contact with clayey sand, reddish-brown, medium-grained, wet, 20 - 30% clay, grading to clayey sand, dark gray, plastic, saturated	SC
Clayey sand, gray, loose, grading to gray and light brown clayey sand and sandy clay, plastic, fine to very fine-grained with clay content varying (40-50%), saturated then wet to saturated	SC

www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-13A

Project Number: R021218159	Ground Elevation (ft.): 38.79	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 19.33	Total Depth of Boring (ft.): 60.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 41.61	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/20/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/20/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 49.5-59.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			2.28 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						
5						
10						Turbated mix of Clay, Silty Clay, Sand, and Sandy Clay.
15						Dark gray, Clayey Sand w/ plant matter
						Dark gray, loose, medium grained Sand
						Dark gray and mottled reddish brown Clayey Sand interbedded with Sandy Clay
20	▽					
			Grout (0.0' - 43.0')			
25						
30						
35						Mottled reddish-brown and light gray, stiff, plastic, massive Sandy Clay. Iron nodules and plant matter throughout
40						
45			Bentonite Seal (43.0' - 47.0')			
			Sand Pack (47.0' - 60.0')			
50						Reddish brown and gray, stiff, plastic, Clay
						Reddish-brown, loose, gravelly, very coarse Sand
55			Screen (49.5' - 59.5')			Pale reddish-brown, loose, medium to fine grained Sand
						Pale reddish-brown, loose, gravelly, very coarse to coarse grained Sand
60			Bottom Well Cap (60.0')			

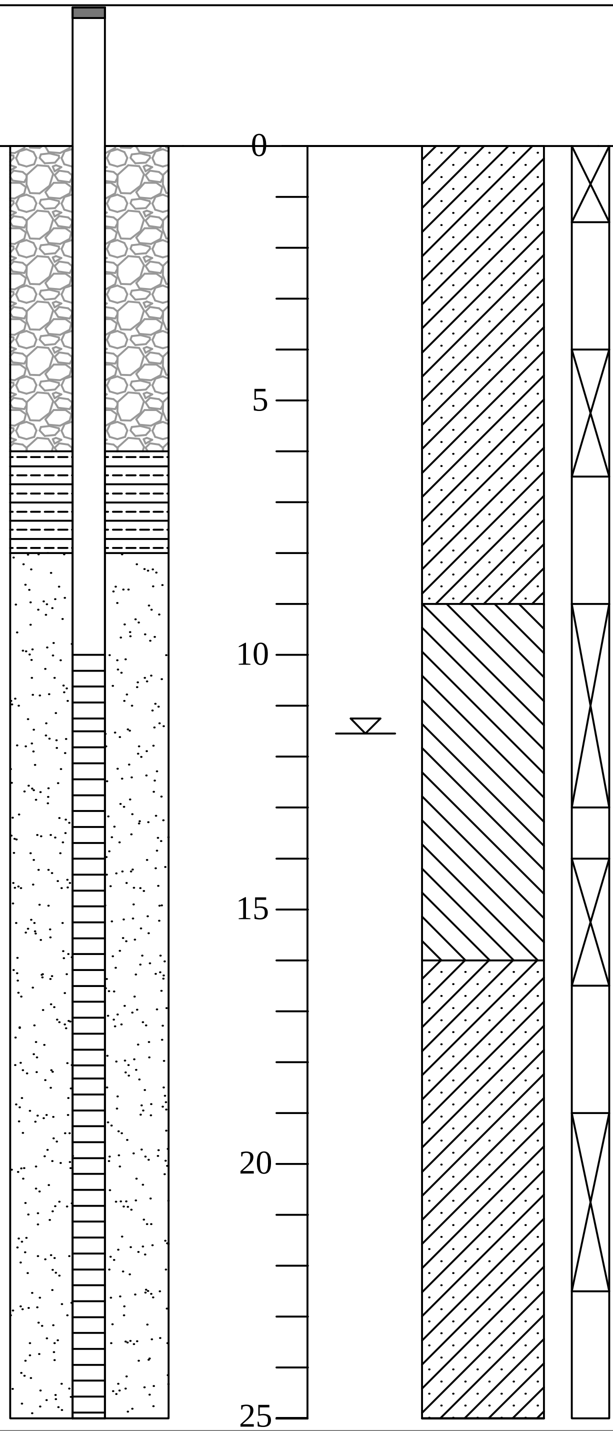
BOREHOLE LOG

CDG Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 34.93 — Casing Elev.: 38.56
Location: Leroy, Washington County, AL	Groundwater Elevation: 23.31
Hole Number: MW-14	Datum Elevation: MSL
Driller: Heath Holmes	Size and Type of Auger: 8.25" O.D.
Total Depth of Boring: 25'	Size and Type of Sampler: 5' Core Barrel
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T
Remarks: 15 Feet = Screen Length	Date Started: 4-7-16 — Date Completed: 4-7-16

PID (ppm) | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



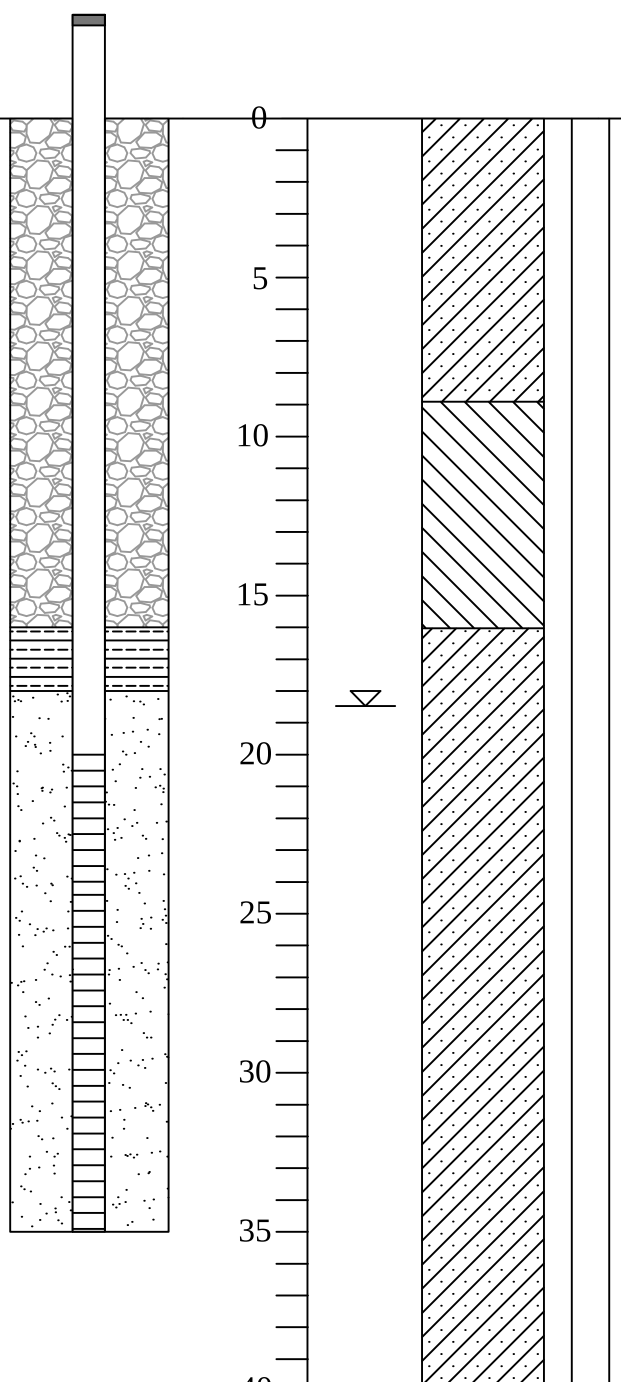
Description of Materials	USCS
Fill material, reddish-brown and red gravel, clayey sand, loose, moist to wet, sharp contact with gray clayey sand at 1.4 ft.	SC
Clayey sand with interbedded sandy clay and sand, dark gray mottled dark gray and reddish-brown, stiff, loose in sandy lenses, wet, fine-grained	SC
Sandy clay with interbedded clay and clayey sand, dark gray to gray, very fine to fine-grained, plastic, wet	CL
Silty clay, dark gray, plastic, wood debris, sharp contact with clayey sand at 16.1 ft., clayey sand, fine-grained, slightly plastic, saturated	CL SC
Clayey sand with interbedded (minor) sandy clay, dark gray, loose, saturated, fine to medium-grained	SC

BOREHOLE LOG

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061621202	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Power Plant	Ground Elevation: 34.93	Casing Elev.: 38.50
Location: Leroy, Washington County, AL	Groundwater Elevation: 8.42	
Hole Number: MW-14A	Datum Elevation: MSL	
Driller: Heath Holmes	Size and Type of Auger: 8.25" O.D.	
Total Depth of Boring: 35'	Size and Type of Sampler: 5' Core Barrel	
Log Prepared By: Alan Barck	Drill Rig Manufacture: Mobile D-50 T	
Remarks: 15 Feet = Screen Length	Date Started: 8-2-16	Date Completed: 8-2-16

PID (ppm) | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



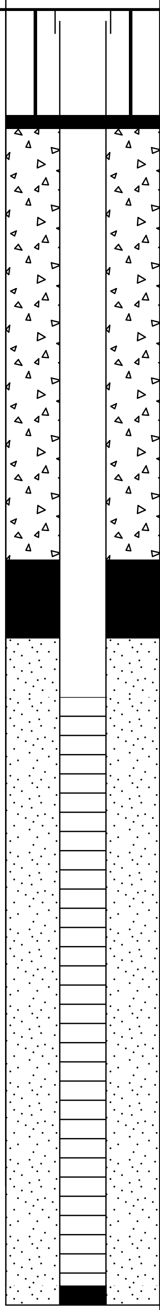
Description of Materials	USCS
Fill material, reddish-brown and red gravel, clayey sand, loose, moist to wet, sharp contact with gray clayey sand at 1.4 ft.	SC
Clayey sand with interbedded sandy clay and sand, dark gray mottled dark gray and reddish-brown, stiff, loose in sandy lenses, wet, fine-grained	SC
Sandy clay with interbedded clay and clayey sand, dark gray to gray, very fine to fine-grained, plastic, wet	CL
Silty clay, dark gray, plastic, wood debris, sharp contact with clayey sand at 16.1 ft., clayey sand, fine-grained, slightly plastic, saturated	CL
	SC
Clayey sand with interbedded (minor) sandy clay, dark gray, loose, saturated, fine to medium-grained	SC

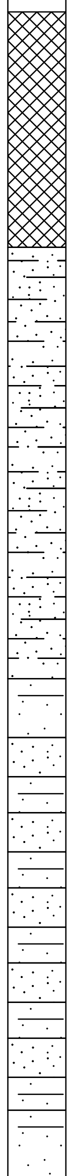
CDG
Engineering. Environmental. Answers.
www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-15

Project Number: R021218159	Ground Elevation (ft.): 33.20	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 18.87	Total Depth of Boring (ft.): 30.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 31.51	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/18/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/18/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 14.5-29.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			3.03 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						
5			Grout (0.0' - 11.0')			Turbated mix of reddish-brown, sandy clay, clay and sand
10	▽		Bentonite Seal (11.0' - 13.0')			Dark gray to reddish brown, mottled, stiff, plastic, sandy clay with plant matter and wood pieces
15			Sand Pack (13.0' - 30.0')			Light gray and brown, cohesive, clayey sand
20			Screen (14.5' - 29.5')			Interbedded light brown, loose, med-fine grained sand and intervals of clayey sand
25						
30			Bottom Well Cap (30.0')			Dark gray, cohesive, clayey sand



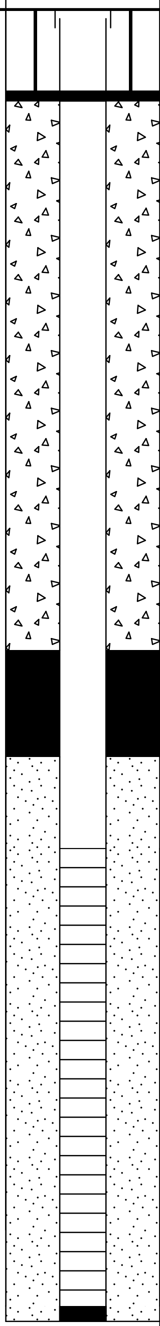


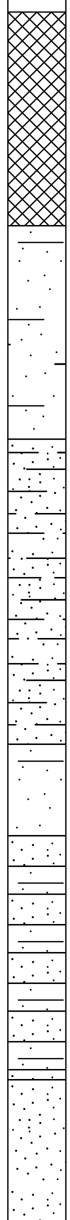
CDG
Engineering. Environmental. Answers.
www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-16

Project Number: R021218159	Ground Elevation (ft.): 31.70	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 18.83	Total Depth of Boring (ft.): 40.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 34.70	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/19/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/19/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 24.5-39.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
0			3.0 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
5						Turbated mix of red-orange, clay, sand, gravel, clayey sand, with plant matter and wood fibers
10	▽		Grout (0.0' - 18.0')			Light green-gray, cohesive, clayey sand
15						
20			Bentonite Seal (18.0' - 21.5')			Dark gray, plastic, stiff, sandy clay with iron/pyrite nodules and plant matter
25			Sand Pack (21.5' - 40.0')			Light gray, cohesive, clayey sand
30						Interbedded, pale gray and light brown, sand and clayey sand
35			Screen (24.5' - 39.5')			
40			Bottom Well Cap (40.0')			Light brown, loose, med-fine grained sand



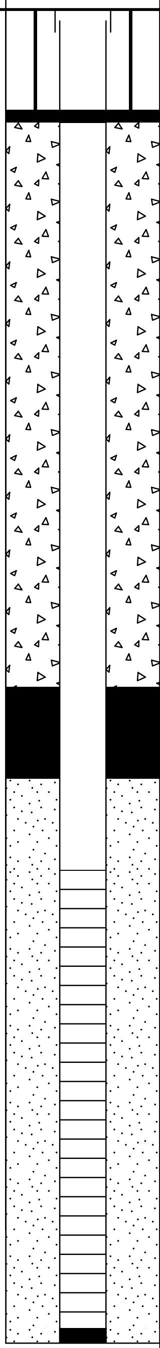
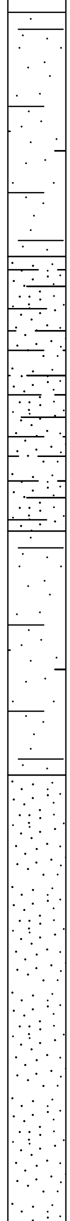


www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-17

Project Number: R021218159	Ground Elevation (ft.): 27.81	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 18.52	Total Depth of Boring (ft.): 40.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 31.51	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/19/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/19/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 24.5-39.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			3.7 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						
5						Orange-brown, micaceous, cohesive, clayey sand
10			Grout (0.0' - 18.5')			
	▽					Green-gray, micaceous, stiff, plastic, bioturbated sandy clay
15						
20			Bentonite Seal (18.5' - 21.5')			Light gray-brown, micaceous, cohesive, clayey sand
			Sand Pack (21.5' - 40.0')			
25						
30						
			Screen (24.5' - 39.5')			Tan-brown, micaceous, fine-medium grained sand
35						
40			Bottom Well Cap (40.0')			

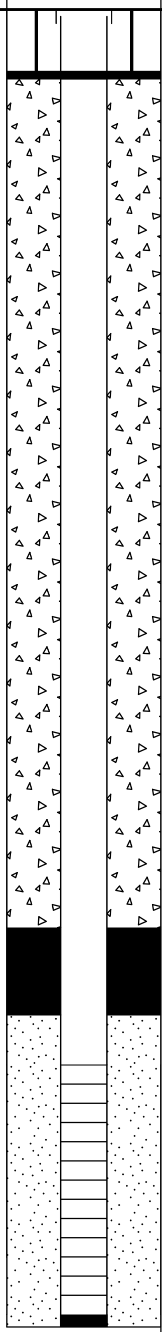
CDG
Engineering. Environmental. Answers.
www.cdge.com

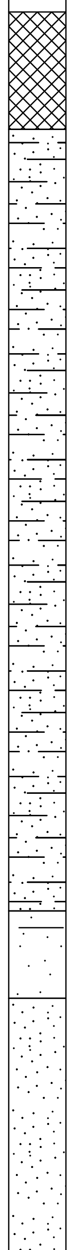
BORING AND WELL COMPLETION LOG

BORING / WELL ID MW-18

Project Number: R021218159	Ground Elevation (ft.): 32.64	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 16.18	Total Depth of Boring (ft.): 50.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 35.42	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/20/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/20/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 39.5-49.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			2.78 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						Red-orange, sand, gravel, mix of coal, clay, sand and gravel
5						
10						
	▽					
15						
			Grout (0.0' - 34.0')			
20						Light gray, stiff, plastic, sandy clay with plant matter, and large pieces of wood at 16.5 ft
25						
30						
35			Bentonite Seal (34' - 37.5')			
			Sand Pack (37.5' - 50.0')			Light gray, cohesive, clayey sand
40						
45			Screen (39.5' - 49.5')			Light to dark gray, loose, fine grained sand with organic matter around 42 ft.
50			Bottom Well Cap (50.0')			



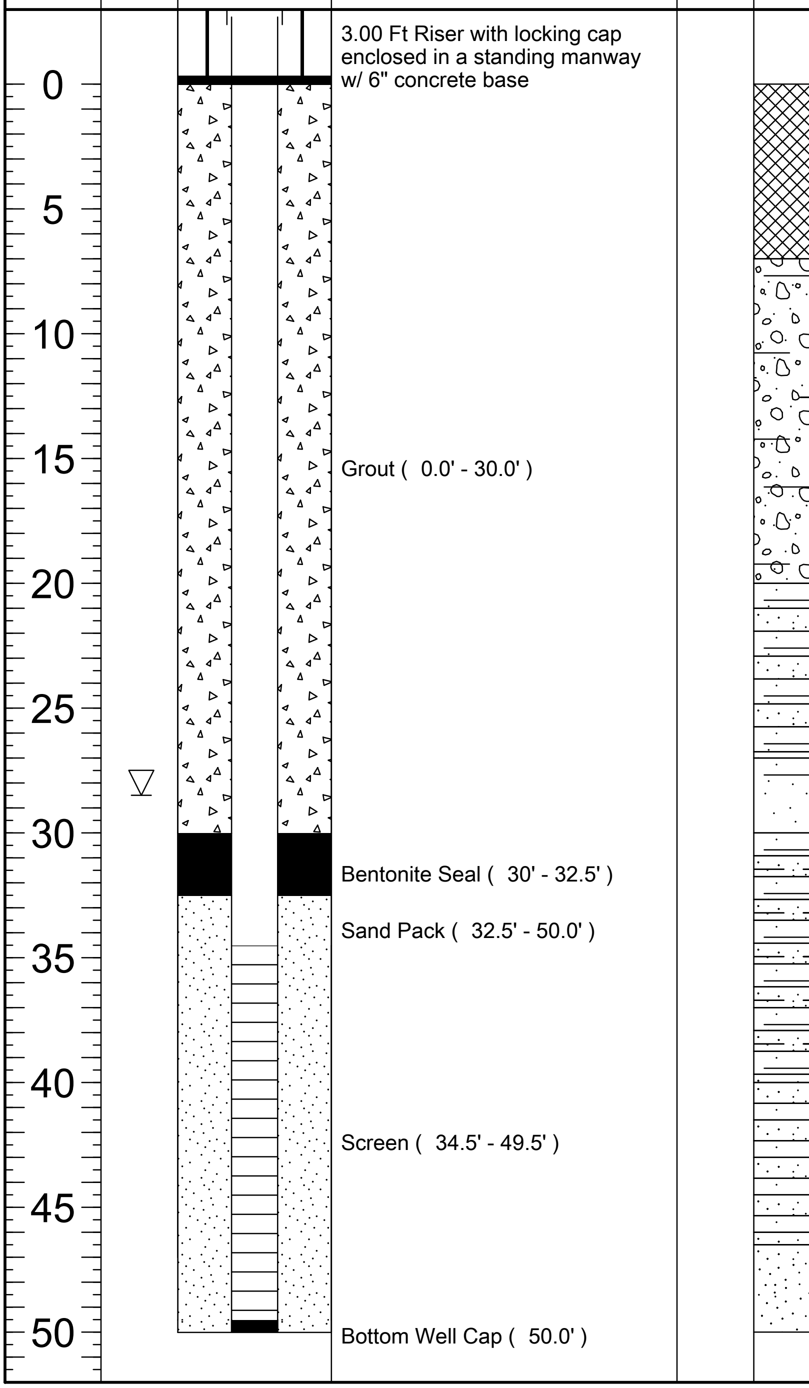


BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-19

CDG Engineering. Environmental. Answers.
www.cdge.com

Project Number: R021218159	Ground Elevation (ft.): 47.77	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 19.32	Total Depth of Boring (ft.): 50.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 50.76	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/20/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/20/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 34.5-49.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description



Depth (feet): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Water Levels: ▽ (approx. 28 ft)

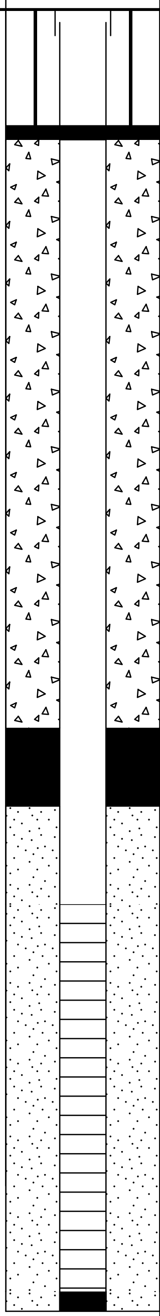
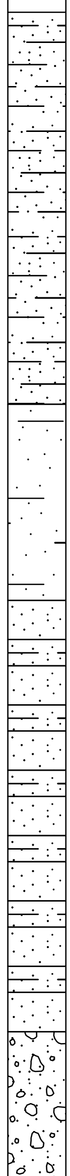
Description of Materials:
- 3.00 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base
- Grout (0.0' - 30.0')
- Bentonite Seal (30' - 32.5')
- Sand Pack (32.5' - 50.0')
- Screen (34.5' - 49.5')
- Bottom Well Cap (50.0')

Soil Description:
- Fill material from berm, turbated sand, clayey sand, gravel with wood fibers/debris
- Dark gray, cohesive, gravelly, clayey sand
- Interbedded dark gray, cohesive, clayey sand and sand
- Reddish brown, cohesive, clayey sand
- Reddish brown clayey sand interbedded with stiff, plastic, sandy clay. Trap door bit was used to recover core. Recovery 8.5 ft
- Interbedded, pale brown, med-fine grained sand and clayey sand
- Light gray to reddish brown, fine grained sand

CDG
Engineering. Environmental. Answers.
www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-20

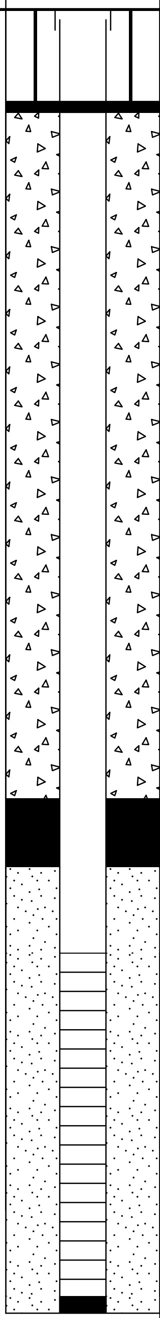
Project Number: R021218159	Ground Elevation (ft.): 26.69	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 18.06	Total Depth of Boring (ft.): 30.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 30.01	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/21/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/21/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 19.5-29.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			3.32 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						
5						Gray-green, micaceous, stiff, plastic, bioturbated sandy clay
	▽		Grout (0.0' - 15.0')			
10						
						Gray-green, micaceous, cohesive, clayey sand
15			Bentonite Seal (15.0' - 17.0')			
			Sand Pack (17.0' - 30.0')			
20						Light gray, interbedded, fine grained sand and stiff, plastic, sandy clay
25			Screen (19.5' - 29.5')			
						Tan-gray, micaceous, gravelly, coarse grained sand
30			Bottom Well Cap (30.0')			

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-21

CDG
Engineering. Environmental. Answers.
www.cdge.com

Project Number: R021218159	Ground Elevation (ft.): 26.68	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 14.52	Total Depth of Boring (ft.): 35.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 30.00	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/21/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/21/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 24.5-34.5	Remarks:

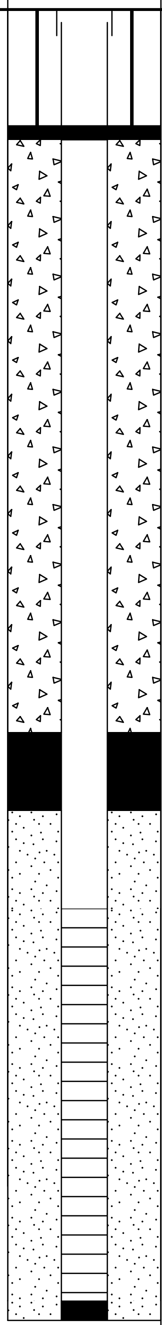
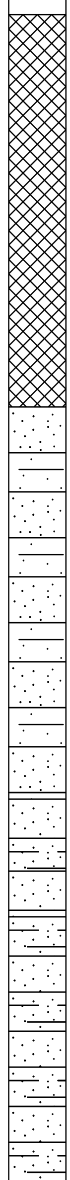


Depth (feet)	Water Levels	Description of Materials	OVA (ppm)	Soil Description
		3.0 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base		
0				
				Reddish-brown, clayey sand and sand
5				
				No recovery, likely a sand or similar to above
10		Grout (0.0' - 20.0')		
	▽			
15				
				Interbedded gray and brown, mod. plastic, clayey sand and sand
20		Bentonite Seal (20.0' - 22.0')		
		Sand Pack (22.0' - 35.0')		
25				Dark gray, stiff, plastic, sandy, clay
		Screen (24.5' - 34.5')		
30				Dark gray, interbedded, cohesive, clayey sand and loose, sand
35		Bottom Well Cap (35.0')		

CDG
Engineering. Environmental. Answers.
www.cdge.com

BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-22

Project Number: R021218159	Ground Elevation (ft.): 26.82	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 16.67	Total Depth of Boring (ft.): 30.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 30.24	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/21/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/21/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 19.5-29.5	Remarks:

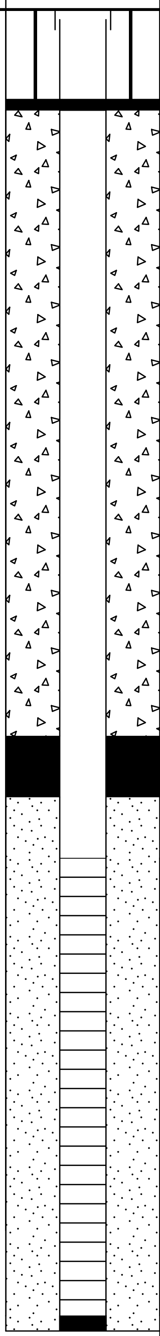
Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			3.32 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0						
5						Mix of sand, gravel, clayey sand, plant matter, pieces of coal. color varies
			Grout (0.0' - 15.0')			
10	▽					
15						Trap door bit was used to recover core. Interbedded mix of sand, clayey sand and thin intervals of clay
			Bentonite Seal (15.0' - 17.0')			
			Sand Pack (17.0' - 30.0')			
20						
						Dark gray, loose, med-fine grained sand interbedded with sandy clay
25			Screen (19.5' - 29.5')			
						Dark gray, stiff, plastic, sandy clay with intervals of very fine grained sand
30			Bottom Well Cap (30.0')			

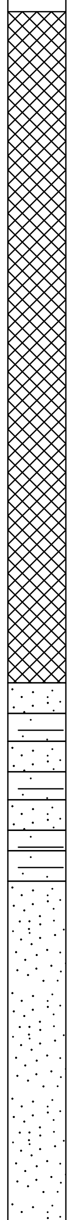
BORING AND WELL COMPLETION LOG
BORING / WELL ID MW-23

CDG Engineering. Environmental. Answers.
www.cdge.com

Project Number: R021218159	Ground Elevation (ft.): 35.56	Depth Drilled Into Rock (ft.): N/A
Project Name: Lowman CI	Groundwater Elevation (ft.): 17.64	Total Depth of Boring (ft.): 40.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): 38.86	Auger Size ID (in.): 5.00
Log Prepared By: Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Type II	Type of Sampler: 4.75" Core barrel
Drilling Method: Sonic	Well Diameter (in.): 2	Date Started: 3/21/2019
▼ - Groundwater at Time of Drilling	Screen Size (in.): 0.01	Date Completed: 3/21/2019
▽ - Groundwater at Time of Sampling	Screen Interval (ft.): 24.5-39.5	Remarks:

Depth (feet)	Water Levels	Well Construction Diagram	Description of Materials	OVA (ppm)	Lithology	Soil Description
			3.3 Ft Riser with locking cap enclosed in a standing manway w/ 6" concrete base			
0–20.5	▽ (approx. 17.6)		Grout (0.0' - 15.0')			Construction backfill mix of dark gray to orangeish-red, gravel, sand, clayey sand, sandy clay, plant matter, and wood pieces
20.5–22.5			Bentonite Seal (20.5' - 22.5')			
22.5–40			Sand Pack (22.5' - 40.0')			Interbedded, gray, med-fine grained sand and cohesive, clayey sand
						Light gray, mottled reddish-brown, cohesive, clayey sand
			Screen (24.5' - 39.5')			Light reddish brown, loose, med-fine grained sand
40			Bottom Well Cap (40.0')			





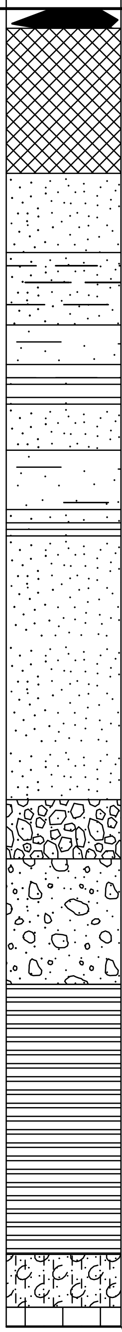
Engineering. Environmental. Answers.
www.cdge.com

BOREHOLE COMPLETION LOG
SOIL BORING ID: BVD 407

Project Number: R021219295	Ground Elevation (ft.): 39.95	Date: 3/25/2019
Project Name: Lowman Geotech Exploration	Groundwater Elevation (ft.): N/A	Total Depth of Boring (ft.): 100.00
Project Location: Leroy, Alabama	Casing Elevation (ft.): N/A	Auger Size ID (in.): 5.00
Log Prepared By: James Alan Barck	Datum Elevation: MSL	Auger Size OD (in.): 6.025
Driller: Heath Holmes - CDG	Well Type: Soil Boring	Type of Sampler: 4.75" x 10 ft. Core Barrel
Drilling Method: Sonic	Soil Boring Diameter (in.): 6.025	Drilling Rig: TSI 150CC

Depth (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

Lithology



Soil Description	Soil Type
Coal	COAL
Varies from Clayey Sand to Sandy Clay and Gravel. Turbated structure with lots of plant matter	FILL
Light to dark gray poorly graded Sand	SAND
Gray, plastic, cohesive, Sandy Clay	SANDY CLAY
Reddish-brown, Clayey Sand	CLAYEY SAND
Interbedded, light brown, cohesive, Clays and mg-fg Sand	CLAY
Light brown, mg-fg Sand	SAND
Sandy clay with interbedded Clayey Sand	CLAYEY SAND
Light brown, mg-fg Sand with interbedded Sandy Clays	SAND
Light reddish brown to gray, loose, mg-fg Sand	SAND
Sandy Gravel	SANDY GRAVEL
Light brown, loose, gravelly Sand. Clay content varies locally	GRAVELLY SAND
Green-gray, Mudstone with abundant plant matter, occasional shell fragments	MUDSTONE
Silty Sand with abundant shell fragments	SILTY SAND
Gray, fossiliferous, Limestone	LIMESTONE

Boring terminated at 100.0 feet bls.

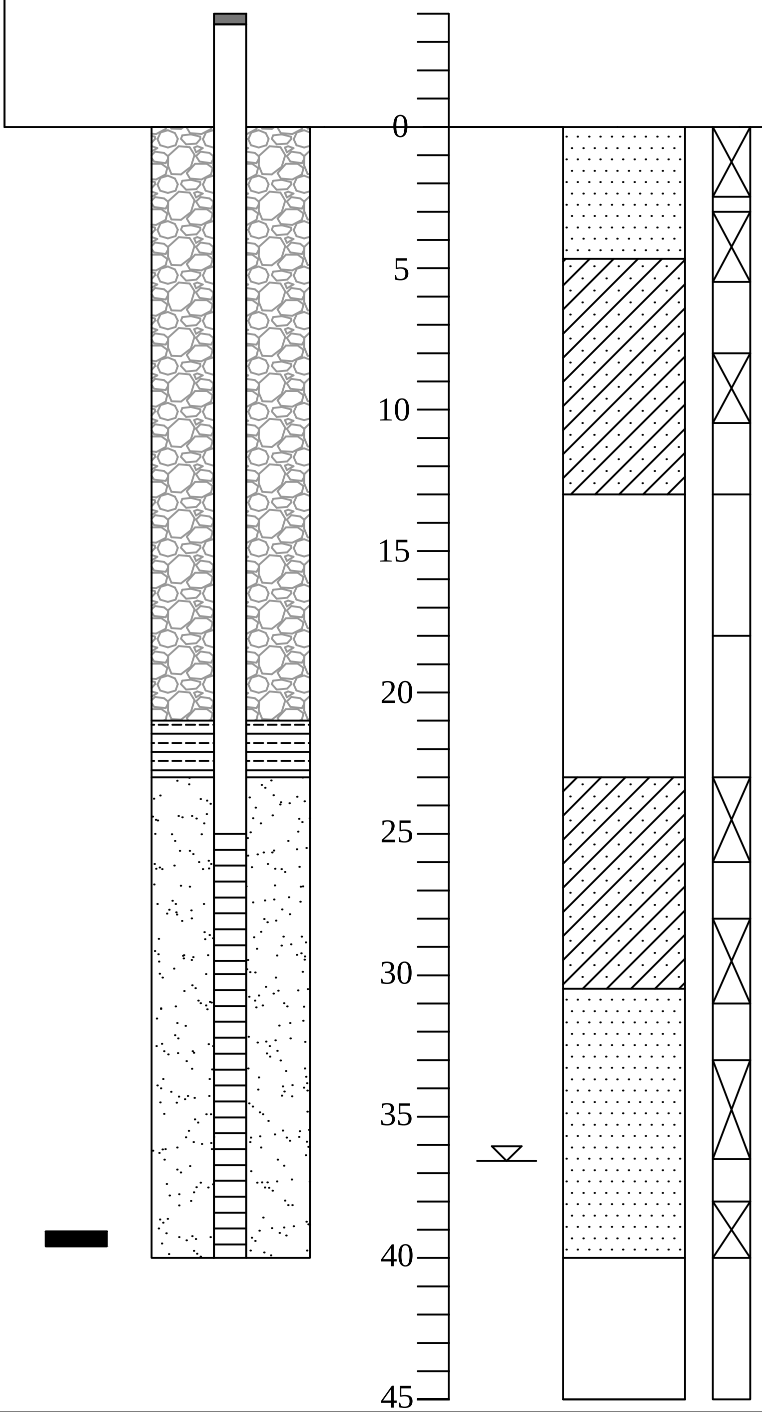
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061321201	Client: PowerSouth	Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 45.30	Casing Elev.: 49.30
Location: Lowman Power Plant	Groundwater Elevation: 8.62	
Hole Number: PZ-6	Datum Elevation: MSL	
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.	
Total Depth of Boring: 40'	Size and Type of Sampler: 5' Continuous	
Log Prepared By: Alan Barck	Date Started: 10-16-13	Date Completed: 10-16-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 19'	

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval | Description of Materials | USCS



Description of Materials	USCS
Sand with gravel, reddish-brown to light brown, loose, coarse to very coarse-grained, (fill material for berm), thinly bedded/turbated structure	SP
Sand, light brown, loose, medium-grained, down to 4.8 ft., 4.8 to 6.5 ft. - clayey sand, dark gray, cohesive, stiff, non-plastic, massive, 20% clay content	SP SC
Clayey sand, gray, massive, cohesive, slightly plastic, fine-grained sand, 20% clay content	SC
No recovery	
No recovery	
Clayey sand, gray, cohesive, plastic to moderately plastic, fine-grained, micaeous sand, 10% clay content	SC
Clayey sand down to 30.5 ft., 30.5 to 31 ft. - sand, light gray, loose, wet, very fine-grained to fine-grained, micaeous	SC SP
Sand with interbedded clayey sand, loose, light gray to dark gray and red, fine-grained micaeous sand with 10% clay content, saturated	SP
Sand/clayey sand	SP

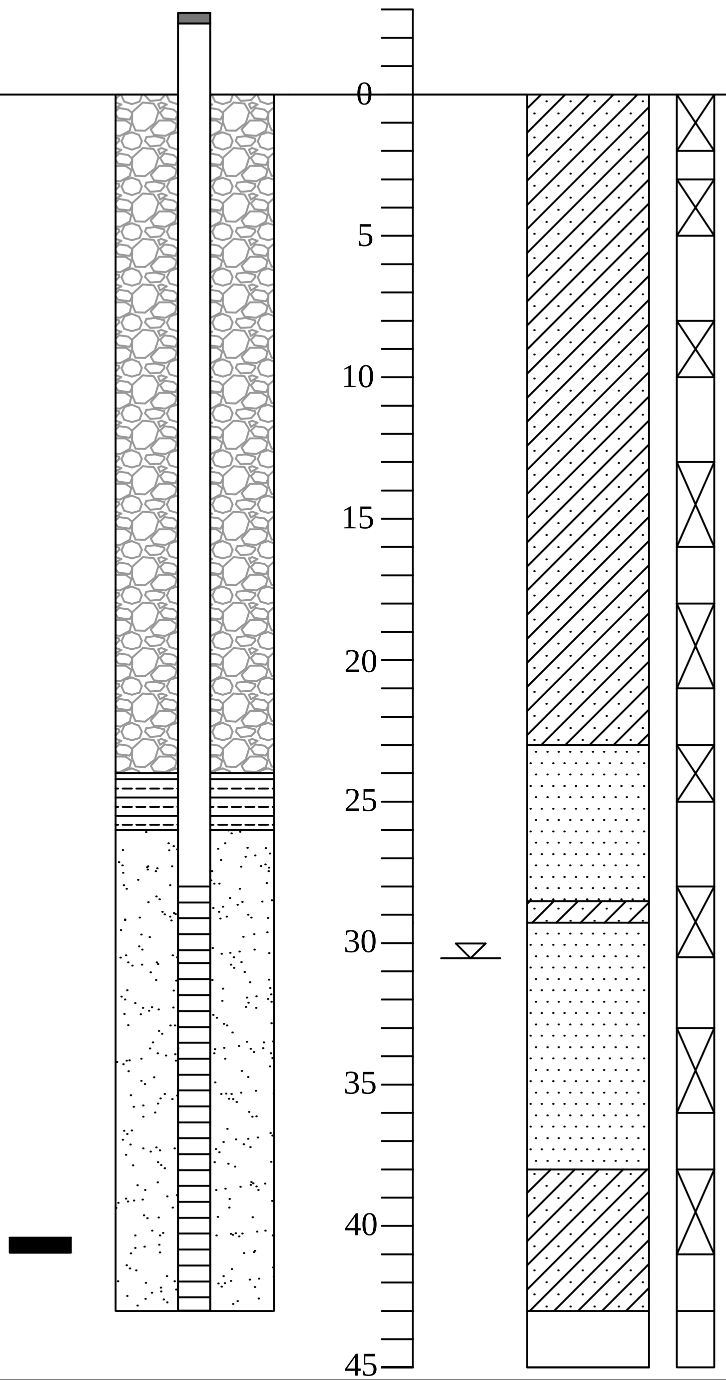
BOREHOLE LOG

CDG
Engineering. Environmental. Answers.

1840 E. Three Notch Street
Andalusia, Alabama 36420
(334) 222-9431

Job Number: 061321201	Client: PowerSouth — Sheet 1 of 1
Project: Lowman Hydrogeologic Investigation	Ground Elevation: 41.83 — Casing Elev.: 44.75
Location: Lowman Power Plant	Groundwater Elevation: 11.32
Hole Number: PZ-11R	Datum Elevation: MSL
Driller: Judd Channell	Size and Type of Auger: 4 1/4" I.D.
Total Depth of Boring: 43'	Size and Type of Sampler: 5' Continuous
Log Prepared By: Alan Barck	Date Started: 10-17-13 — Date Completed: 10-17-13
Remarks: 15 Feet = Screen Length	Total Core Recovery: 22.5'

Transducer Level | Well Construction | Depth (Feet) | Water Levels | Lithology | Recovered Interval



Description of Materials	USCS
Gypsum, then sand and gravel and clayey sand, turbated structure, very coarse-grained, moist	SC
Clayey sand with gravel, red, very coarse-grained, loose to slightly cohesive, (10 to 15% of 1/2" gravel), massive, moist to wet	SC
Clayey sand with gravel, red, (20% of 1/2" to 1" gravel), turbated structure, poorly sorted	SC
Clayey sand with gravel down to 15.2 ft., sharp contact with clayey sand, dark gray, plastic to moderately plastic, wet at contact, fine-grained, clay content varied	SC
Clayey sand grading to sand, light brown, cohesive to loose, moderately plastic in upper 1 ft. of core, fine-grained, laminated structure in sand	SC
Sand, light brown mottled pale brown, loose, fine-grained, cohesive, clayey sand lense in shoe of sampler, wet	SP
Sand interbedded with clayey sand, loose to cohesive, clayey sand at 28.5 to 29.2 ft., loose, moderately plastic, fine to medium-grained sand, light brown banded pale brown and gray, moist to wet, wet in clayey sand interval	SP SC SP
Sand interbedded with clayey sand, light brown and gray mottled, loose to cohesive, slightly plastic in clayey sand intervals, fine to medium-grained micaceous sand, saturated	SP
Clayey sand interbedded with sand, light brown mottled gray down to 39.4 ft. then becoming gray with pale gray beds of fine to very fine-grained sand, saturated, cohesive, plastic, loose sand in 1/2" to 3" stringers	SC

APPENDIX B
LABORATORY SOIL PHYSICAL PROPERTIES ANALYSIS

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-7 / S13348**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Brown, fine sandy CLAY**
Date Sampled:	**10/16/2013**
Date Tested:	**1/2/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

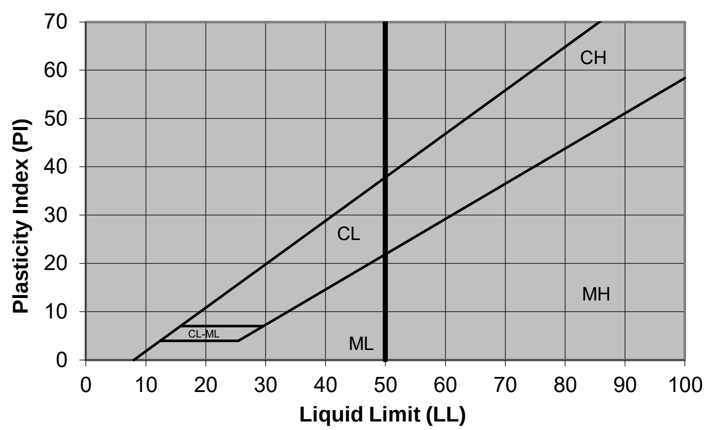
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**CL**

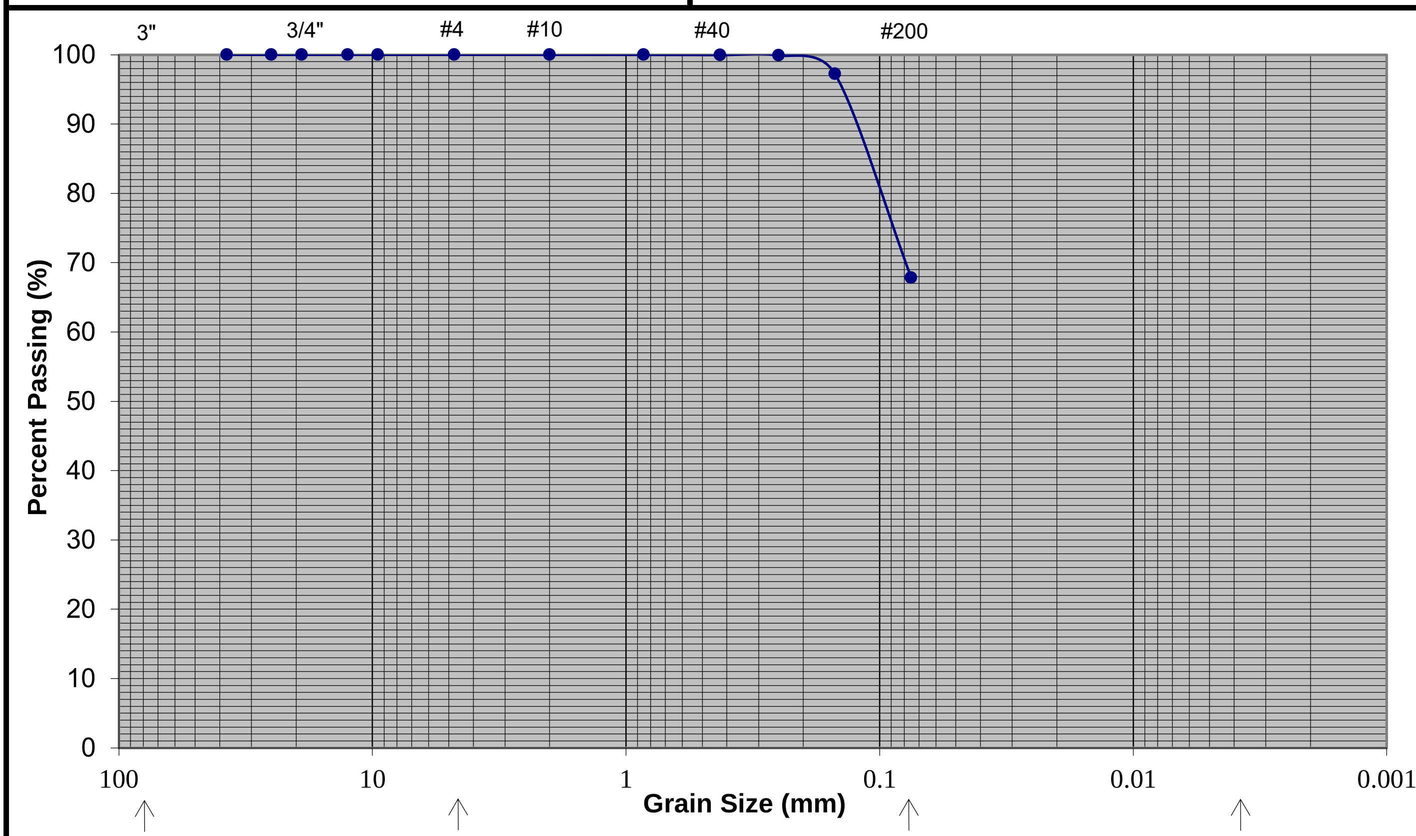
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**32.2%**
Percent Clay/Silt:	**67.8%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-3 / S13349**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Tan CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/2/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

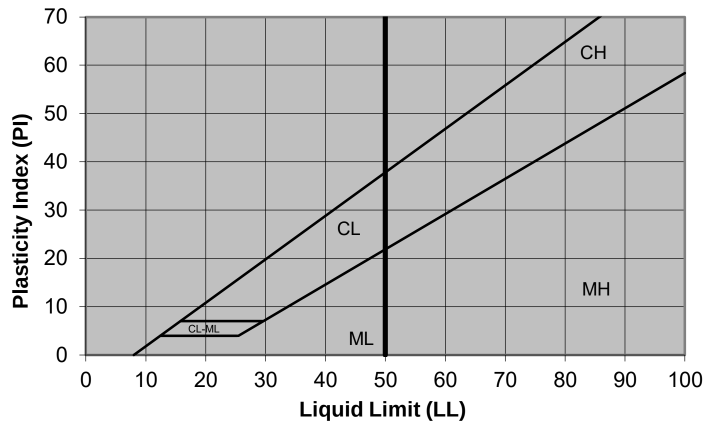
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**CL**

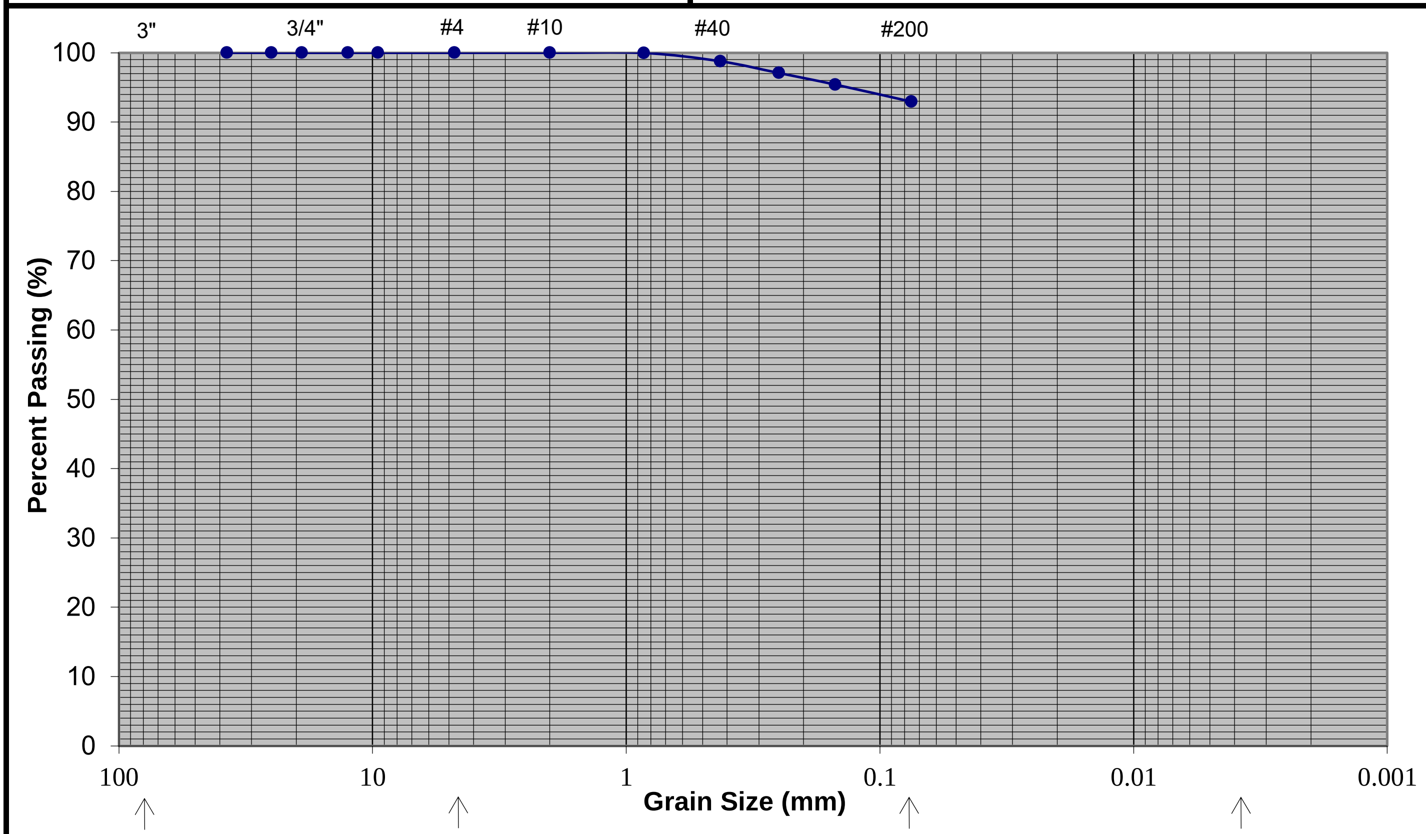
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**7.1%**
Percent Clay/Silt:	**92.9%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-10 / S13350**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/2/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

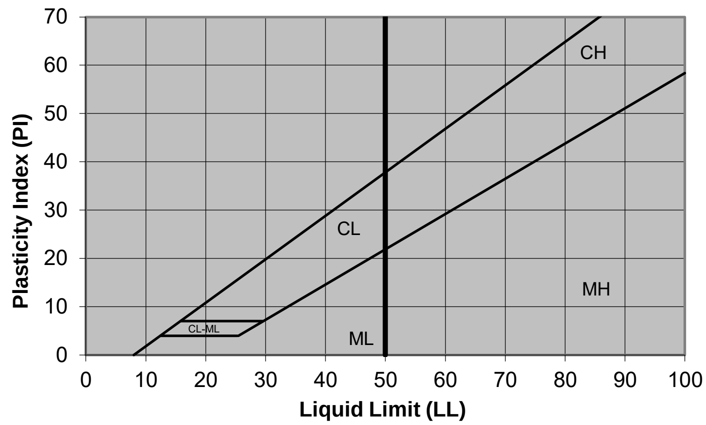
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

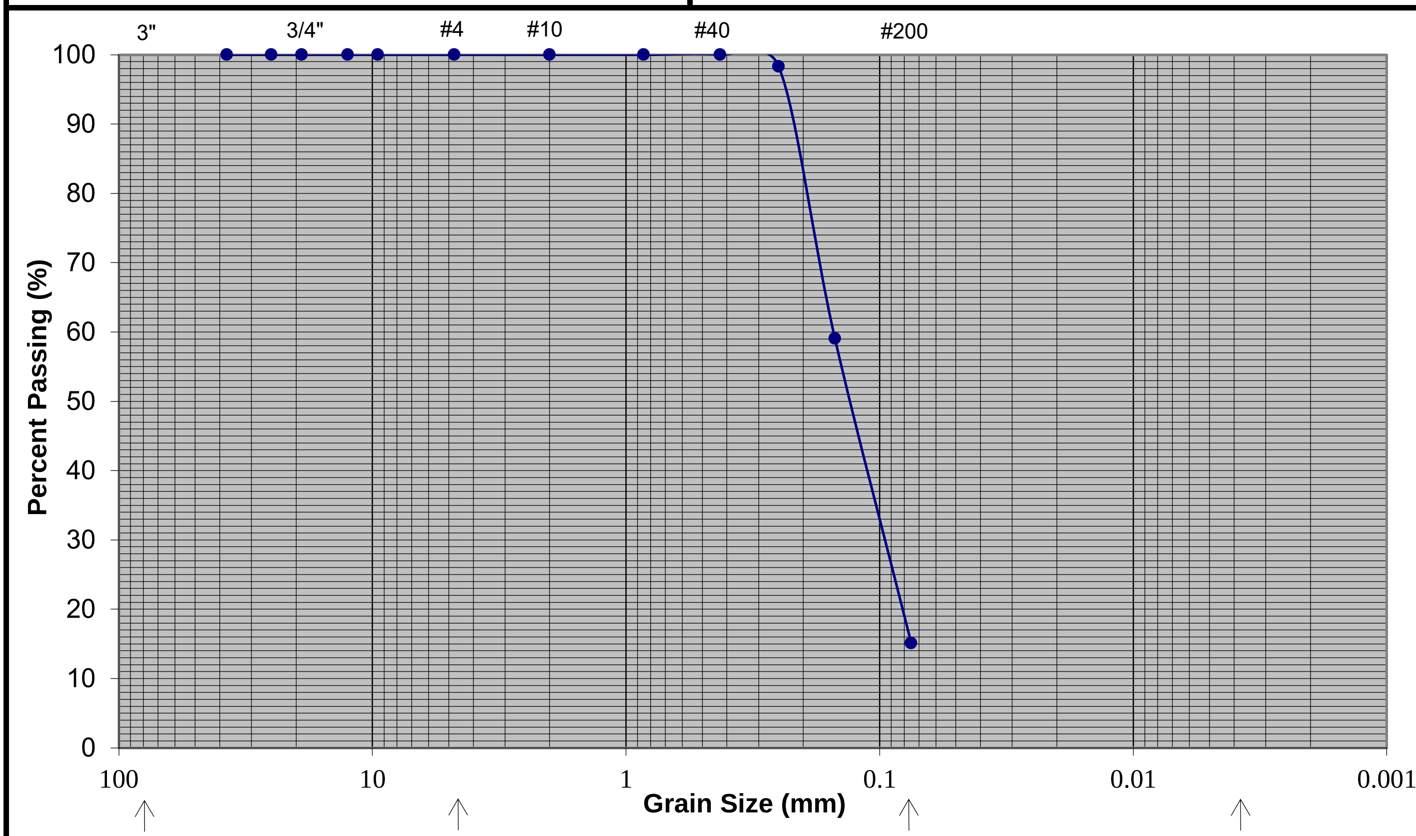
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**84.9%**
Percent Clay/Silt:	**15.1%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-3 / S13351**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Gray, fine sandy CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

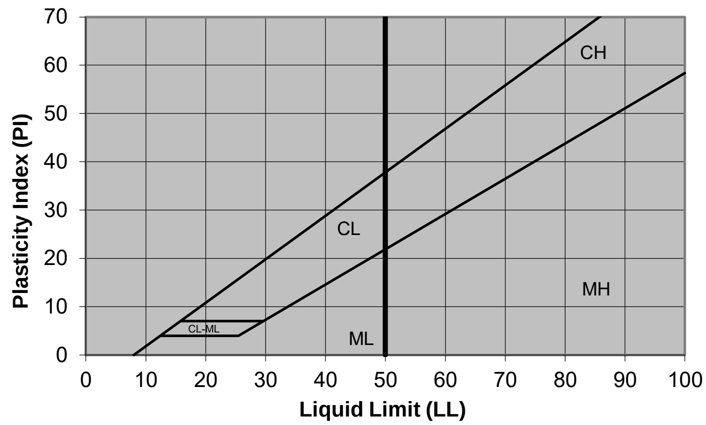
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**CL**

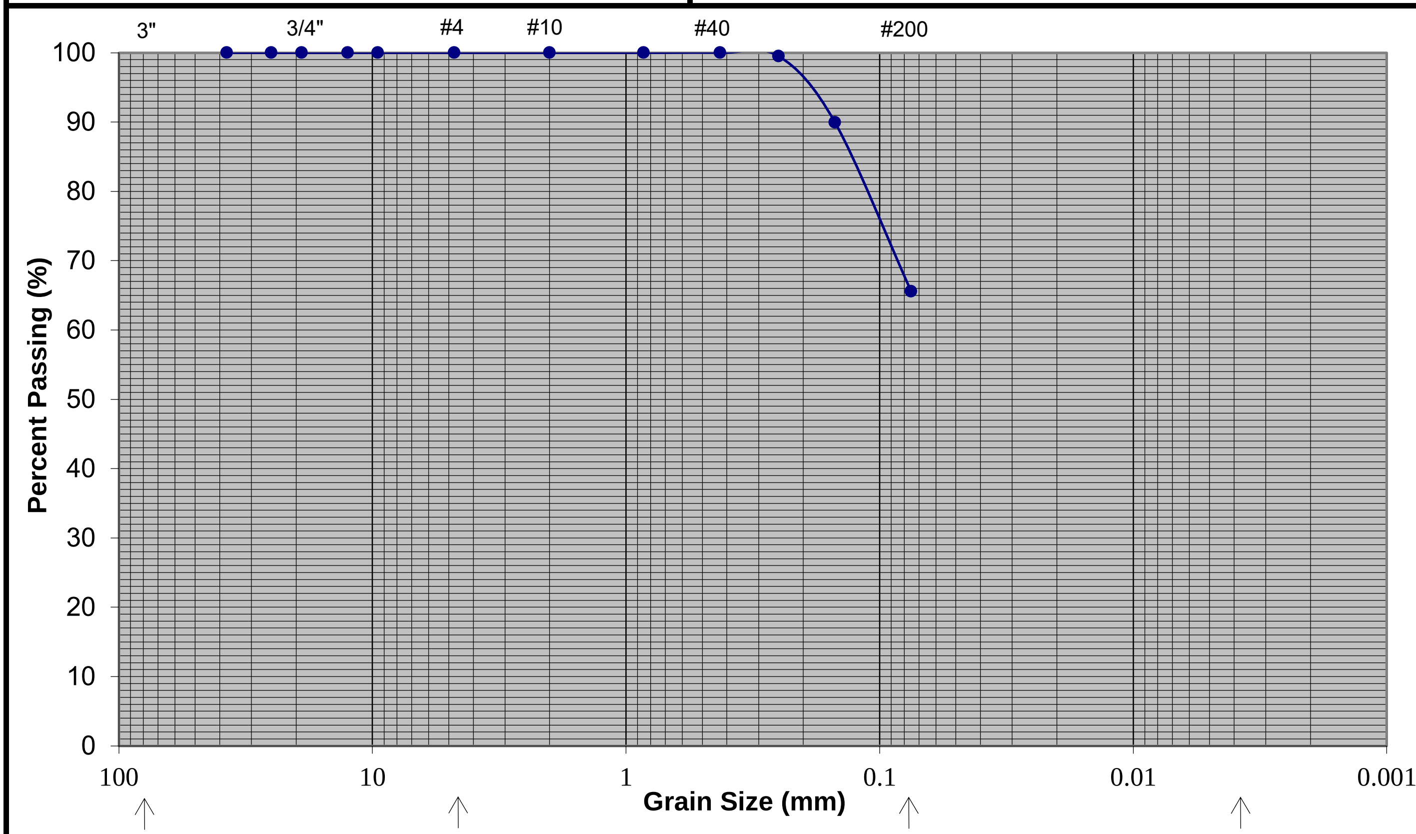
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**34.5%**
Percent Clay/Silt:	**65.5%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-1 / S13352**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

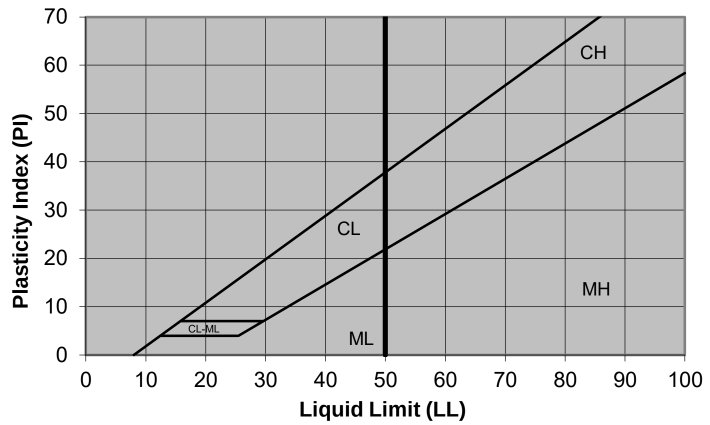
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**CL**

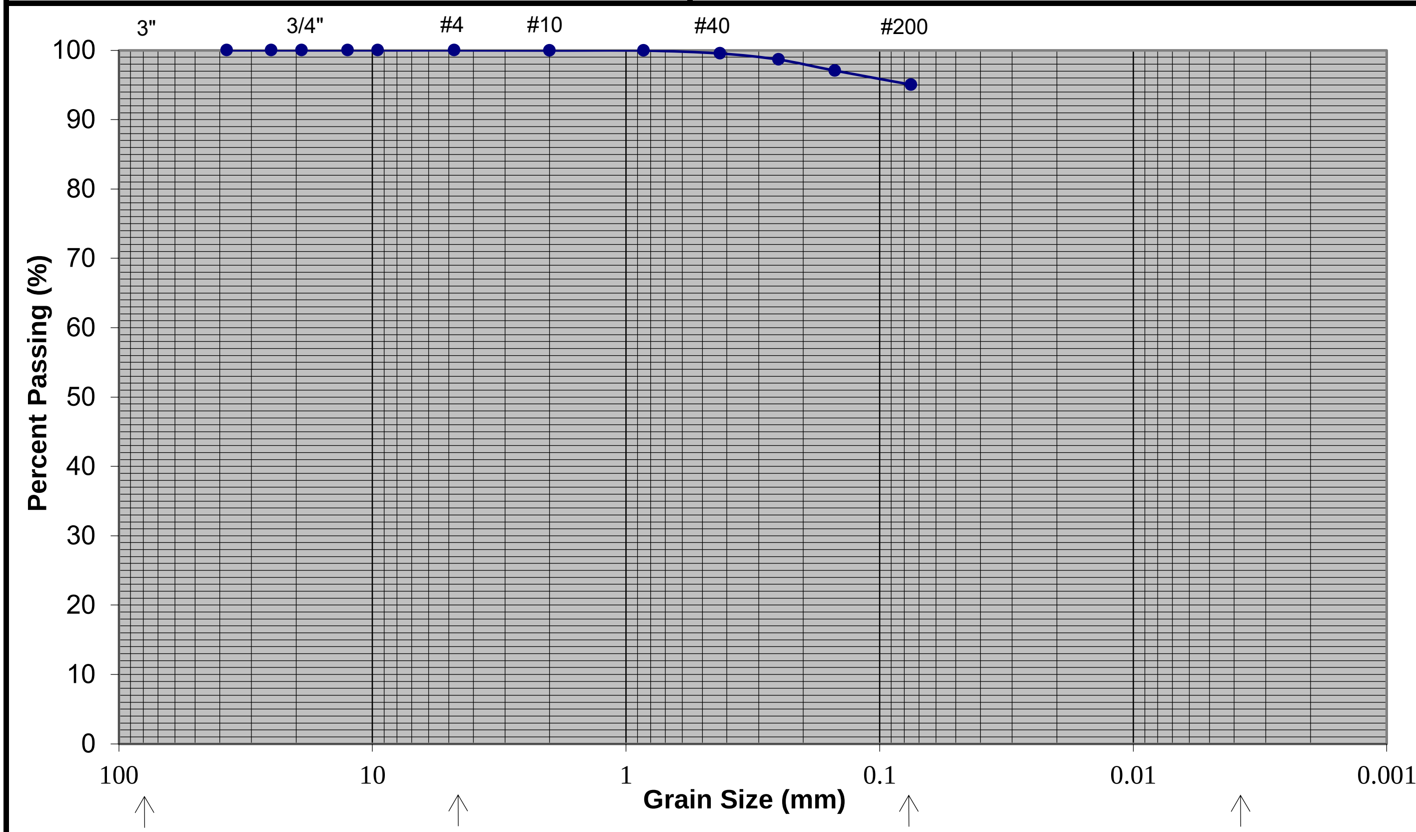
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**5.0%**
Percent Clay/Silt:	**95.0%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-4 / S13353**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Gray CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

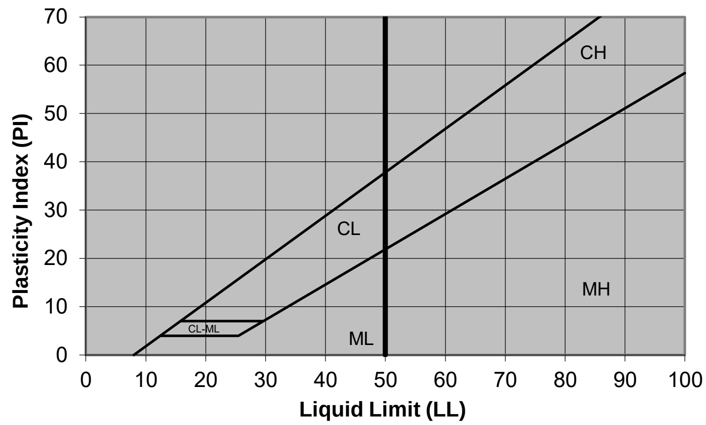
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**CL**

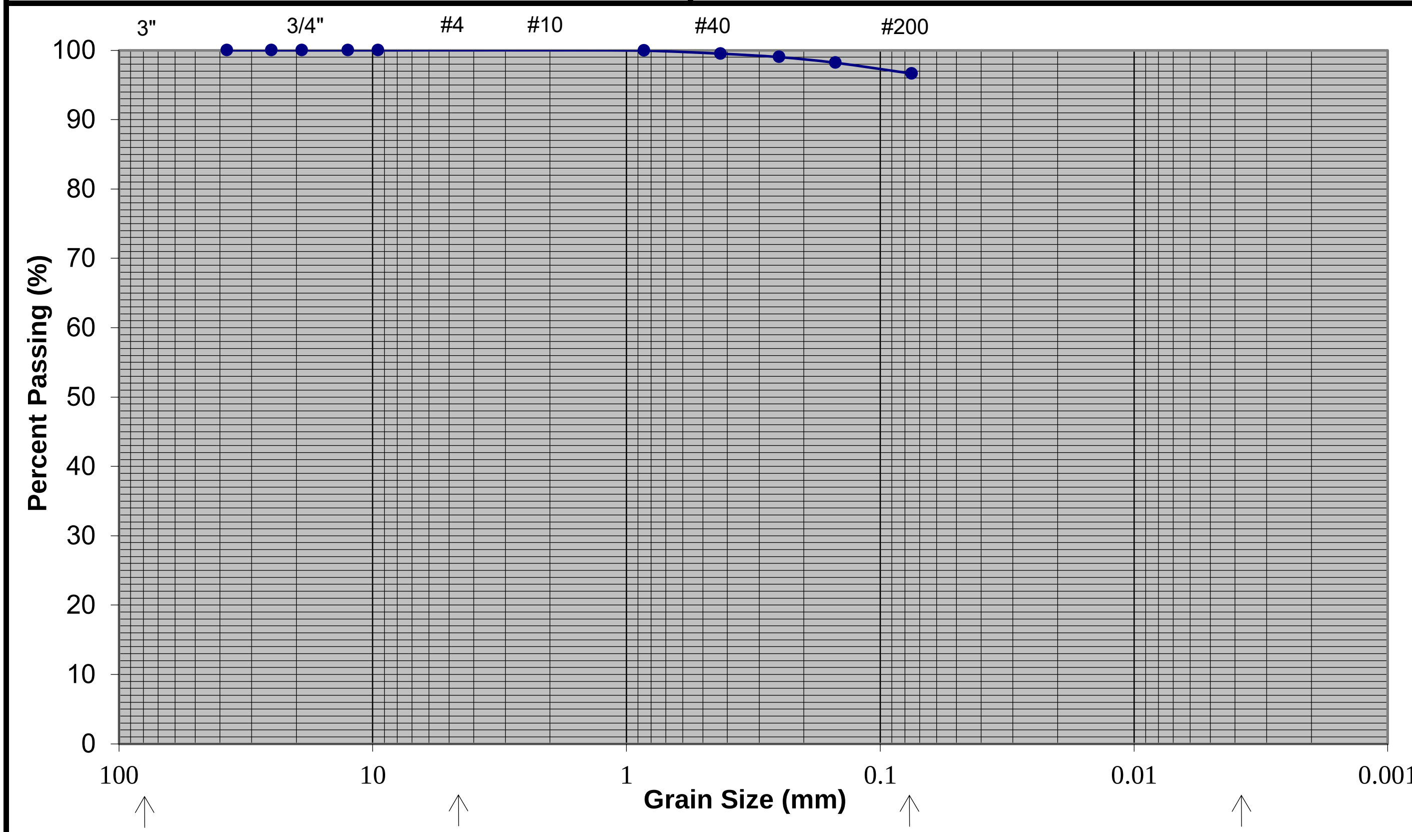
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**3.4%**
Percent Clay/Silt:	**96.6%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-4 / S13354**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray, fine sandy CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

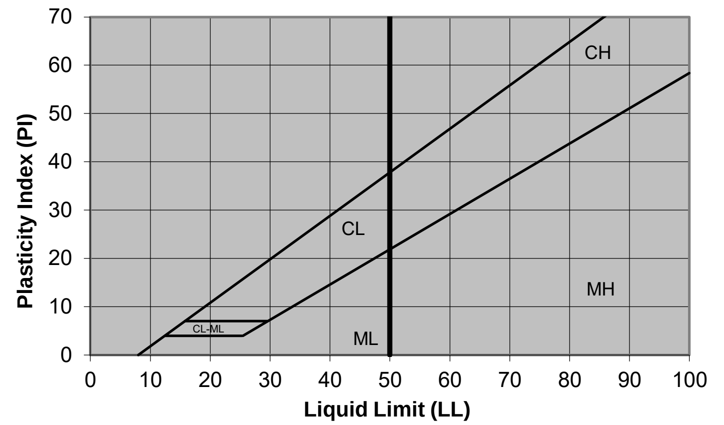
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**CL**

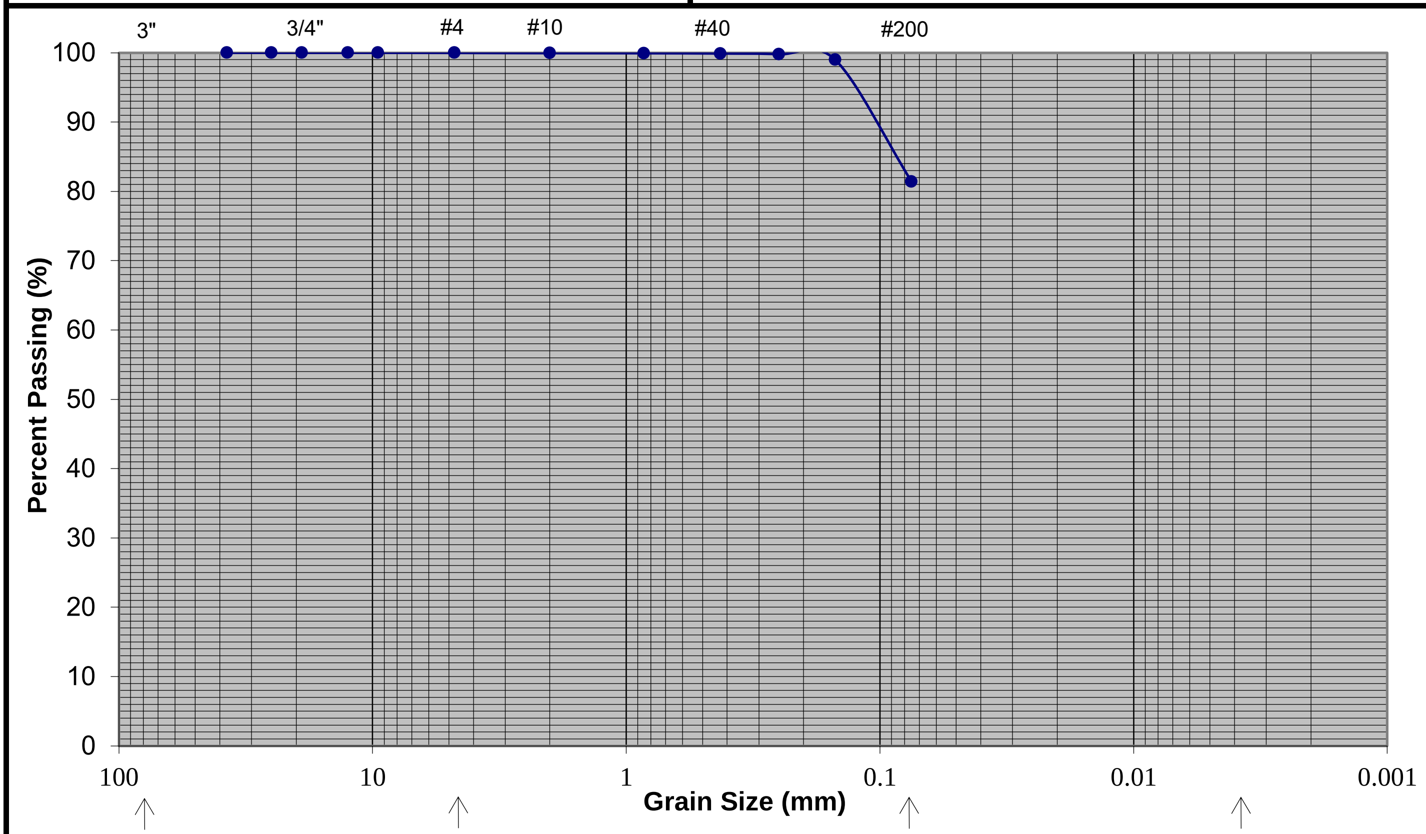
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**18.6%**
Percent Clay/Silt:	**81.4%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-7 / S13355**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Tan, fine sandy SILT**
Date Sampled:	**10/16/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

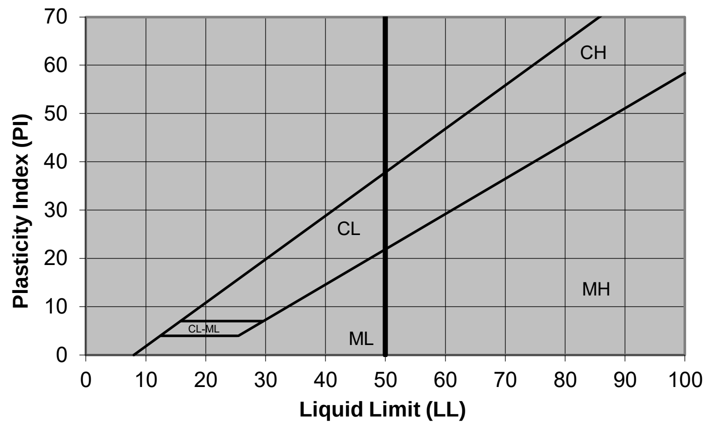
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**ML**

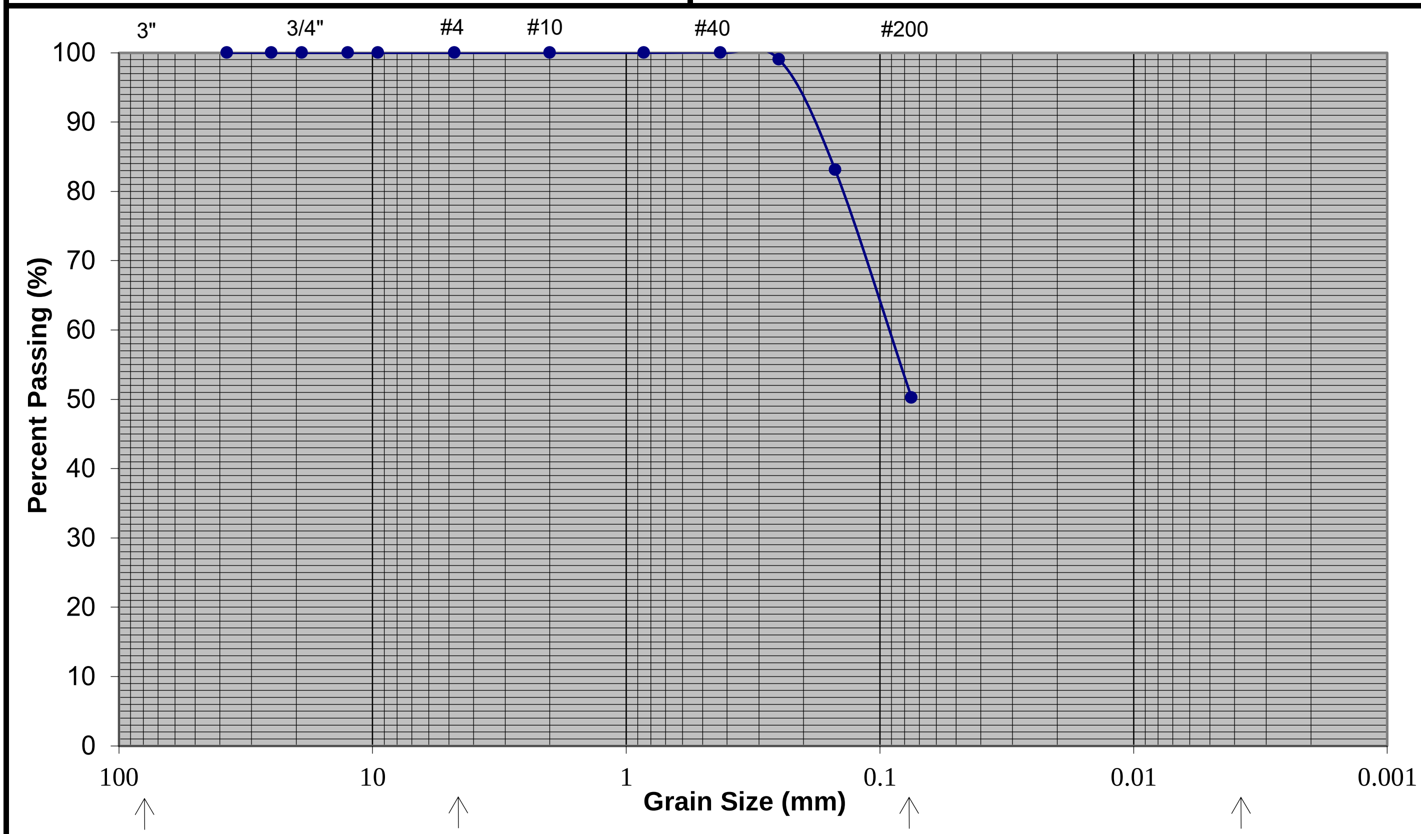
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**49.8%**
Percent Clay/Silt:	**50.2%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-5 / S13356**
Sample Depth / Location	**3-5 feet**
Sample Description:	**Tan, fine sandy SILT**
Date Sampled:	**10/15/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

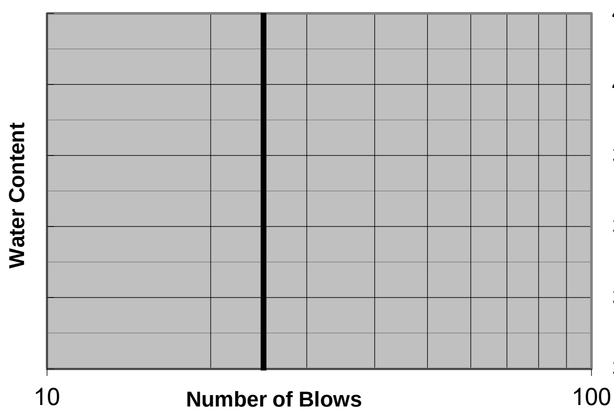
Visual-Manual Identification of Soils (D2488)

		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**ML**

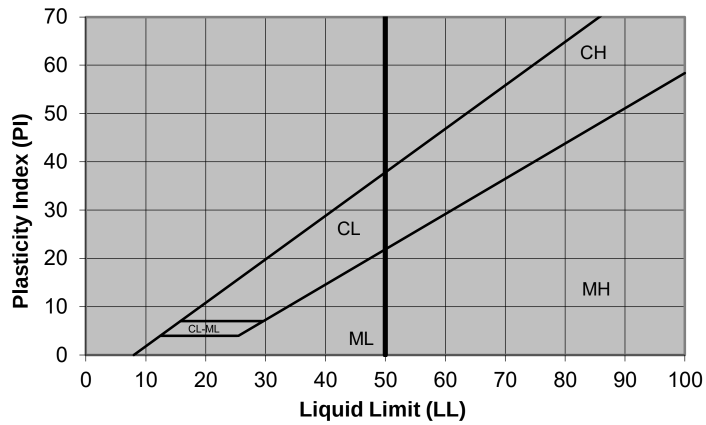
REPORT OF SIEVE ANALYSIS (ASTM D422)

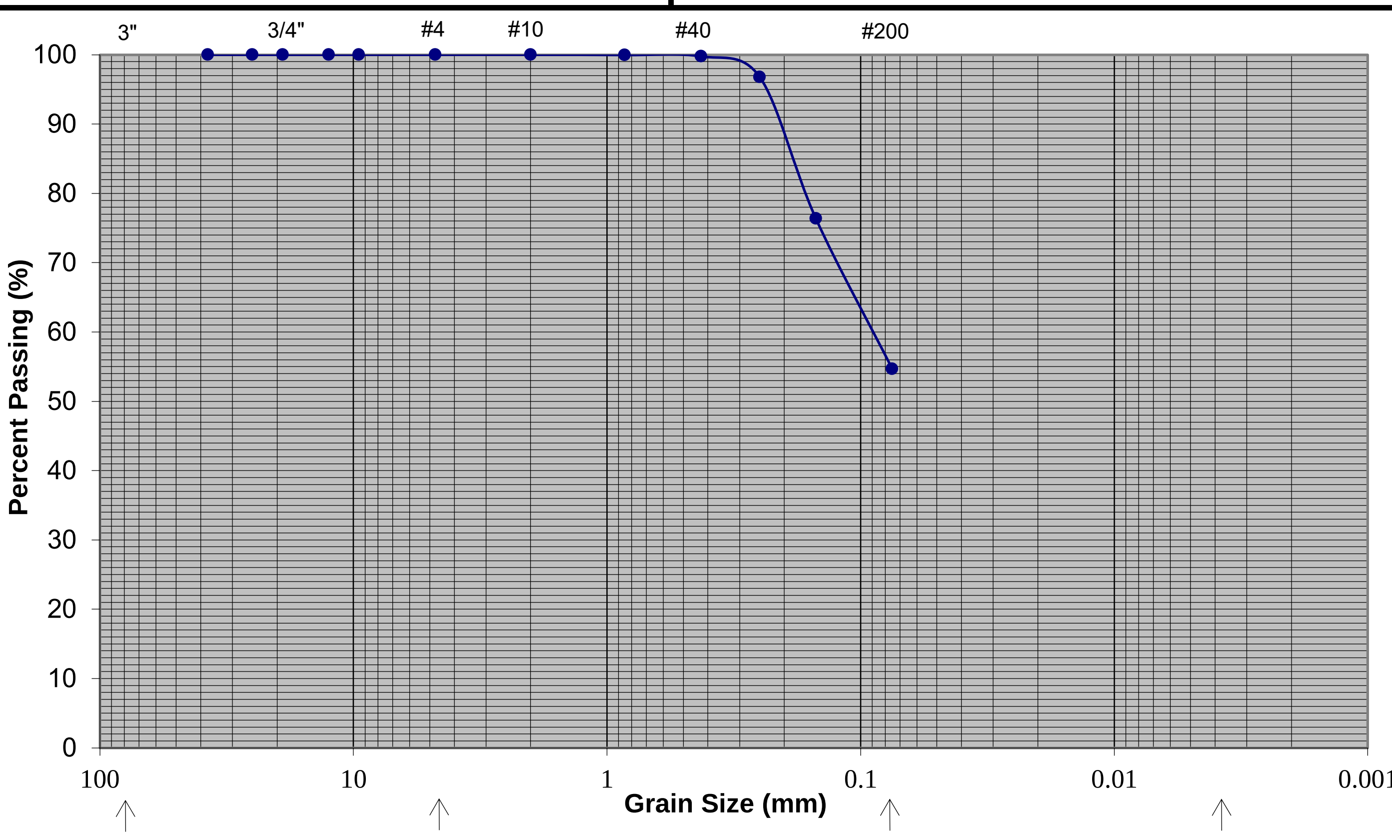
Percent Gravel:	**0.0%**
Percent Sand:	**45.3%**
Percent Clay/Silt:	**54.7%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-10 / S13357**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

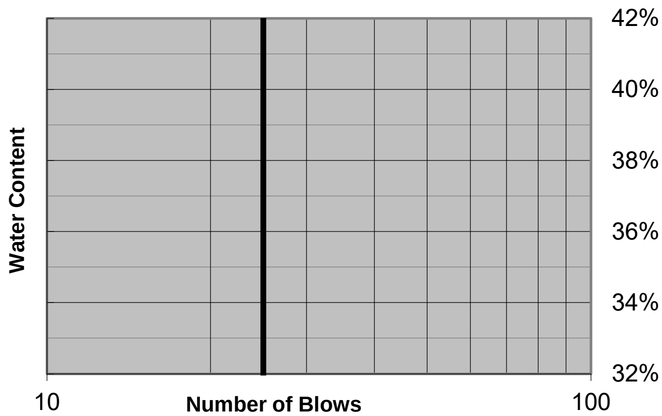
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

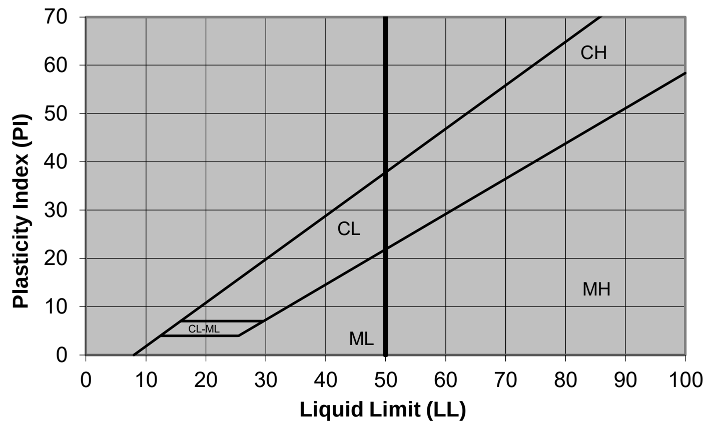
REPORT OF SIEVE ANALYSIS (ASTM D422)

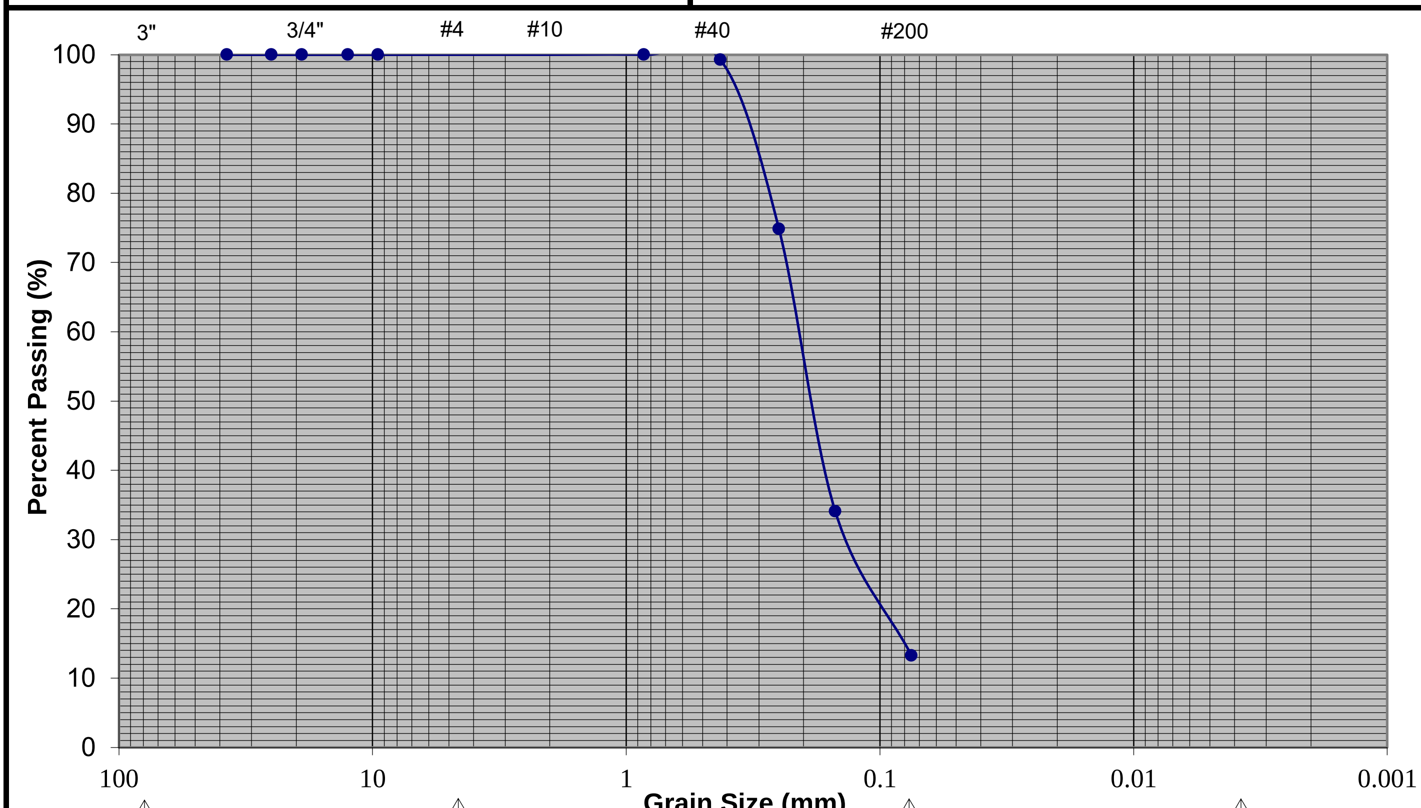
Percent Gravel:	**0.0%**
Percent Sand:	**86.7%**
Percent Clay/Silt:	**13.3%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-8 / S13358**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Tan, fine sandy SILT**
Date Sampled:	**10/16/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

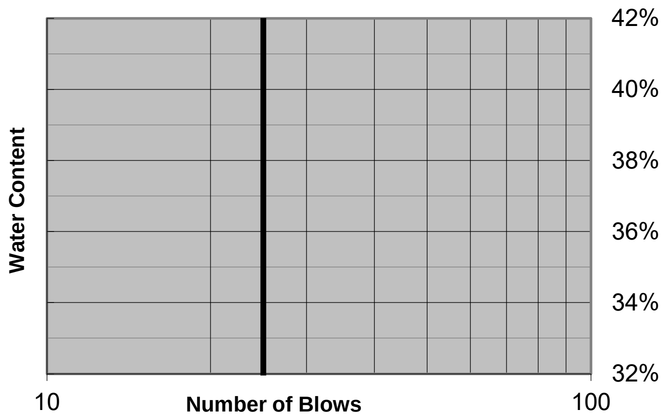
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**ML**

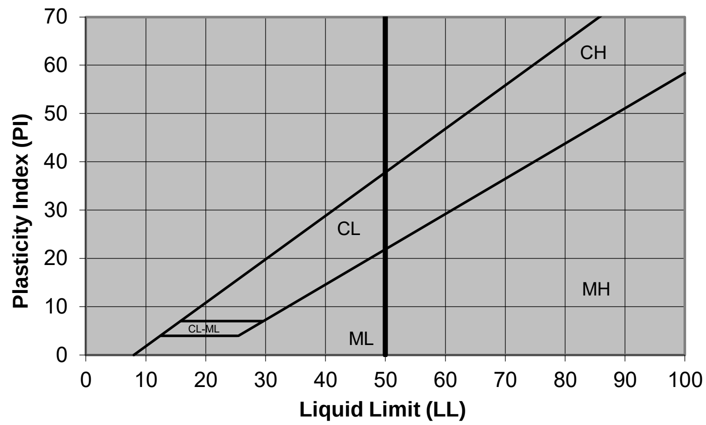
REPORT OF SIEVE ANALYSIS (ASTM D422)

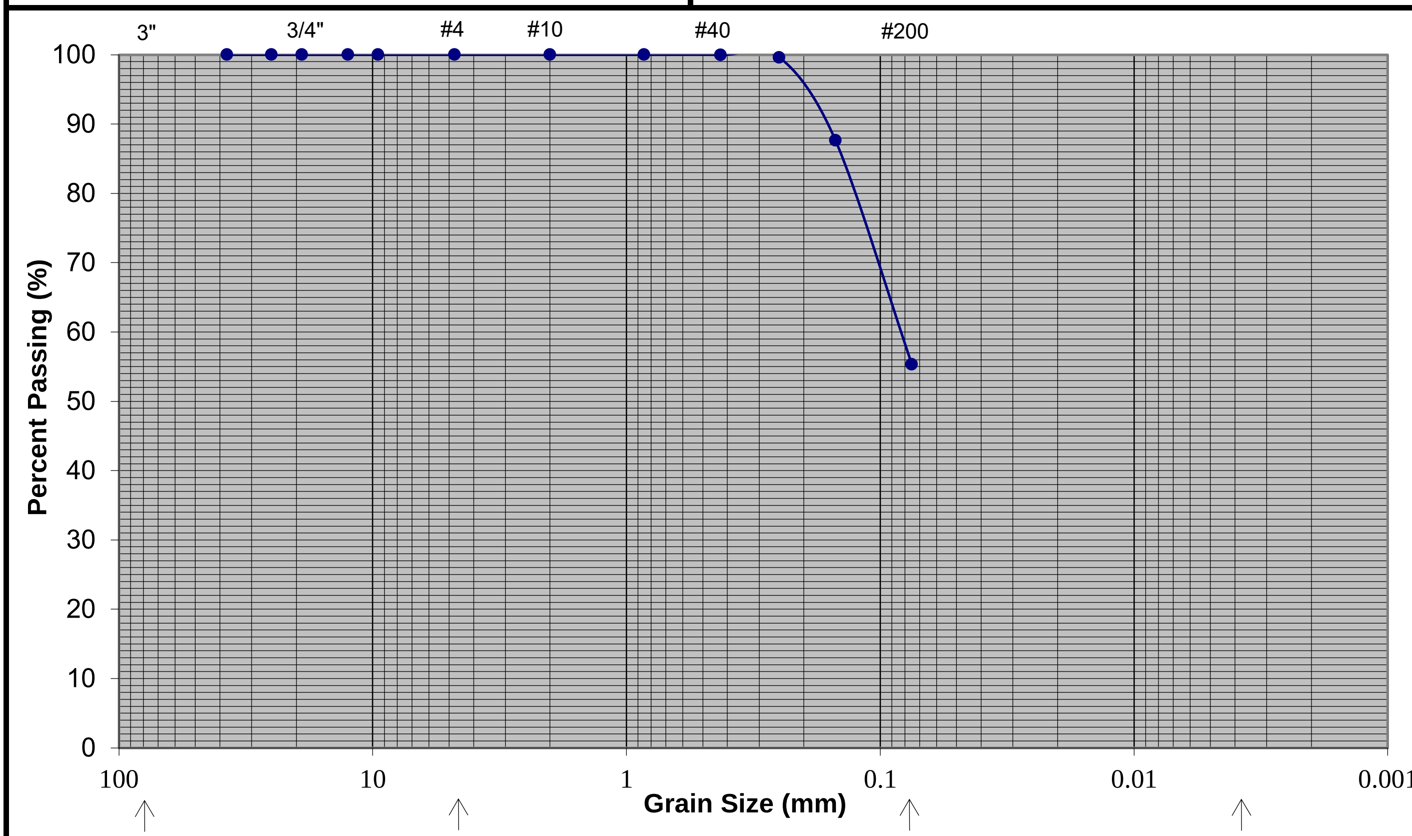
Percent Gravel:	**0.0%**
Percent Sand:	**44.7%**
Percent Clay/Silt:	**55.3%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-11 / S13359**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

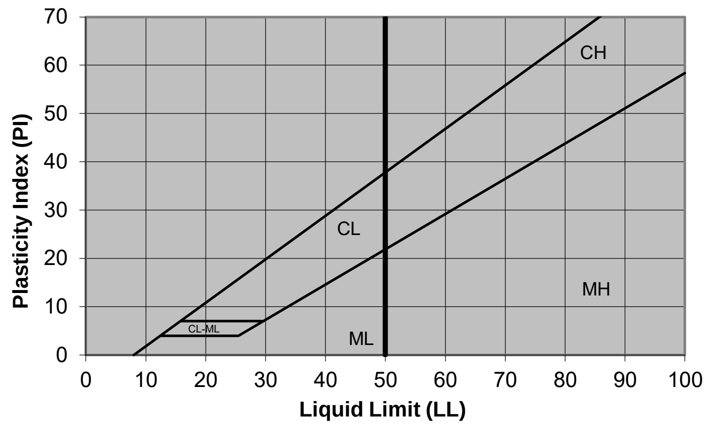
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

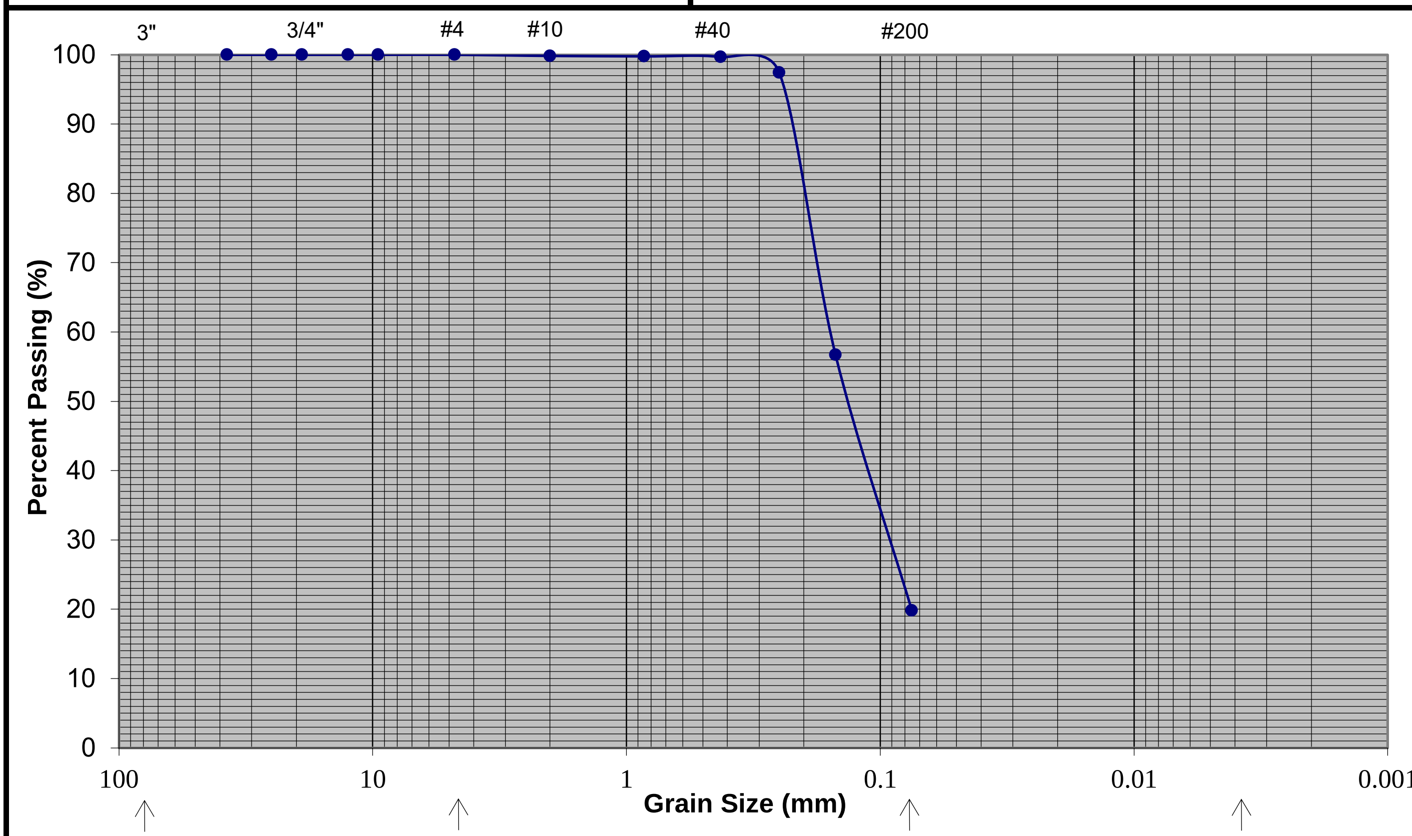
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**80.2%**
Percent Clay/Silt:	**19.8%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-4 / S13360**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Gray and tan, fine sandy CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

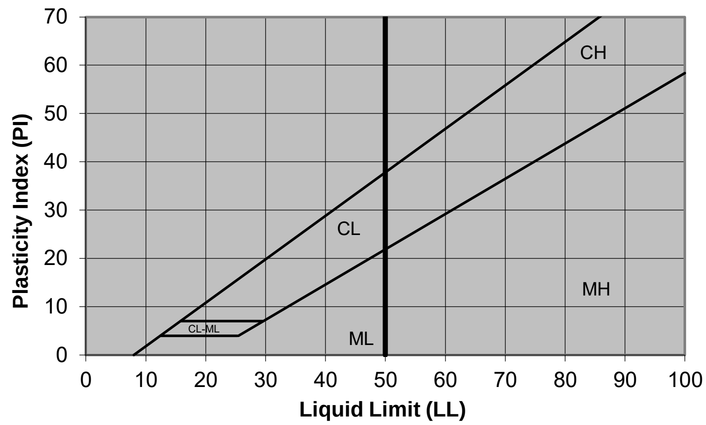
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**CL**

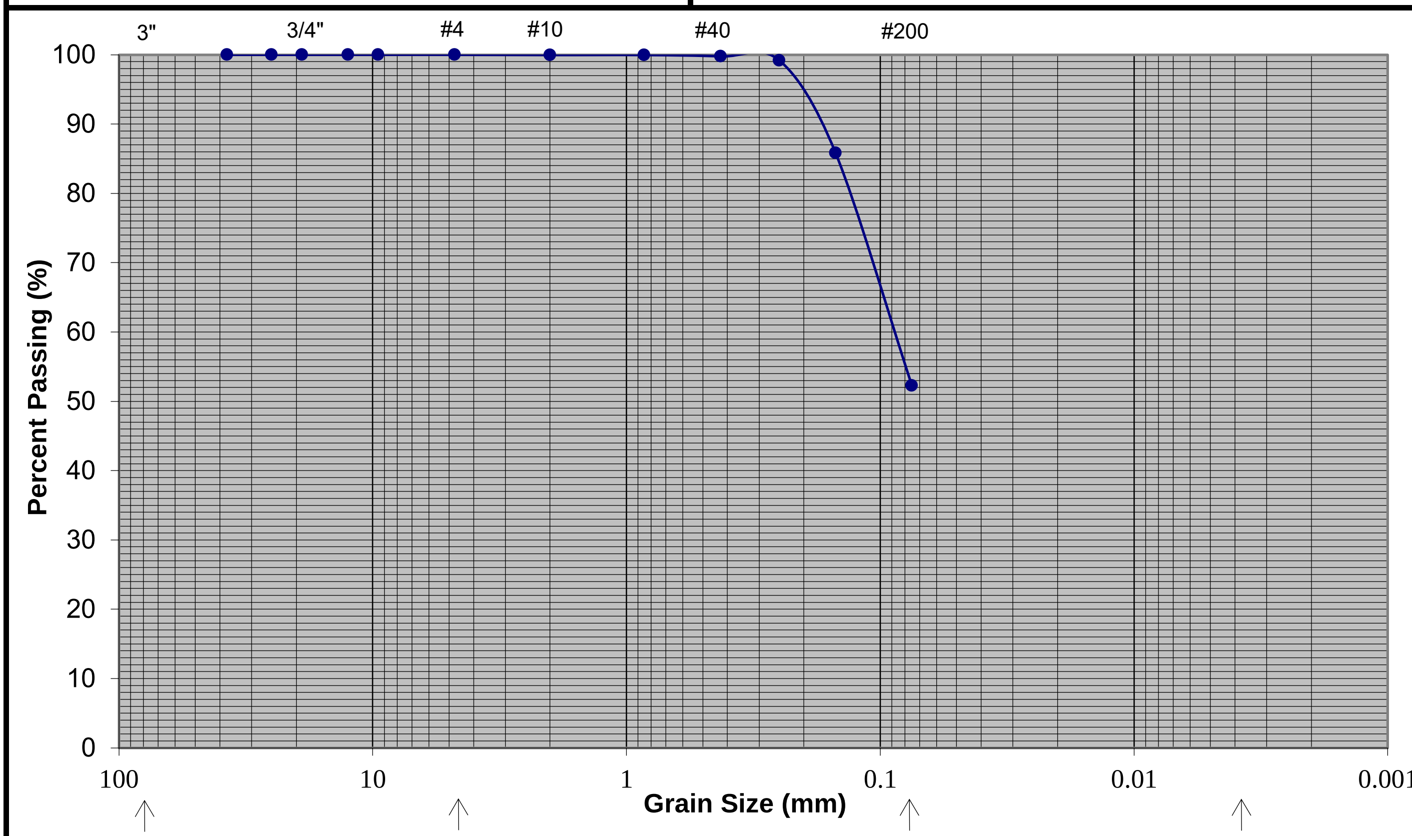
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**47.7%**
Percent Clay/Silt:	**52.3%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-10 / S13361**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

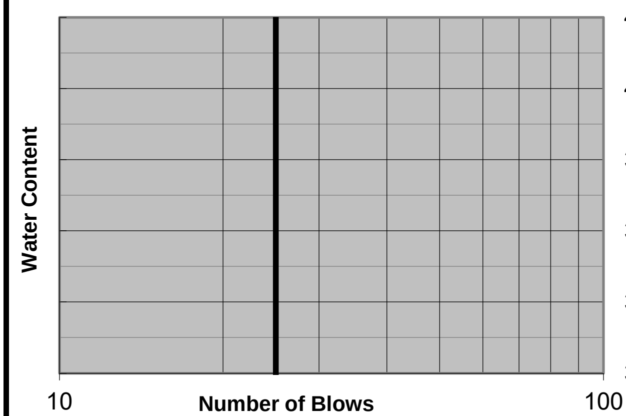
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

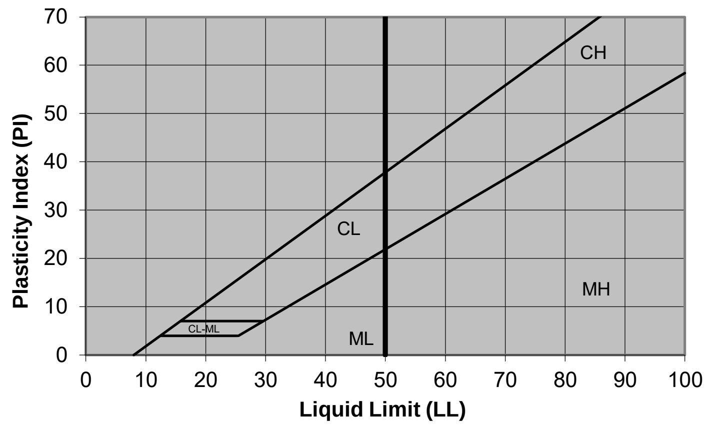
REPORT OF SIEVE ANALYSIS (ASTM D422)

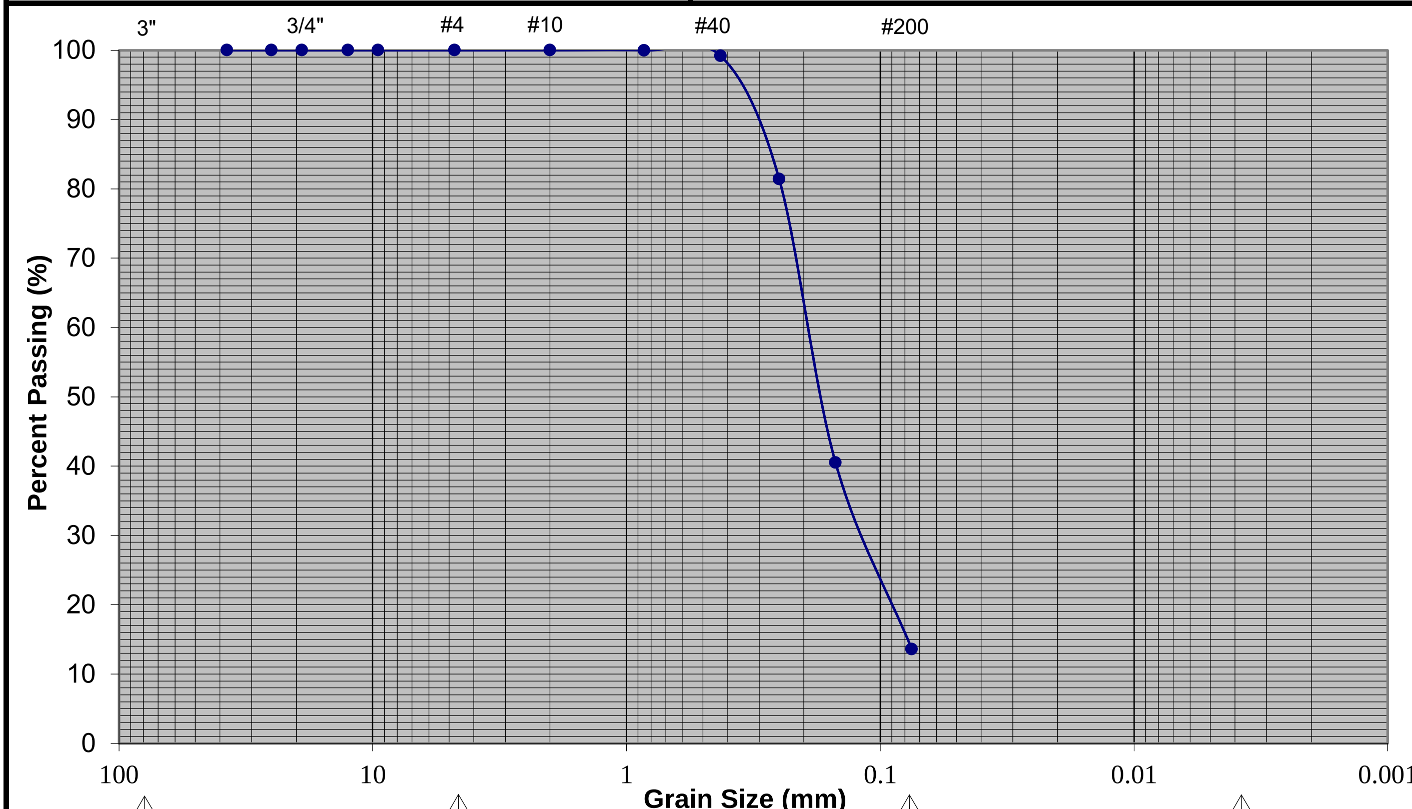
Percent Gravel:	**0.0%**
Percent Sand:	**86.4%**
Percent Clay/Silt:	**13.6%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ- 7 / S13362**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Tan, fine sandy SILT**
Date Sampled:	**10/16/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

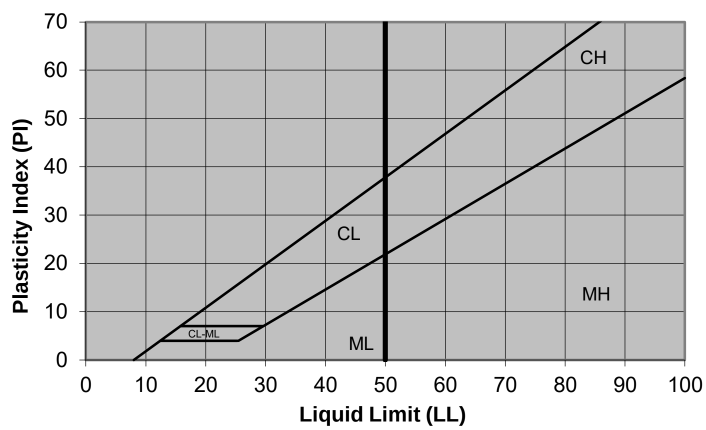
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

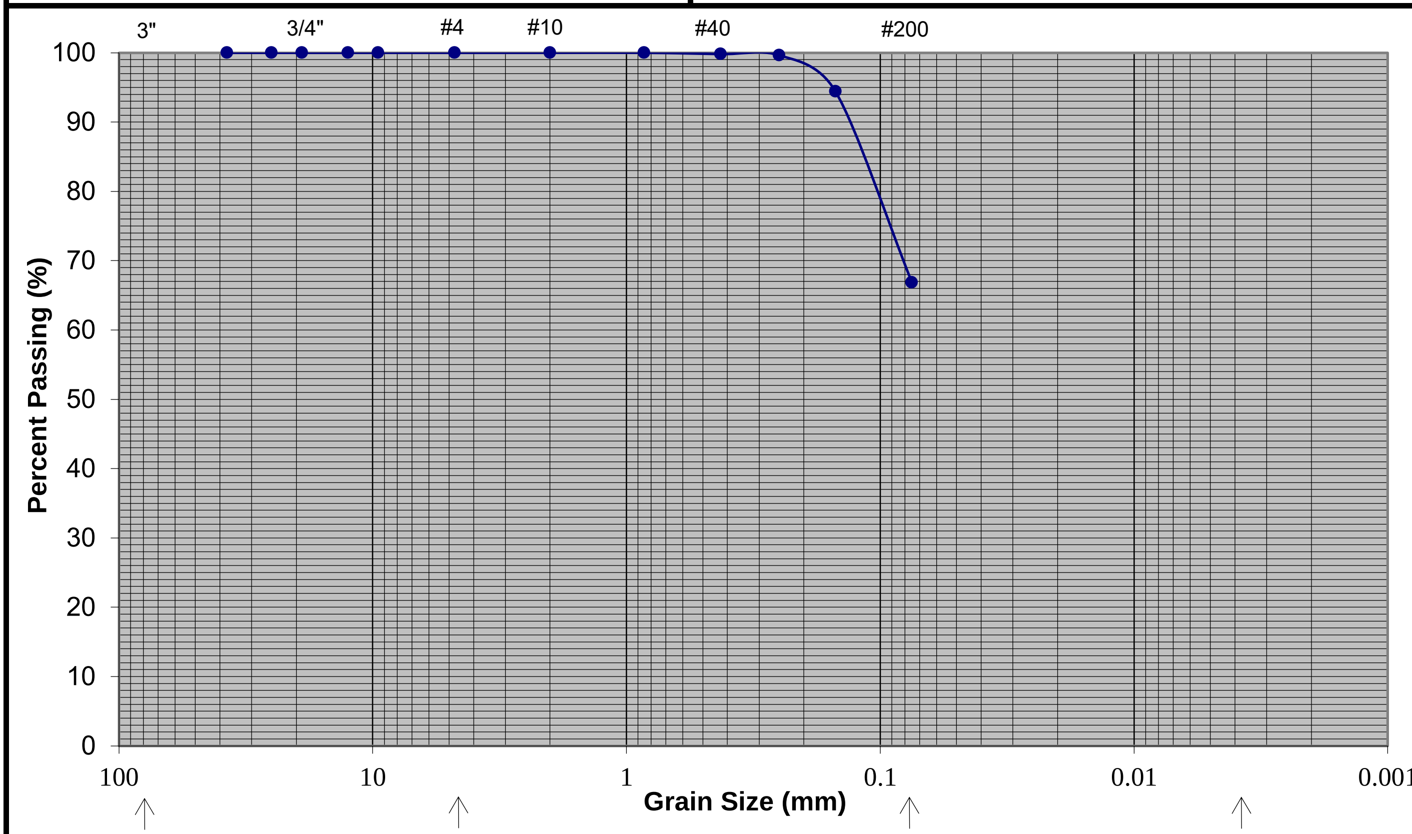
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**33.1%**
Percent Clay/Silt:	**66.9%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-11 / S13363**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Tan, silty fine silty SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

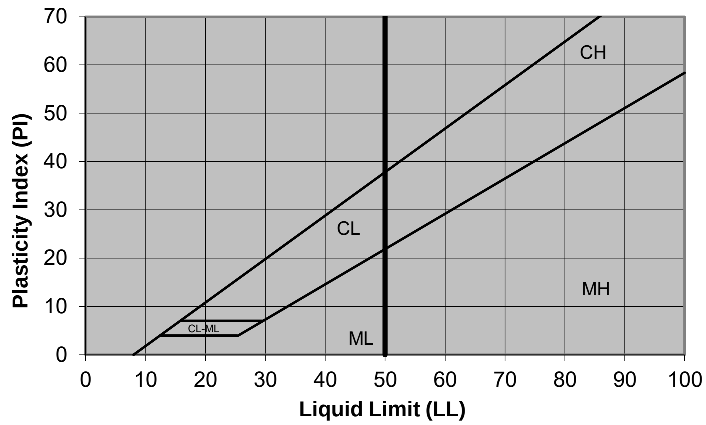
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

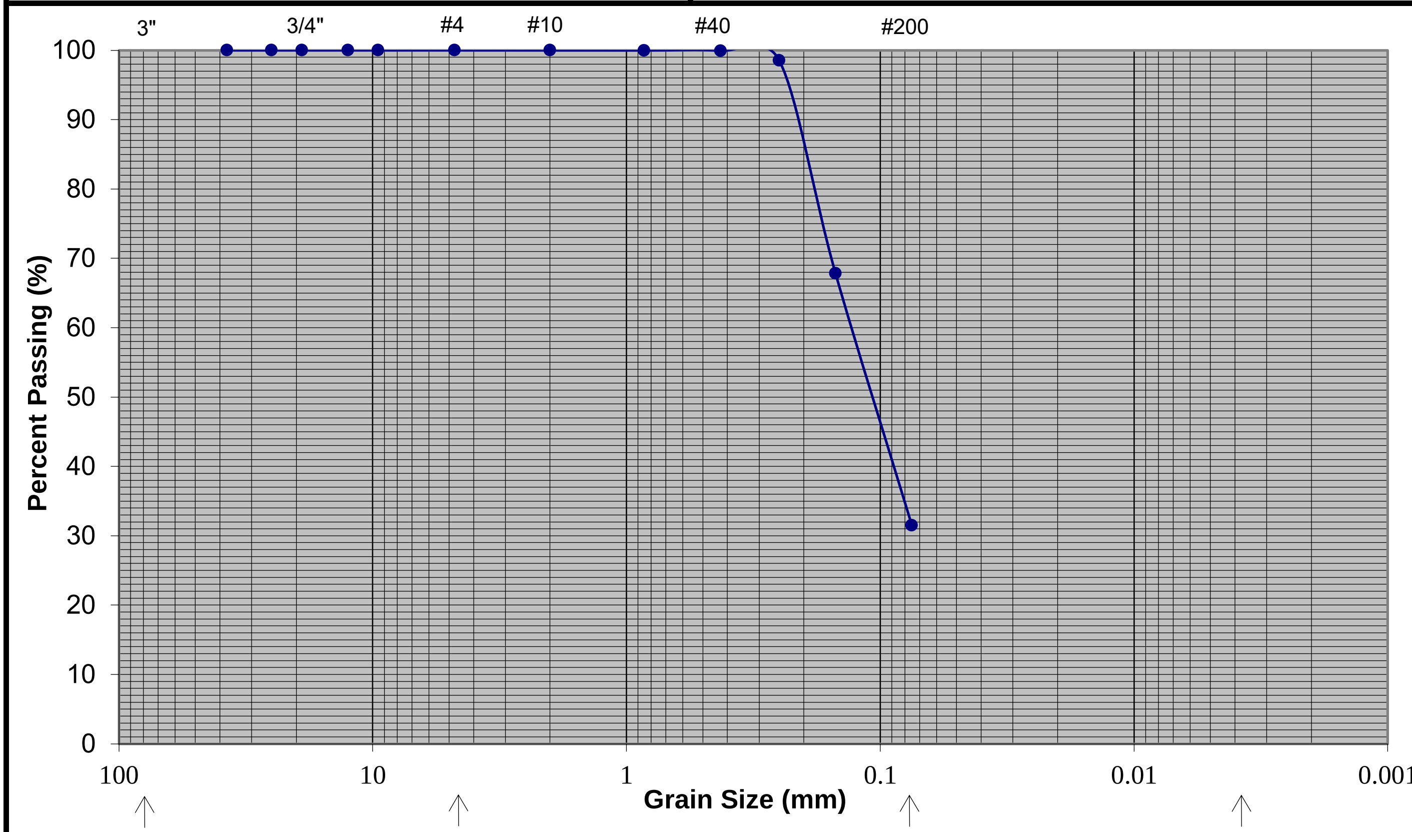
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**68.5%**
Percent Clay/Silt:	**31.5%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-10/S13364**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

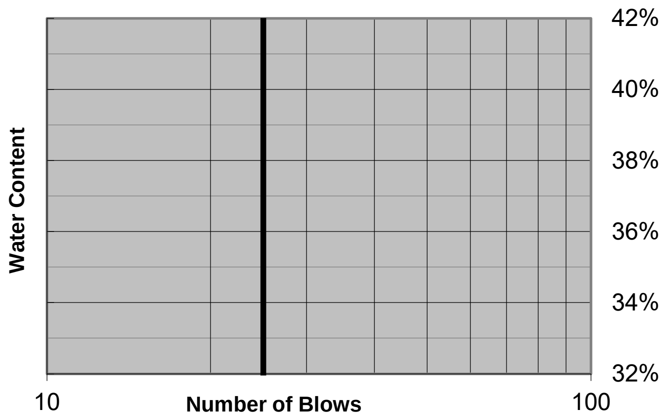
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

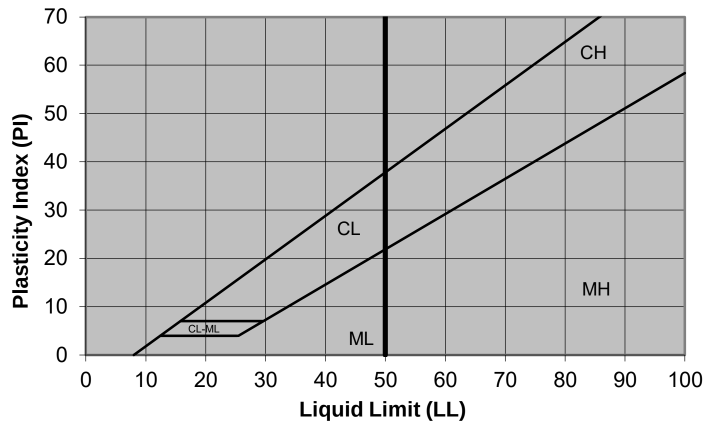
REPORT OF SIEVE ANALYSIS (ASTM D422)

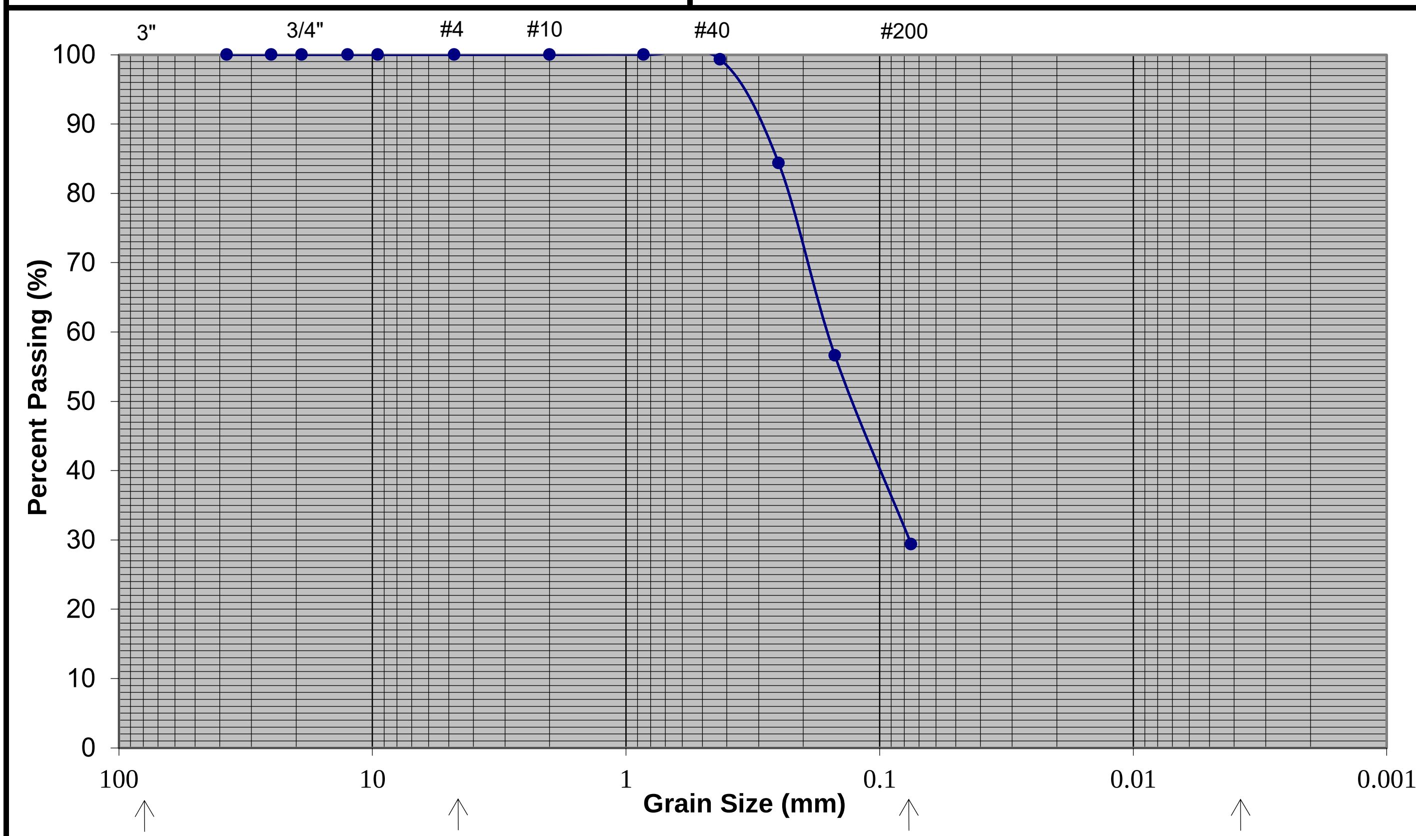
Percent Gravel:	**0.0%**
Percent Sand:	**70.6%**
Percent Clay/Silt:	**29.4%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-3 / S13365**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray, fine sandy CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

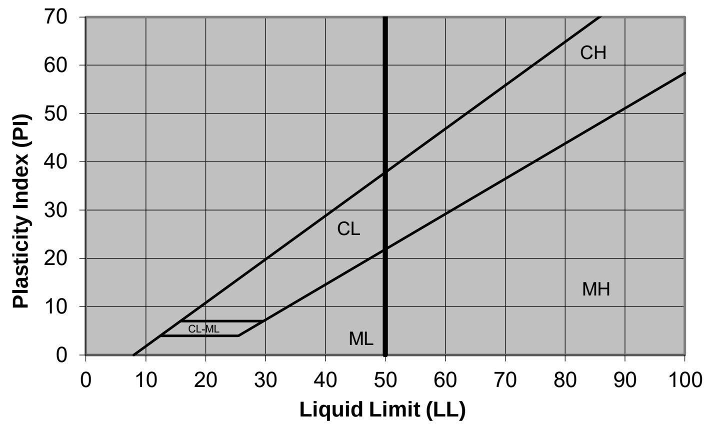
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**CL**

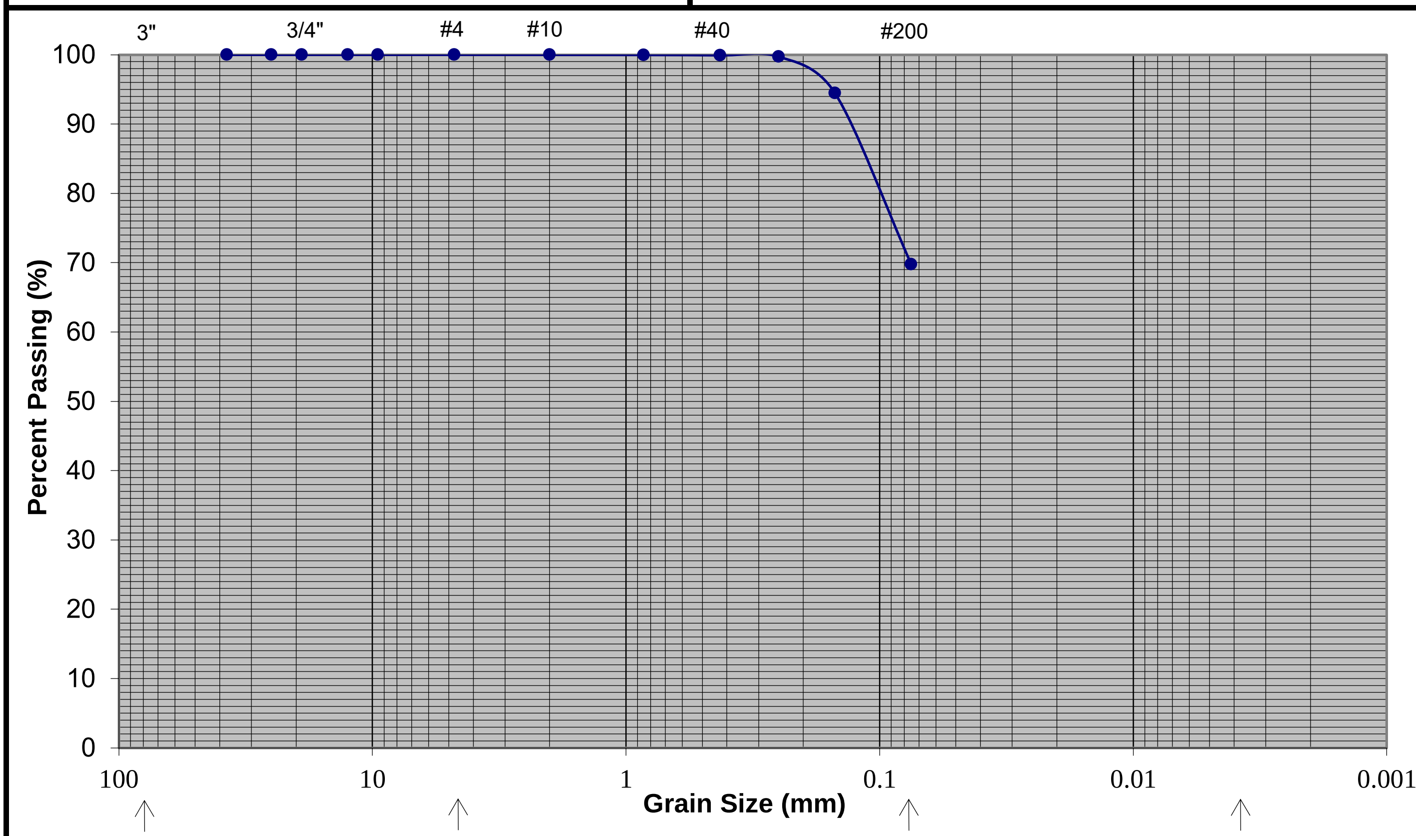
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**30.2%**
Percent Clay/Silt:	**69.8%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-12 / S13366**
Sample Depth / Location	**28-30 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/18/2013**
Date Tested:	**1/3/2014**
Reviewed By:	
Date Issued:	

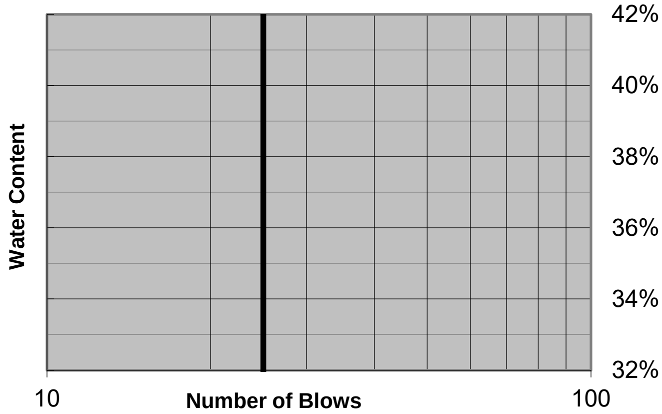
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

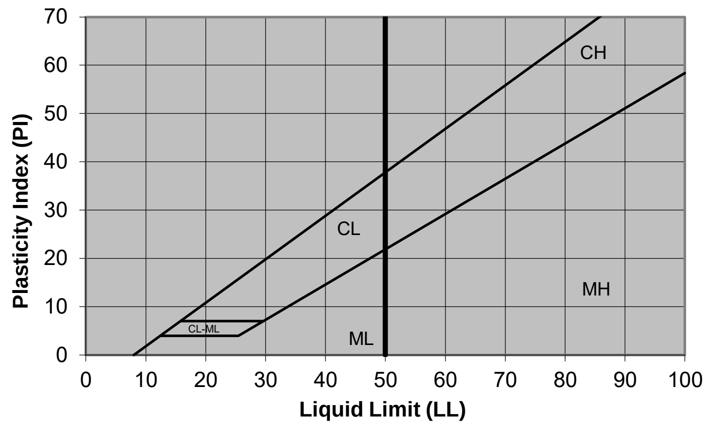
REPORT OF SIEVE ANALYSIS (ASTM D422)

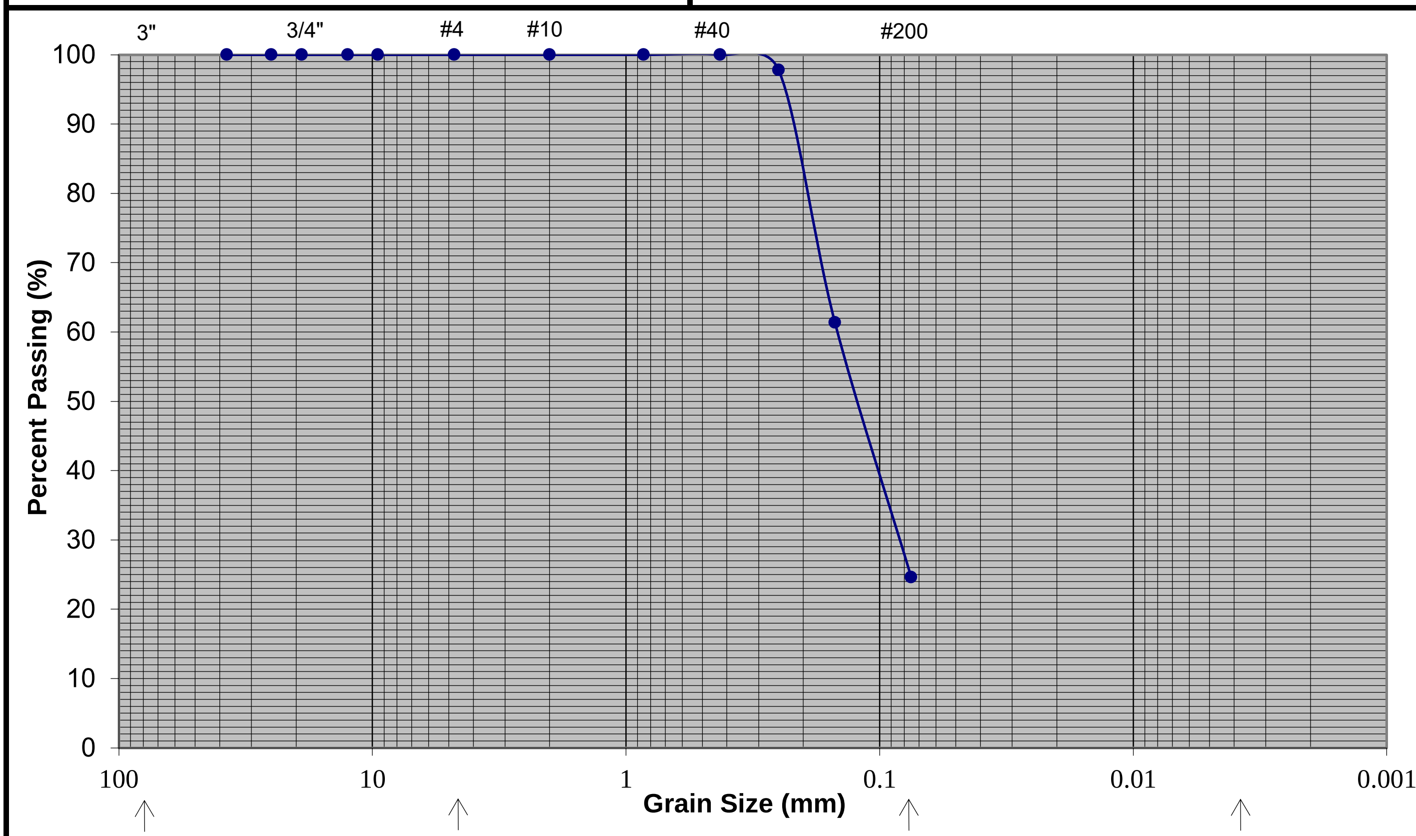
Percent Gravel:	**0.0%**
Percent Sand:	**75.4%**
Percent Clay/Silt:	**24.6%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-12 / S13367**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/18/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

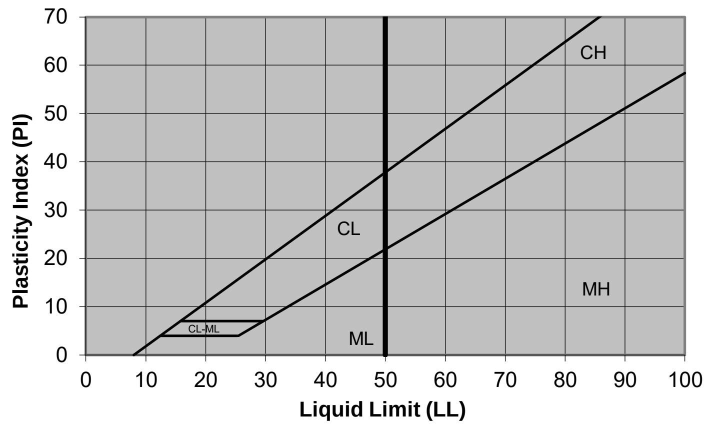
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

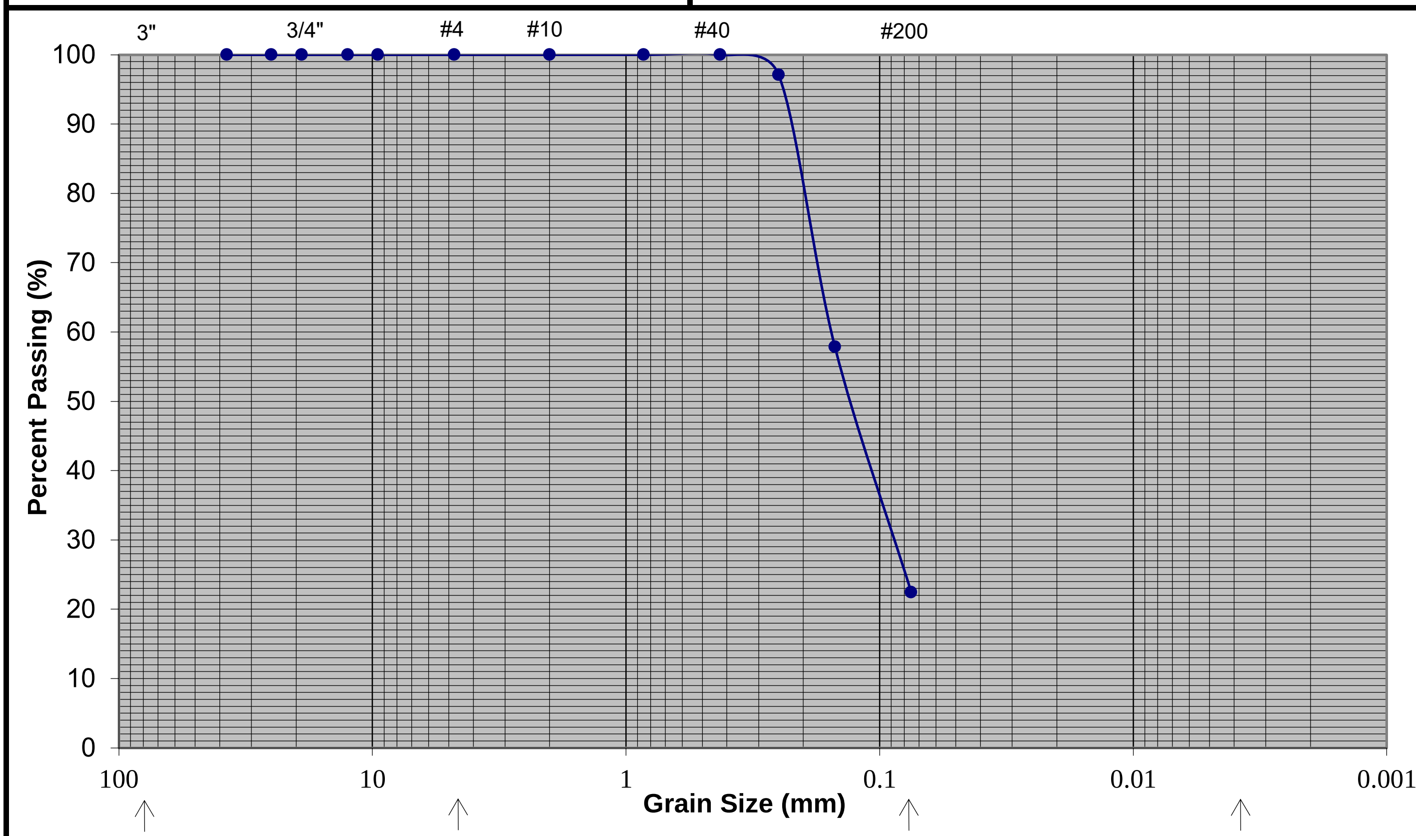
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**77.5%**
Percent Clay/Silt:	**22.5%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.	Project Name: **Lowman Hydrogeologic Investigation** Project Number: **061321201** Client: **PowerSouth Energy** Address: **Andalusia, Alabama** Project Location:

Boring No. / Sample No.	**PZ-5 / S13368**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Gray, silty fine SAND**
Date Sampled:	**10/15/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

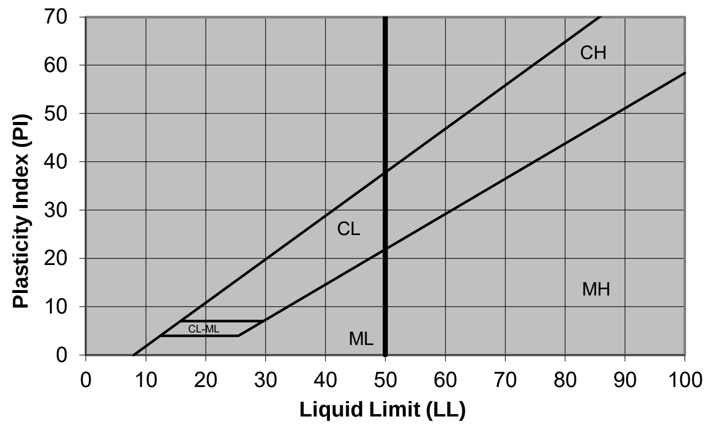
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**ML**

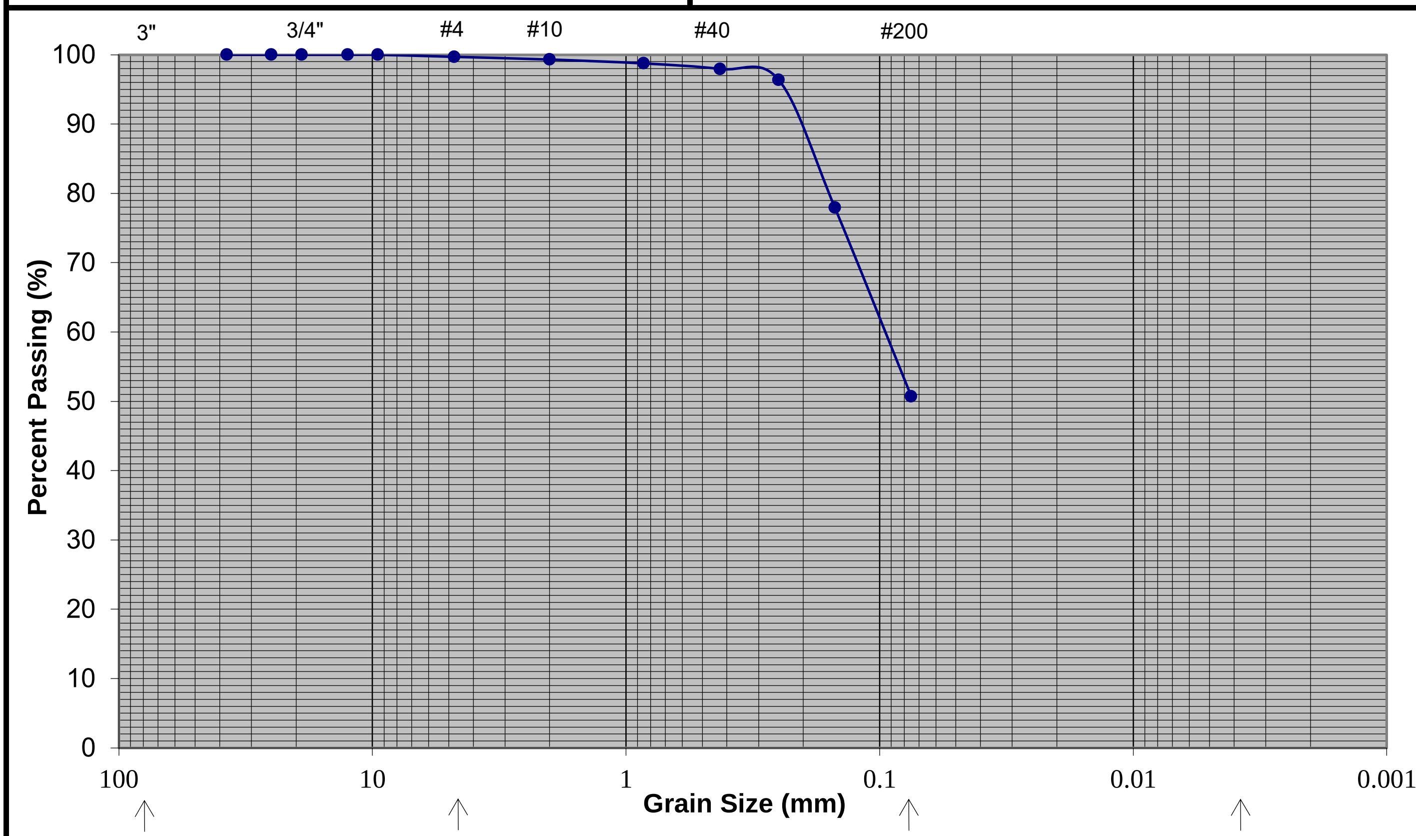
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.3%**
Percent Sand:	**49.0%**
Percent Clay/Silt:	**50.7%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG
Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-8 / S13369**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

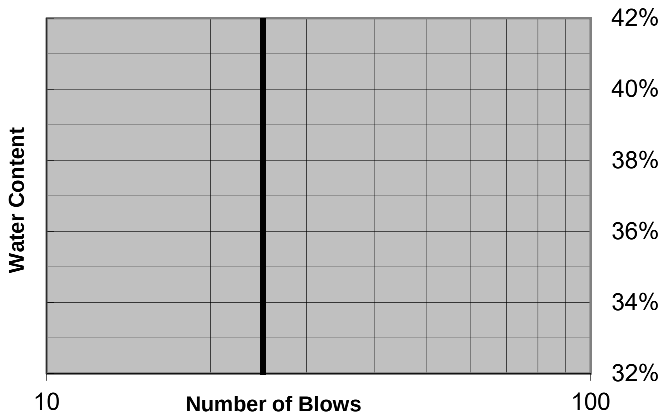
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

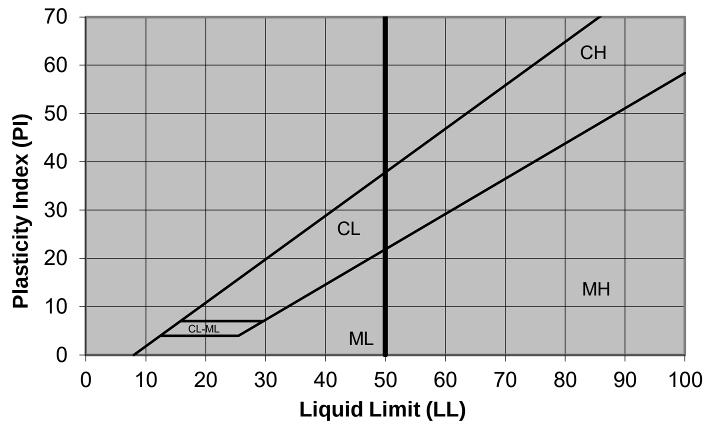
REPORT OF SIEVE ANALYSIS (ASTM D422)

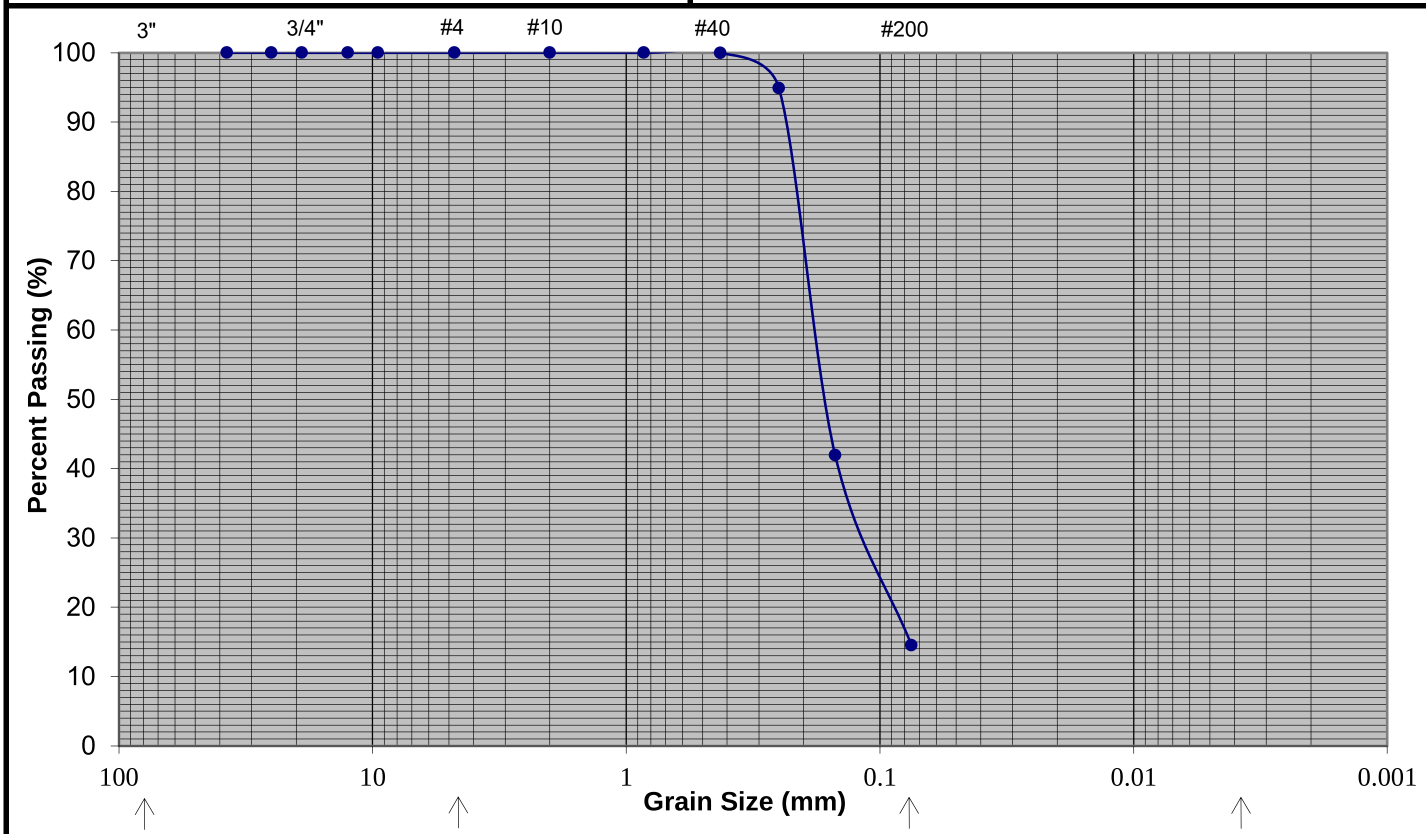
Percent Gravel:	**0.0%**
Percent Sand:	**85.5%**
Percent Clay/Silt:	**14.5%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Project Name:	Lowman Hydrogeologic Investigation
Project Number:	061321201
Client:	PowerSouth Energy
Address:	Andalusia, Alabama
Project Location:	

Engineering. Environmental. Answers.

Boring No. / Sample No.	**PZ-12 /S13370**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/18/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

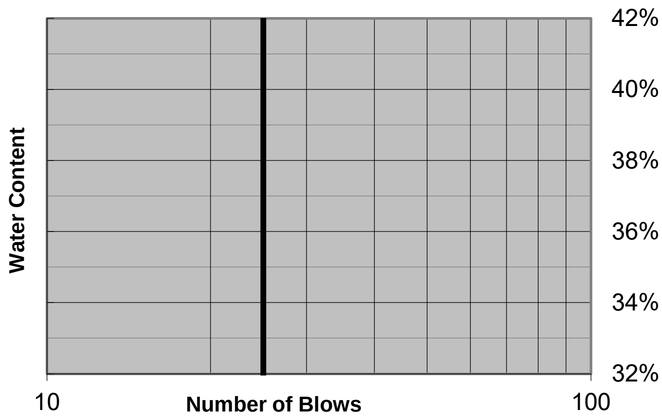
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

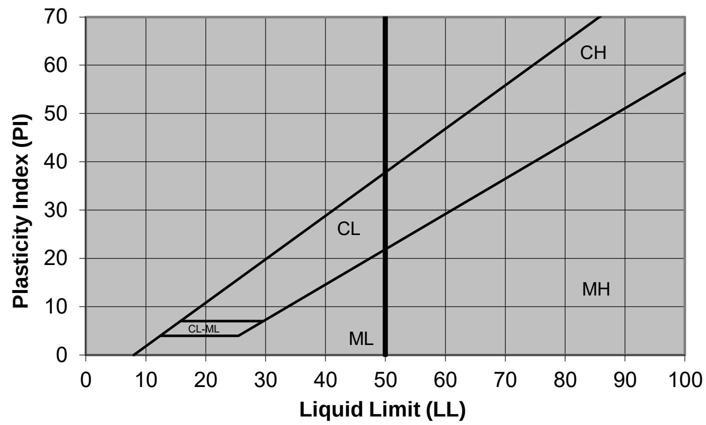
REPORT OF SIEVE ANALYSIS (ASTM D422)

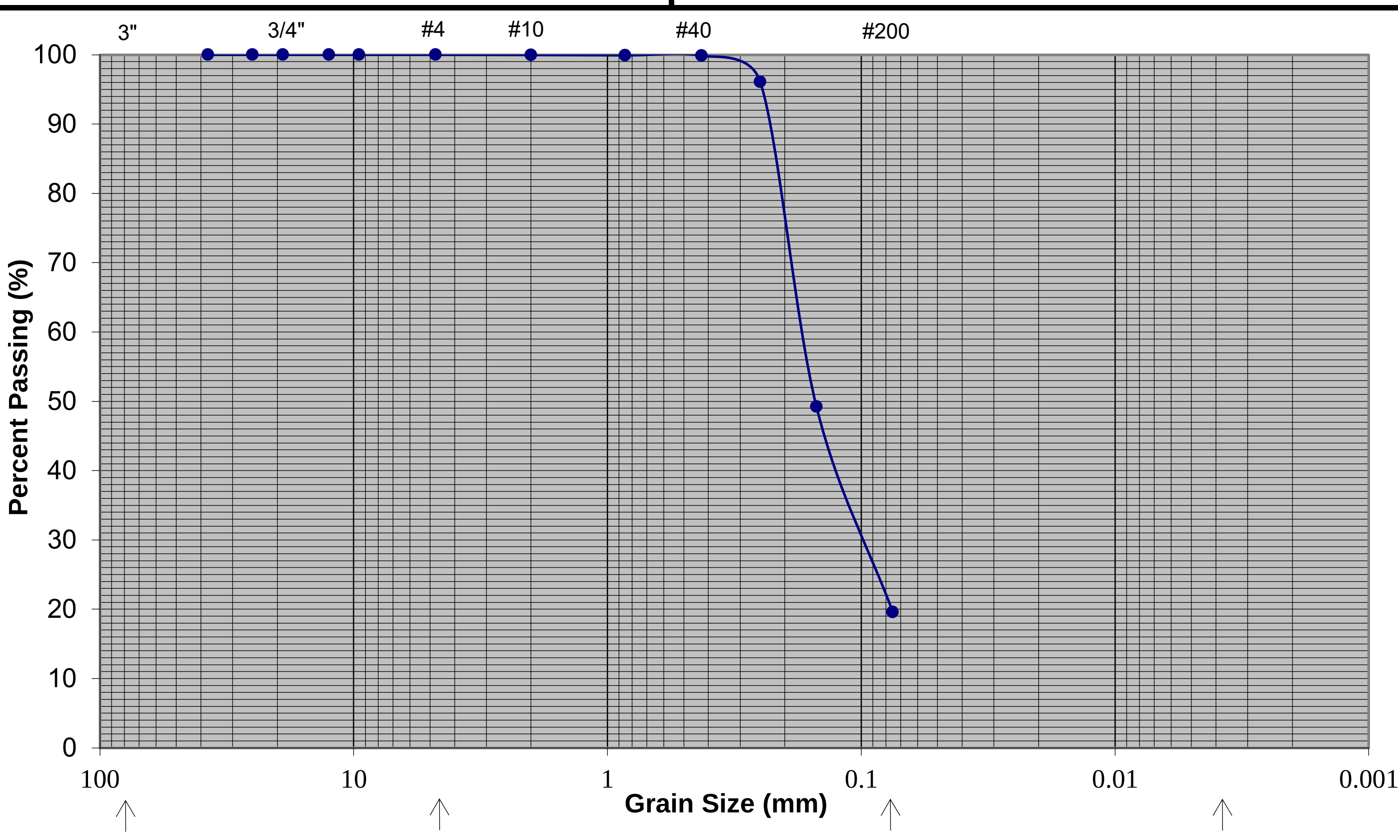
Percent Gravel:	**0.0%**
Percent Sand:	**80.4%**
Percent Clay/Silt:	**19.6%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-9 / S13371**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray, silty fine SAND**
Date Sampled:	**10/17/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

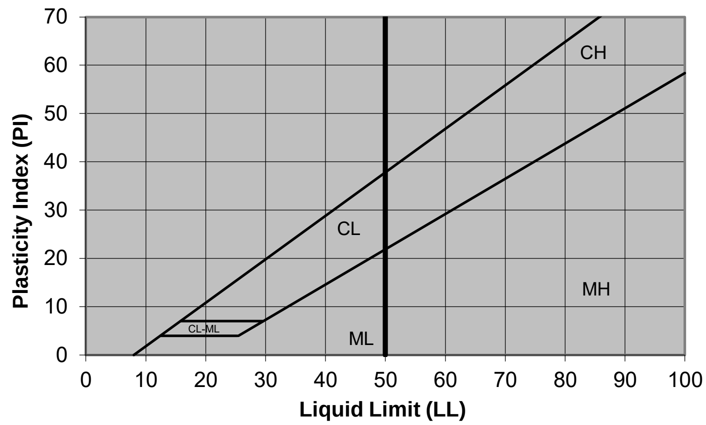
Liquid Limit (LL):		AASHTO / USCS Classifications
Plastic Limit (PL):		
Plasticity Index (PI):		**SM**

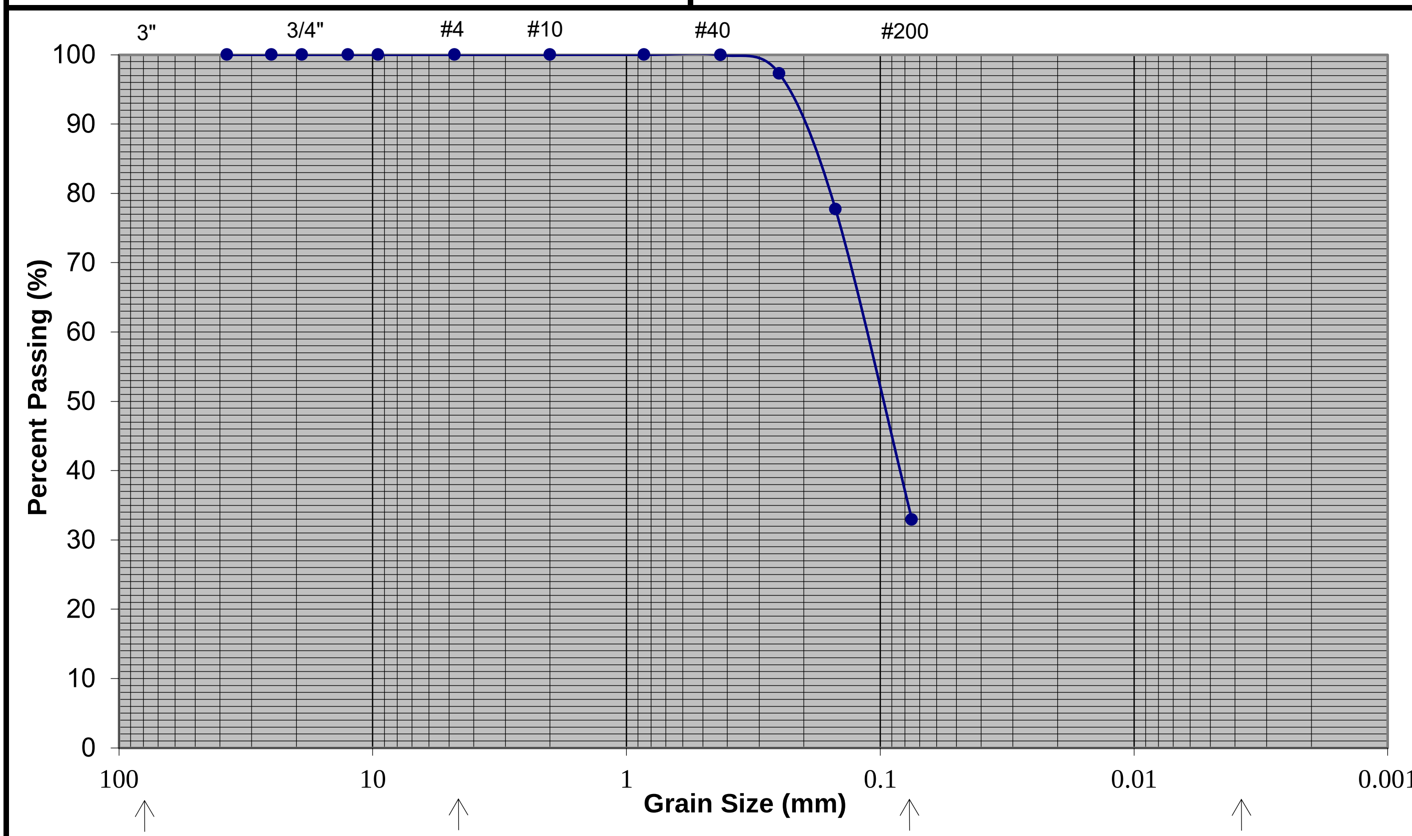
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**67.1%**
Percent Clay/Silt:	**32.9%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-12 / S13372**
Sample Depth / Location	**18-20 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/18/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

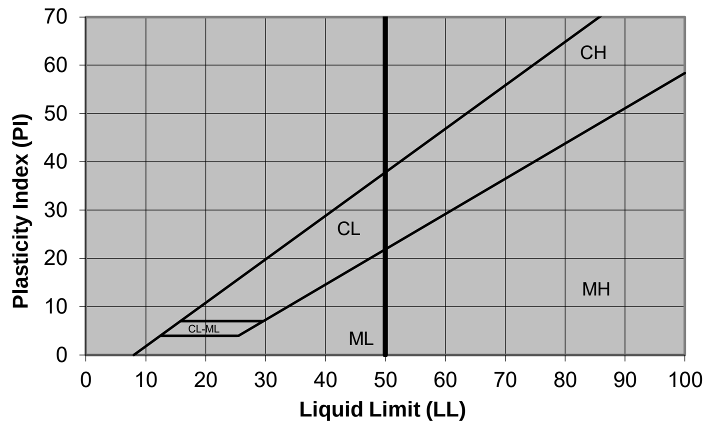
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

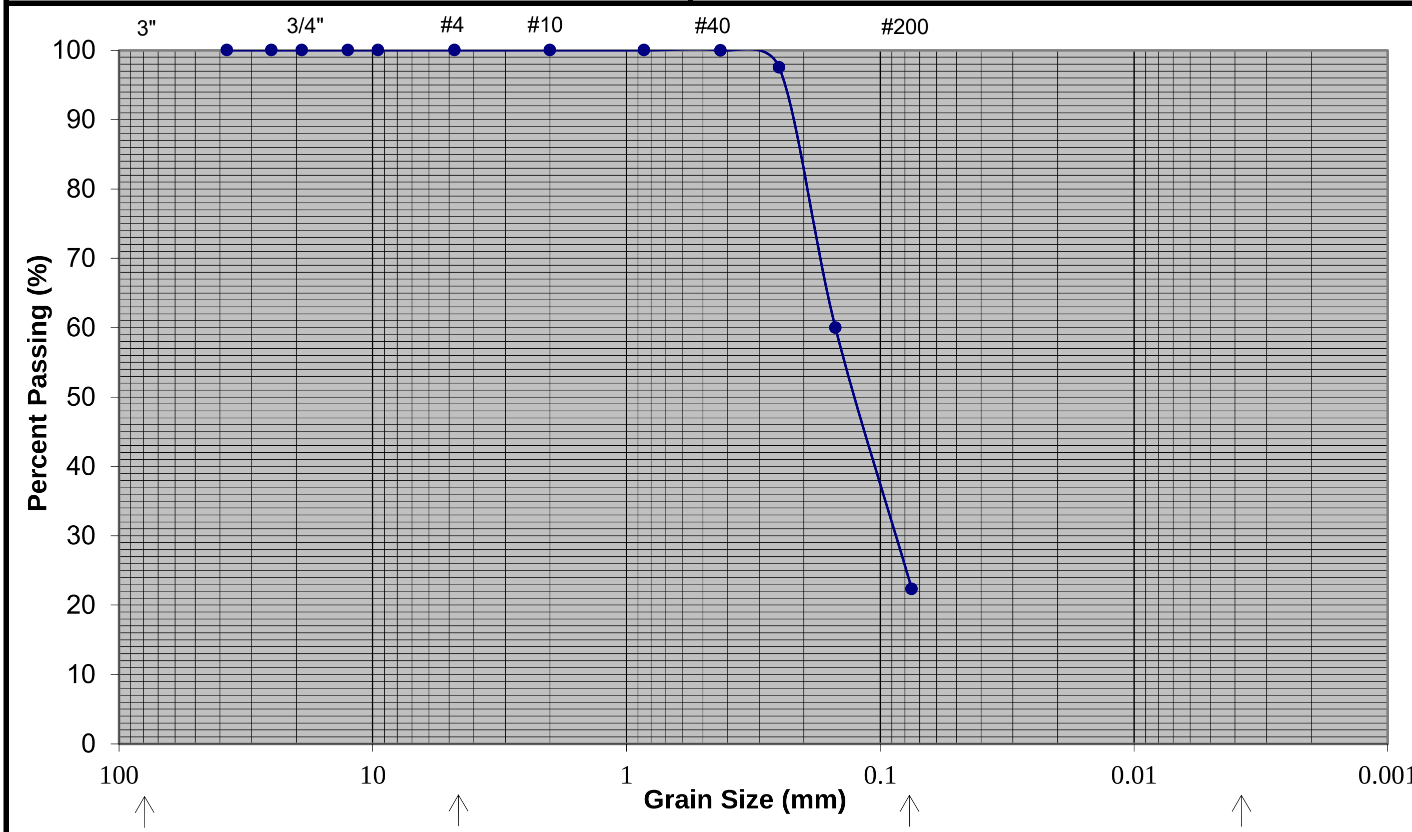
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**77.7%**
Percent Clay/Silt:	**22.3%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Project Name: **Lowman Hydrogeologic Investigation**
Project Number: **061321201**
Client: **PowerSouth Energy**
Address: **Andalusia, Alabama**
Project Location:

Boring No. / Sample No.	**PZ-11 / S13373**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Red, clayey fine to coarse SAND with gravel**
Date Sampled:	**10/17/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

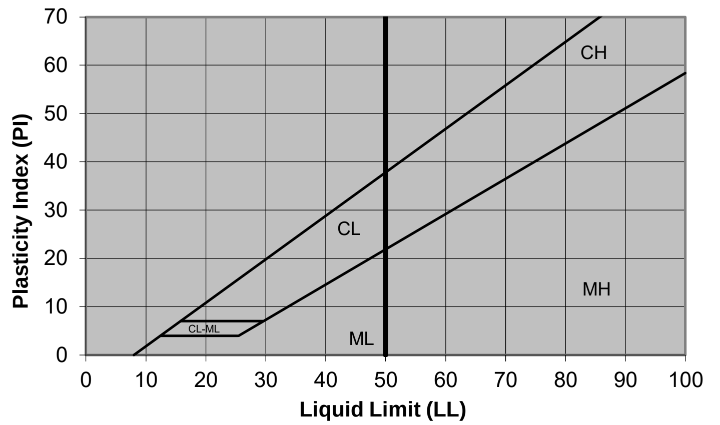
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SC**

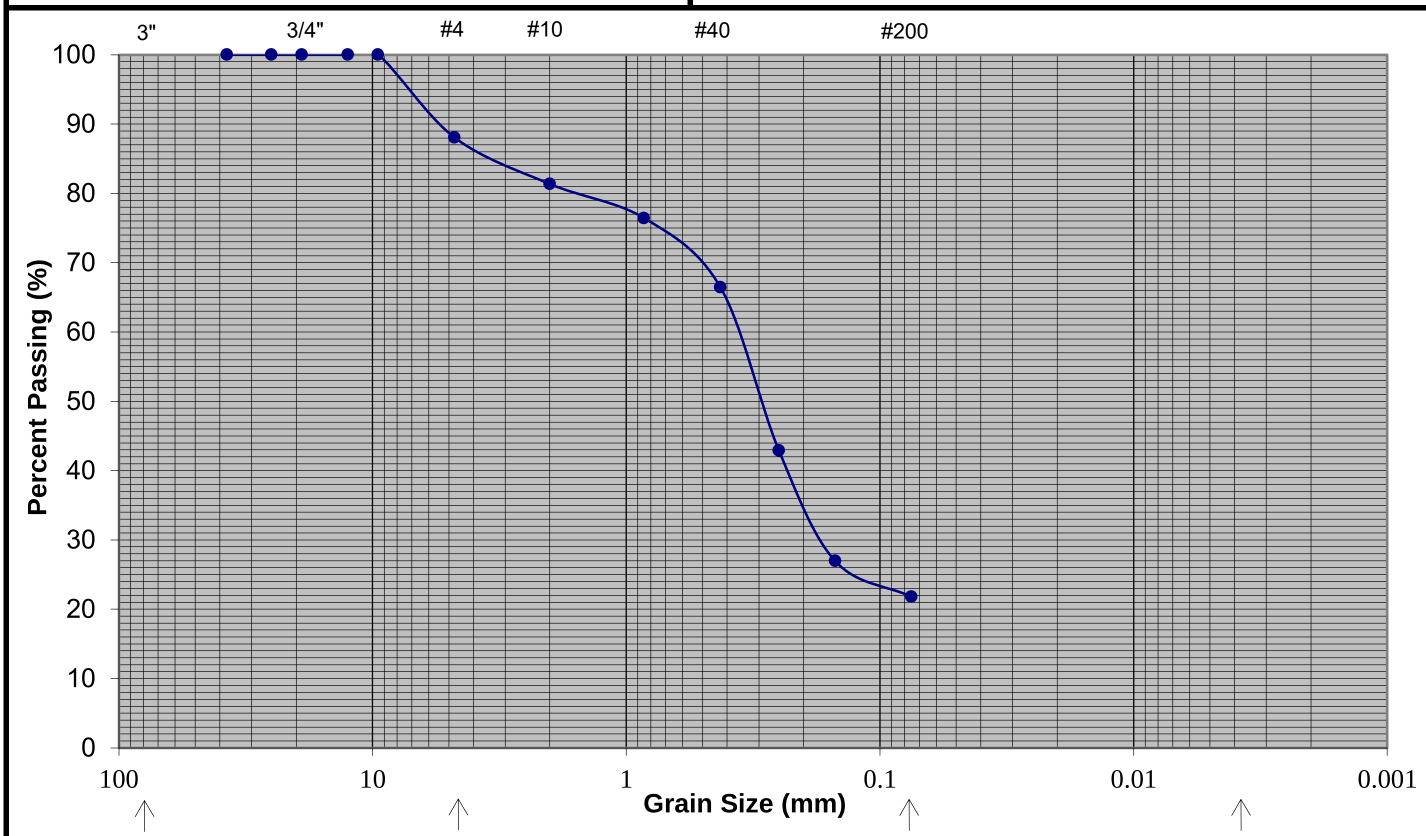
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**11.9%**
Percent Sand:	**66.3%**
Percent Clay/Silt:	**21.8%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-11 /S13374**
Sample Depth / Location	**28-30 feet**
Sample Description:	**Tan, silty, poorly graded fine SAND**
Date Sampled:	**10/24/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

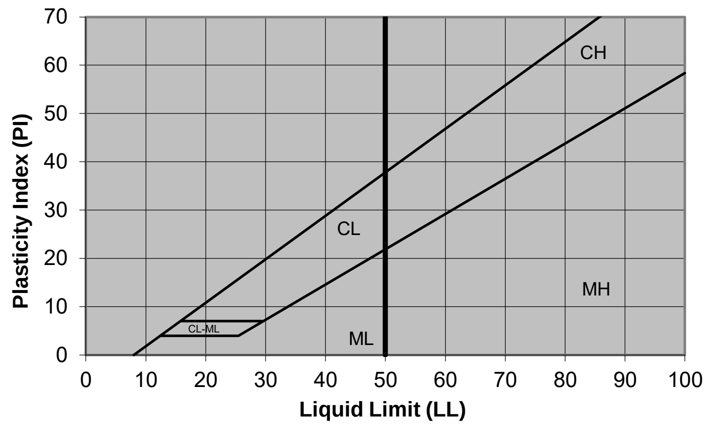
Liquid Limit (LL):		AASHTO / USCS Classifications
Plastic Limit (PL):		
Plasticity Index (PI):		**SP-SM**

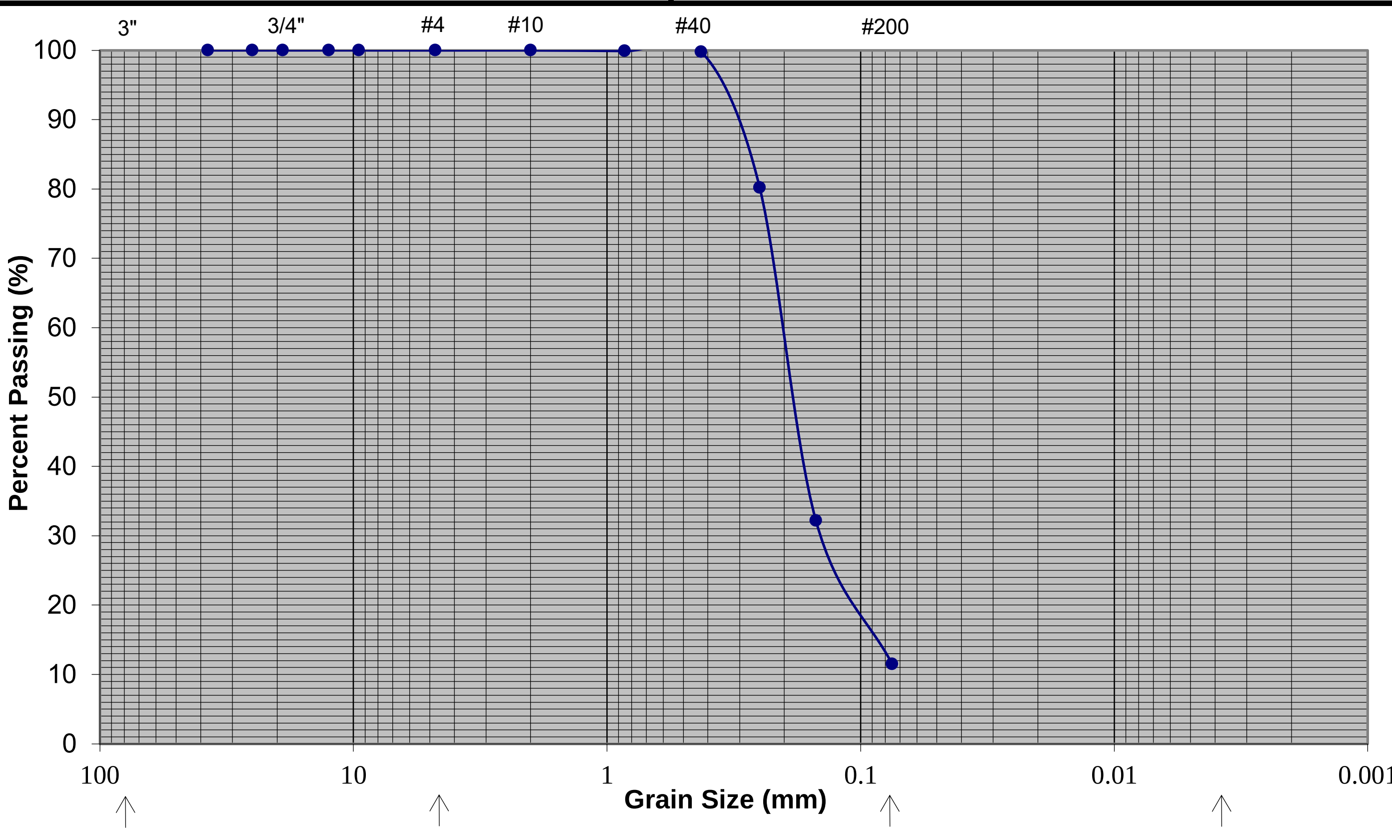
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**88.5%**
Percent Clay/Silt:	**11.5%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-6 / S13375**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**1/6/2014**
Reviewed By:	
Date Issued:	

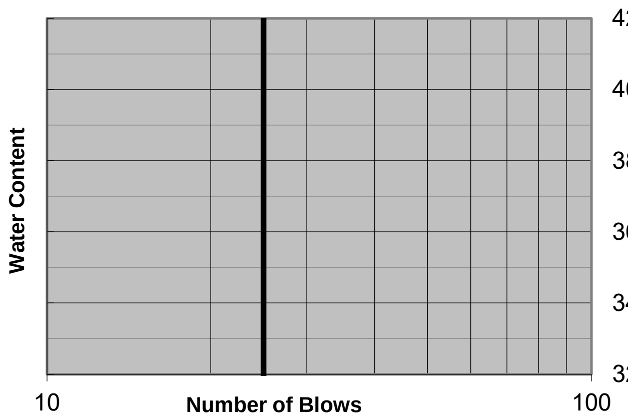
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

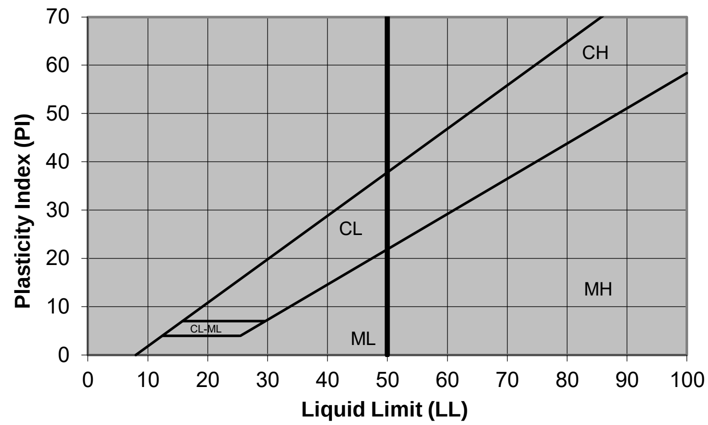
REPORT OF SIEVE ANALYSIS (ASTM D422)

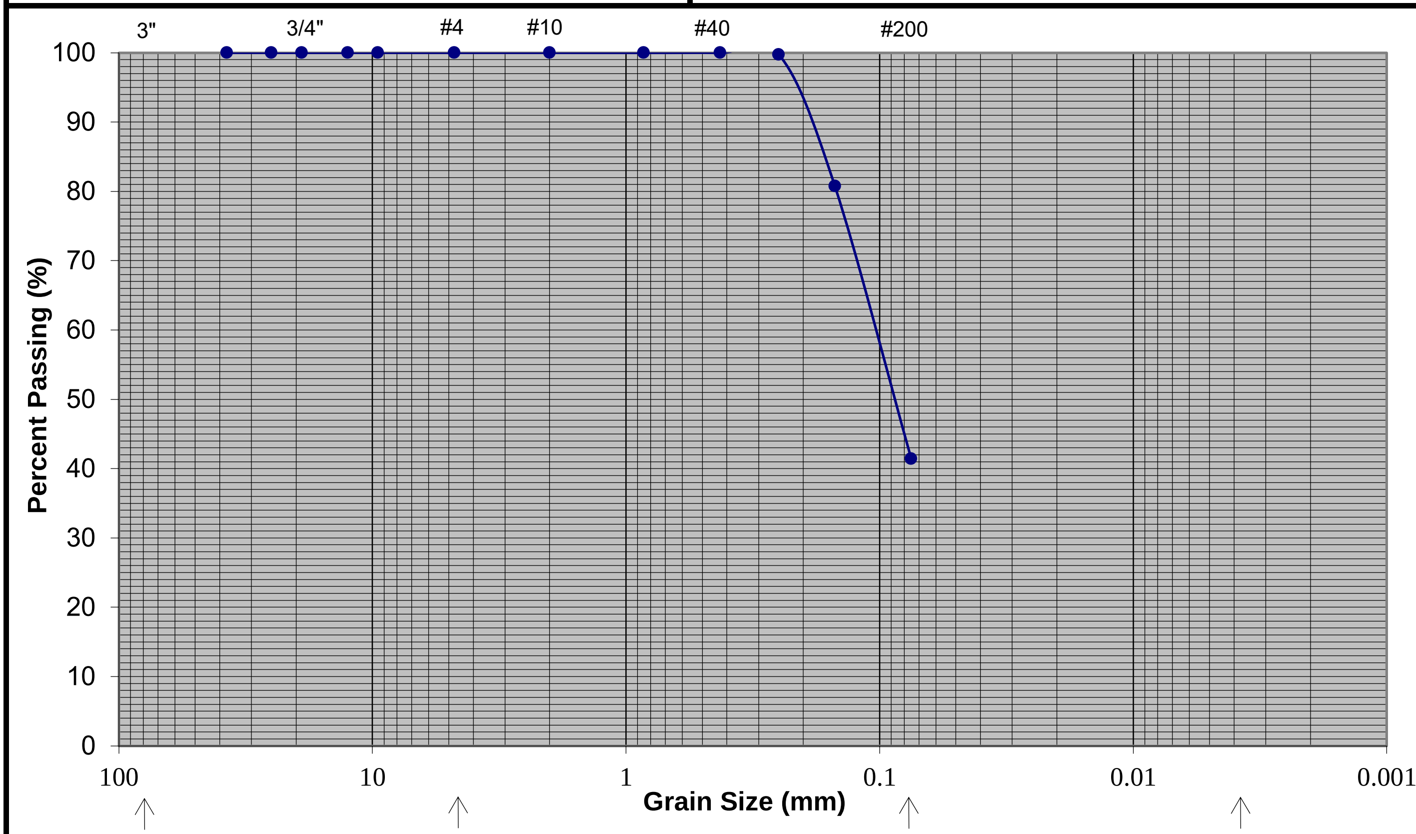
Percent Gravel:	**0.0%**
Percent Sand:	**58.6%**
Percent Clay/Silt:	**41.4%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-6 / S13376**
Sample Depth / Location	**33-35 feet**
Sample Description:	**Gray, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

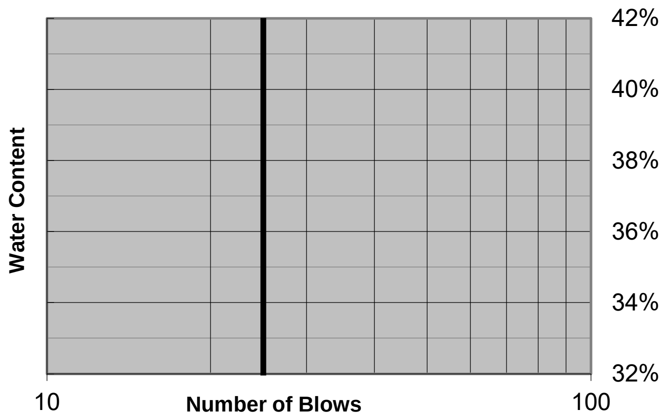
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

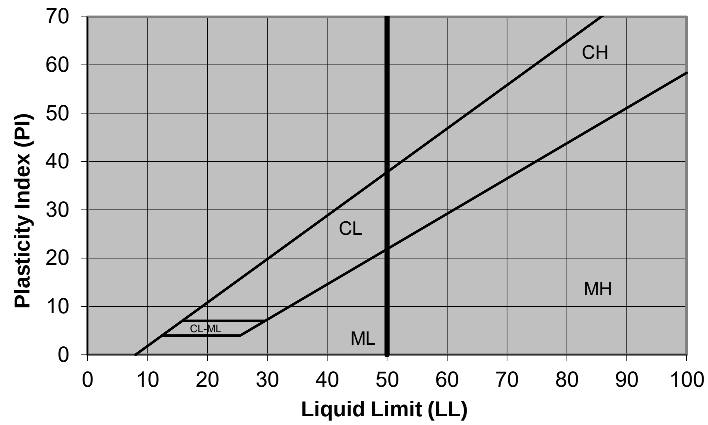
REPORT OF SIEVE ANALYSIS (ASTM D422)

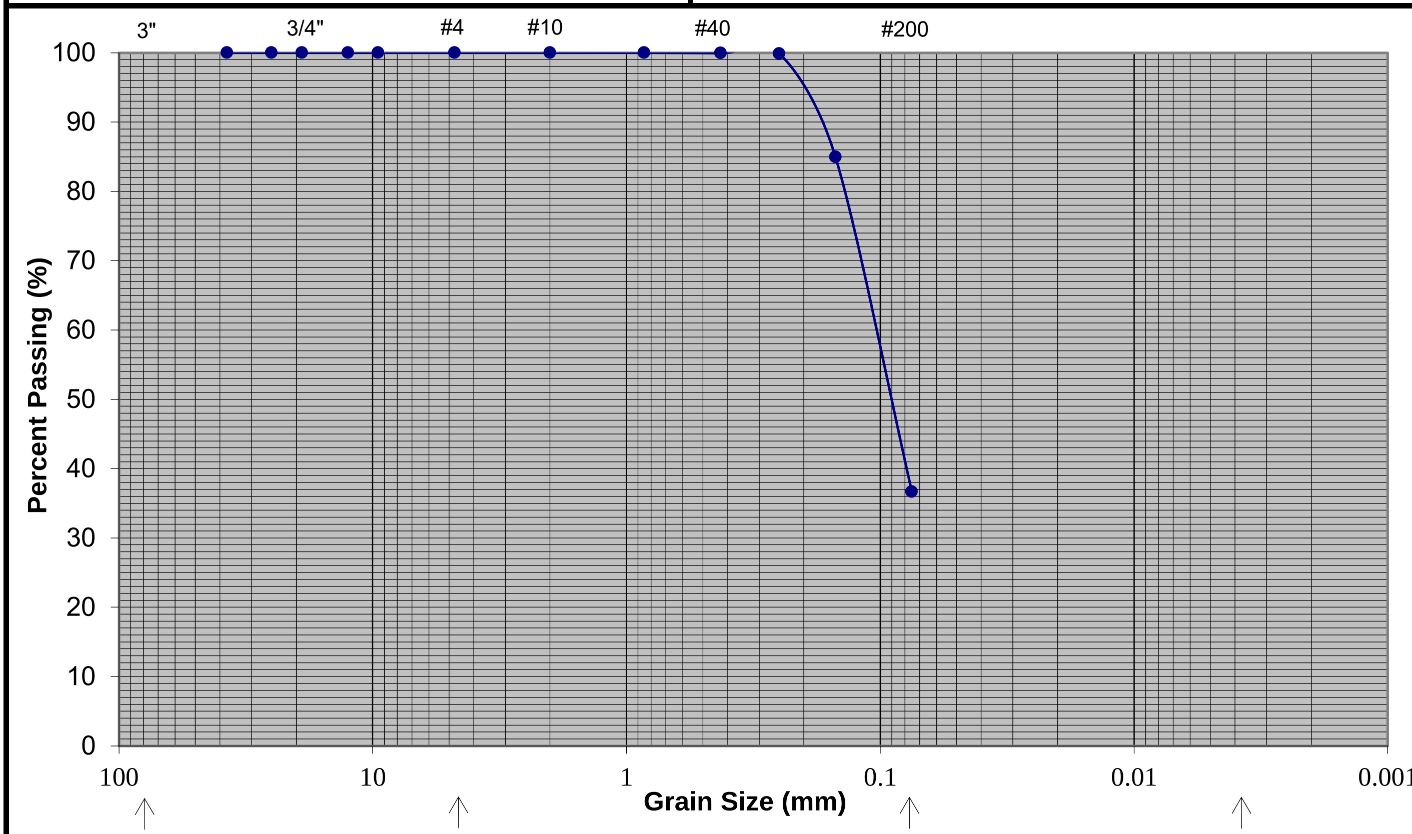
Percent Gravel:	**0.0%**
Percent Sand:	**63.3%**
Percent Clay/Silt:	**36.7%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**MW-4 / S13377**
Sample Depth / Location	**23-25 feet**
Sample Description:	**Orange, silty, poorly graded fine to coarse SAND with gravel**
Date Sampled:	**10/21/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

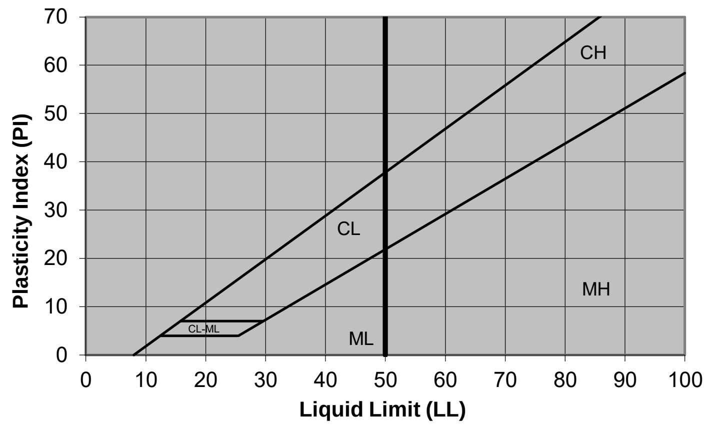
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SP-SM**

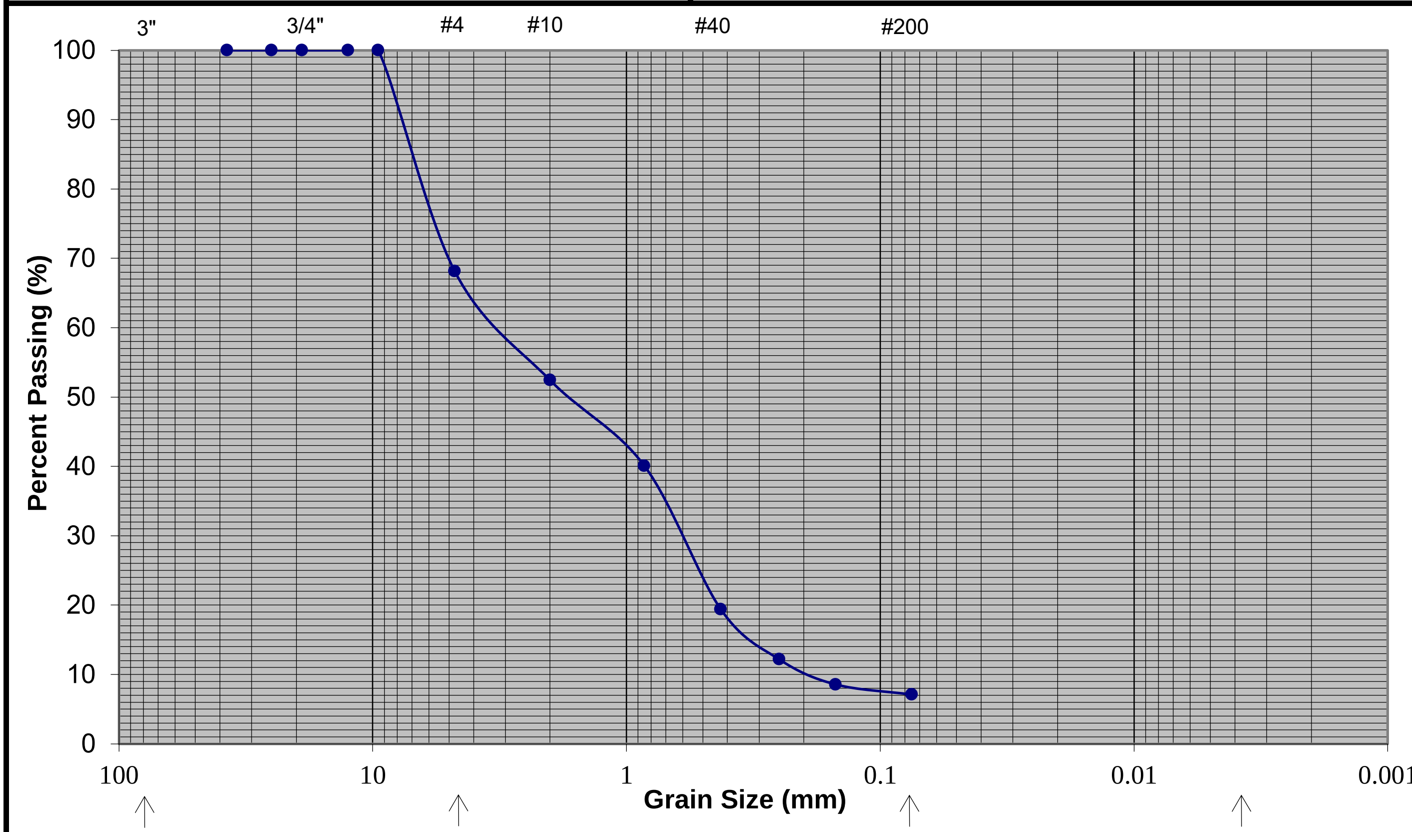
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**31.9%**
Percent Sand:	**61.0%**
Percent Clay/Silt:	**7.1%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-2 / S13378**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Gray CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

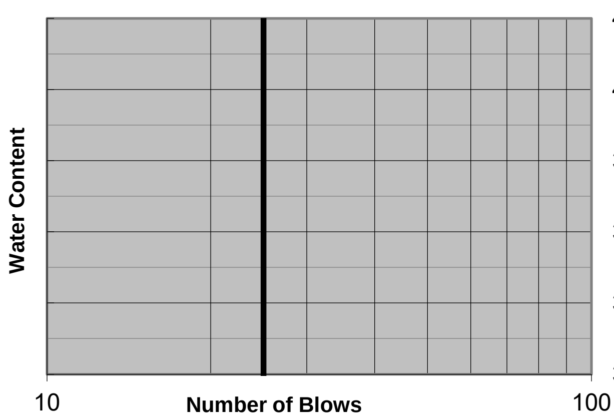
Visual-Manual Identification of Soils (D2488)

		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**CH**

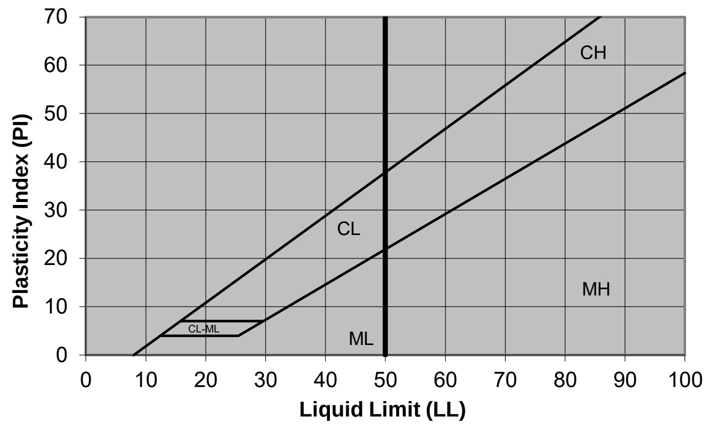
REPORT OF SIEVE ANALYSIS (ASTM D422)

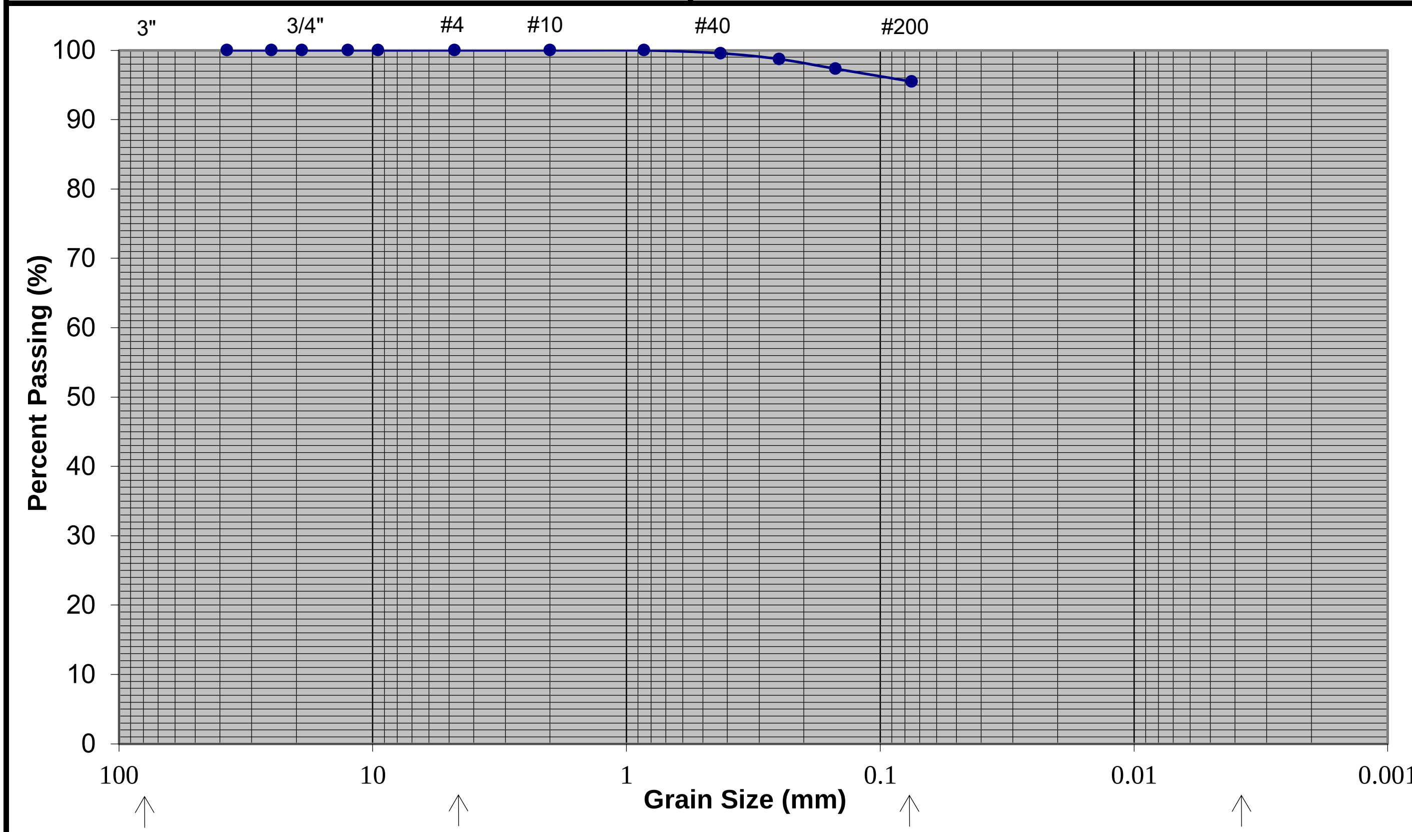
Percent Gravel:	**0.0%**
Percent Sand:	**4.5%**
Percent Clay/Silt:	**95.5%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-1 / S13379**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Gray, fine sandy SILT**
Date Sampled:	**10/14/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

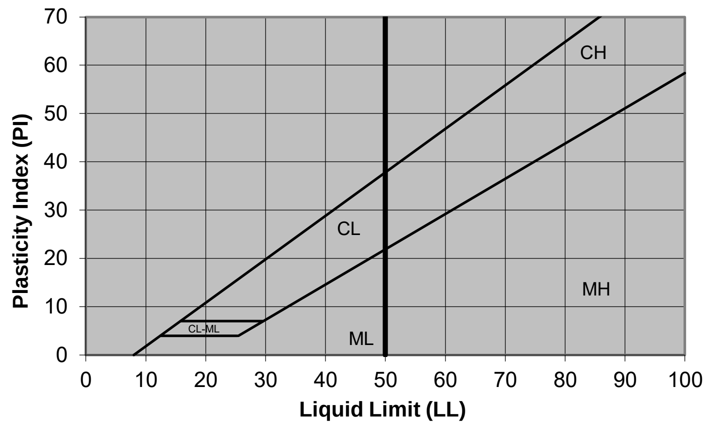
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		**ML**

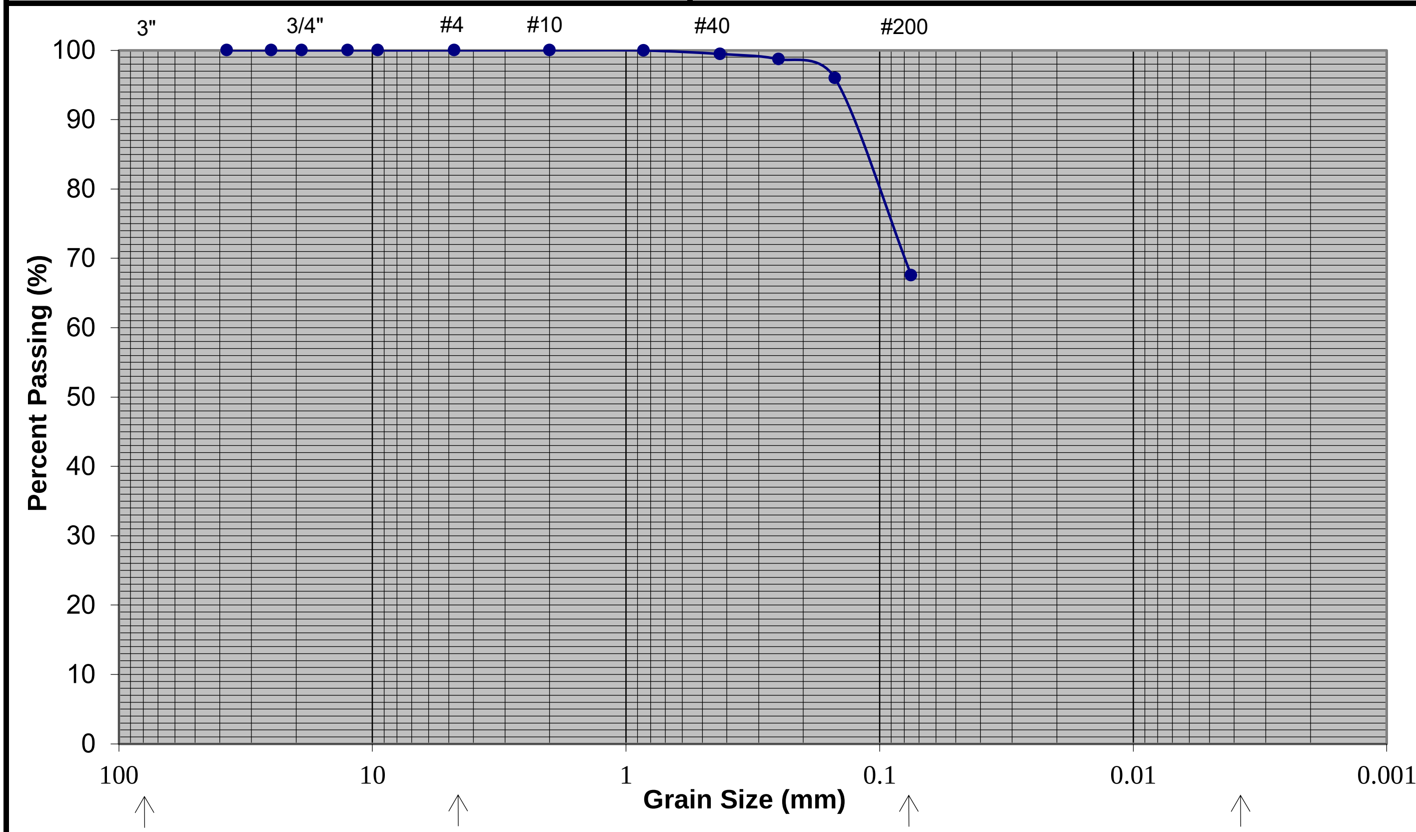
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**32.5%**
Percent Clay/Silt:	**67.5%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-CLF-2 / S13380**
Sample Depth / Location	**3-5 feet**
Sample Description:	**Gray, fine sandy SILT**
Date Sampled:	**10/23/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

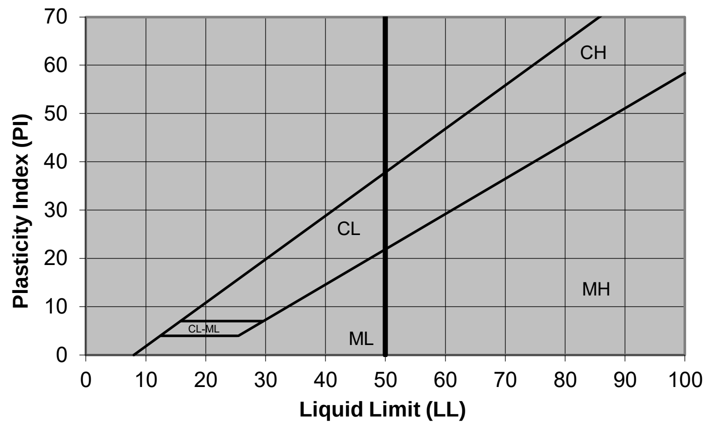
		AASHTO / USCS Classifications
Liquid Limit (LL):		
Plastic Limit (PL):		
Plasticity Index (PI):		

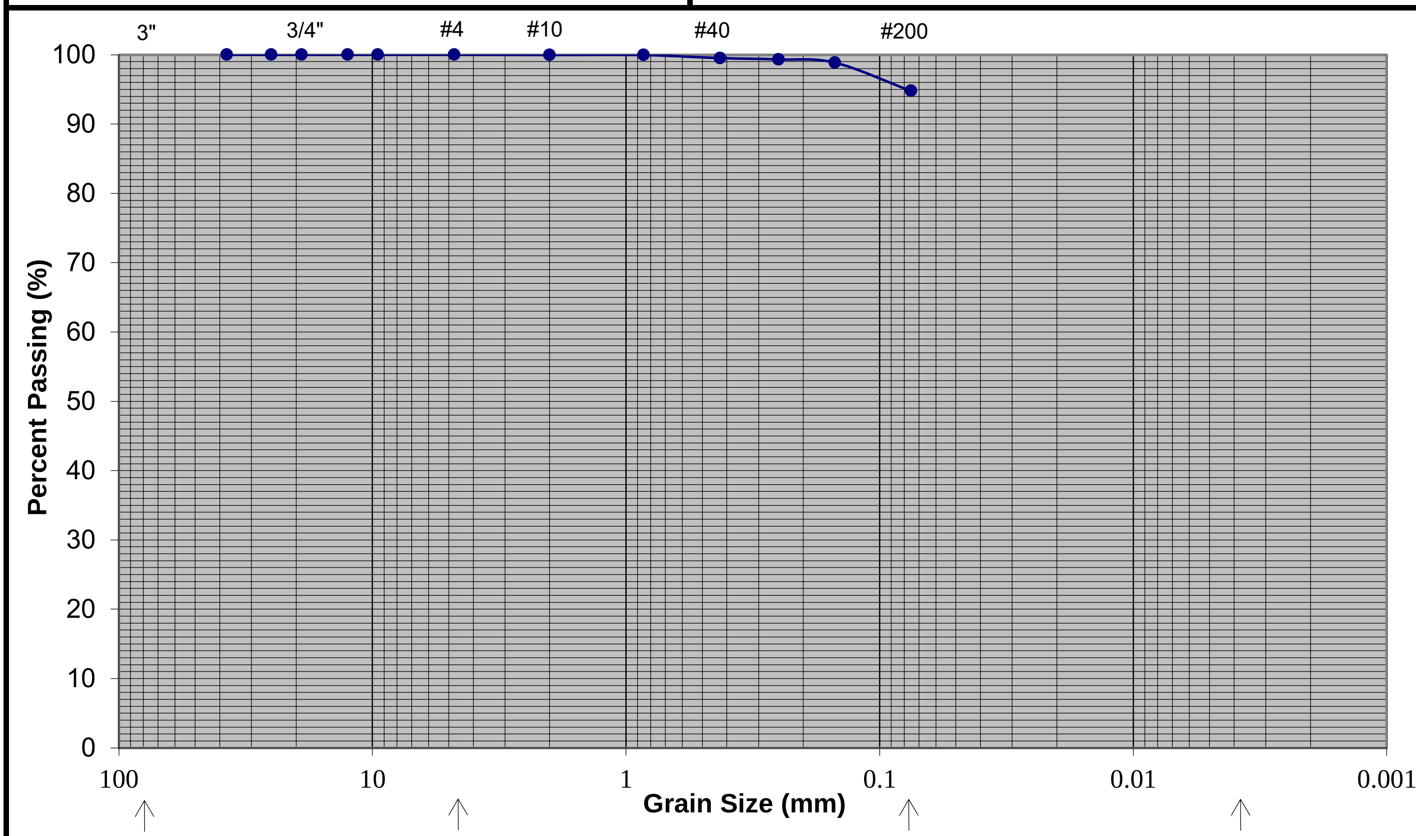
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**5.2%**
Percent Clay/Silt:	**94.8%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

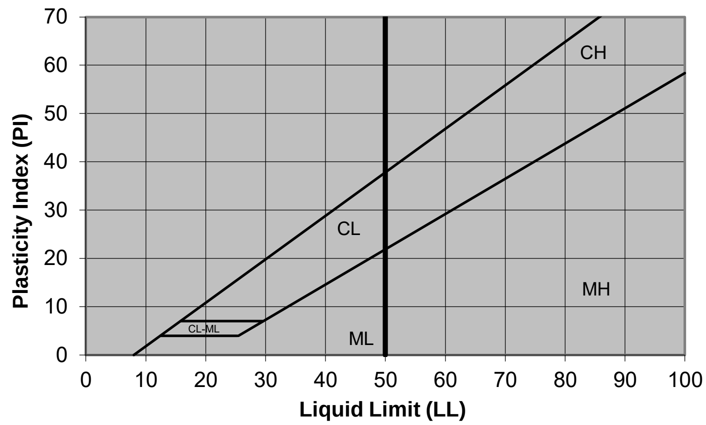
Boring No. / Sample No.	**PZ-3 / S13381**
Sample Depth / Location	**3-5 feet**
Sample Description:	**Gray CLAY**
Date Sampled:	**10/15/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

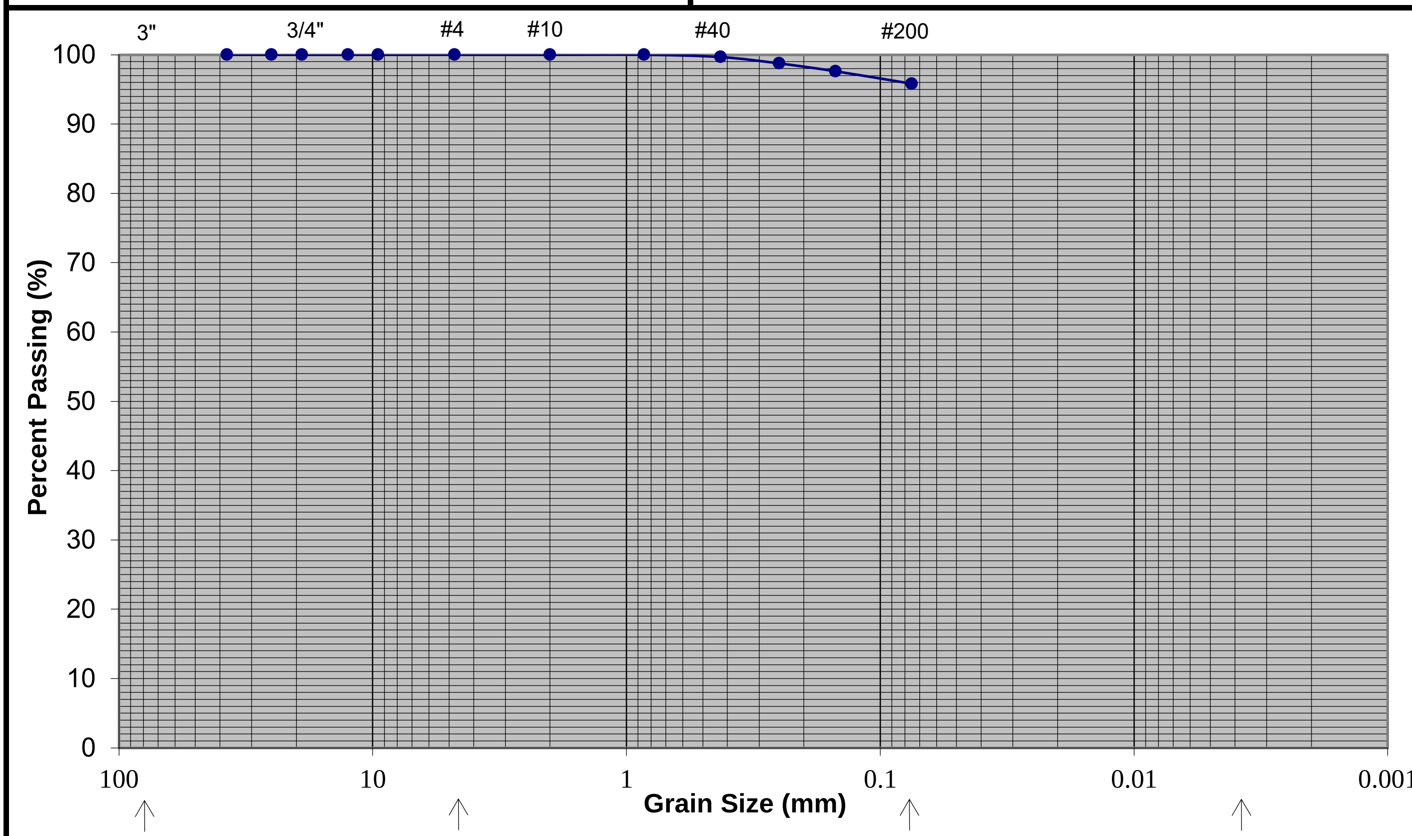
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**CL**

REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**4.2%**
Percent Clay/Silt:	**95.8%**





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-6 / S13382**
Sample Depth / Location	**38-40 feet**
Sample Description:	**Gray, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

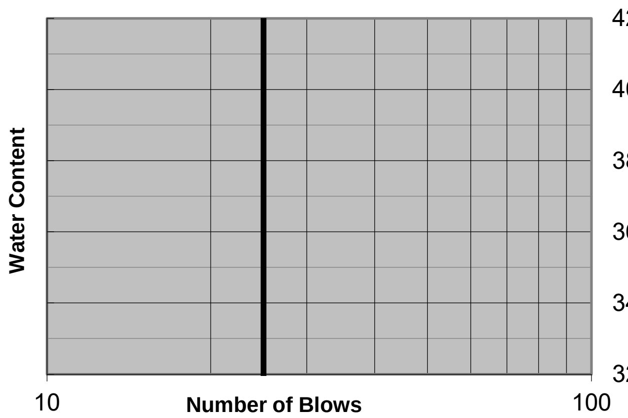
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

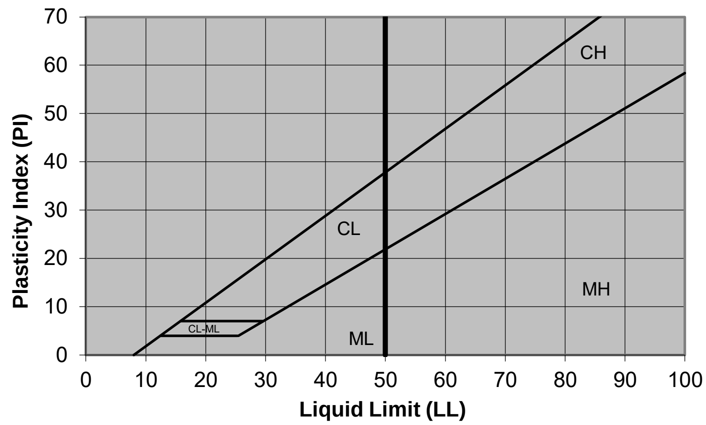
REPORT OF SIEVE ANALYSIS (ASTM D422)

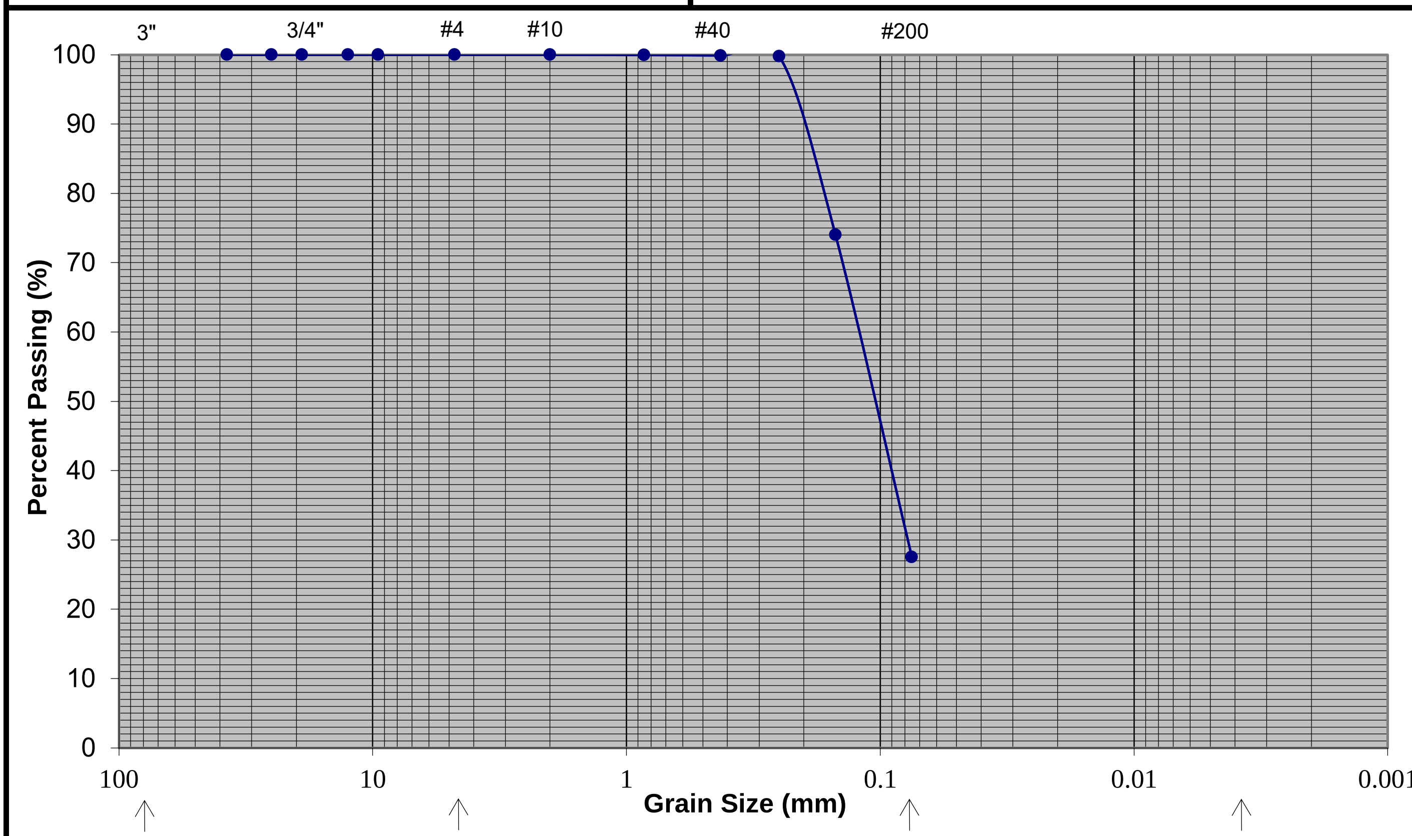
Percent Gravel:	**0.0%**
Percent Sand:	**72.5%**
Percent Clay/Silt:	**27.5%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-CLF-2 / S13383**
Sample Depth / Location	**8-10 feet**
Sample Description:	**Gray, clayey fine to coarse SAND with gravel**
Date Sampled:	**10/23/2013**
Date Tested:	**1/7/2014**
Reviewed By:	
Date Issued:	

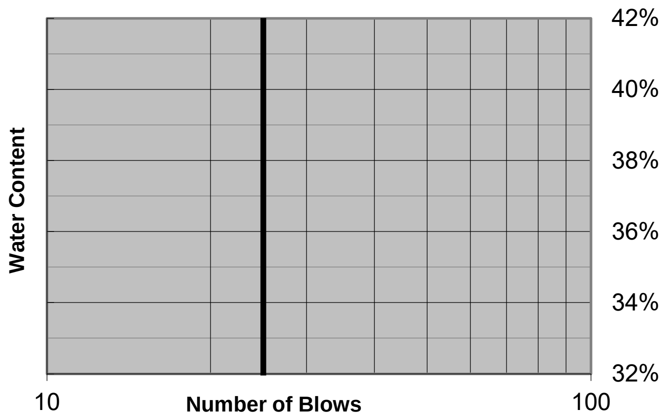
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SC**

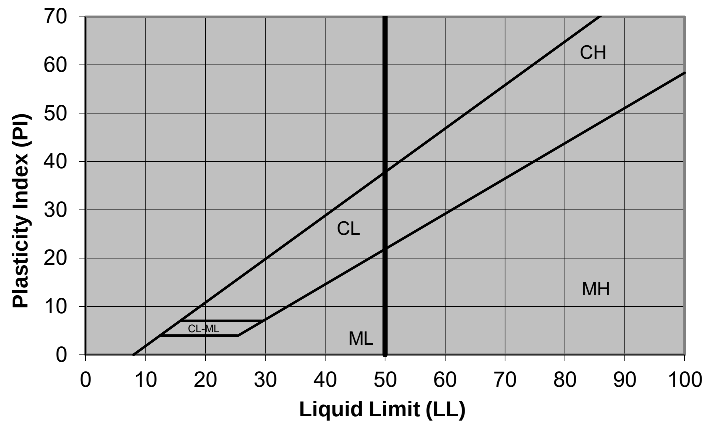
REPORT OF SIEVE ANALYSIS (ASTM D422)

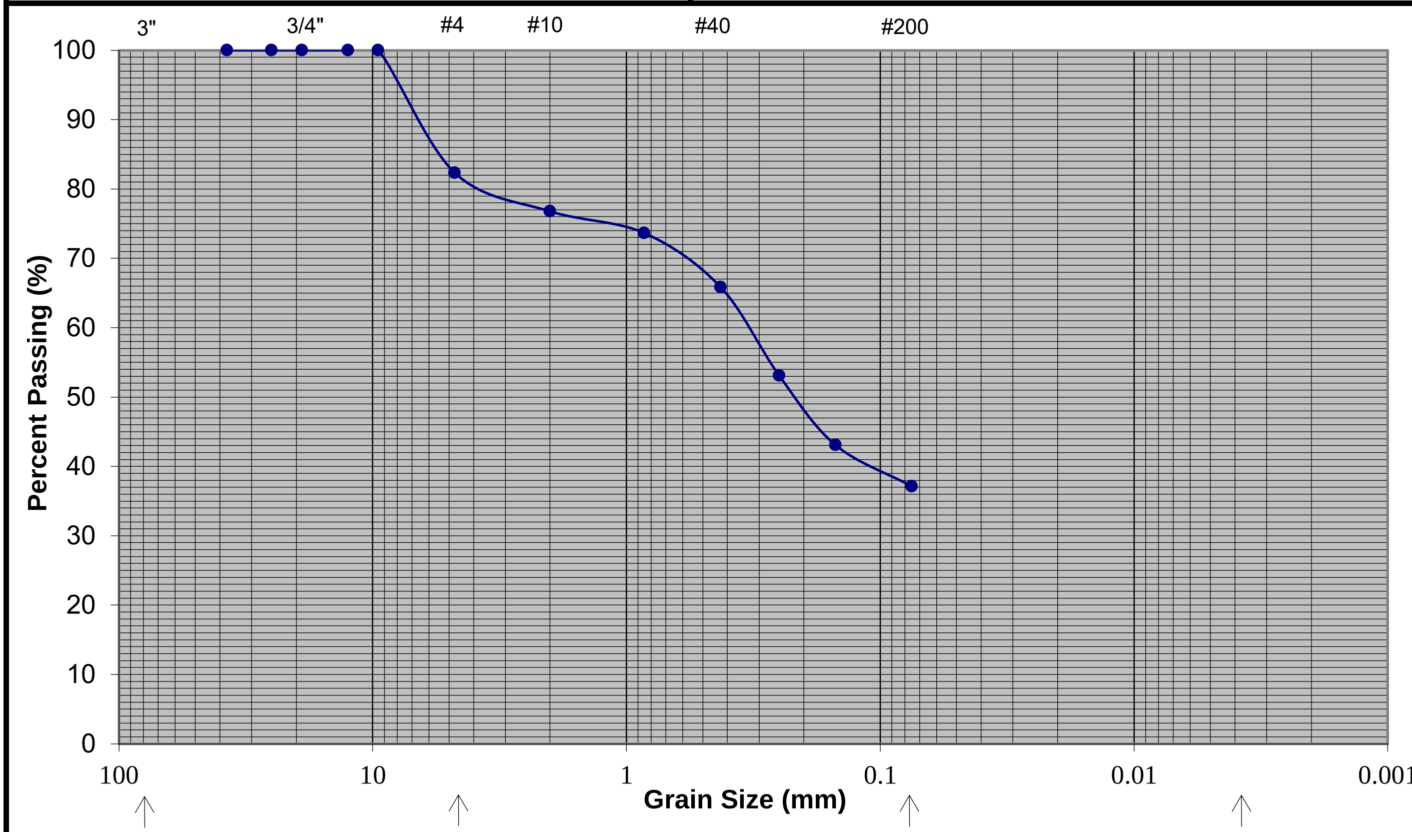
Percent Gravel:	**17.7%**
Percent Sand:	**45.2%**
Percent Clay/Silt:	**37.1%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy**
Address:	**Andalusia, Alabama**
Project Location:	

Boring No. / Sample No.	**PZ-8 / S13384**
Sample Depth / Location	**13-15 feet**
Sample Description:	**Brown, fine sandy SILT**
Date Sampled:	**10/16/2013**
Date Tested:	**1/0/1900**
Reviewed By:	
Date Issued:	

Visual-Manual Identification of Soils (D2488)

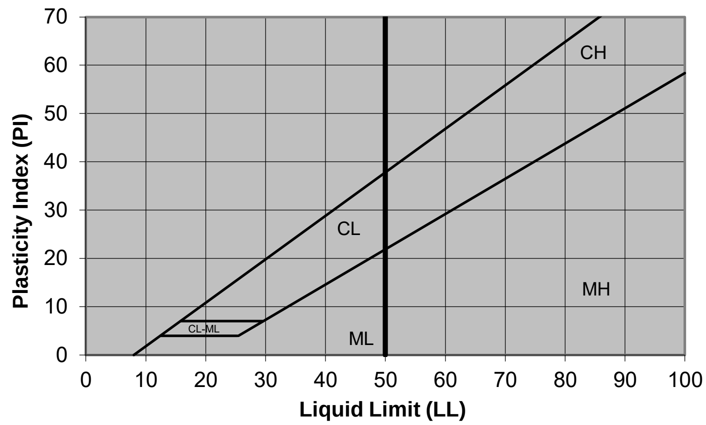
Liquid Limit (LL):		AASHTO / USCS
Plastic Limit (PL):		Classifications
Plasticity Index (PI):		**SM**

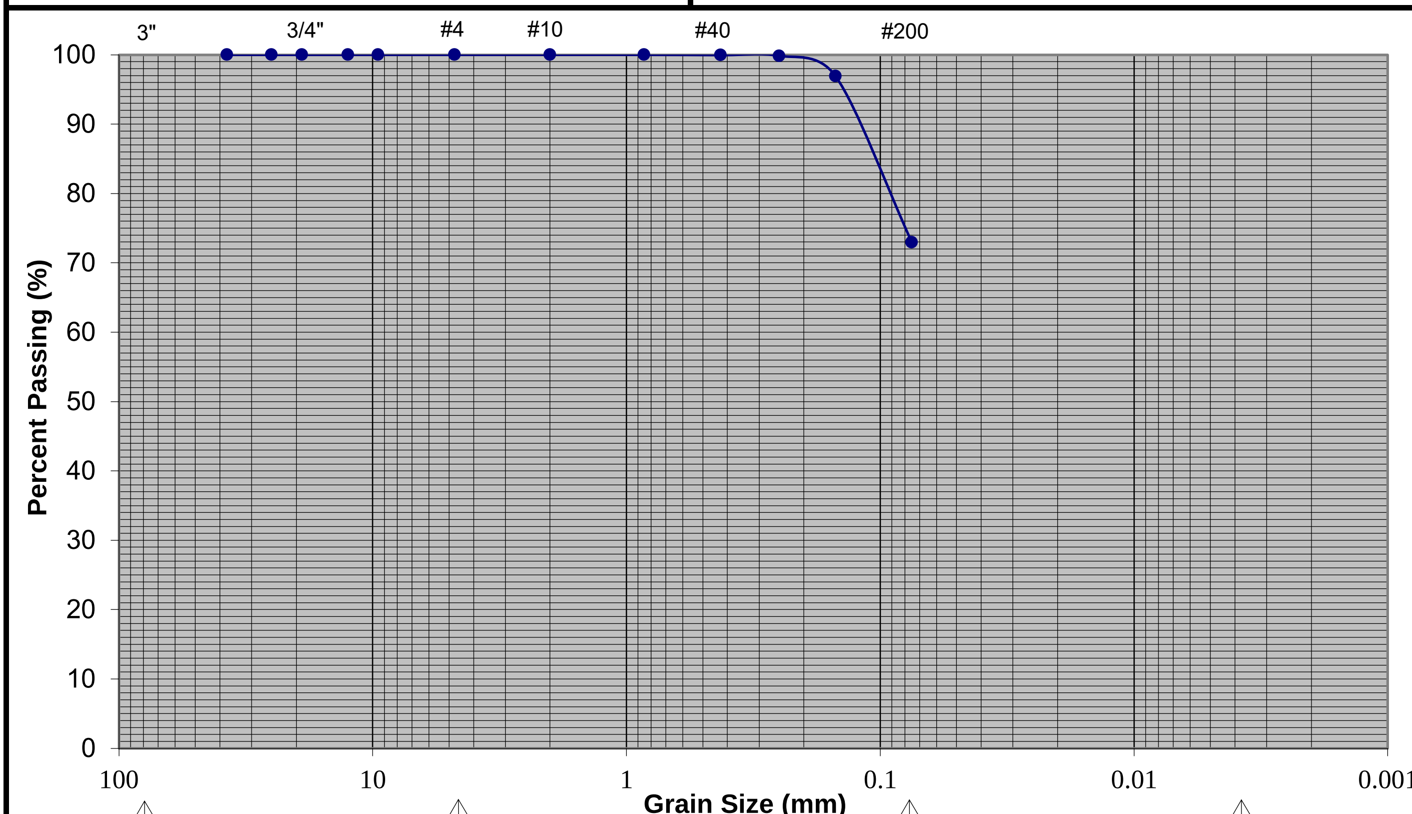
REPORT OF SIEVE ANALYSIS (ASTM D422)

Percent Gravel:	**0.0%**
Percent Sand:	**27.1%**
Percent Clay/Silt:	**72.9%**

Liquid Limit Plot

Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Engineering. Environmental. Answers.

Albertville, AL
(256) 891-3458

Andalusia, AL
(334) 222-9431

Dothan, Al
(334) 677-9431

Huntsville, Al
(256) 593-7470

Birmingham, Al
(205) 403-2600

REPORT OF LABORATORY ANALYSIS

Job Name:	Lowman Hydrogeologic Investigation	Client:	PowerSouth Energy Cooperative
Job Number:	061321201	Address:	Andalusia, Alabama
Project Location:	Washington County, Alabama	Report Date:	October 13, 2021

Sample Designation	Sample Depth	Moisture Content (ASTM D-2216)	In-Place Dry Density (g/cm3) (ASTM D-2937)	Porosity (n)[1]
PZ-1 / S13379	8-10 feet	30.50%	1.467	0.457
PZ-1 / S13352	13-15 feet	35.40%	1.295	0.520
PZ-2 / S13378	13-15 feet	39.40%	1.283	0.525
PZ-3 / S13381	3-5 feet	33.40%	1.290	0.522
PZ-3 / S13349	8-10 feet	39.80%	1.268	0.530
PZ-3 / S13365	13-15 feet	19.80%	1.593	0.410
PZ-3 / S13351	18-20 feet	22.90%	1.631	0.396
PZ-4 / S13354	13-15 feet	24.50%	1.570	0.418
PZ-4 / S13353	18-20 feet	32.40%	1.400	0.481
PZ-4 / S13360	23-25 feet	19.80%	1.747	0.353
PZ-5 / S13356	3-5 feet	20.70%	1.588	0.412
PZ-5 / S13368	8-10 feet	23.60%	1.514	0.439
PZ-6 / S13375	23-25 feet	13.60%	1.362	0.496
PZ-6 / S13376	33-35 feet	31.40%	1.429	0.047
PZ-6 / S13382	38-40 feet	28.30%	1.504	0.443
PZ-7 / S13348	8-10 feet	30.90%	1.383	0.488
PZ-7 / S13362	13-15 feet	28.10%	1.446	0.464
PZ-7 / S13355	18-20 feet	31.70%	1.386	0.487
PZ-8 / S13358	8-10 feet	24.70%	1.471	0.455
PZ-8 / S13384	13-15 feet	29.60%	1.456	0.461
PZ-8 / S13369	18-20 feet	6.80%	1.464	0.458
PZ-9 / S13371	13-15 feet	20.60%	1.683	0.377
PZ-10 / S13361	8-10 feet	12.70%	1.419	0.475
PZ-10 / S13357	13-15 feet	13.00%	1.432	0.470
PZ-10 / S13364	18-20 feet	16.60%	1.444	0.465
PZ-10 / S13350	23-25 feet	14.70%	1.425	0.472
PZ-11 / S13373	8-10 feet	8.30%	1.766	0.346
PZ-11 / S13359	18-20 feet	10.00%	1.396	0.483
PZ-11 / S13363	23-25 feet	14.60%	1.415	0.476

Albertville, AL
(256) 891-3458

Andalusia, AL
(334) 222-9431

Dothan, Al
(334) 677-9431

Huntsville, Al
(256) 593-7470

Birmingham, Al
(205) 403-2600

REPORT OF LABORATORY ANALYSIS

Job Name:	Lowman Hydrogeologic Investigation	Client:	PowerSouth Energy Cooperative
Job Number:	061321201	Address:	Andalusia, Alabama
Project Location:	Washington County, Alabama	Report Date:	October 13, 2021

Sample Designation	Sample Depth	Moisture Content (ASTM D-2216)	In-Place Dry Density (g/cm3) (ASTM D-2937)	Porosity (n)[1]
PZ-11 /S13374	28-30 feet	10.60%	1.462	0.459
PZ-12 / S13367	13-15 feet	21.00%	1.581	0.414
PZ-12 / S13366	28-30 feet	27.20%	1.448	0.464
PZ-12 / S13372	18-20 feet	23.30%	1.478	0.452
PZ-12 /S13370	23-25 feet	20.40%	1.074	0.602
MW-4 / S13377	23-25 feet	10.10%	1.664	0.384
PZ-CLF-2 / S13380	3-5 feet	28.30%	1.416	0.475
PZ-CLF-2 / S13383	8-10 feet	17.80%	1.775	0.343

1. Porosity (n) was calculated using the equation **$n = 1-(\delta d/Gs)$** where δ_d is the dry density of the soil and G_s is the Specific Gravity of solids (2.65).

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-CLF-1 / S14169**
Sample Depth:	**8-10 feet**
Sample Description:	**Red, silty fine to coarse SAND with gravel**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

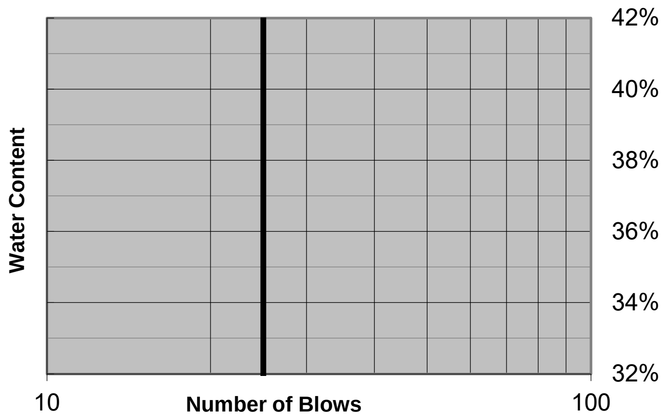
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**SM**

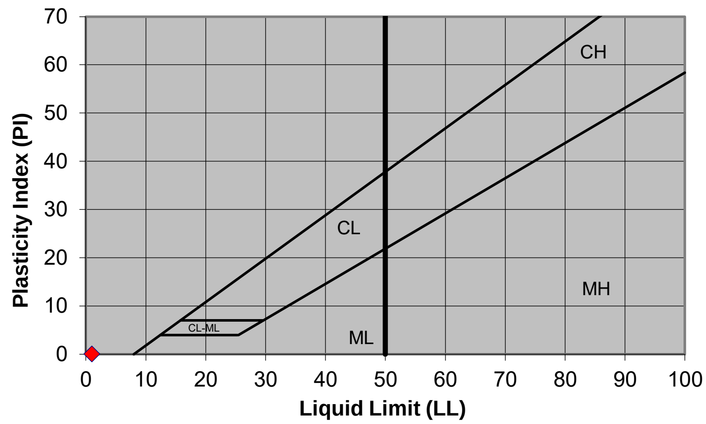
REPORT OF SIEVE ANALYSIS (ASTM D422)

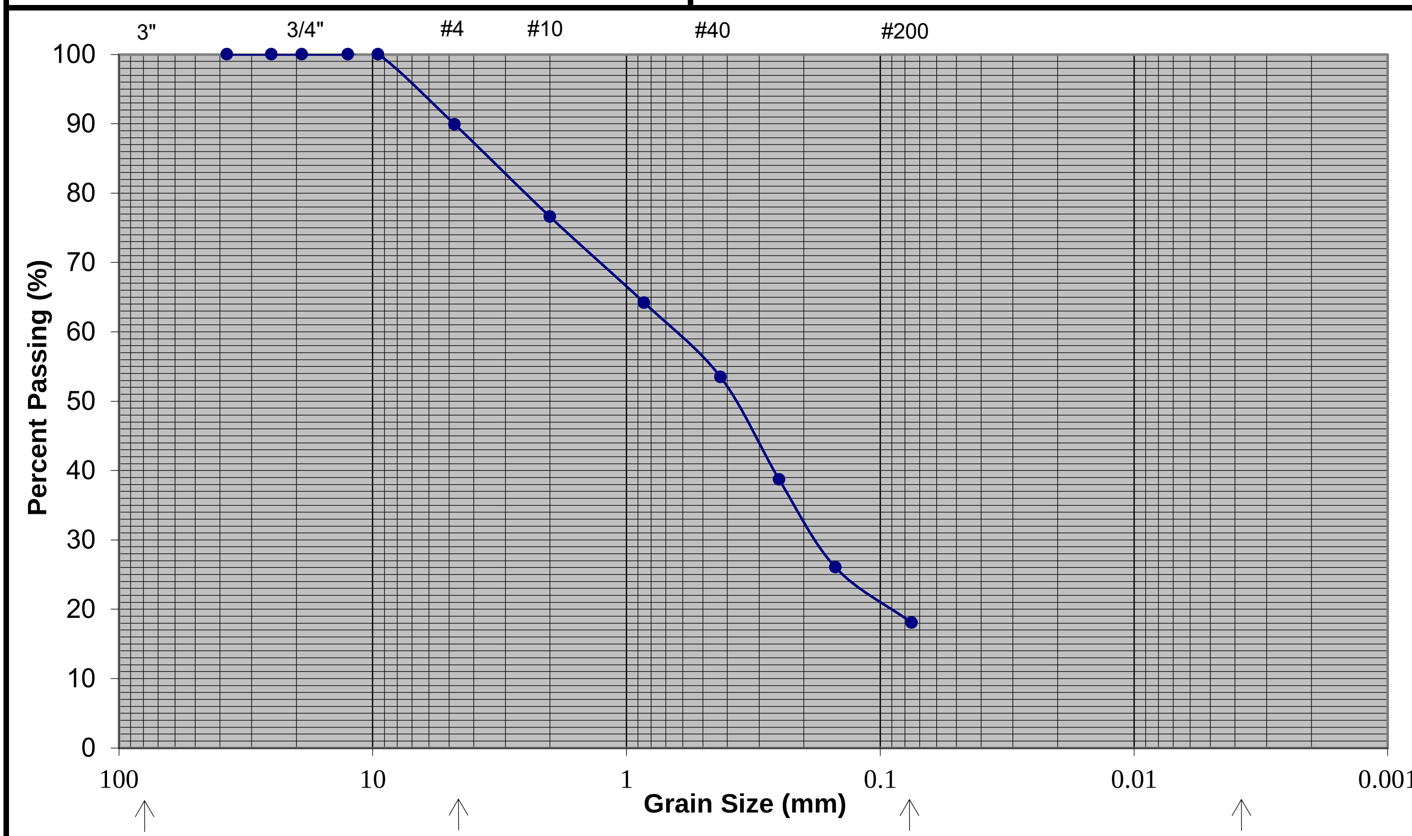
Percent Gravel:	**10.1%**
Percent Sand:	**71.9%**
Percent Clay/Silt:	**18.0%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates	Albertville, AL Andalusia, AL Birmingham, AL Dothan, AL Huntsville, AL	Project Name: Project Number:	**Lowman Hydrogeologic Investigation** **061321201**
		Client: Address: Project Location:	**PowerSouth Energy Cooperative** **Andalusia, Alabama**

Boring Number:	**PZ-CLF-1 / S14170**
Sample Depth:	**28-30 feet**
Sample Description:	**Tan, poorly graded clean GRAVEL**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

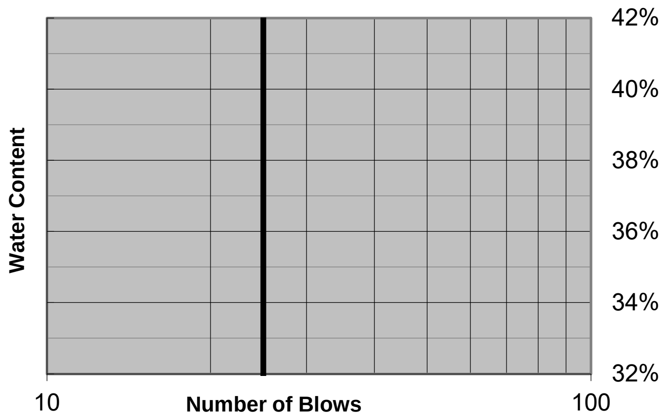
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	**GP**

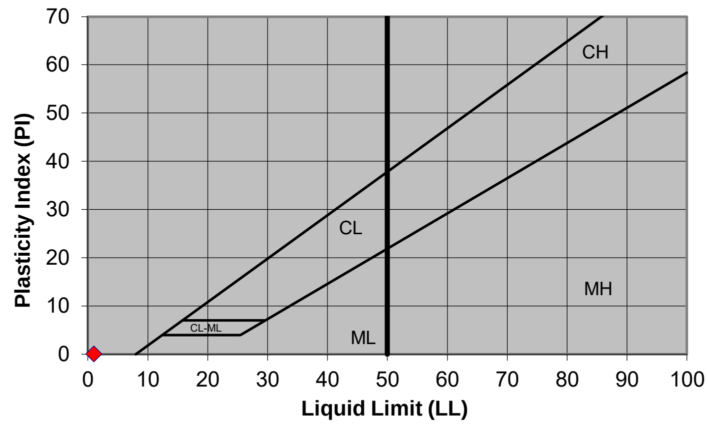
REPORT OF SIEVE ANALYSIS (ASTM D422)

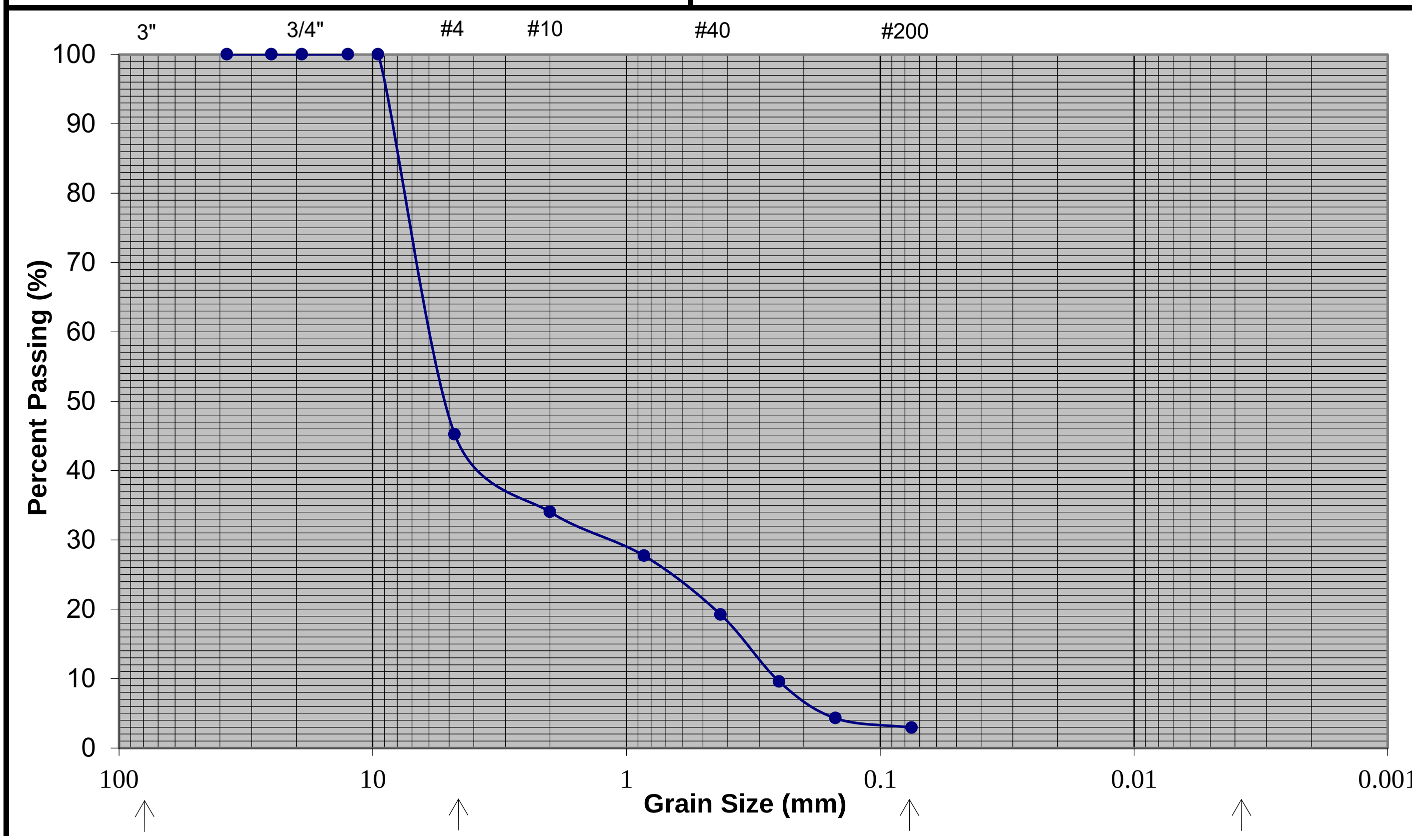
Percent Gravel:	**54.8%**
Percent Sand:	**42.3%**
Percent Clay/Silt:	**2.9%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-CLF-3 / S14171**
Sample Depth:	**3-5 feet**
Sample Description:	**Tan, fine sandy CLAY**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

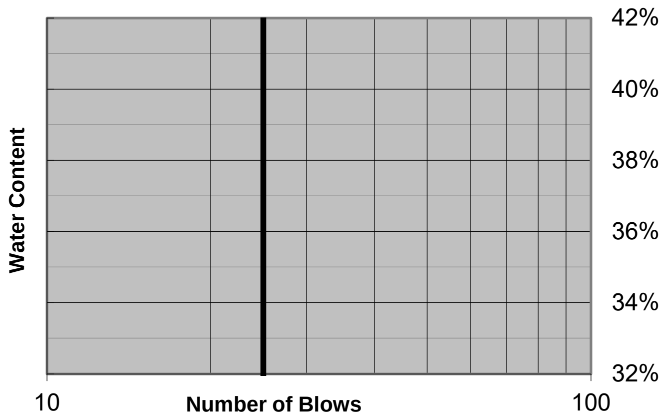
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**CL**

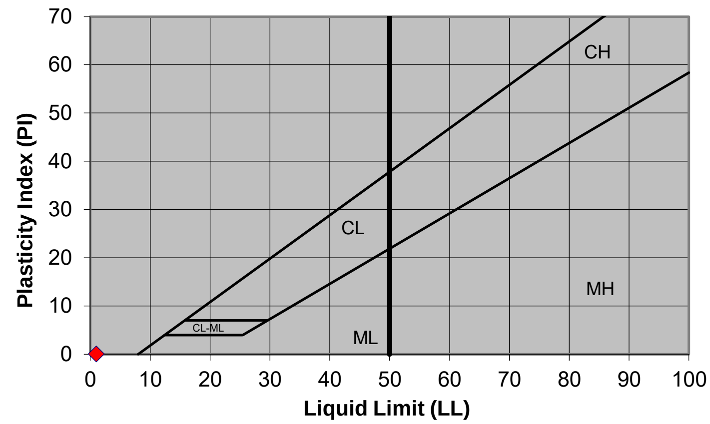
REPORT OF SIEVE ANALYSIS (ASTM D422)

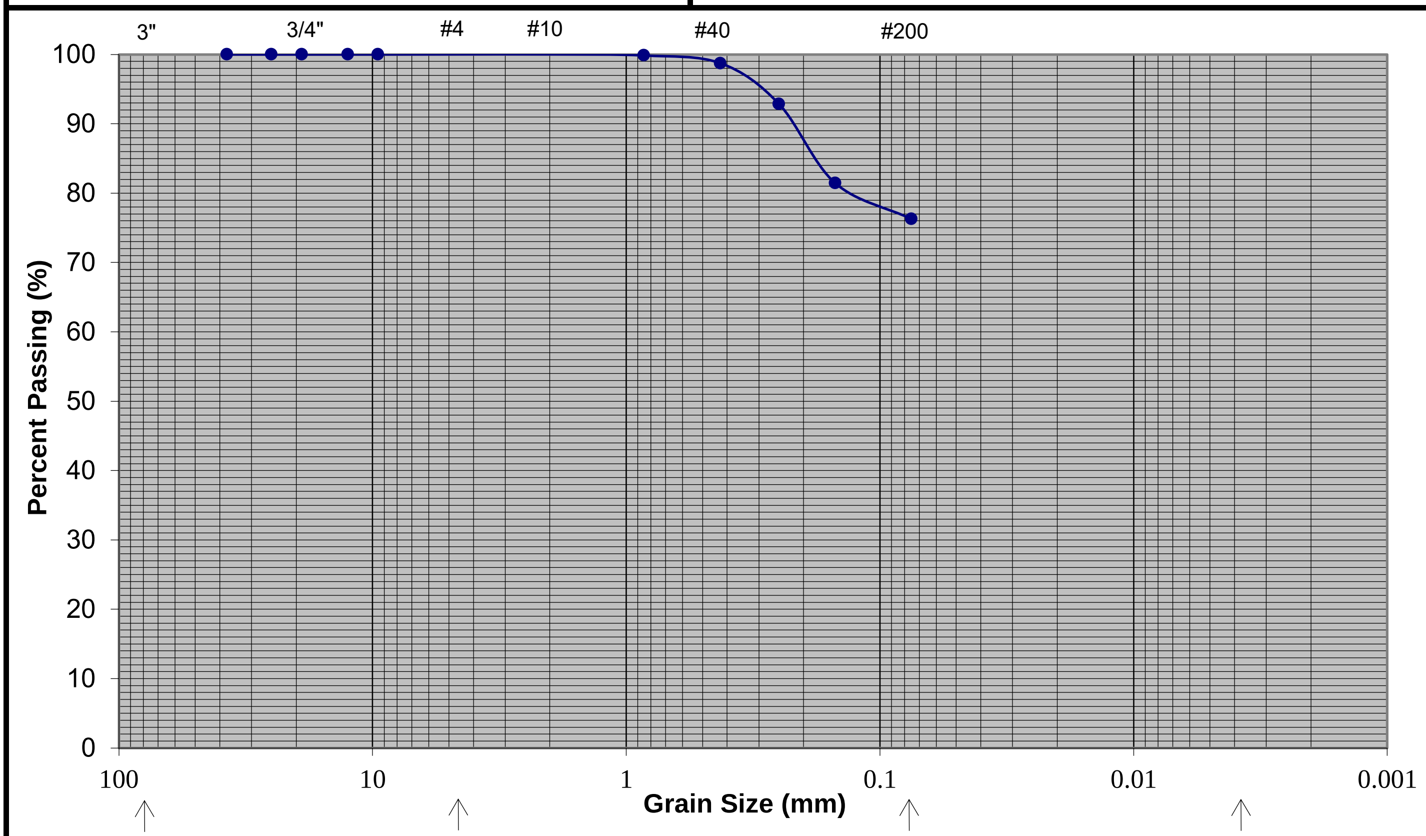
Percent Gravel:	**0.0%**
Percent Sand:	**23.7%**
Percent Clay/Silt:	**76.3%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-CLF-3 / S14172**
Sample Depth:	**13-15 feet**
Sample Description:	**Tan, poorly graded, fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

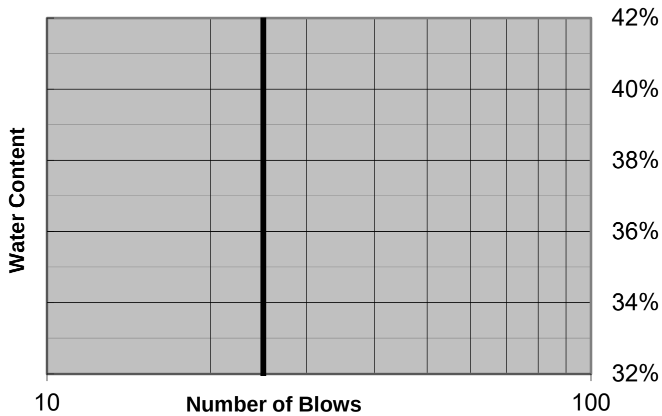
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**SP**

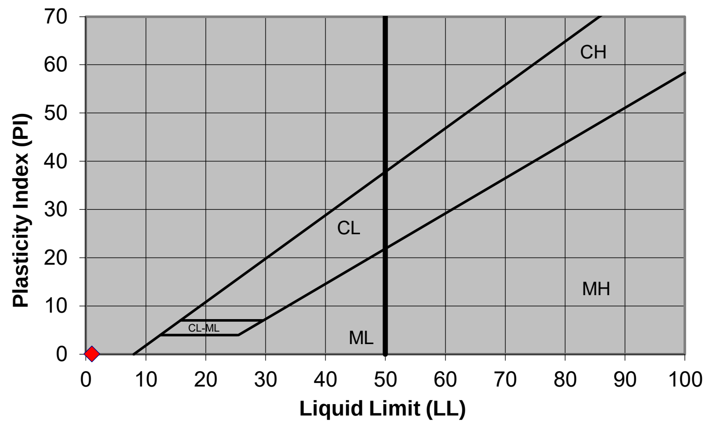
REPORT OF SIEVE ANALYSIS (ASTM D422)

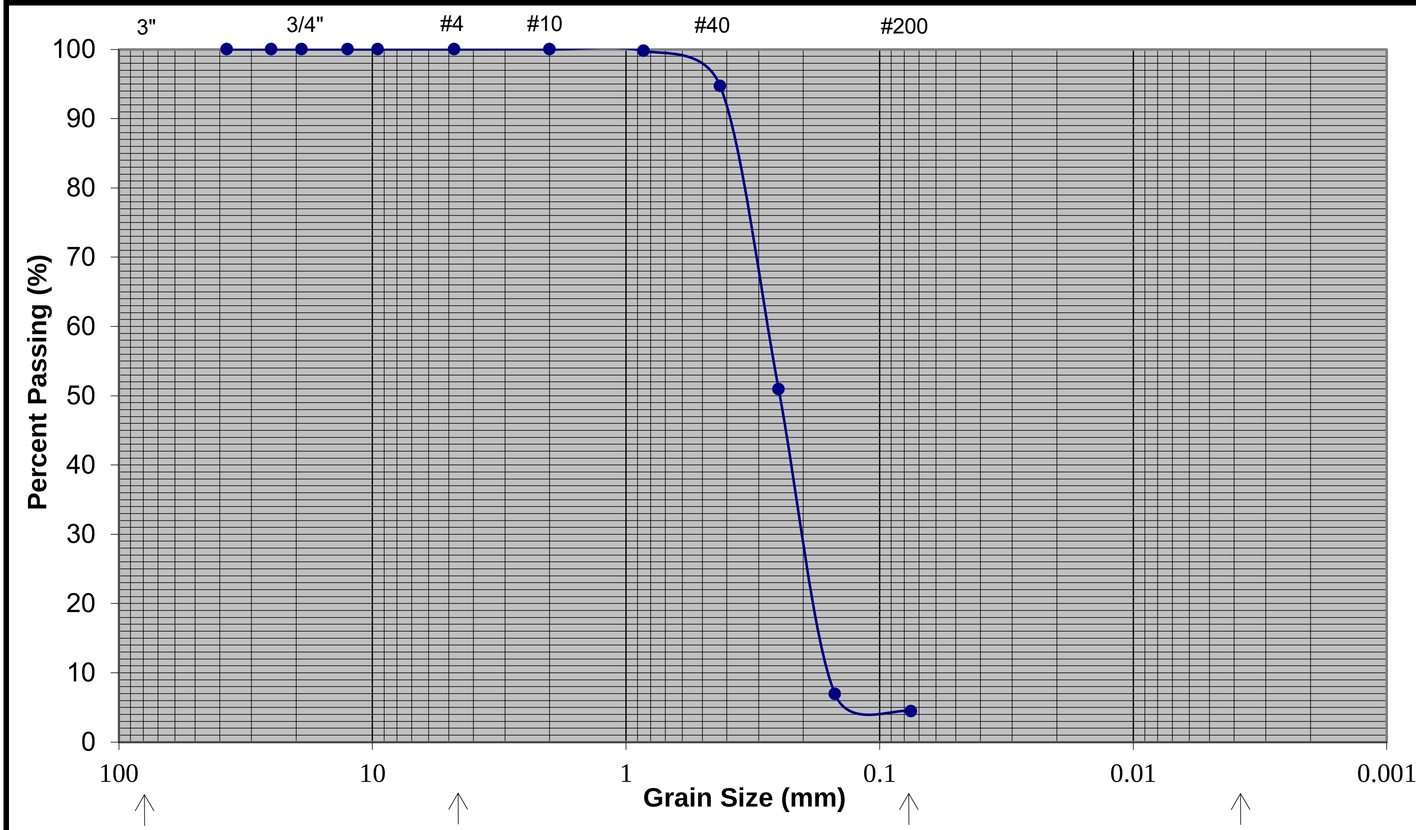
Percent Gravel:	**0.0%**
Percent Sand:	**95.6%**
Percent Clay/Silt:	**4.4%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-CLF-4 / S14173**
Sample Depth:	**13-15 feet**
Sample Description:	**Red, clayey fine to medium SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

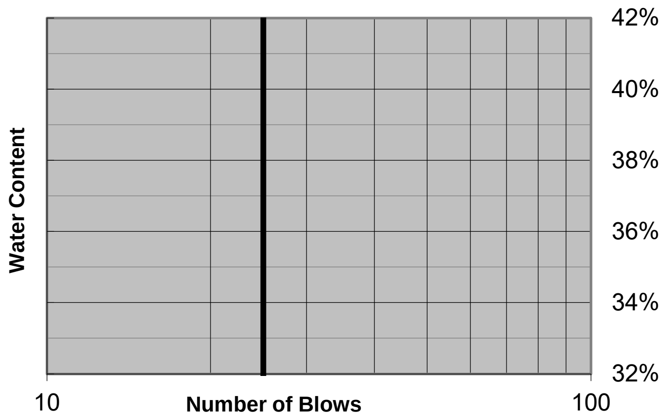
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**SC**

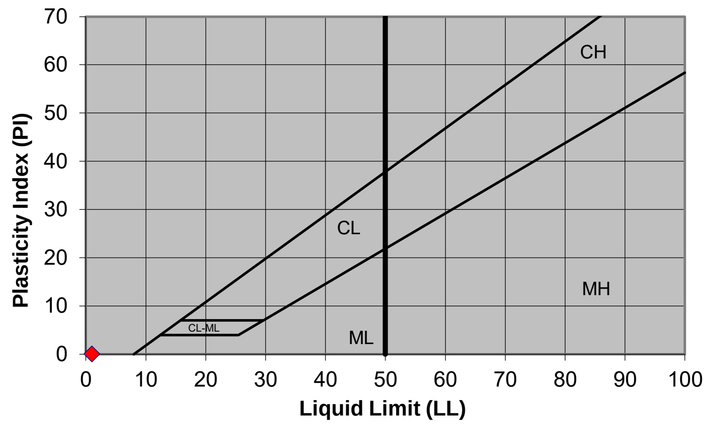
REPORT OF SIEVE ANALYSIS (ASTM D422)

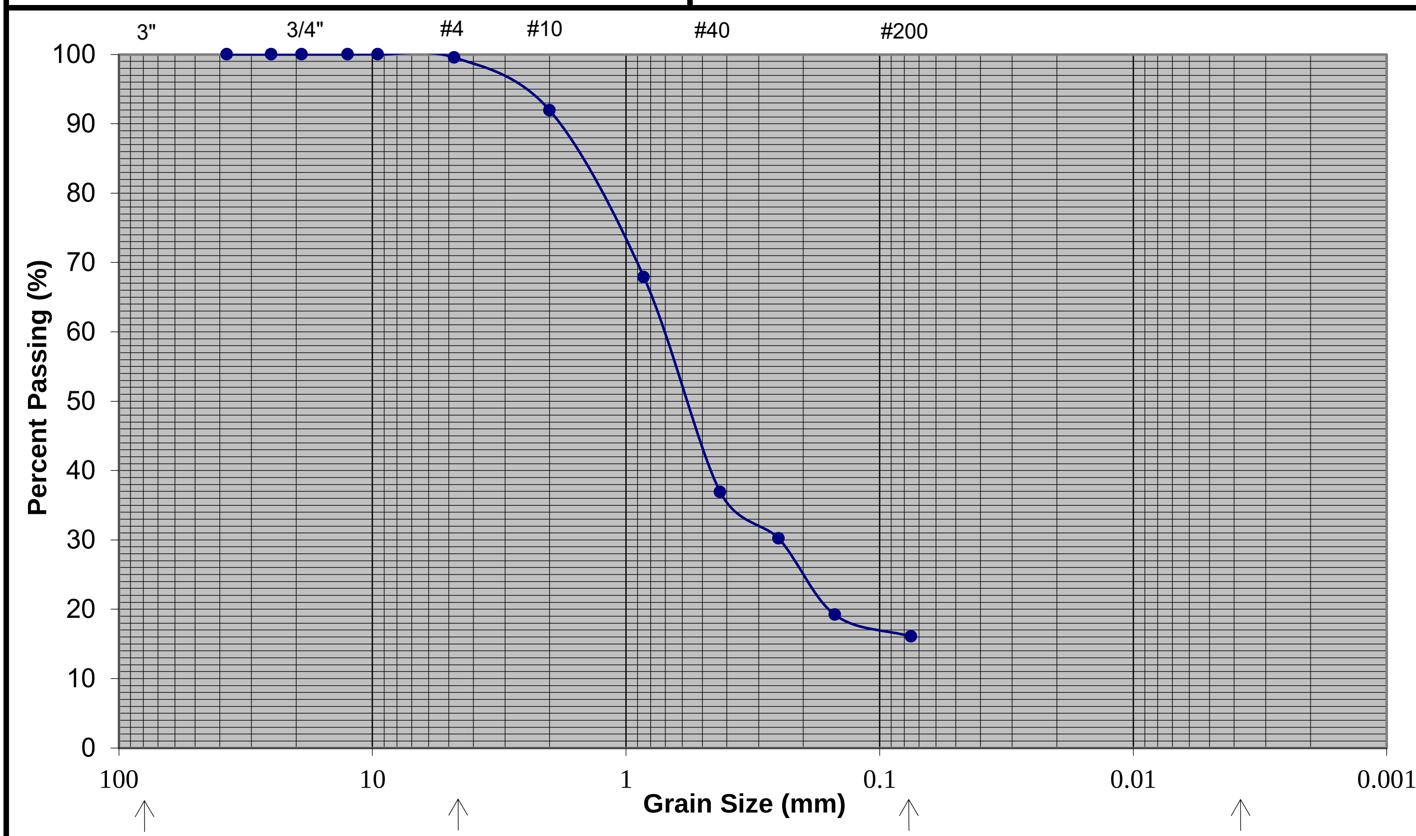
Percent Gravel:	**0.4%**
Percent Sand:	**83.5%**
Percent Clay/Silt:	**16.1%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates	Albertville, AL Andalusia, AL Birmingham, AL Dothan, AL Huntsville, AL	Project Name:	**Lowman Hydrogeologic Investigation**
		Project Number:	**061321201**
		Client:	**PowerSouth Energy Cooperative**
		Address:	**Andalusia, Alabama**
		Project Location:	

Boring Number:	**PZ-CLF-4 / S14174**
Sample Depth:	**33-34 feet**
Sample Description:	**Tan, poorly graded, fine to coarse SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

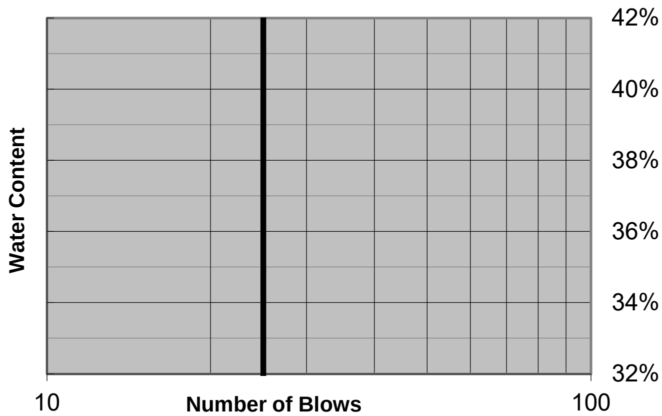
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	**SP**

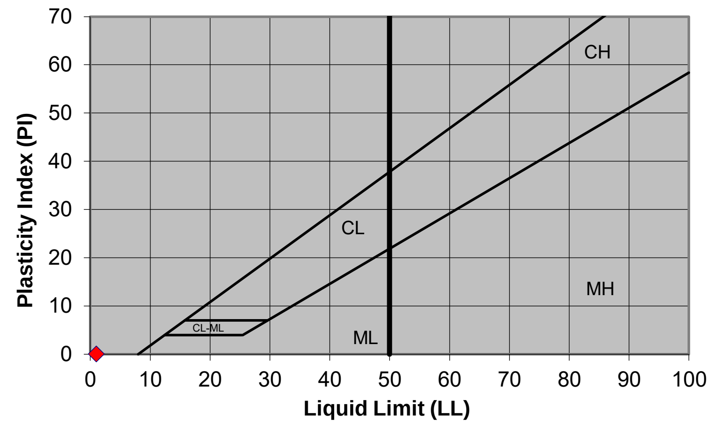
REPORT OF SIEVE ANALYSIS (ASTM D422)

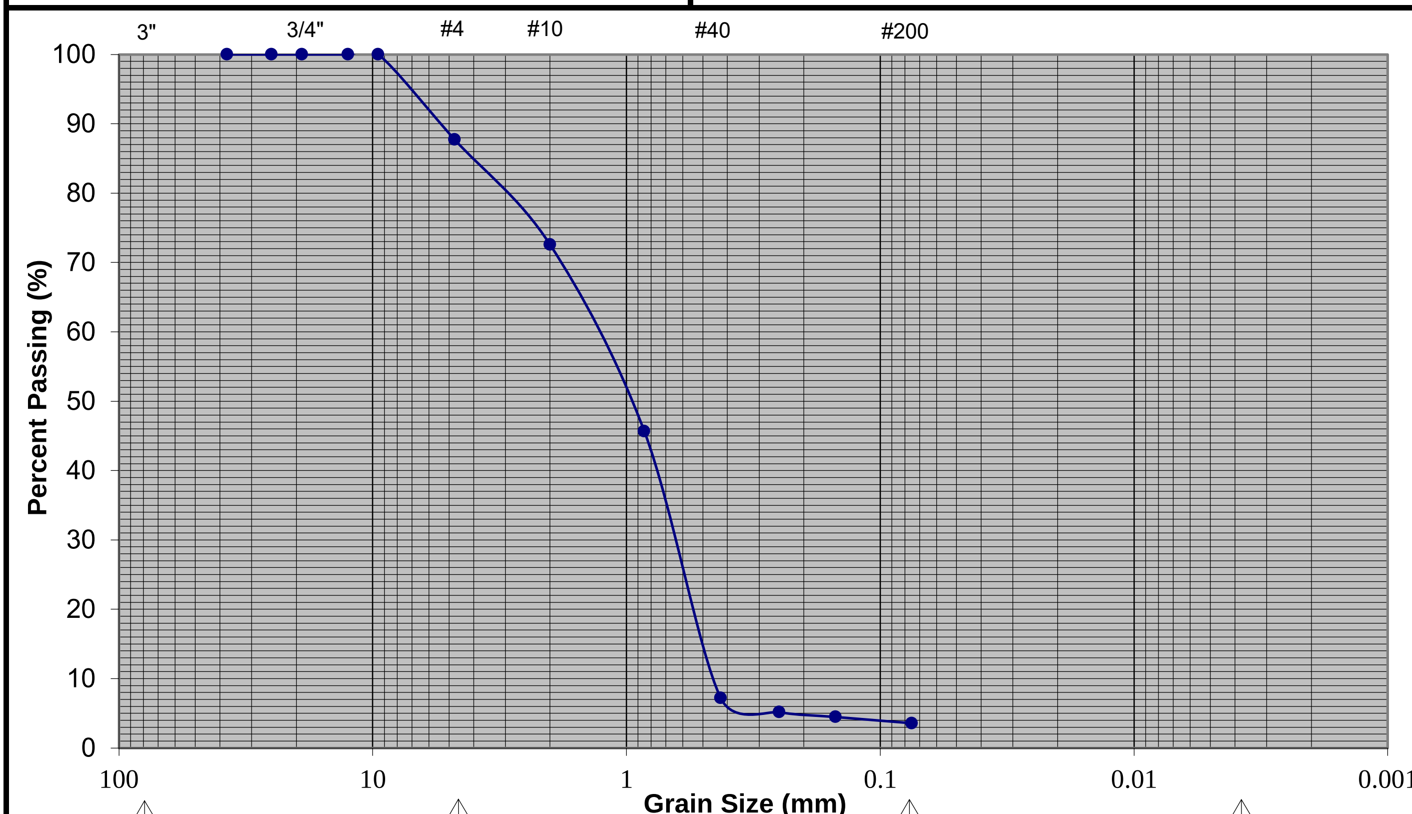
Percent Gravel:	**12.3%**
Percent Sand:	**84.1%**
Percent Clay/Silt:	**3.6%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**MW-1 / S14175**
Sample Depth:	**3-5 feet**
Sample Description:	**Tan, gravely, silty fine to coarse SAND**
Date Sampled:	**6/26/2014**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

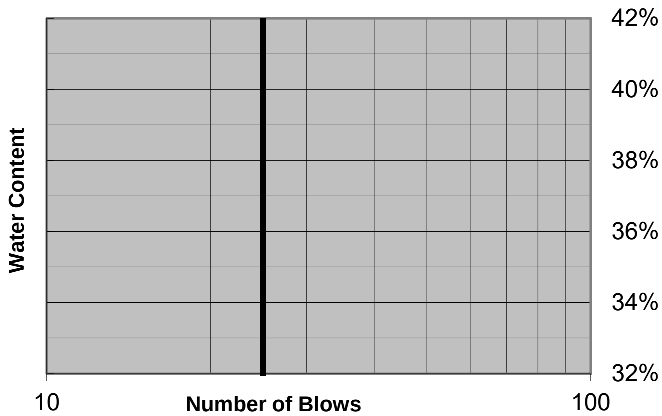
REPORT OF ATTERBERG LIMITS (ASTM D4318)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	**SM**

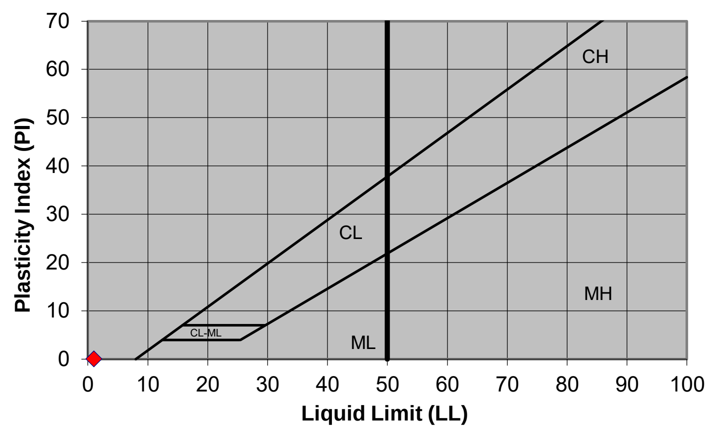
REPORT OF SIEVE ANALYSIS (ASTM D422)

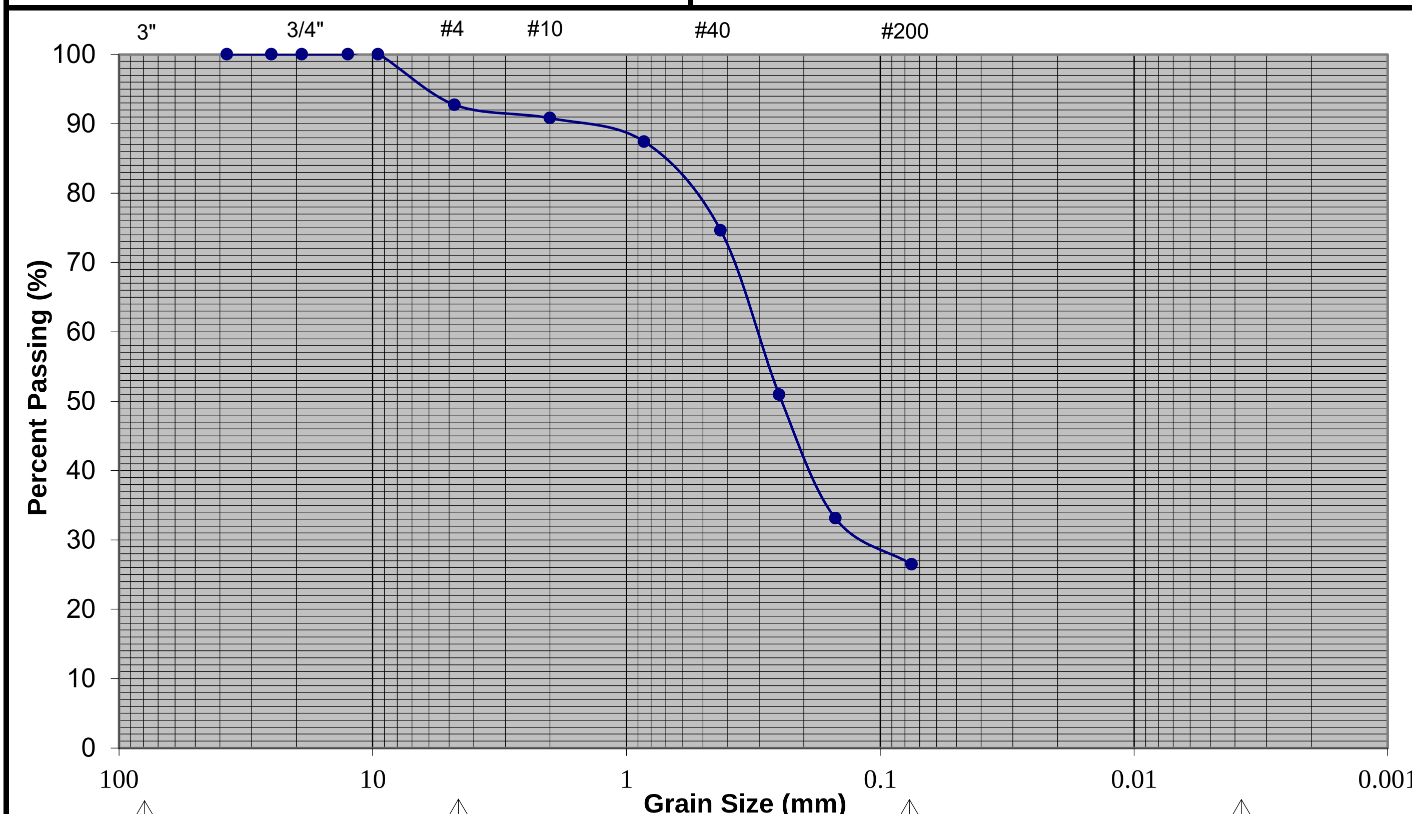
Percent Gravel:	**7.3%**
Percent Sand:	**66.3%**
Percent Clay/Silt:	**26.5%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**MW-1 / S14176**
Sample Depth:	**14-15 feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

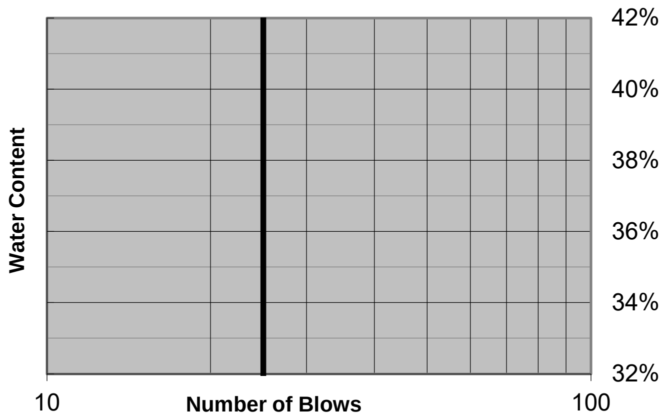
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	

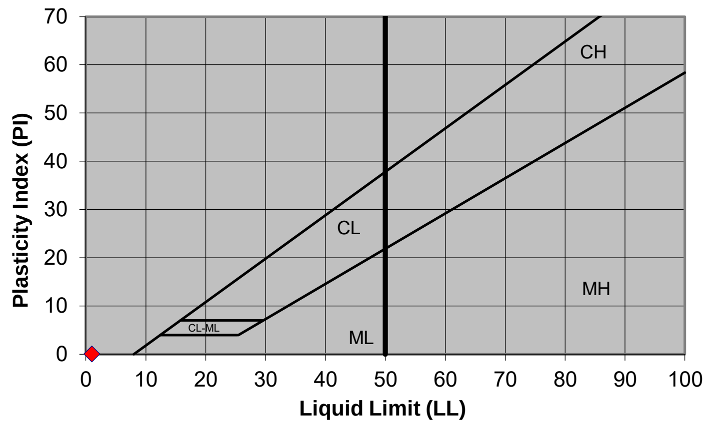
REPORT OF SIEVE ANALYSIS (ASTM D422)

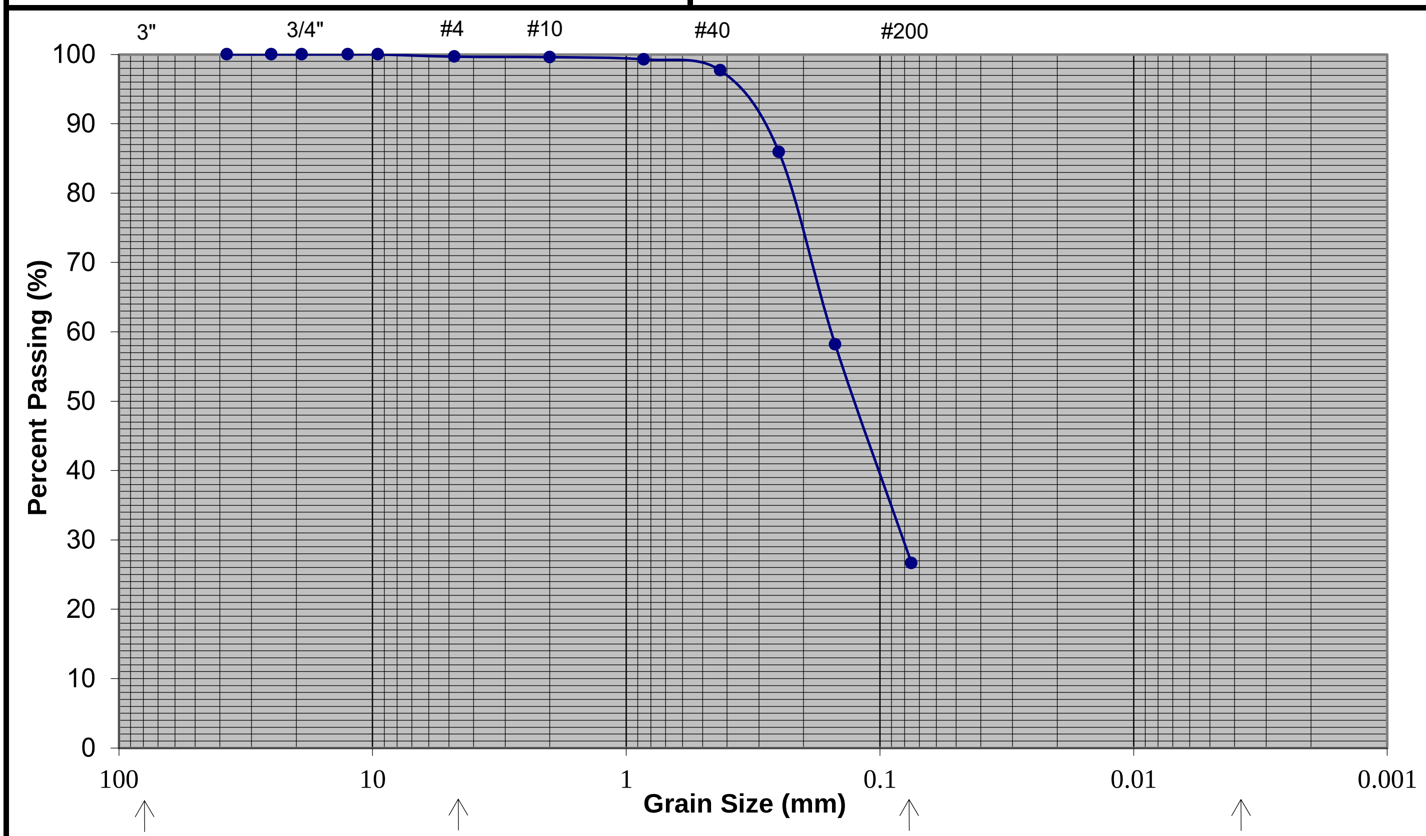
Percent Gravel:	**0.3%**
Percent Sand:	**73.1%**
Percent Clay/Silt:	**26.6%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**MW-3 / S14177**
Sample Depth:	**18-20 feet**
Sample Description:	**Reddish orange, silty, poorly graded fine to medium SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

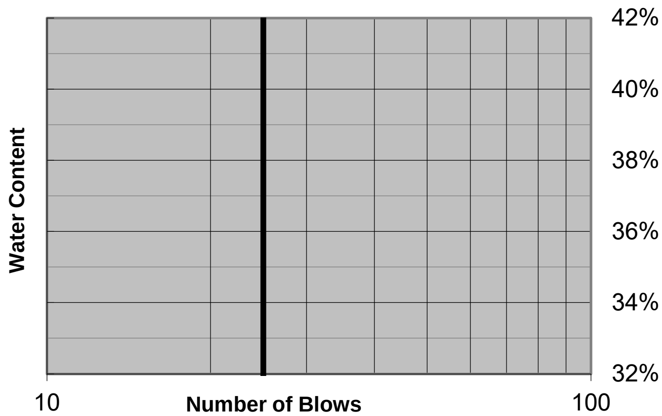
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	**SP-SM**

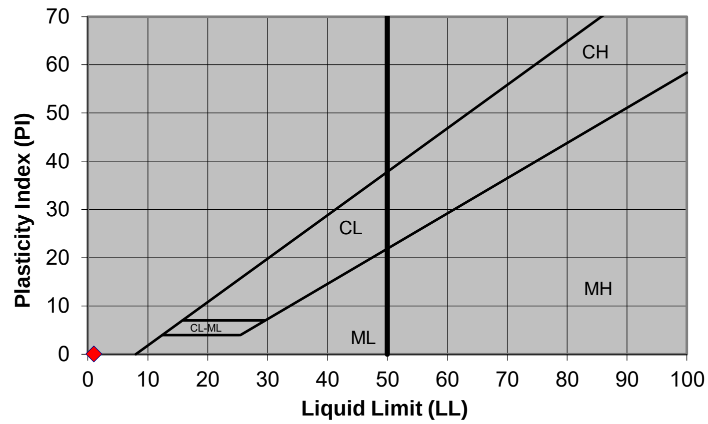
REPORT OF SIEVE ANALYSIS (ASTM D422)

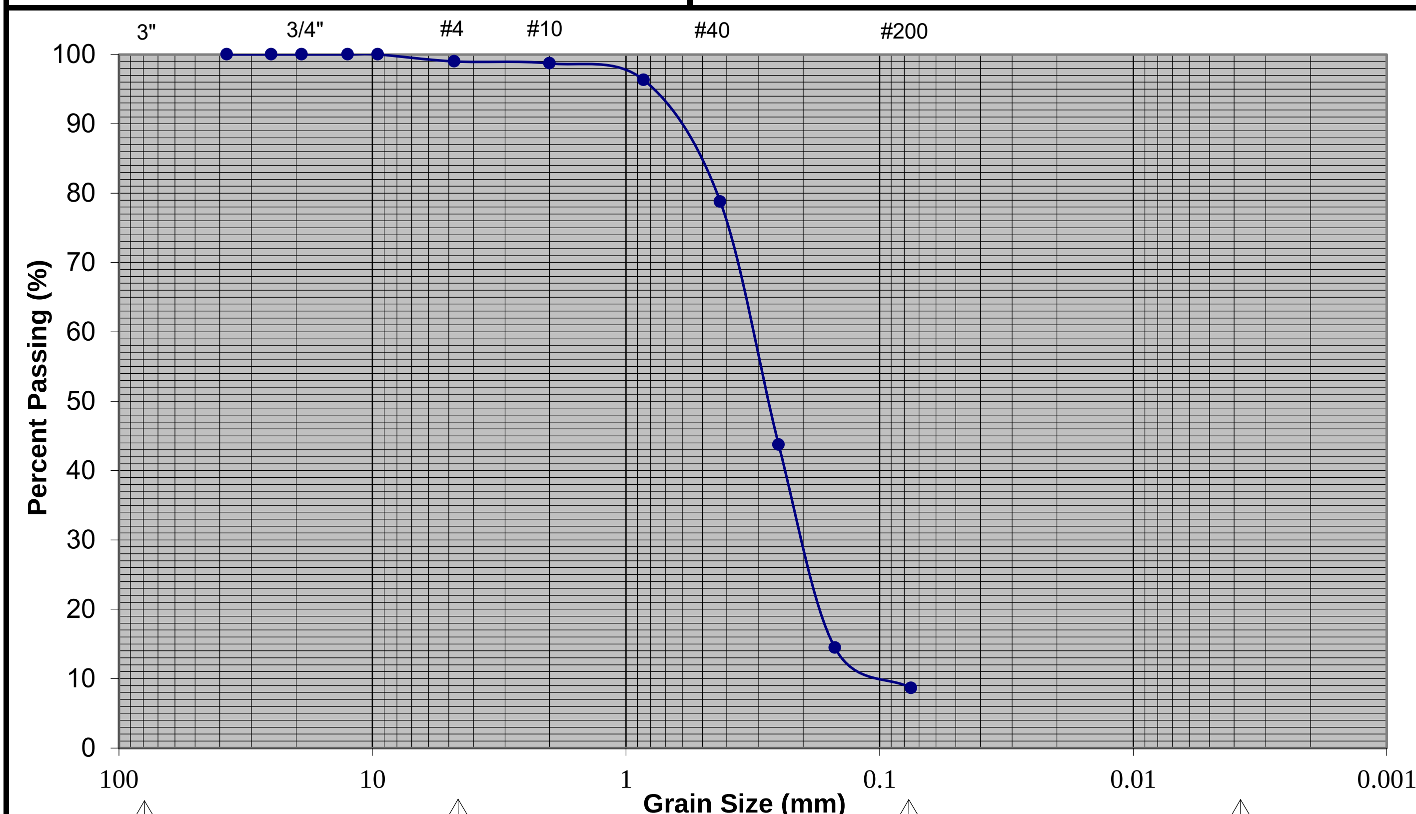
Percent Gravel:	**1.0%**
Percent Sand:	**90.3%**
Percent Clay/Silt:	**8.7%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates	Albertville, AL Andalusia, AL Birmingham, AL Dothan, AL Huntsville, AL	

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**MW-3 / S14178**
Sample Depth:	**33-34 feet**
Sample Description:	**Tan, poorly graded fine to medium SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

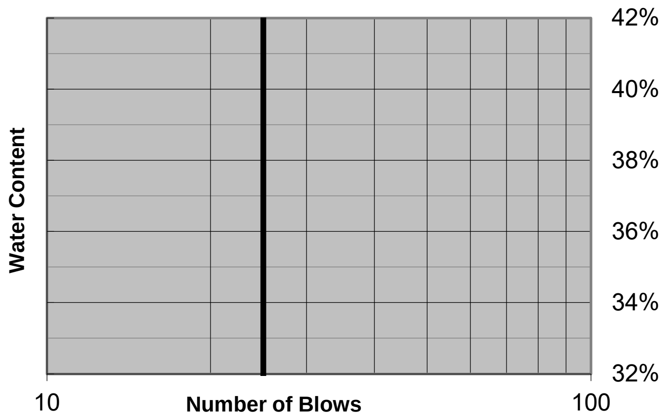
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**NP**	USCS
Plastic Limit (PL):	**NP**	Classification
Plasticity Index (PI):	**NP**	**SP**

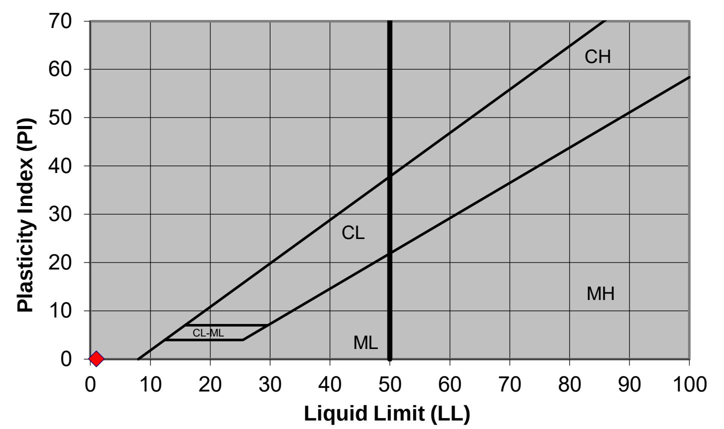
REPORT OF SIEVE ANALYSIS (ASTM D422)

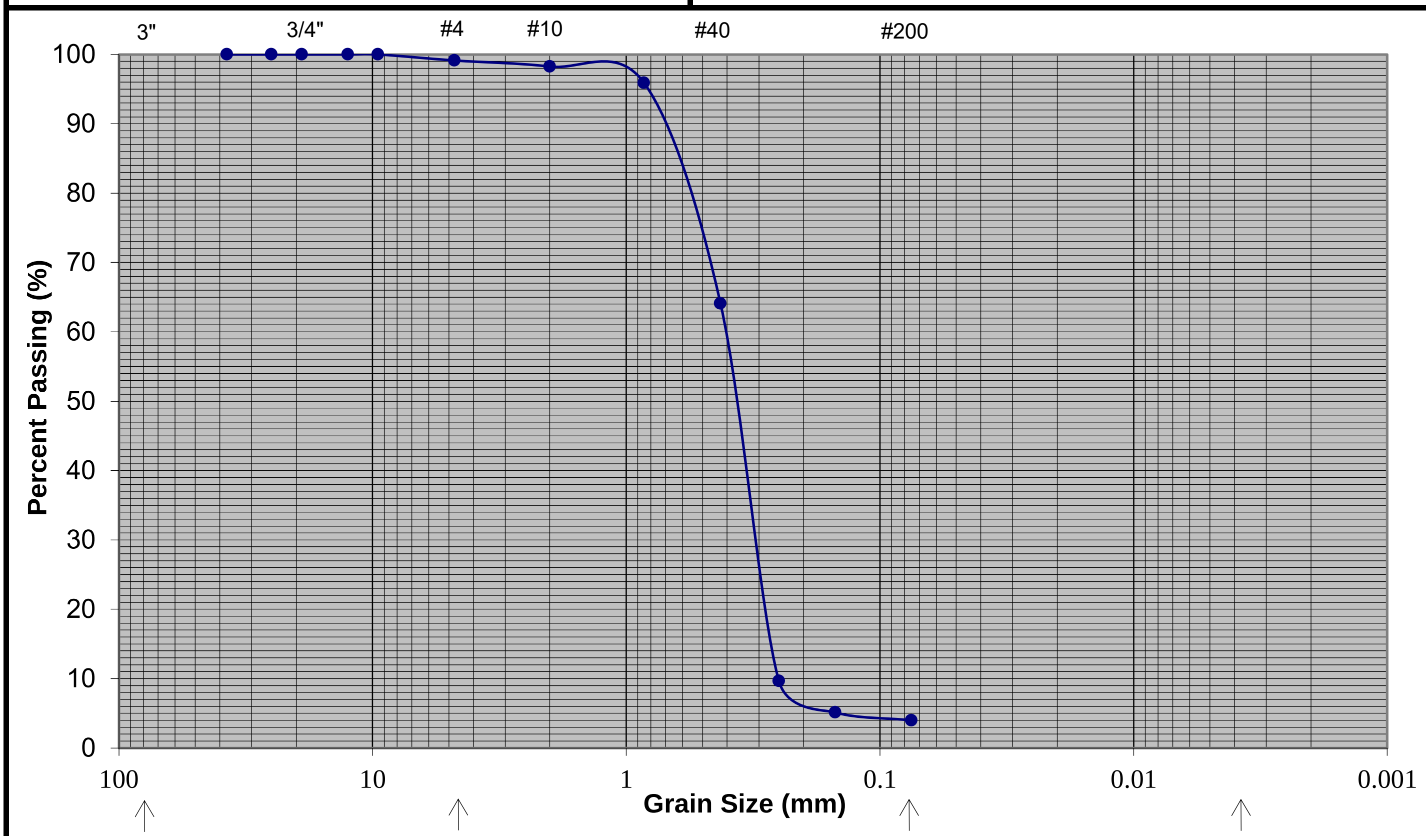
Percent Gravel:	**0.9%**
Percent Sand:	**95.1%**
Percent Clay/Silt:	**4.0%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-5 / S14179**
Sample Depth:	**20-20½ feet**
Sample Description:	**Tan, silty fine SAND**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

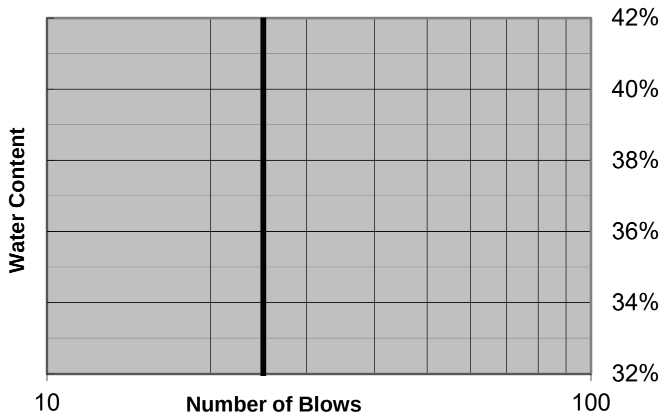
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**SM**

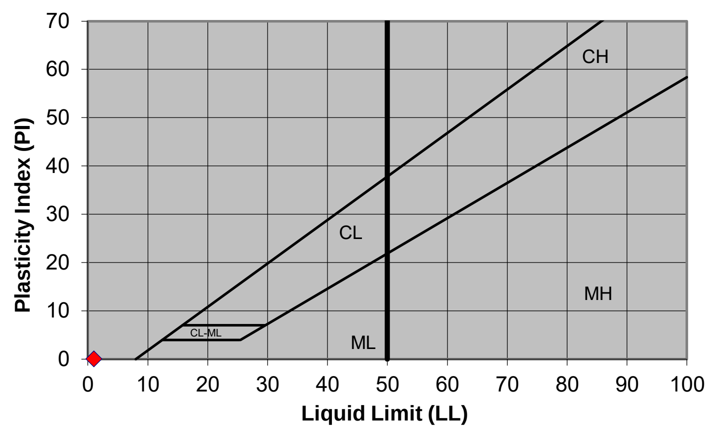
REPORT OF SIEVE ANALYSIS (ASTM D422)

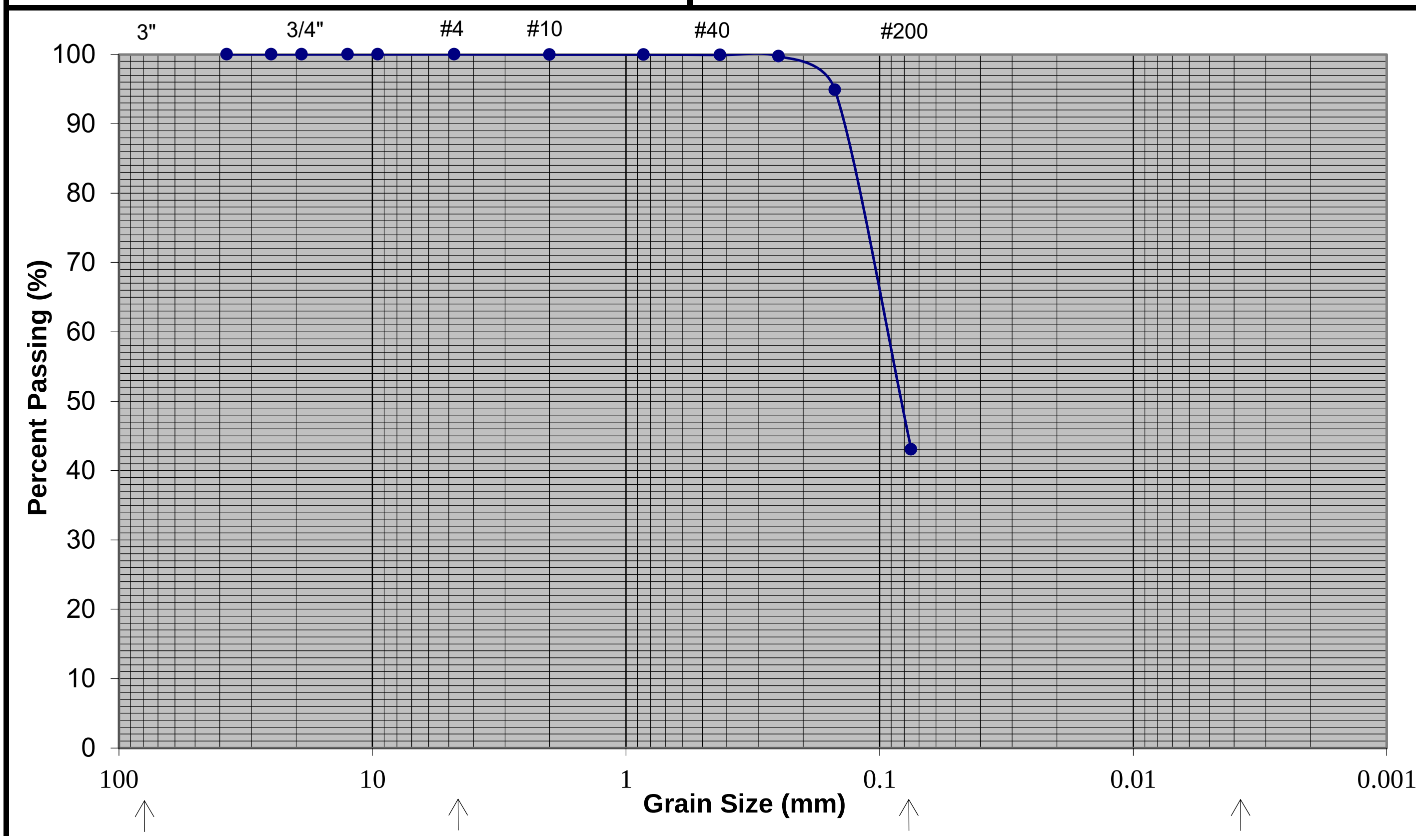
Percent Gravel:	**0.0%**
Percent Sand:	**57.0%**
Percent Clay/Silt:	**43.0%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-7 / S14180**
Sample Depth:	**25-26 feet**
Sample Description:	**Brown, fine sandy CLAY**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

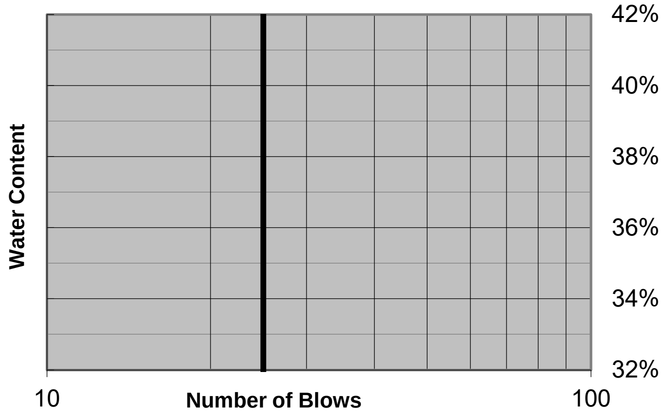
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**CL**

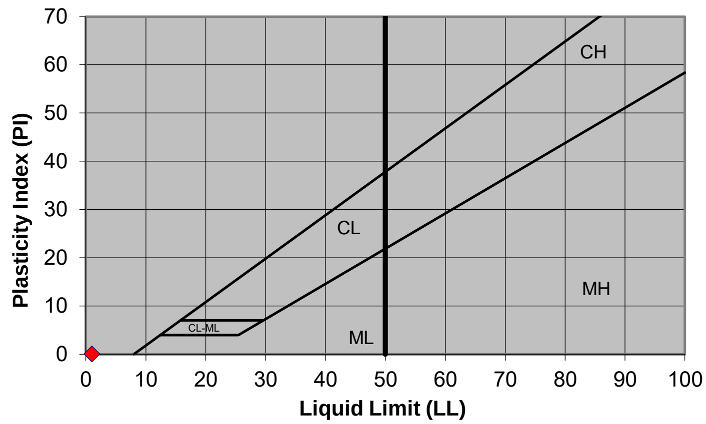
REPORT OF SIEVE ANALYSIS (ASTM D422)

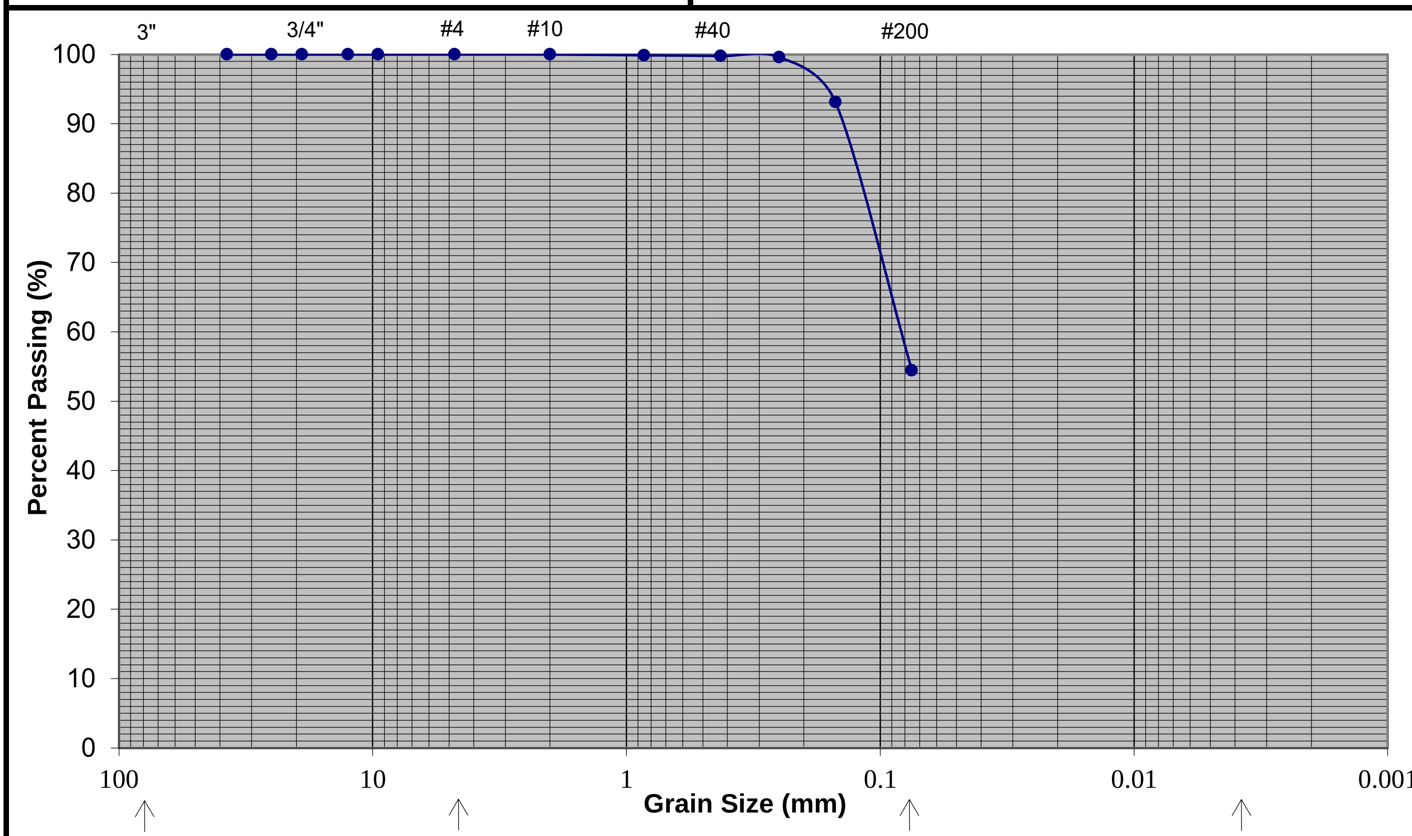
Percent Gravel:	**0.0%**
Percent Sand:	**45.6%**
Percent Clay/Silt:	**54.4%**

Liquid Limit Plot



Plasticity Chart





Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

CDG Engineers & associates

Albertville, AL
Andalusia, AL
Birmingham, AL
Dothan, AL
Huntsville, AL

Project Name:	**Lowman Hydrogeologic Investigation**
Project Number:	**061321201**
Client:	**PowerSouth Energy Cooperative**
Address:	**Andalusia, Alabama**
Project Location:	

Boring Number:	**PZ-8 / S14181**
Sample Depth:	**29-30 feet**
Sample Description:	**Dark gray fine sandy CLAY**
Date Sampled:	**10/16/2013**
Date Tested:	**6/26/2014**
Reviewed By:	
Date Issued:	

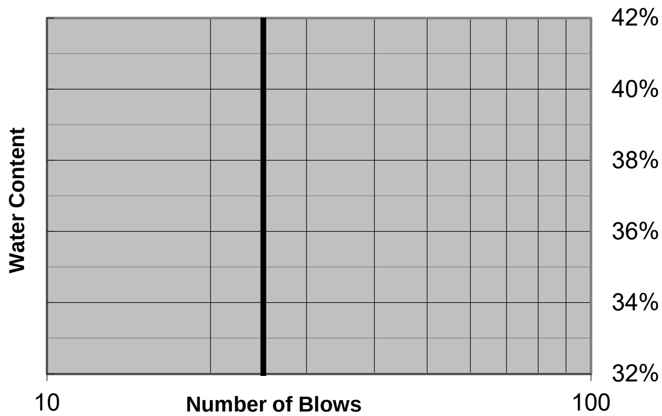
Visual-Manual Identification of Soils (D2488)

Liquid Limit (LL):	**N/A**	USCS
Plastic Limit (PL):	**N/A**	Classification
Plasticity Index (PI):	**N/A**	**CH**

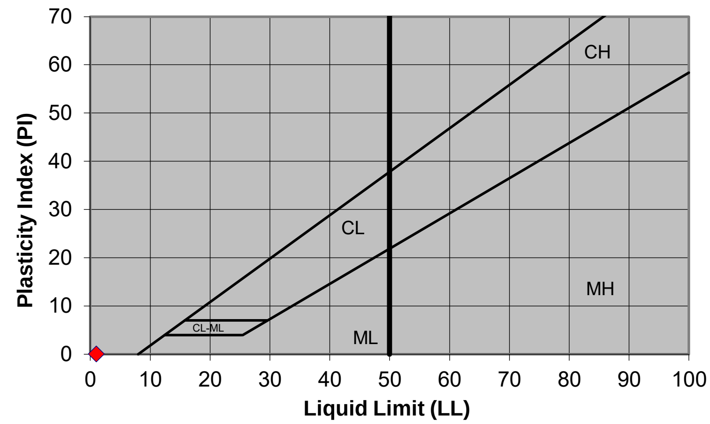
REPORT OF SIEVE ANALYSIS (ASTM D422)

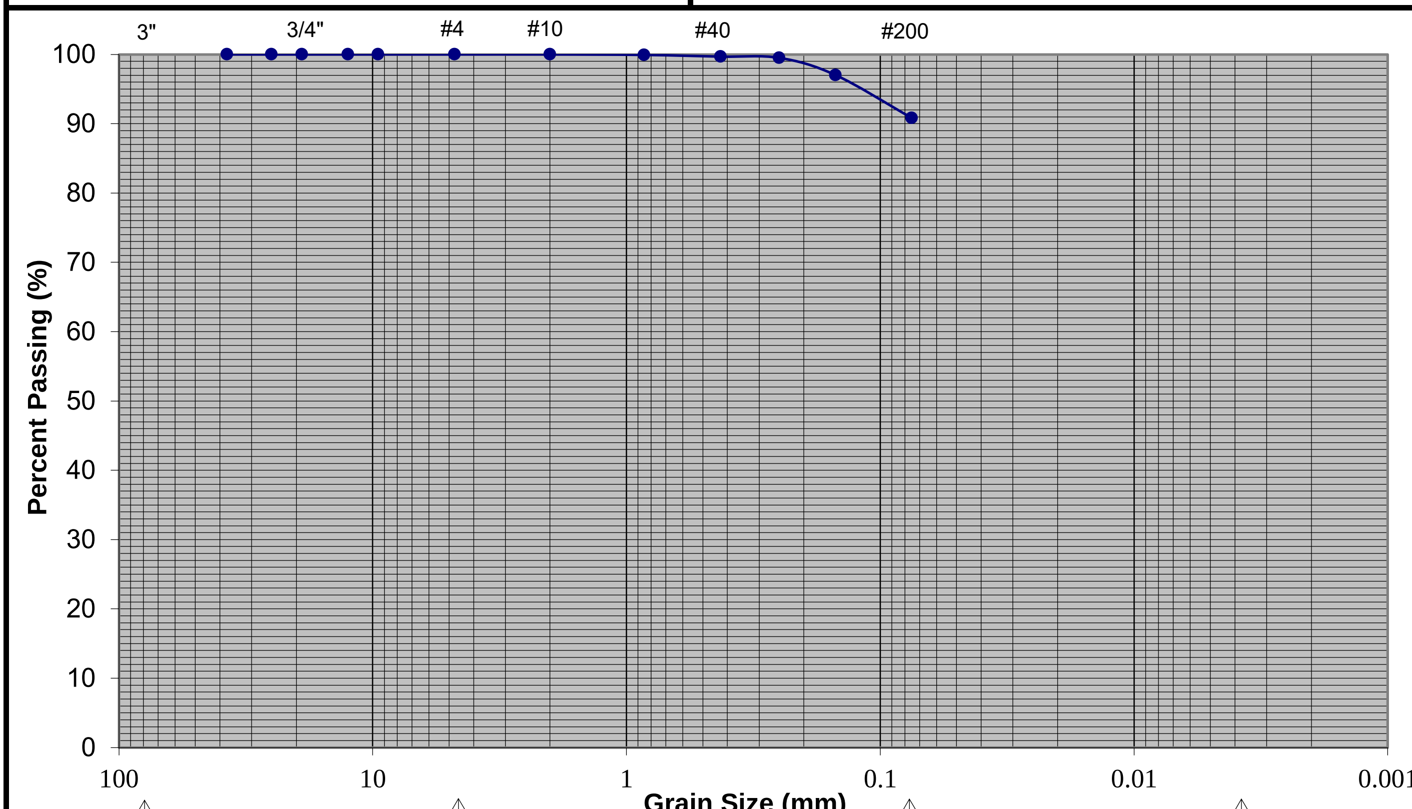
Percent Gravel:	**0.0%**
Percent Sand:	**9.2%**
Percent Clay/Silt:	**90.8%**

Liquid Limit Plot



Plasticity Chart

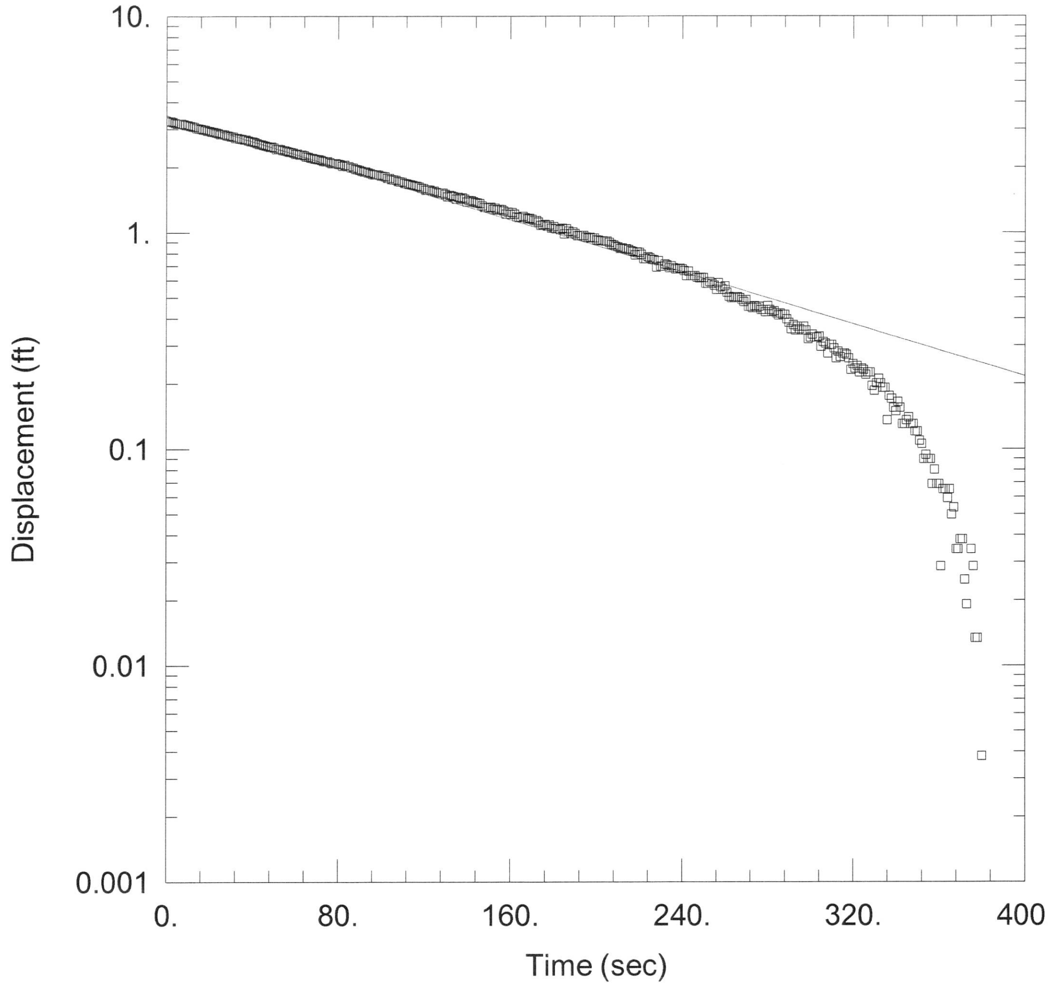




Boulders/ Cobbles	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

APPENDIX C

AQUIFER TEST DATA



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-1 Pumping Test.aqt
Date: 12/18/14 Time: 15:22:14

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-1
Test Date: August 25, 2014

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-1)

Initial Displacement: 3.27 ft
Total Well Penetration Depth: 14.75 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.75 ft
Screen Length: 14.75 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001769 cm/sec
y0 = 3.474 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:22:23

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: August 25, 2014
Test Well: PZ-1

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-1

X Location: 1838175.959 ft
Y Location: 542424.9629 ft

Initial Displacement: 3.27 ft
Static Water Column Height: 14.75 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 14.75 ft
Total Well Penetration Depth: 14.75 ft

No. of Observations: 381

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	3.259	192.	0.9684
2.	3.265	193.	0.9684
3.	3.244	194.	0.9684
4.	3.209	195.	0.9531
5.	3.188	196.	0.9435
6.	3.188	197.	0.9493
7.	3.185	198.	0.9435
8.	3.158	199.	0.9435
9.	3.142	200.	0.9244
10.	3.129	201.	0.9186
11.	3.114	202.	0.9129
12.	3.083	203.	0.9129
13.	3.074	204.	0.9091
14.	3.037	205.	0.9091
15.	3.022	206.	0.8976
16.	3.012	207.	0.8784
17.	2.997	208.	0.8727
18.	2.987	209.	0.8631
19.	2.957	210.	0.8574
20.	2.947	211.	0.8421
21.	2.92	212.	0.8478
22.	2.911	213.	0.8383
23.	2.892	214.	0.8383
24.	2.876	215.	0.8325
25.	2.85	216.	0.8229
26.	2.84	217.	0.8172

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
27.	2.831	218.	0.7866
28.	2.809	219.	0.8115
29.	2.8	220.	0.8076
30.	2.781	221.	0.7923
31.	2.765	222.	0.756
32.	2.735	223.	0.756
33.	2.735	224.	0.7713
34.	2.714	225.	0.7617
35.	2.698	226.	0.7502
36.	2.689	227.	0.7464
37.	2.683	228.	0.6909
38.	2.654	229.	0.7407
39.	2.639	230.	0.6966
40.	2.633	231.	0.6966
41.	2.614	232.	0.7158
42.	2.584	233.	0.7062
43.	2.563	234.	0.6851
44.	2.553	235.	0.7005
45.	2.532	236.	0.6851
46.	2.513	237.	0.6756
47.	2.503	238.	0.6756
48.	2.482	239.	0.6813
49.	2.492	240.	0.6756
50.	2.461	241.	0.666
51.	2.421	242.	0.6296
52.	2.432	243.	0.6603
53.	2.421	244.	0.6296
54.	2.396	245.	0.6296
55.	2.39	246.	0.6296
56.	2.377	247.	0.6201
57.	2.356	248.	0.6143
58.	2.346	249.	0.6201
59.	2.331	250.	0.6162
60.	2.306	251.	0.5799
61.	2.31	252.	0.5799
62.	2.291	253.	0.5895
63.	2.285	254.	0.5799
64.	2.27	255.	0.5684
65.	2.239	256.	0.5435
66.	2.23	257.	0.5837
67.	2.21	258.	0.5588
68.	2.205	259.	0.5435
69.	2.189	260.	0.5646
70.	2.184	261.	0.5282
71.	2.174	262.	0.5052
72.	2.159	263.	0.4976
73.	2.14	264.	0.5033
74.	2.128	265.	0.5033
75.	2.128	266.	0.5033
76.	2.109	267.	0.4976
77.	2.088	268.	0.488
78.	2.084	269.	0.4784
79.	2.088	270.	0.488
80.	2.069	271.	0.4536
81.	2.063	272.	0.4536
82.	2.032	273.	0.4478
83.	2.054	274.	0.4574
84.	2.023	275.	0.4478
85.	2.023	276.	0.4536
86.	1.992	277.	0.4383
87.	1.987	278.	0.4383
88.	1.962	279.	0.4287
89.	1.952	280.	0.4574

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
90.	1.943	281.	0.4383
91.	1.921	282.	0.4287
92.	1.912	283.	0.4325
93.	1.906	284.	0.4229
94.	1.891	285.	0.4134
95.	1.876	286.	0.4229
96.	1.856	287.	0.4172
97.	1.851	288.	0.4172
98.	1.851	289.	0.3981
99.	1.847	290.	0.3828
100.	1.826	291.	0.3579
101.	1.82	292.	0.3732
102.	1.81	293.	0.3521
103.	1.786	294.	0.3675
104.	1.78	295.	0.3579
105.	1.761	296.	0.3521
106.	1.755	297.	0.3675
107.	1.745	298.	0.3521
108.	1.721	299.	0.3215
109.	1.715	300.	0.3273
110.	1.709	301.	0.3368
111.	1.69	302.	0.3273
112.	1.68	303.	0.3273
113.	1.669	304.	0.3311
114.	1.665	305.	0.2966
115.	1.654	306.	0.312
116.	1.644	307.	0.3062
117.	1.634	308.	0.2756
118.	1.625	309.	0.3024
119.	1.606	310.	0.3024
120.	1.598	311.	0.2909
121.	1.573	312.	0.2622
122.	1.575	313.	0.2813
123.	1.569	314.	0.266
124.	1.548	315.	0.2756
125.	1.554	316.	0.2756
126.	1.535	317.	0.2718
127.	1.523	318.	0.2622
128.	1.523	319.	0.2316
129.	1.523	320.	0.2469
130.	1.504	321.	0.2354
131.	1.464	322.	0.2411
132.	1.489	323.	0.2258
133.	1.477	324.	0.2354
134.	1.468	325.	0.2316
135.	1.428	326.	0.2201
136.	1.458	327.	0.2258
137.	1.443	328.	0.2258
138.	1.449	329.	0.1952
139.	1.428	330.	0.1856
140.	1.384	331.	0.2009
141.	1.409	332.	0.2105
142.	1.403	333.	0.2009
143.	1.388	334.	0.1914
144.	1.378	335.	0.1914
145.	1.372	336.	0.1359
146.	1.363	337.	0.1761
147.	1.328	338.	0.1703
148.	1.307	339.	0.155
149.	1.307	340.	0.1493
150.	1.301	341.	0.1646
151.	1.313	342.	0.155
152.	1.282	343.	0.1301

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
153.	1.298	344.	0.1301
154.	1.273	345.	0.1359
155.	1.282	346.	0.1397
156.	1.277	347.	0.1301
157.	1.257	348.	0.1301
158.	1.217	349.	0.1206
159.	1.242	350.	0.1206
160.	1.211	351.	0.1091
161.	1.236	352.	0.1053
162.	1.217	353.	0.08995
163.	1.181	354.	0.09377
164.	1.171	355.	0.08995
165.	1.171	356.	0.08995
166.	1.187	357.	0.06889
167.	1.171	358.	0.08038
168.	1.156	359.	0.06889
169.	1.166	360.	0.06889
170.	1.15	361.	0.0287
171.	1.135	362.	0.06507
172.	1.135	363.	0.06507
173.	1.116	364.	0.05932
174.	1.079	365.	0.06507
175.	1.085	366.	0.04976
176.	1.091	367.	0.05358
177.	1.07	368.	0.03444
178.	1.085	369.	0.03444
179.	1.049	370.	0.03827
180.	1.064	371.	0.03827
181.	1.039	372.	0.02488
182.	1.039	373.	0.01913
183.	1.03	374.	-0.00575
184.	1.049	375.	0.03444
185.	0.9837	376.	0.0287
186.	1.039	377.	0.01339
187.	1.014	378.	0.01339
188.	0.9894	379.	-0.00575
189.	1.005	380.	0.00382
190.	0.9894	381.	0.
191.	0.9646		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.556

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0001769	cm/sec
y0	3.474	ft

T = K*b = 0.4313 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0001769	1.371E-6	+/- 2.695E-6	129.1	cm/sec

y0	3.474	0.01803	+/- 0.03545	192.7	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.4313 cm²/sec

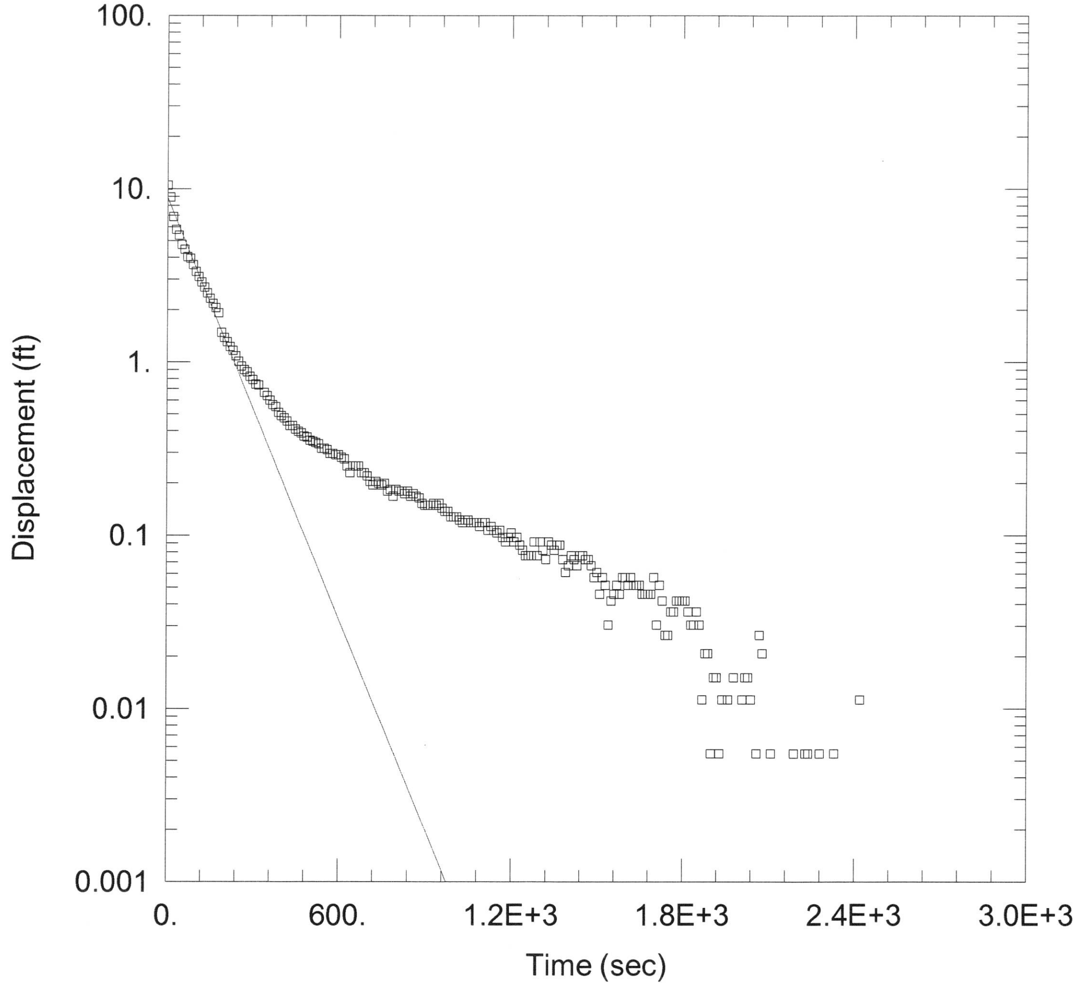
Parameter Correlations

	K	y0
K	1.00	0.73
y0	0.73	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 4.121 ft^2
Variance . . . . 0.01087 ft^2
Std. Deviation . . . . 0.1043 ft
Mean . . . . -0.02234 ft
No. of Residuals 381
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-7 Pumping Test.aqt
Date: 12/17/14 Time: 17:34:43

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-7R
Test Date: June 11, 2014

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-7R)

Initial Displacement: 10.48 ft
Total Well Penetration Depth: 15.67 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 15.67 ft
Screen Length: 15.67 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002268 cm/sec
y0 = 8.853 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:22:51

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: June 11, 2014
Test Well: PZ-7R

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-7R

X Location: 1840040.102 ft
Y Location: 539656.3645 ft

Initial Displacement: 10.48 ft
Static Water Column Height: 15.67 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 15.67 ft
Total Well Penetration Depth: 15.67 ft

No. of Observations: 251

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	10.47	1270.	0.0763
10.	8.947	1280.	0.09161
20.	6.895	1290.	0.0763
30.	5.81	1300.	0.09161
40.	5.383	1310.	0.08204
50.	4.761	1320.	0.07247
60.	4.453	1330.	0.09161
70.	4.046	1340.	0.08778
80.	3.963	1350.	0.08204
90.	3.638	1360.	0.08778
100.	3.324	1370.	0.08778
110.	3.1	1380.	0.07247
120.	2.88	1390.	0.06099
130.	2.691	1400.	0.06673
140.	2.493	1410.	0.0763
150.	2.323	1420.	0.07247
160.	2.172	1430.	0.06673
170.	2.055	1440.	0.0763
180.	1.914	1450.	0.0763
190.	1.479	1460.	0.07247
200.	1.378	1470.	0.07247
210.	1.307	1480.	0.06673
220.	1.223	1490.	0.05716
230.	1.161	1500.	0.06099
240.	1.081	1510.	0.04568
250.	1.004	1520.	0.05716

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
260.	0.9452	1530.	0.05142
270.	0.8992	1540.	0.03037
280.	0.8744	1550.	0.04185
290.	0.8227	1560.	0.04568
300.	0.7882	1570.	0.05142
310.	0.7423	1580.	0.04568
320.	0.7327	1590.	0.05716
340.	0.6658	1600.	0.05716
350.	0.6371	1610.	0.05142
360.	0.6007	1620.	0.05716
370.	0.5662	1630.	0.05142
380.	0.5509	1640.	0.05142
390.	0.5107	1650.	0.05142
400.	0.4897	1660.	0.04568
410.	0.4744	1670.	0.04568
420.	0.4552	1680.	0.04568
430.	0.4284	1690.	0.04568
440.	0.4284	1700.	0.05716
450.	0.4093	1710.	0.03037
460.	0.3978	1720.	0.05142
470.	0.3882	1730.	0.04185
480.	0.3729	1740.	0.02654
490.	0.3672	1750.	0.02654
500.	0.3519	1760.	0.03611
510.	0.3481	1770.	0.03611
520.	0.3423	1780.	0.04185
530.	0.3366	1790.	0.04185
540.	0.3174	1800.	0.04185
550.	0.3174	1810.	0.04185
560.	0.3117	1820.	0.03611
570.	0.2964	1830.	0.03037
580.	0.2964	1840.	0.03037
590.	0.2907	1850.	0.03611
600.	0.2907	1860.	0.03037
610.	0.2811	1870.	0.01123
620.	0.2753	1880.	0.0208
630.	0.2505	1890.	0.0208
640.	0.2294	1900.	0.00549
650.	0.2505	1910.	0.01506
660.	0.2505	1920.	0.01506
670.	0.2505	1930.	0.00549
680.	0.2294	1940.	0.01123
690.	0.2294	1950.	-0.00025
700.	0.2198	1960.	0.01123
710.	0.2045	1970.	-0.00025
720.	0.195	1980.	0.01506
730.	0.2045	1990.	-0.00025
740.	0.1988	2000.	-0.00025
750.	0.195	2010.	0.01123
760.	0.1988	2020.	0.01506
770.	0.1797	2030.	0.01506
780.	0.1835	2040.	0.01123
790.	0.1682	2050.	-0.00025
800.	0.1835	2060.	0.00549
810.	0.1797	2070.	0.02654
820.	0.1797	2080.	0.0208
830.	0.1739	2090.	-0.00408
840.	0.1797	2100.	-0.00982
850.	0.1682	2110.	0.00549
860.	0.1739	2120.	-0.00982
870.	0.1682	2130.	-0.00025
880.	0.1643	2140.	-0.00025
890.	0.1529	2150.	-0.00408

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
900.	0.149	2160.	-0.00408
910.	0.149	2170.	-0.01556
920.	0.149	2180.	-0.00982
930.	0.1529	2190.	0.00549
940.	0.149	2200.	-0.00025
950.	0.1529	2210.	-0.01556
960.	0.1433	2220.	-0.01556
970.	0.1375	2230.	0.00549
980.	0.1375	2240.	0.00549
990.	0.128	2250.	-0.00025
1000.	0.128	2260.	-0.00408
1010.	0.128	2270.	-0.00025
1020.	0.1222	2280.	0.00549
1030.	0.1184	2290.	-0.00408
1040.	0.1222	2300.	-0.01939
1050.	0.1222	2310.	-0.01939
1060.	0.1184	2320.	-0.00408
1070.	0.1184	2330.	0.00549
1080.	0.1184	2340.	-0.00408
1090.	0.1127	2350.	-0.00025
1100.	0.1184	2360.	-0.00025
1110.	0.1184	2370.	-0.00982
1120.	0.1069	2380.	-0.00025
1130.	0.1127	2390.	-0.00408
1140.	0.1069	2400.	-0.01939
1150.	0.1031	2410.	-0.00025
1160.	0.1069	2420.	0.01123
1170.	0.09735	2430.	-0.00408
1180.	0.09161	2440.	-0.00408
1190.	0.09735	2450.	-0.00982
1200.	0.1031	2460.	-0.01939
1210.	0.09161	2470.	-0.01556
1220.	0.09735	2480.	-0.00408
1230.	0.08778	2490.	-0.00982
1240.	0.08204	2500.	-0.00025
1250.	0.0763	2510.	-0.00025
1260.	0.0763		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.61

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0002268	cm/sec
y0	8.853	ft

T = K*b = 0.553 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0002268	4.55E-6	+/- 8.958E-6	49.85	cm/sec
y0	8.853	0.1188	+/- 0.234	74.51	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.553 cm^2/sec

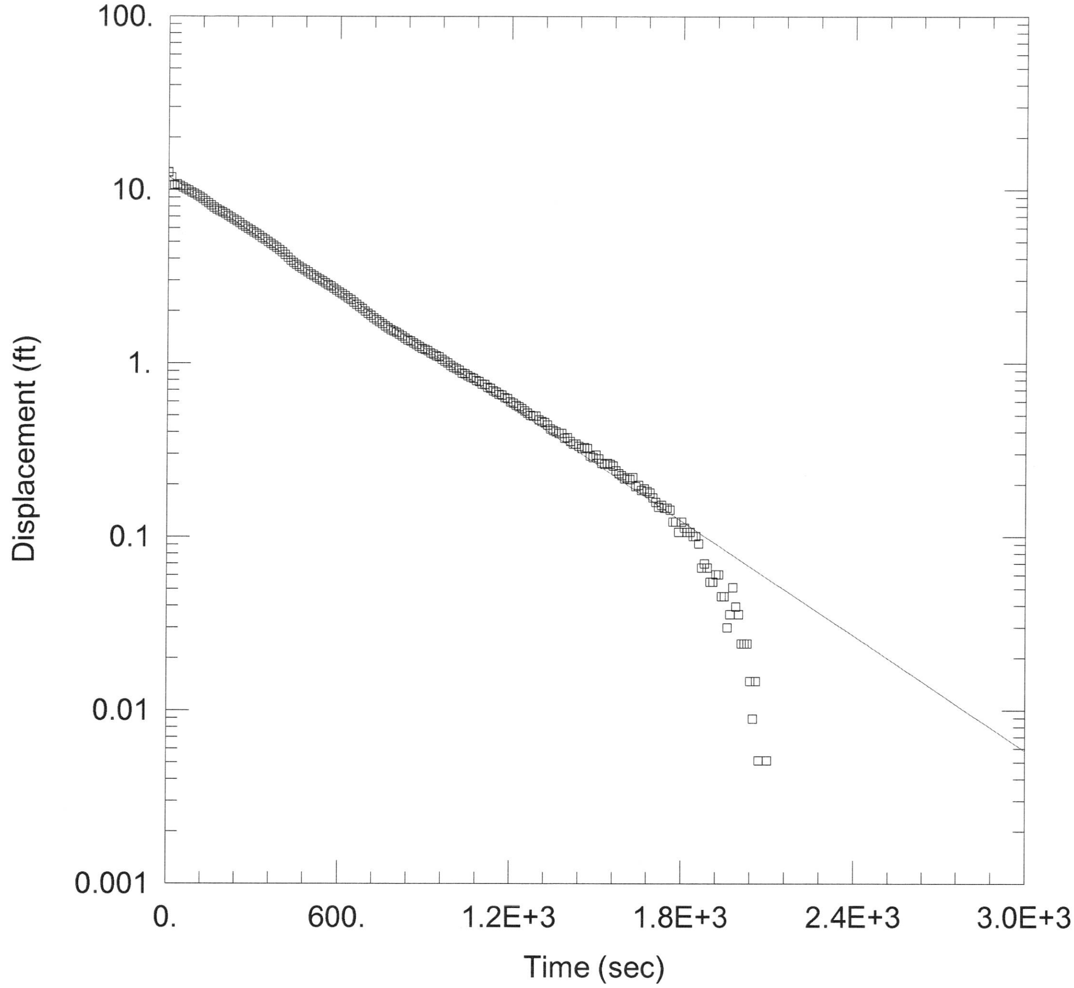
Parameter Correlations

	K	y0
K	1.00	0.68
y0	0.68	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 11.1 ft^2
Variance . . . . 0.04458 ft^2
Std. Deviation . . . . 0.2111 ft
Mean . . . . 0.08593 ft
No. of Residuals 251
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-8 Pumping Test.aqt
Date: 12/18/14 Time: 15:23:15

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-8R
Test Date: June 12, 2014

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-8R)

Initial Displacement: 12.6 ft
Total Well Penetration Depth: 16.17 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 16.17 ft
Screen Length: 15.5 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.279E-5 cm/sec
y0 = 11.91 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:23:23

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: June 12, 2014
Test Well: PZ-8R

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-8R

X Location: 1840790.04 ft
Y Location: 540698.2017 ft

Initial Displacement: 12.6 ft
Static Water Column Height: 16.17 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 15.5 ft
Total Well Penetration Depth: 16.17 ft

No. of Observations: 215

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	12.59	1080.	0.7917
10.	11.76	1090.	0.7821
20.	10.65	1100.	0.7553
30.	10.71	1110.	0.7515
40.	10.51	1120.	0.7247
50.	10.29	1130.	0.7151
60.	10.08	1140.	0.6903
70.	9.886	1150.	0.6788
80.	9.664	1160.	0.6596
90.	9.461	1170.	0.6539
100.	9.276	1180.	0.6329
110.	9.079	1190.	0.6233
120.	8.857	1200.	0.5984
130.	8.614	1210.	0.5869
140.	8.386	1220.	0.5716
150.	8.139	1230.	0.562
160.	7.902	1240.	0.5467
170.	7.704	1250.	0.5314
180.	7.542	1260.	0.5161
190.	7.391	1270.	0.5008
200.	7.249	1280.	0.4951
210.	7.067	1290.	0.4951
220.	6.922	1300.	0.4702
230.	6.749	1310.	0.4606
240.	6.593	1320.	0.4549
250.	6.426	1330.	0.4396

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
260.	6.254	1340.	0.4185
270.	6.103	1350.	0.4089
280.	5.967	1360.	0.4032
290.	5.835	1370.	0.3936
300.	5.693	1380.	0.3936
310.	5.572	1390.	0.3687
320.	5.421	1400.	0.3726
330.	5.274	1410.	0.3534
340.	5.148	1420.	0.3419
350.	5.006	1430.	0.3419
360.	4.88	1440.	0.3324
370.	4.753	1450.	0.3228
380.	4.633	1460.	0.3266
390.	4.501	1470.	0.3228
400.	4.359	1480.	0.2922
410.	4.217	1490.	0.2864
420.	4.051	1500.	0.296
430.	3.905	1510.	0.2807
440.	3.794	1520.	0.2654
450.	3.687	1530.	0.2616
460.	3.597	1540.	0.2654
470.	3.515	1550.	0.2616
480.	3.431	1560.	0.2558
490.	3.345	1570.	0.2405
500.	3.253	1580.	0.2309
510.	3.178	1590.	0.2252
520.	3.096	1600.	0.2156
530.	3.037	1610.	0.2195
540.	2.97	1620.	0.2137
550.	2.899	1630.	0.2195
560.	2.828	1640.	0.1946
570.	2.773	1650.	0.1984
580.	2.698	1660.	0.185
590.	2.631	1670.	0.1888
600.	2.556	1680.	0.1831
610.	2.505	1690.	0.1793
620.	2.445	1700.	0.1678
630.	2.374	1710.	0.1582
640.	2.319	1720.	0.1487
650.	2.248	1730.	0.1525
660.	2.177	1740.	0.1467
670.	2.116	1750.	0.1467
680.	2.057	1760.	0.1429
690.	1.99	1770.	0.1219
700.	1.93	1780.	0.1219
710.	1.884	1790.	0.1066
720.	1.823	1800.	0.1219
730.	1.777	1810.	0.1123
740.	1.733	1820.	0.1066
750.	1.687	1830.	0.1066
760.	1.636	1840.	0.1008
770.	1.596	1850.	0.1008
780.	1.555	1860.	0.09124
790.	1.53	1870.	0.06636
800.	1.5	1880.	0.07019
810.	1.465	1890.	0.06636
820.	1.435	1900.	0.05488
830.	1.395	1910.	0.05488
840.	1.358	1920.	0.06062
850.	1.339	1930.	0.06062
860.	1.303	1940.	0.04531
870.	1.278	1950.	0.04531
880.	1.243	1960.	0.03

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
890.	1.217	1970.	0.03574
900.	1.197	1980.	0.05105
910.	1.176	1990.	0.03957
920.	1.146	2000.	0.03574
930.	1.127	2010.	0.02426
940.	1.102	2020.	0.02426
950.	1.086	2030.	0.02426
960.	1.05	2040.	0.01469
970.	1.025	2050.	0.00895
980.	1.	2060.	0.01469
990.	0.9697	2070.	0.00512
1000.	0.9448	2080.	-0.00636
1010.	0.9295	2090.	-0.00062
1020.	0.9084	2100.	0.00512
1030.	0.874	2110.	-0.00636
1040.	0.8682	2120.	-0.01019
1050.	0.8434	2130.	-0.00062
1060.	0.8281	2140.	-0.00636
1070.	0.8166		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.623

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	6.279E-5	cm/sec
y0	11.91	ft

T = K*b = 0.1531 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	6.279E-5	2.195E-7	+/- 4.327E-7	286.	cm/sec
y0	11.91	0.02884	+/- 0.05685	412.9	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.1531 cm²/sec

Parameter Correlations

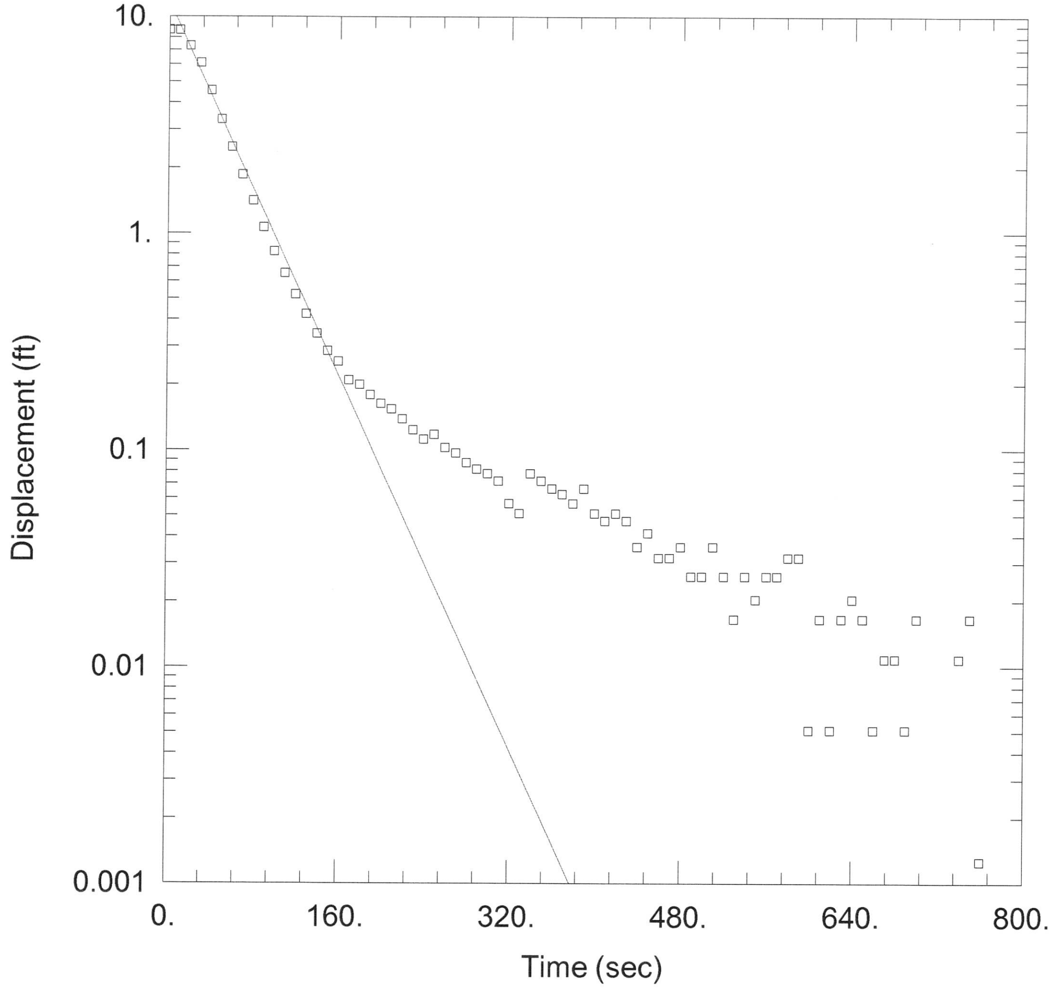
	K	y0
K	1.00	0.70
y0	0.70	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 1.822 ft^2
Variance . . . . 0.008552 ft^2

Std. Deviation . . . . 0.09248 ft
Mean . . . . -0.003142 ft
No. of Residuals 215
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-10 Pumping Test.aqt
Date: 12/18/14 Time: 15:23:40

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-10R
Test Date: June 12, 2014

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-10R)

Initial Displacement: 8.67 ft
Total Well Penetration Depth: 19.58 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 19.58 ft
Screen Length: 15.5 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0006282 cm/sec
y0 = 11.64 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:23:54

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: June 12, 2014
Test Well: PZ-10R

AQUIFER DATA

Saturated Thickness: 80. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-10R

X Location: 1841000.61 ft
Y Location: 543380.2747 ft

Initial Displacement: 8.67 ft
Static Water Column Height: 19.58 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 15.5 ft
Total Well Penetration Depth: 19.58 ft

No. of Observations: 77

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
10.	8.656	400.	0.05102
20.	7.316	410.	0.04719
30.	6.11	420.	0.05102
40.	4.548	430.	0.04719
50.	3.349	440.	0.03571
60.	2.495	450.	0.04145
70.	1.861	460.	0.03188
80.	1.412	470.	0.03188
90.	1.063	480.	0.03571
100.	0.8242	490.	0.02614
110.	0.6539	500.	0.02614
120.	0.5218	510.	0.03571
130.	0.4242	520.	0.02614
140.	0.3438	530.	0.01657
150.	0.2864	540.	0.02614
160.	0.2558	550.	0.0204
170.	0.2099	560.	0.02614
180.	0.2003	570.	0.02614
190.	0.1792	580.	0.03188
200.	0.1639	590.	0.03188
210.	0.1544	600.	0.00509
220.	0.1391	610.	0.01657
230.	0.1237	620.	0.00509
240.	0.1123	630.	0.01657
250.	0.118	640.	0.0204
260.	0.1027	650.	0.01657

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
270.	0.09695	660.	0.00509
280.	0.08738	670.	0.01083
290.	0.08164	680.	0.01083
300.	0.07781	690.	0.00509
310.	0.07207	700.	0.01657
320.	0.05676	710.	-0.00448
330.	0.05102	720.	-0.00448
340.	0.07781	730.	-0.00448
350.	0.07207	740.	0.01083
360.	0.06633	750.	0.01657
370.	0.0625	760.	0.00126
380.	0.05676	770.	-0.01022
390.	0.06633		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.721

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0006282	cm/sec
y0	11.64	ft

T = K*b = 1.532 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0006282	9.87E-6	+/- 1.966E-5	63.65	cm/sec
y0	11.64	0.146	+/- 0.2909	79.73	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 1.532 cm²/sec

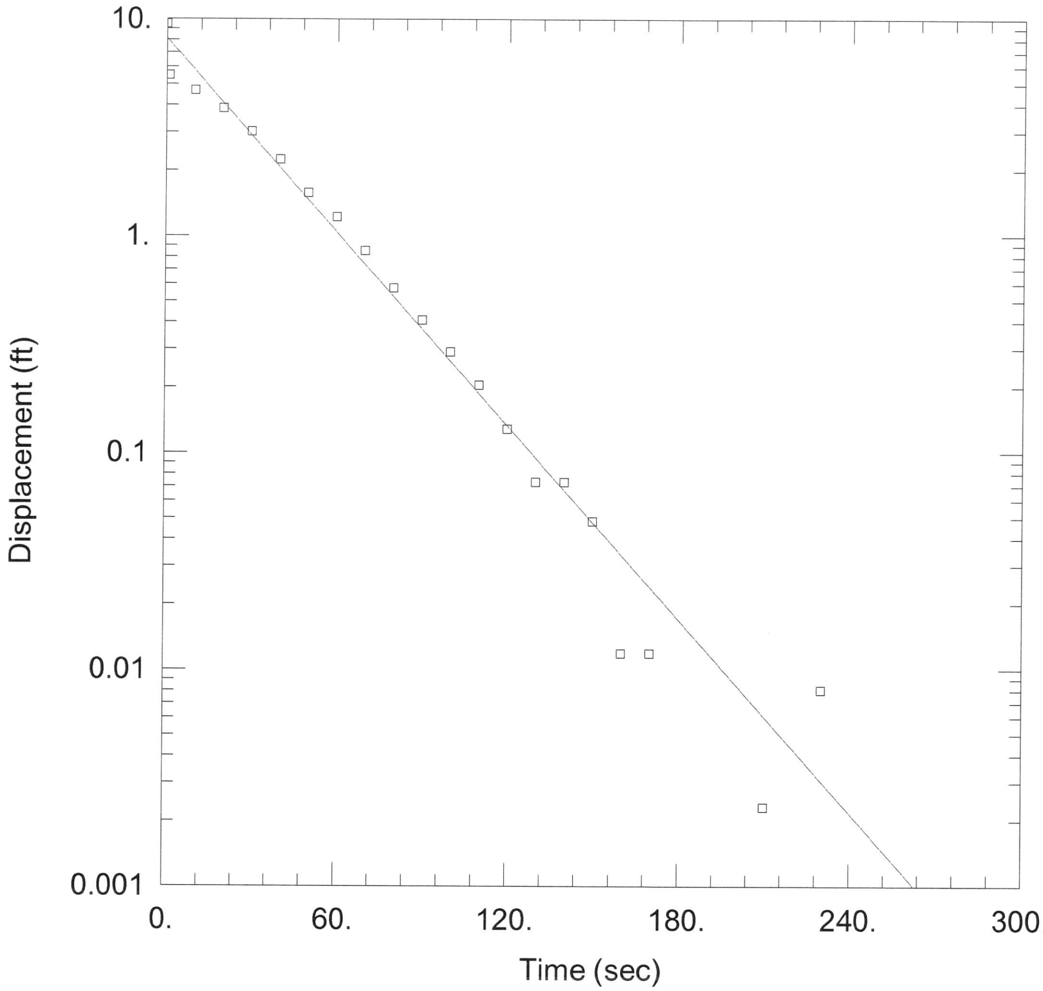
Parameter Correlations

	K	y0
K	1.00	0.79
y0	0.79	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 0.9385 ft^2
Variance . . . . 0.01251 ft^2
Std. Deviation . . . . 0.1119 ft
Mean . . . . 0.02437 ft
No. of Residuals 77
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-CLF-1R Pumping Test.aqt
Date: 12/18/14 Time: 15:24:14

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-CLF-1R
Test Date: December 4, 2014

AQUIFER DATA

Saturated Thickness: 127. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 9.5 ft
Total Well Penetration Depth: 13.82 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.82 ft
Screen Length: 13.82 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0009172 cm/sec
y0 = 8.111 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:24:21

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: December 4, 2014
Test Well: PZ-CLF-1R

AQUIFER DATA

Saturated Thickness: 127. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-1

X Location: 1829744.889 ft
Y Location: 541323.8017 ft

Initial Displacement: 9.5 ft
Static Water Column Height: 13.82 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 13.82 ft
Total Well Penetration Depth: 13.82 ft

No. of Observations: 24

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	5.503	120.	0.1286
10.	4.674	130.	0.07313
20.	3.872	140.	0.07313
30.	3.028	150.	0.04825
40.	2.251	160.	0.01189
50.	1.579	170.	0.01189
60.	1.22	180.	-0.00342
70.	0.8521	190.	-0.00342
80.	0.5746	200.	-0.01299
90.	0.4081	210.	0.00232
100.	0.2913	220.	-0.00725
110.	0.2052	230.	0.00806

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.499

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0009172	cm/sec

y0	8.111	ft

T = K*b = 3.551 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0006959	2.323E-5	+/- 4.818E-5	29.96	cm/sec
y0	5.974	0.1249	+/- 0.259	47.84	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 2.694 cm²/sec

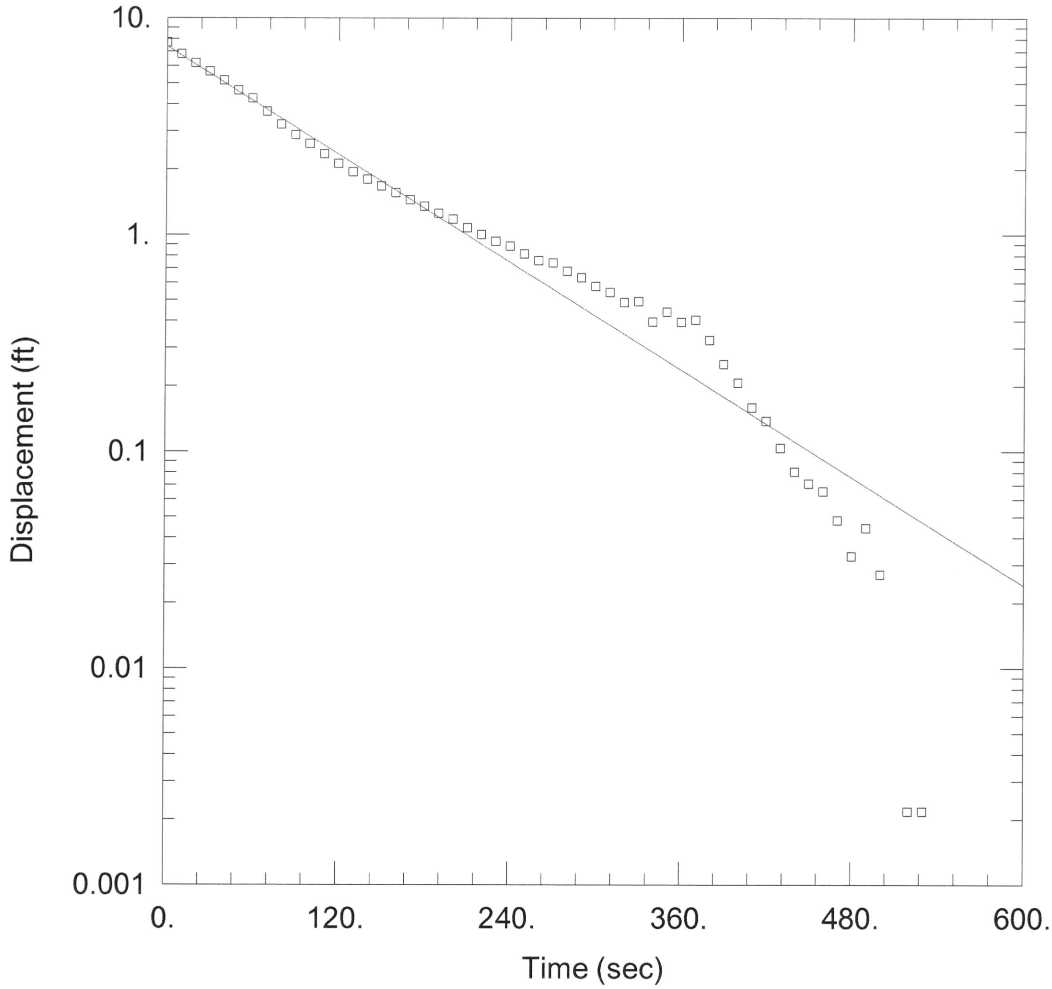
Parameter Correlations

	K	y0
K	1.00	0.63
y0	0.63	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 0.4951 ft^2
Variance . . . . 0.0225 ft^2
Std. Deviation . . . . 0.15 ft
Mean . . . . -0.0461 ft
No. of Residuals 24
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\PZ-CLF-2 Pumping Test.aqt
Date: 12/18/14 Time: 15:24:42

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: PZ-CLF-2
Test Date: August 25, 2014

AQUIFER DATA

Saturated Thickness: 90. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-CLF-2)

Initial Displacement: 7.69 ft
Total Well Penetration Depth: 11.04 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 11.04 ft
Screen Length: 11.04 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0003021 cm/sec
y0 = 7.382 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:24:48

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: August 25, 2014
Test Well: PZ-CLF-2

AQUIFER DATA

Saturated Thickness: 90. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-CLF-2

X Location: 1832810.419 ft
Y Location: 540786.6285 ft

Initial Displacement: 7.69 ft
Static Water Column Height: 11.04 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 11.04 ft
Total Well Penetration Depth: 11.04 ft

No. of Observations: 53

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
10.	6.812	280.	0.6797
20.	6.186	290.	0.6337
30.	5.665	300.	0.5782
40.	5.15	310.	0.5419
50.	4.63	320.	0.4883
60.	4.249	330.	0.4921
70.	3.704	340.	0.3964
80.	3.225	350.	0.4405
90.	2.888	360.	0.3945
100.	2.626	370.	0.4041
110.	2.356	380.	0.3256
120.	2.128	390.	0.2529
130.	1.947	400.	0.207
140.	1.801	410.	0.1591
150.	1.677	420.	0.1381
160.	1.558	430.	0.1036
170.	1.449	440.	0.08065
180.	1.351	450.	0.07108
190.	1.256	460.	0.06534
200.	1.179	470.	0.04811
210.	1.078	480.	0.0328
220.	1.003	490.	0.04429
230.	0.9323	500.	0.02706
240.	0.8864	510.	-0.00739
250.	0.8156	520.	0.00218
260.	0.7601	530.	0.00218

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
270.	0.7428		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.304

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0003021	cm/sec
y0	7.382	ft

T = K*b = 0.8286 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0003021	4.793E-6	+/- 9.625E-6	63.01	cm/sec
y0	7.382	0.08621	+/- 0.1731	85.63	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.8286 cm²/sec

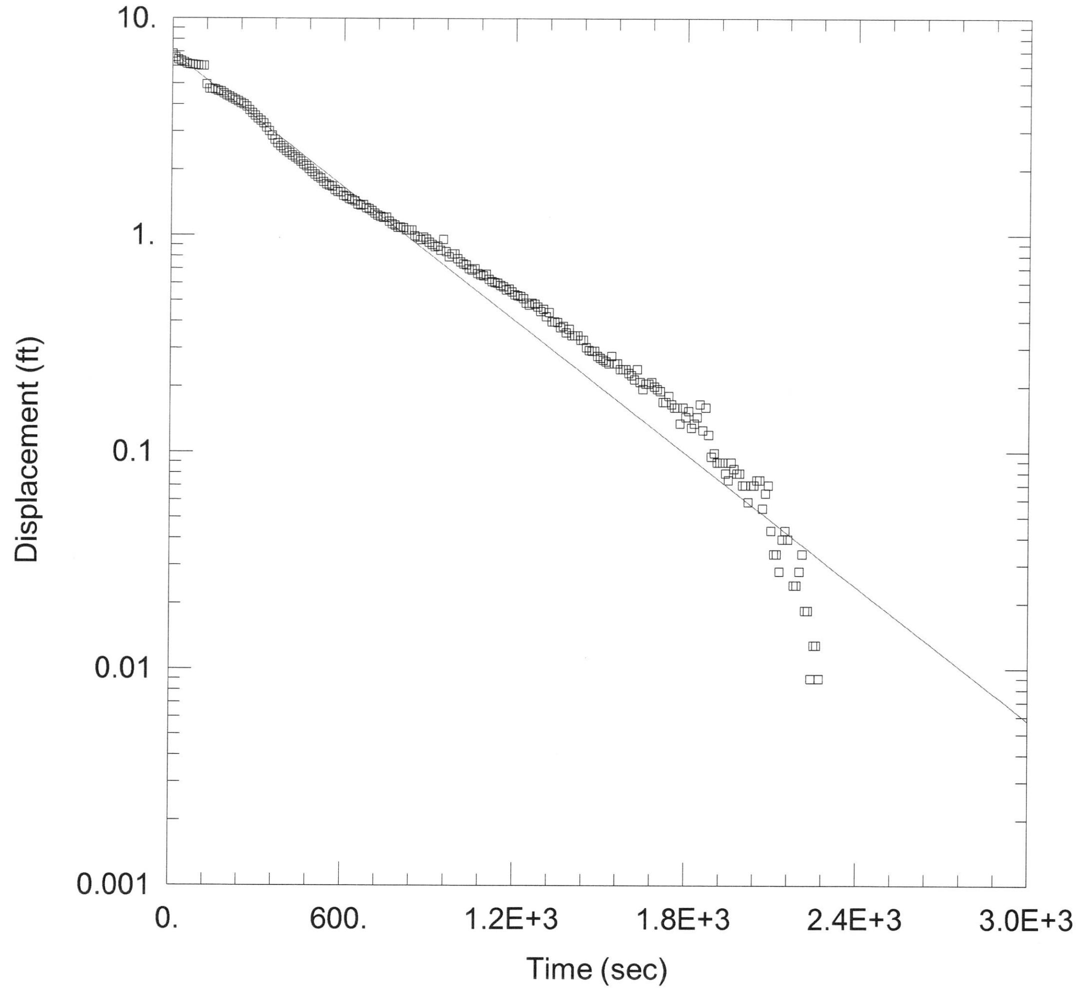
Parameter Correlations

	K	y0
K	1.00	0.74
y0	0.74	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 0.809 ft^2
Variance . . . . 0.01586 ft^2
Std. Deviation . . . . 0.126 ft
Mean . . . . 0.02655 ft
No. of Residuals 53
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\MW-1 Pumping Test.aqt
Date: 12/18/14 Time: 15:21:07

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: MW-1
Test Date: December 4, 2014

AQUIFER DATA

Saturated Thickness: 126. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 6.84 ft
Total Well Penetration Depth: 8.78 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 8.78 ft
Screen Length: 8.78 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.853E-5 cm/sec
y0 = 6.902 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:21:30

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: December 4, 2014
Test Well: MW-1

AQUIFER DATA

Saturated Thickness: 126. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-1

X Location: 1829744.889 ft
Y Location: 541323.8017 ft

Initial Displacement: 6.84 ft
Static Water Column Height: 8.78 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 8.78 ft
Total Well Penetration Depth: 8.78 ft

No. of Observations: 234

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	6.843	1170.	0.5583
10.	6.587	1180.	0.564
20.	6.422	1190.	0.5468
30.	6.342	1200.	0.5315
40.	6.265	1210.	0.5258
50.	6.154	1220.	0.5219
60.	6.099	1230.	0.5104
70.	6.089	1240.	0.4856
80.	6.068	1250.	0.476
90.	6.053	1260.	0.4856
100.	6.028	1270.	0.4817
110.	6.022	1280.	0.4664
120.	4.943	1290.	0.4454
130.	4.706	1300.	0.4549
140.	4.706	1310.	0.4205
150.	4.675	1320.	0.4396
160.	4.623	1330.	0.3994
170.	4.583	1340.	0.3994
180.	4.487	1350.	0.3956
190.	4.407	1360.	0.3746
200.	4.336	1370.	0.3803
210.	4.265	1380.	0.3554
220.	4.204	1390.	0.3688
230.	4.135	1400.	0.3439
240.	4.053	1410.	0.3439
250.	3.997	1420.	0.3439

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
260.	3.902	1430.	0.3286
270.	3.766	1440.	0.3286
280.	3.649	1450.	0.3038
290.	3.553	1460.	0.2942
300.	3.442	1470.	0.2923
310.	3.36	1480.	0.2923
320.	3.27	1490.	0.277
330.	3.132	1500.	0.2712
340.	3.012	1510.	0.2655
350.	2.876	1520.	0.2616
360.	2.753	1530.	0.2559
370.	2.644	1540.	0.277
380.	2.57	1550.	0.2559
390.	2.508	1560.	0.2559
400.	2.443	1570.	0.2406
410.	2.388	1580.	0.2406
420.	2.327	1590.	0.2406
430.	2.277	1600.	0.231
440.	2.235	1610.	0.2253
450.	2.179	1620.	0.2157
460.	2.114	1630.	0.2406
470.	2.08	1640.	0.21
480.	2.013	1650.	0.1947
490.	1.953	1660.	0.2062
500.	1.902	1670.	0.2062
510.	1.858	1680.	0.21
520.	1.827	1690.	0.2004
530.	1.76	1700.	0.1947
540.	1.72	1710.	0.1908
550.	1.695	1720.	0.1698
560.	1.676	1730.	0.1698
570.	1.615	1740.	0.1813
580.	1.584	1750.	0.166
590.	1.578	1760.	0.1602
600.	1.519	1770.	0.1602
610.	1.504	1780.	0.1353
620.	1.467	1790.	0.1602
630.	1.452	1800.	0.1449
640.	1.435	1810.	0.1545
650.	1.385	1820.	0.1296
660.	1.37	1830.	0.1353
670.	1.379	1840.	0.1449
680.	1.335	1850.	0.166
690.	1.32	1860.	0.1258
700.	1.295	1870.	0.1602
710.	1.259	1880.	0.12
720.	1.234	1890.	0.09514
730.	1.219	1900.	0.09897
740.	1.203	1910.	0.0894
750.	1.209	1920.	0.0894
760.	1.157	1930.	0.0894
770.	1.127	1940.	0.07983
780.	1.111	1950.	0.07409
790.	1.085	1960.	0.0894
800.	1.088	1970.	0.08366
810.	1.079	1980.	0.07983
820.	1.054	1990.	0.07983
830.	1.054	2000.	0.07026
840.	1.054	2010.	0.07026
850.	0.9927	2020.	0.05878
860.	0.9774	2030.	0.07026
870.	0.9525	2040.	0.07026
880.	0.9774	2050.	0.07409

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
890.	0.9583	2060.	0.07409
900.	0.9277	2070.	0.05495
910.	0.9028	2080.	0.06452
920.	0.8817	2090.	0.07026
930.	0.8894	2100.	0.04347
940.	0.8492	2110.	0.0339
950.	0.9564	2120.	0.0339
960.	0.8396	2130.	0.02816
970.	0.7956	2140.	0.03964
980.	0.8186	2150.	0.04347
990.	0.8186	2160.	0.03964
1000.	0.7784	2170.	-0.00055
1010.	0.7516	2180.	0.02433
1020.	0.7363	2190.	0.02433
1030.	0.7305	2200.	0.02816
1040.	0.6999	2210.	0.0339
1050.	0.6903	2220.	0.01859
1060.	0.6999	2230.	0.01859
1070.	0.6655	2240.	0.00902
1080.	0.6559	2250.	0.01285
1090.	0.6502	2260.	0.01285
1100.	0.6597	2270.	0.00902
1110.	0.6253	2280.	-0.00055
1120.	0.61	2290.	-0.00629
1130.	0.6042	2300.	-0.00055
1140.	0.6004	2310.	-0.00055
1150.	0.587	2320.	-0.00055
1160.	0.5774	2330.	-0.00055

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.11

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	8.853E-5	cm/sec
y0	6.902	ft

T = K*b = 0.34 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	8.853E-5	7.347E-7	+/- 1.447E-6	120.5	cm/sec
y0	6.902	0.03971	+/- 0.07823	173.8	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.34 cm²/sec

Parameter Correlations

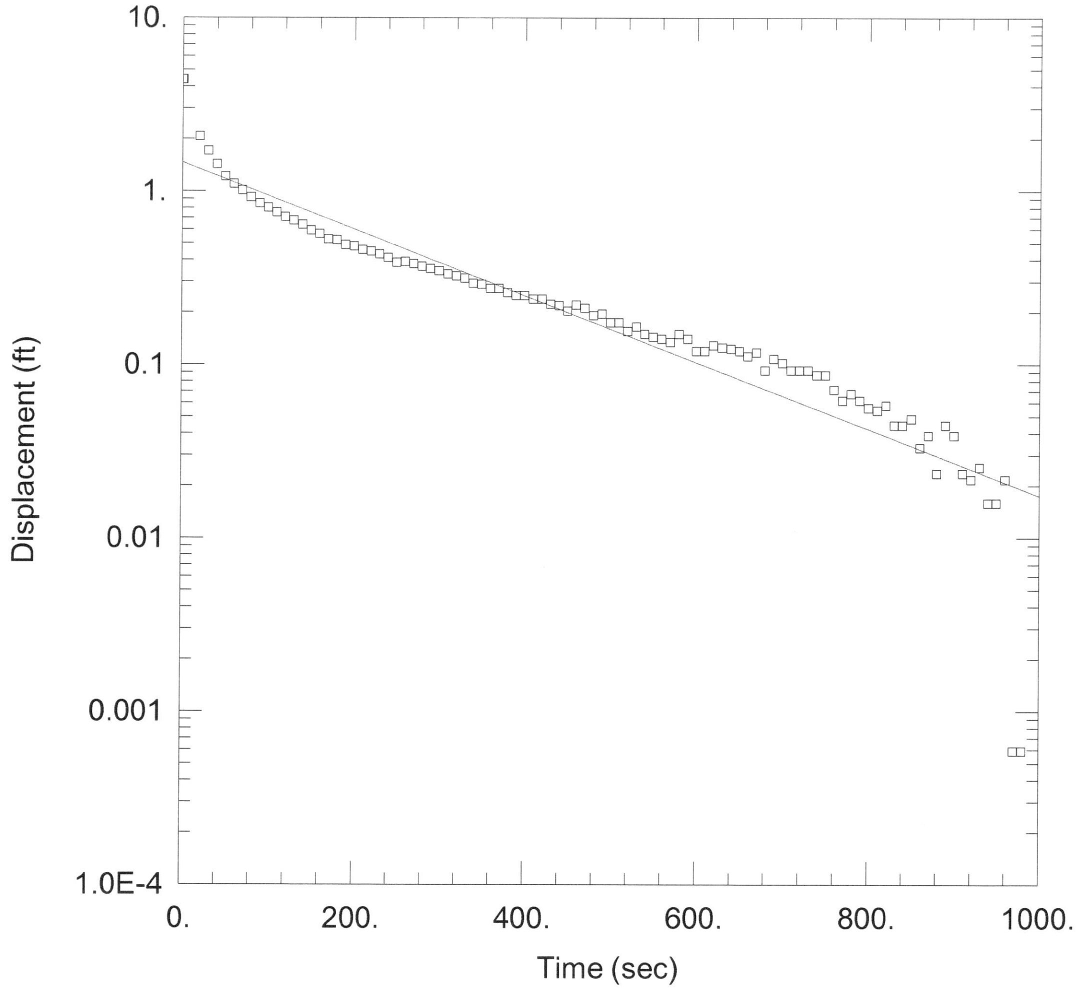
K	y0

K	1.00	0.70
y0	0.70	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 4.03 ft^2
Variance . . . . 0.01737 ft^2
Std. Deviation . . . . 0.1318 ft
Mean . . . . 0.02648 ft
No. of Residuals 234
No. of Estimates 2



LOWMAN POWER PLANT HYDROGEOLOGIC INVESTIGATION

Data Set: J:\...\MW-4B Pumping Test.aqt
Date: 12/18/14 Time: 15:21:47

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Well: MW-4B
Test Date: April 1, 2014

AQUIFER DATA

Saturated Thickness: 135. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-4B)

Initial Displacement: 4.41 ft
Total Well Penetration Depth: 12.56 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 12.56 ft
Screen Length: 12.56 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001274 cm/sec
y0 = 1.462 ft

Data Set: J:\Projects\06\13\21201 Lowman Hydrogeologic Investigation\Documents\Water Level Monitoring Data
Title: Lowman Power Plant Hydrogeologic Investigation
Date: 12/18/14
Time: 15:21:56

PROJECT INFORMATION

Company: CDG Engineers and Associates
Client: Power South Lowman Plant
Project: 061321201
Location: Leroy, Alabama
Test Date: April 1, 2014
Test Well: MW-4B

AQUIFER DATA

Saturated Thickness: 135. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-4B

X Location: 1830253.923 ft
Y Location: 541811.8376 ft

Initial Displacement: 4.41 ft
Static Water Column Height: 12.56 ft
Casing Radius: 0.0833 ft
Well Radius: 0.0833 ft
Well Skin Radius: 0.4271 ft
Screen Length: 12.56 ft
Total Well Penetration Depth: 12.56 ft

No. of Observations: 100

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1.	4.41	510.	0.1747
20.	2.071	520.	0.1556
30.	1.708	530.	0.1652
40.	1.43	540.	0.1499
50.	1.216	550.	0.1441
60.	1.099	560.	0.1403
70.	1.009	570.	0.1346
80.	0.9192	580.	0.1499
90.	0.8484	590.	0.1403
100.	0.8044	600.	0.1192
110.	0.7527	610.	0.1192
120.	0.7087	620.	0.1288
130.	0.6781	630.	0.125
140.	0.6417	640.	0.1231
150.	0.592	650.	0.1192
160.	0.5671	660.	0.1116
170.	0.5269	670.	0.1173
180.	0.5212	680.	0.09246
190.	0.4905	690.	0.1078
200.	0.481	700.	0.102
210.	0.4599	710.	0.09246
220.	0.4503	720.	0.09246
230.	0.4331	730.	0.09246
240.	0.4121	740.	0.08672
250.	0.3872	750.	0.08672
260.	0.3929	760.	0.07141

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
270.	0.3815	770.	0.06184
280.	0.368	780.	0.06758
290.	0.3566	790.	0.06184
300.	0.347	800.	0.0561
310.	0.3317	810.	0.05418
320.	0.324	820.	0.05801
330.	0.3145	830.	0.04461
340.	0.2934	840.	0.04461
350.	0.2896	850.	0.04844
360.	0.2743	860.	0.03313
370.	0.2743	870.	0.03887
380.	0.259	880.	0.02356
390.	0.2494	890.	0.04461
400.	0.2494	900.	0.03887
410.	0.2379	910.	0.02356
420.	0.2379	920.	0.02165
430.	0.2226	930.	0.02547
440.	0.2188	940.	0.01591
450.	0.2035	950.	0.01591
460.	0.2207	960.	0.02165
470.	0.2111	970.	0.00059
480.	0.192	980.	0.00059
490.	0.1958	990.	-0.01854
500.	0.1747	1000.	-0.00323

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.415

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0001274	cm/sec
y0	1.462	ft

T = K*b = 0.5241 cm²/sec

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.000382	2.789E-5	+/- 5.534E-5	13.7	cm/sec
y0	3.23	0.1712	+/- 0.3396	18.87	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 1.572 cm²/sec

Parameter Correlations

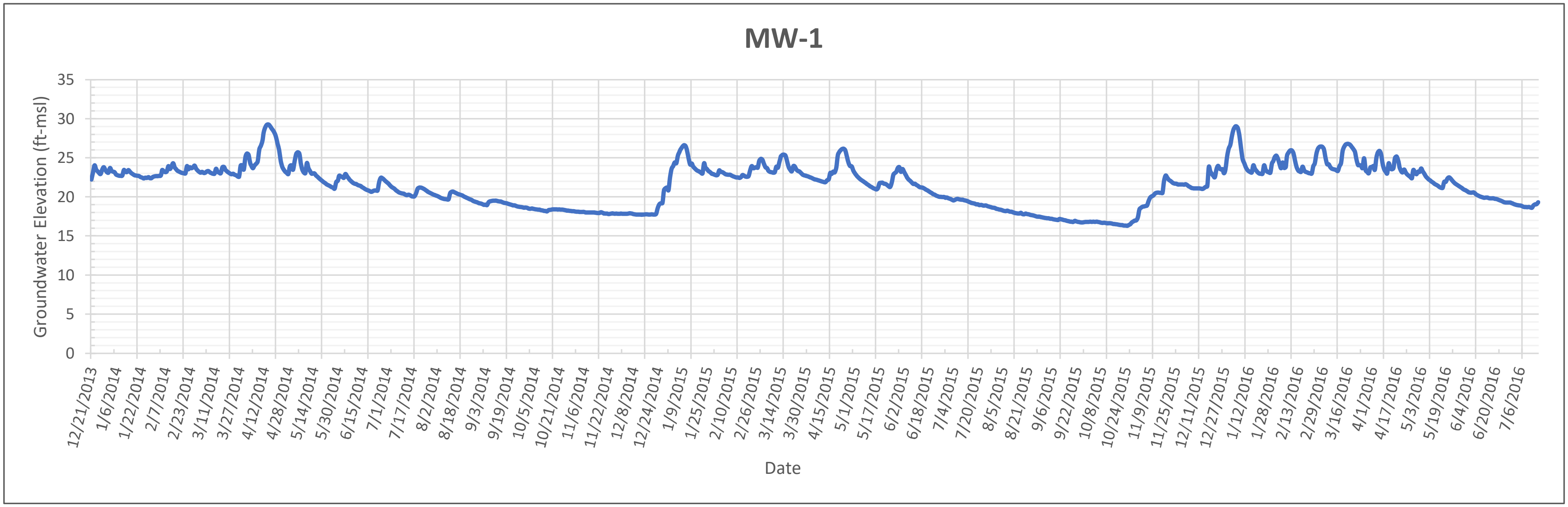
	K	y0
K	1.00	0.70
y0	0.70	1.00

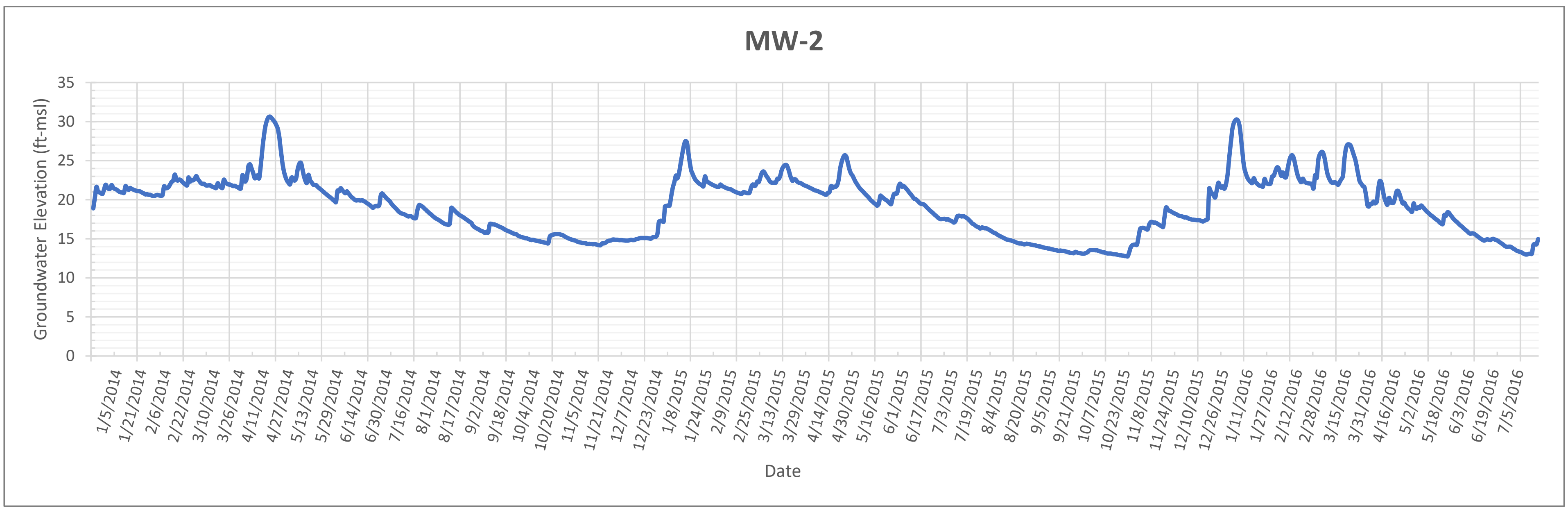
Residual Statistics

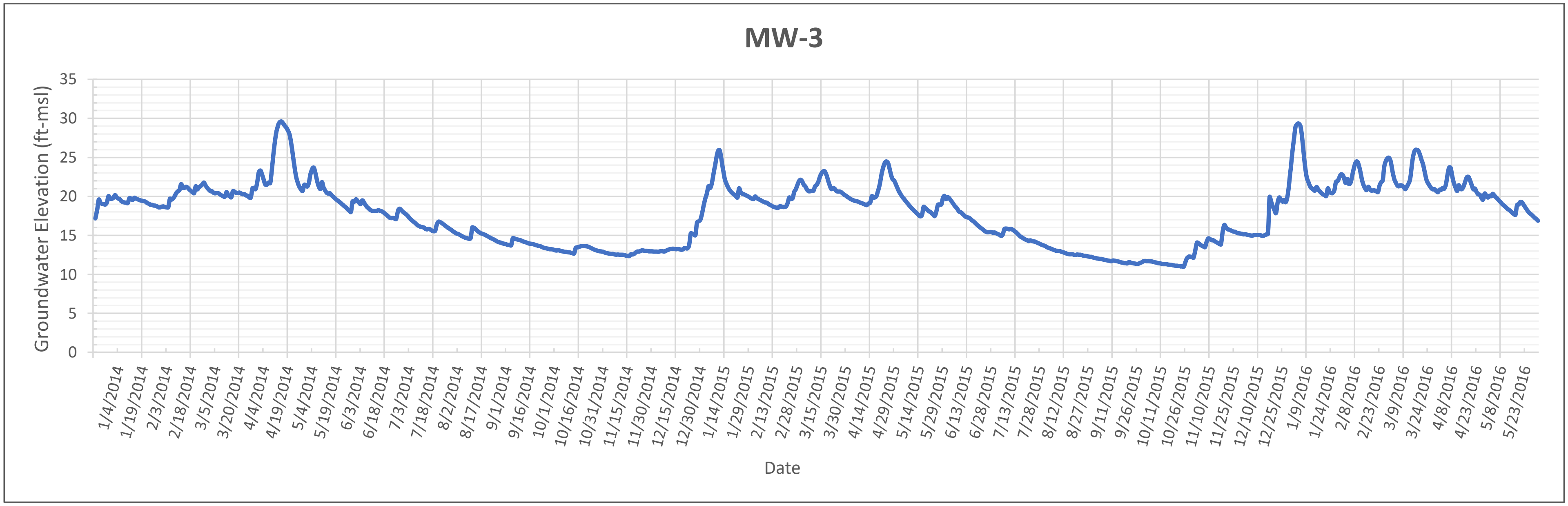
for weighted residuals

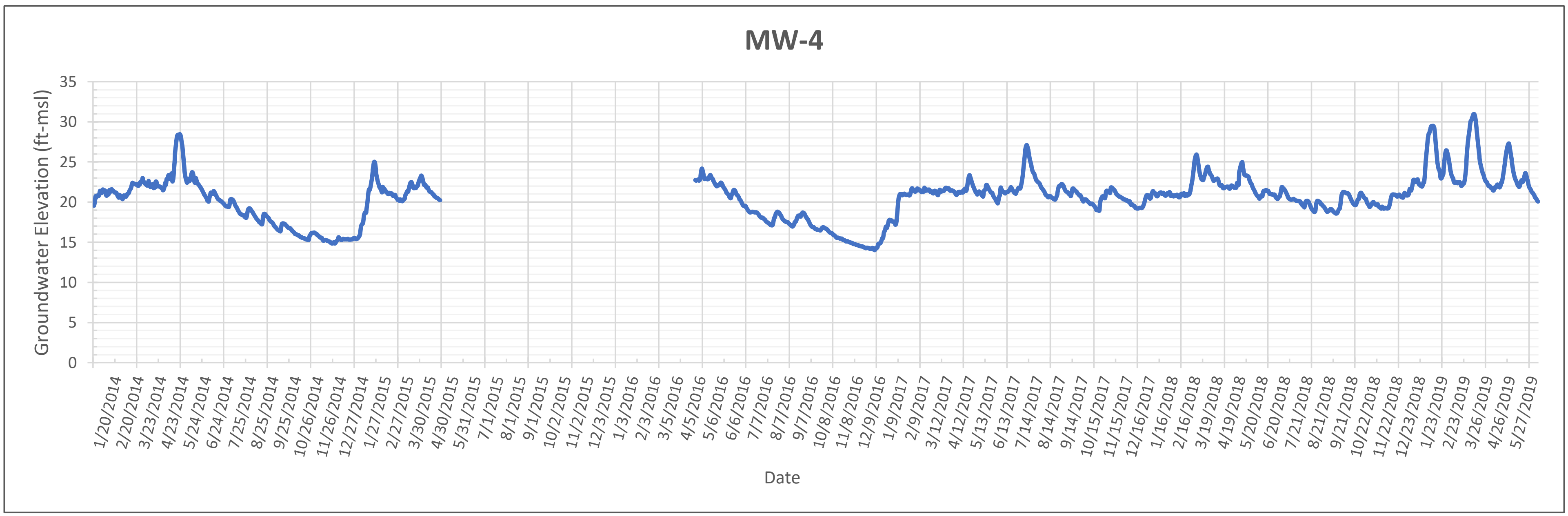
Sum of Squares . . . . . . 5.129 ft^2
Variance . . . . 0.05233 ft^2
Std. Deviation . . . . 0.2288 ft
Mean . . . . 0.1127 ft
No. of Residuals 100
No. of Estimates 2

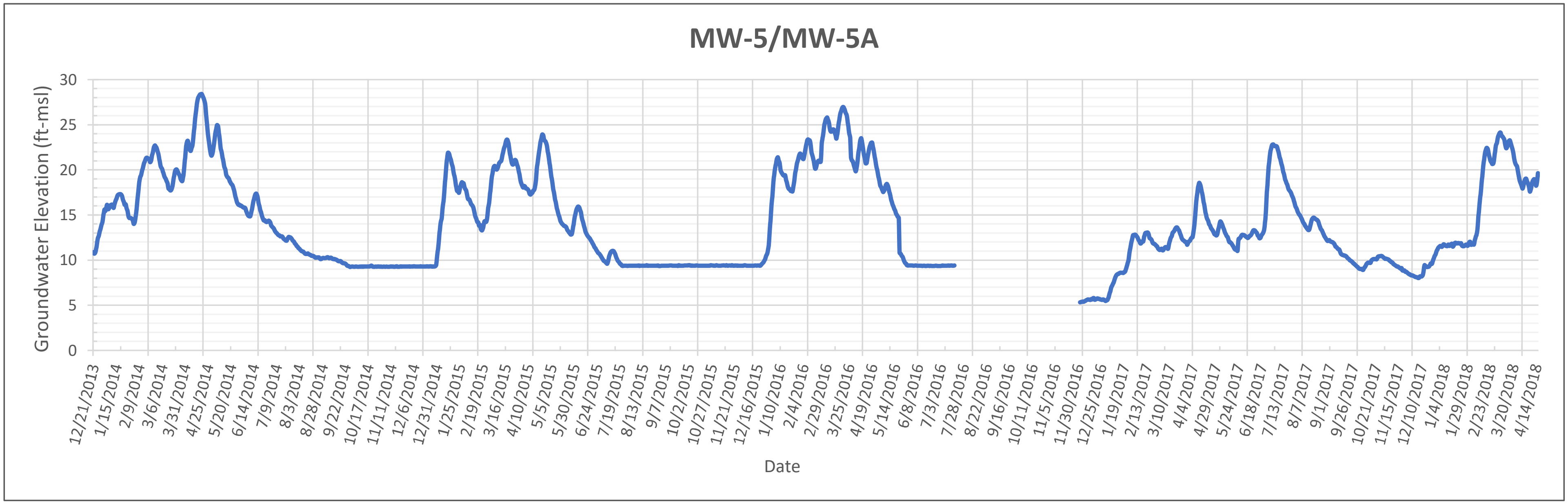
APPENDIX D
GROUNDWATER LEVEL DATA
2014 - 2019


MW-1
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
12/21/2013
1/6/2014
1/22/2014
2/7/2014
2/23/2014
3/11/2014
3/27/2014
4/12/2014
4/28/2014
5/14/2014
5/30/2014
6/15/2014
7/1/2014
7/17/2014
8/2/2014
8/18/2014
9/3/2014
9/19/2014
10/5/2014
10/21/2014
11/6/2014
11/22/2014
12/8/2014
12/24/2014
1/9/2015
1/25/2015
2/10/2015
2/26/2015
3/14/2015
3/30/2015
4/15/2015
5/1/2015
5/17/2015
6/2/2015
6/18/2015
7/4/2015
7/20/2015
8/5/2015
8/21/2015
9/6/2015
9/22/2015
10/8/2015
10/24/2015
11/9/2015
11/25/2015
12/11/2015
12/27/2015
1/12/2016
1/28/2016
2/13/2016
2/29/2016
3/16/2016
4/1/2016
4/17/2016
5/3/2016
5/19/2016
6/4/2016
6/20/2016
7/6/2016
Date

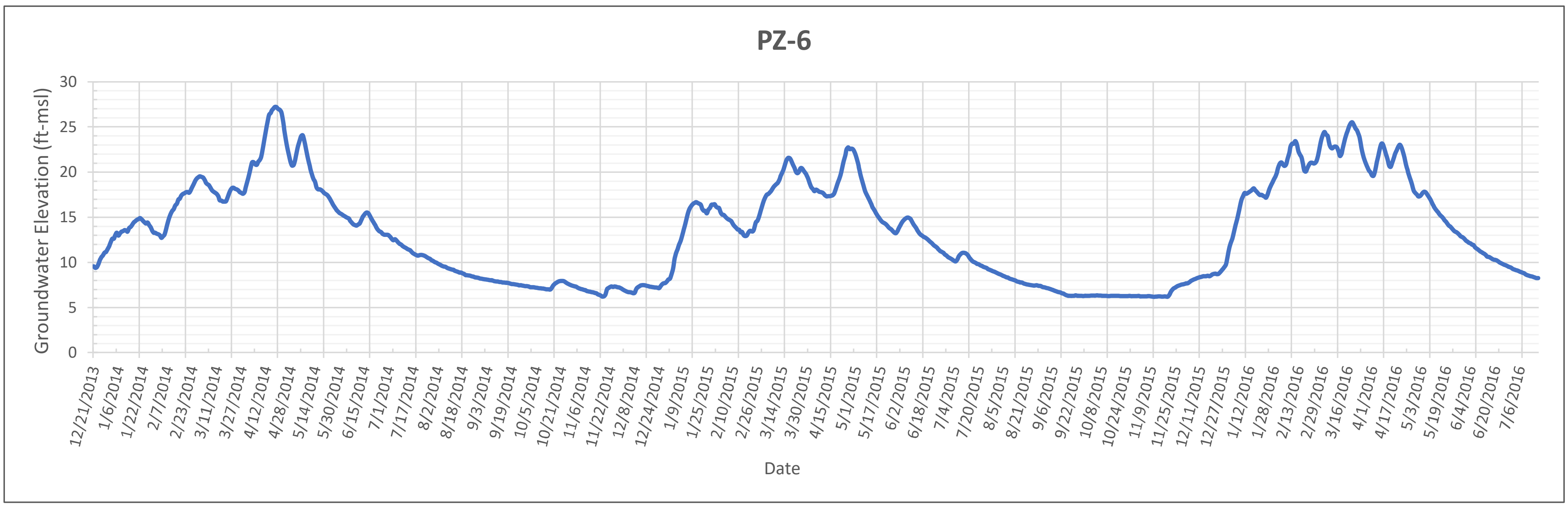

MW-2
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
1/5/2014
1/21/2014
2/6/2014
2/22/2014
3/10/2014
3/26/2014
4/11/2014
4/27/2014
5/13/2014
5/29/2014
6/14/2014
6/30/2014
7/16/2014
8/1/2014
8/17/2014
9/2/2014
9/18/2014
10/4/2014
10/20/2014
11/5/2014
11/21/2014
12/7/2014
12/23/2014
1/8/2015
1/24/2015
2/9/2015
2/25/2015
3/13/2015
3/29/2015
4/14/2015
4/30/2015
5/16/2015
6/1/2015
6/17/2015
7/3/2015
7/19/2015
8/4/2015
8/20/2015
9/5/2015
9/21/2015
10/7/2015
10/23/2015
11/8/2015
11/24/2015
12/10/2015
12/26/2015
1/11/2016
1/27/2016
2/12/2016
2/28/2016
3/15/2016
3/31/2016
4/16/2016
5/2/2016
5/18/2016
6/3/2016
6/19/2016
7/5/2016
Date


MW-3
Groundwater Elevation (ft-msl)
Date

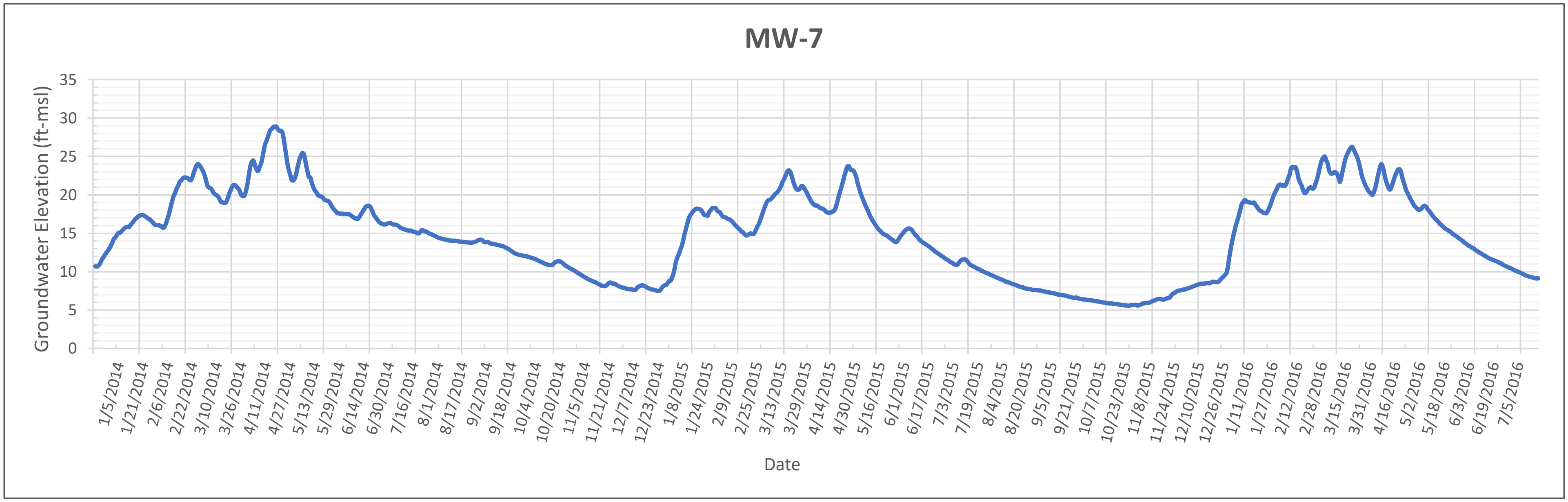

MW-4
Groundwater Elevation (ft-msl)
Date

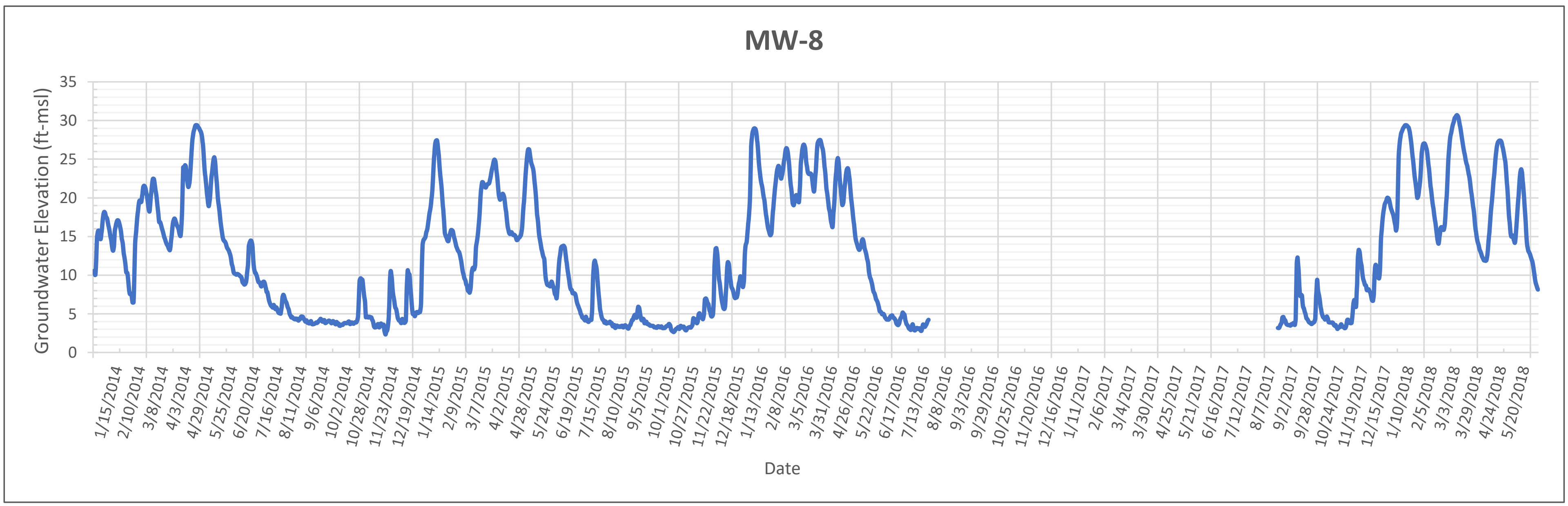


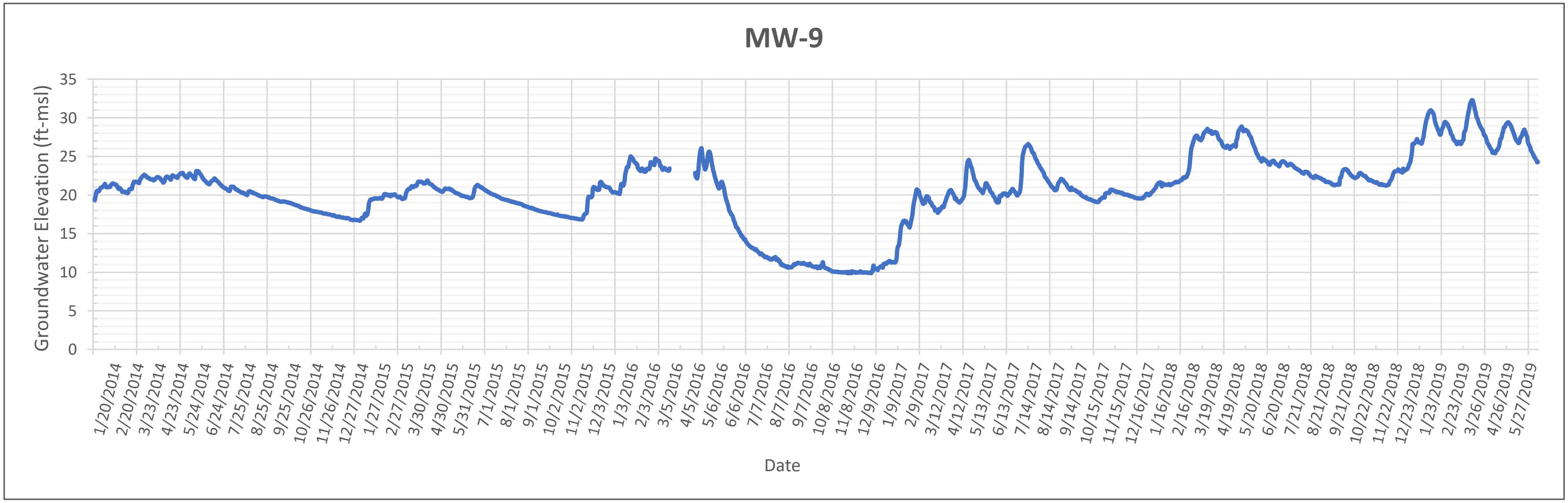
MW-5/MW-5A
Groundwater Elevation (ft-msl)
30
25
20
15
10
5
0
12/21/2013
1/15/2014
2/9/2014
3/6/2014
3/31/2014
4/25/2014
5/20/2014
6/14/2014
7/9/2014
8/3/2014
8/28/2014
9/22/2014
10/17/2014
11/11/2014
12/6/2014
12/31/2014
1/25/2015
2/19/2015
3/16/2015
4/10/2015
5/5/2015
5/30/2015
6/24/2015
7/19/2015
8/13/2015
9/7/2015
10/2/2015
10/27/2015
11/21/2015
12/16/2015
1/10/2016
2/4/2016
2/29/2016
3/25/2016
4/19/2016
5/14/2016
6/8/2016
7/3/2016
7/28/2016
8/22/2016
9/16/2016
10/11/2016
11/5/2016
11/30/2016
12/25/2016
1/19/2017
2/13/2017
3/10/2017
4/4/2017
4/29/2017
5/24/2017
6/18/2017
7/13/2017
8/7/2017
9/1/2017
9/26/2017
10/21/2017
11/15/2017
12/10/2017
1/4/2018
1/29/2018
2/23/2018
3/20/2018
4/14/2018
Date

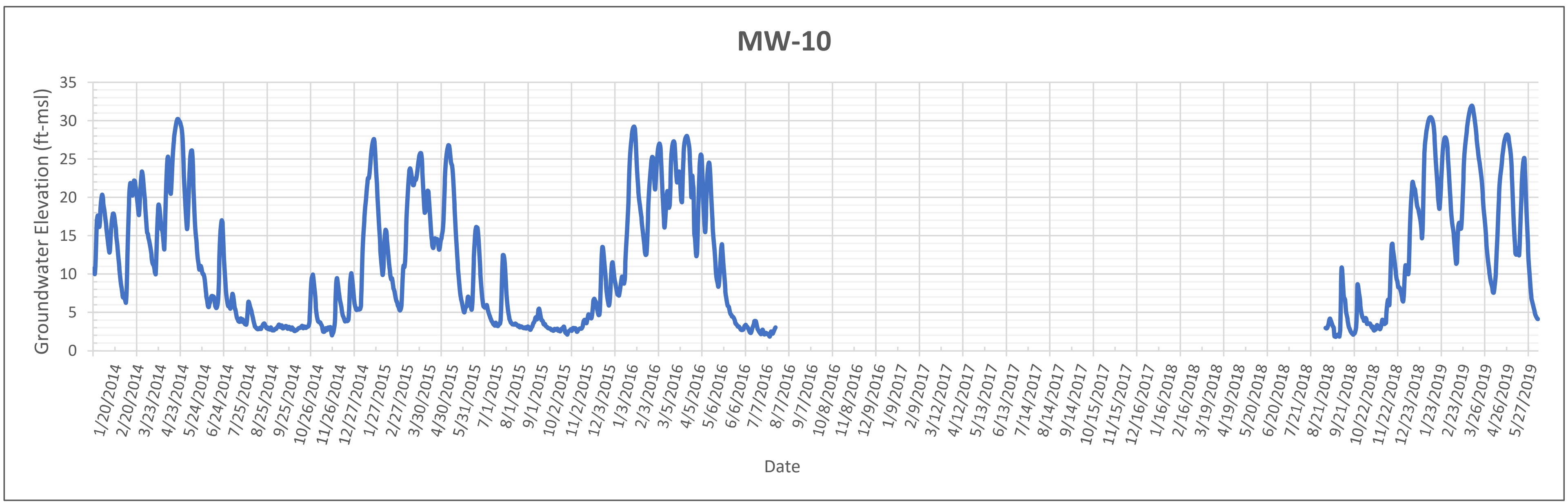


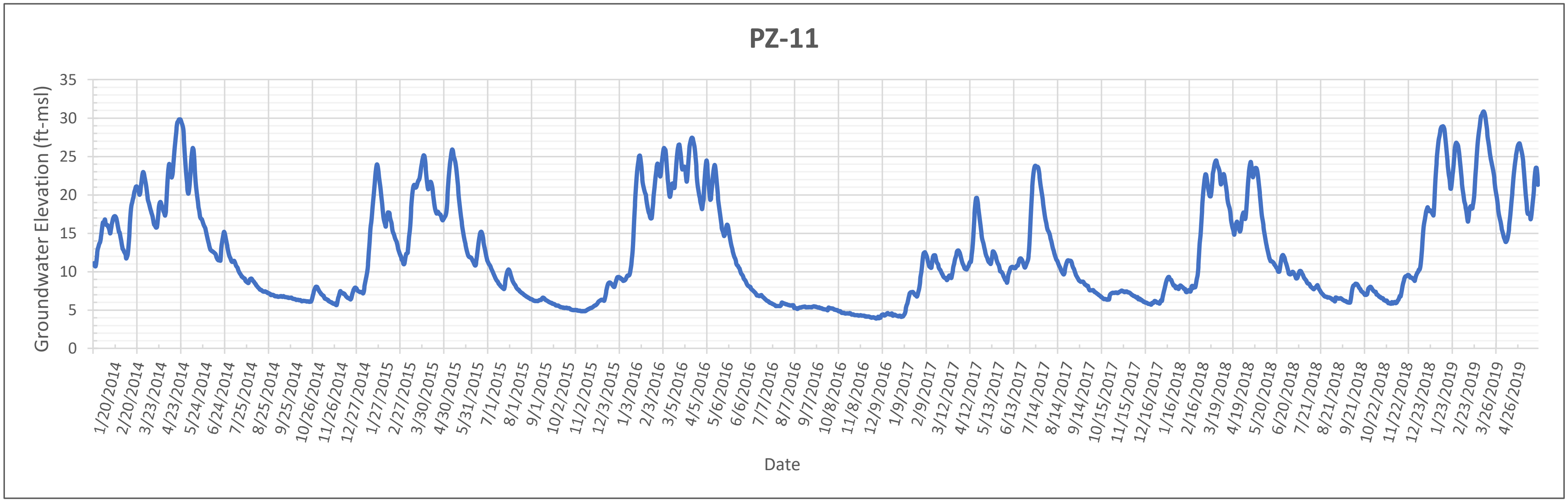
PZ-6
Groundwater Elevation (ft-msl)
30
25
20
15
10
5
0
12/21/2013
1/6/2014
1/22/2014
2/7/2014
2/23/2014
3/11/2014
3/27/2014
4/12/2014
4/28/2014
5/14/2014
5/30/2014
6/15/2014
7/1/2014
7/17/2014
8/2/2014
8/18/2014
9/3/2014
9/19/2014
10/5/2014
10/21/2014
11/6/2014
11/22/2014
12/8/2014
12/24/2014
1/9/2015
1/25/2015
2/10/2015
2/26/2015
3/14/2015
3/30/2015
4/15/2015
5/1/2015
5/17/2015
6/2/2015
6/18/2015
7/4/2015
7/20/2015
8/5/2015
8/21/2015
9/6/2015
9/22/2015
10/8/2015
10/24/2015
11/9/2015
11/25/2015
12/11/2015
12/27/2015
1/12/2016
1/28/2016
2/13/2016
2/29/2016
3/16/2016
4/1/2016
4/17/2016
5/3/2016
5/19/2016
6/4/2016
6/20/2016
7/6/2016
Date

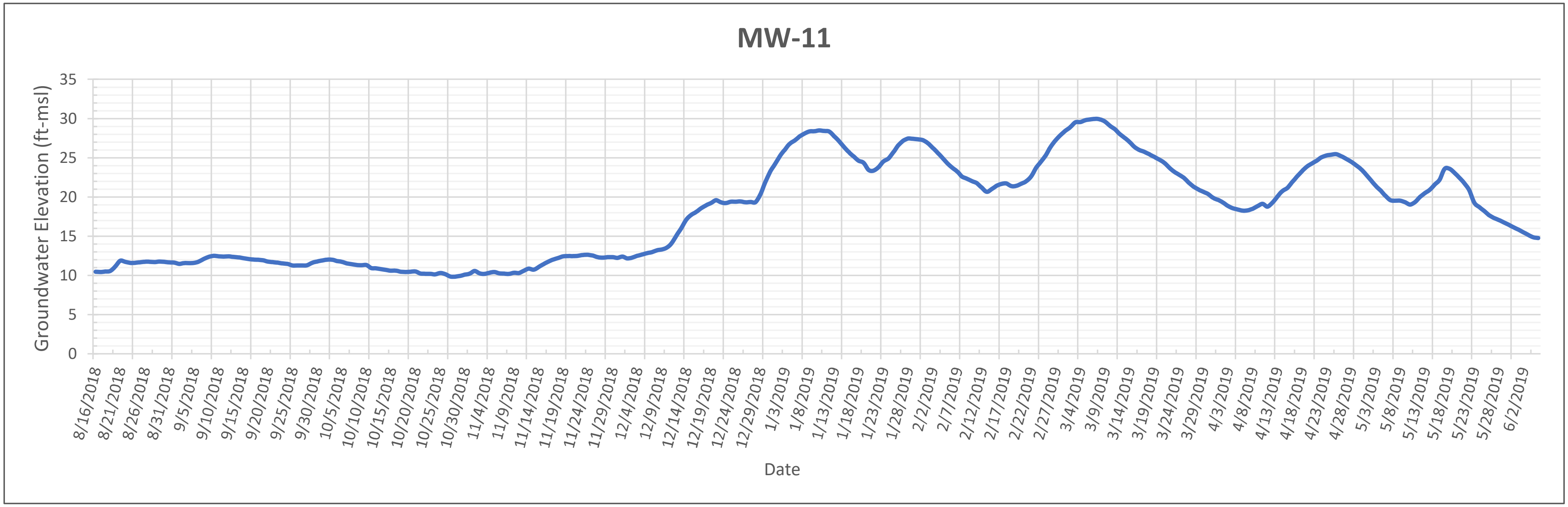

MW-7
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
1/5/2014
1/21/2014
2/6/2014
2/22/2014
3/10/2014
3/26/2014
4/11/2014
4/27/2014
5/13/2014
5/29/2014
6/14/2014
6/30/2014
7/16/2014
8/1/2014
8/17/2014
9/2/2014
9/18/2014
10/4/2014
10/20/2014
11/5/2014
11/21/2014
12/7/2014
12/23/2014
1/8/2015
1/24/2015
2/9/2015
2/25/2015
3/13/2015
3/29/2015
4/14/2015
4/30/2015
5/16/2015
6/1/2015
6/17/2015
7/3/2015
7/19/2015
8/4/2015
8/20/2015
9/5/2015
9/21/2015
10/7/2015
10/23/2015
11/8/2015
11/24/2015
12/10/2015
12/26/2015
1/11/2016
1/27/2016
2/12/2016
2/28/2016
3/15/2016
3/31/2016
4/16/2016
5/2/2016
5/18/2016
6/3/2016
6/19/2016
7/5/2016
Date

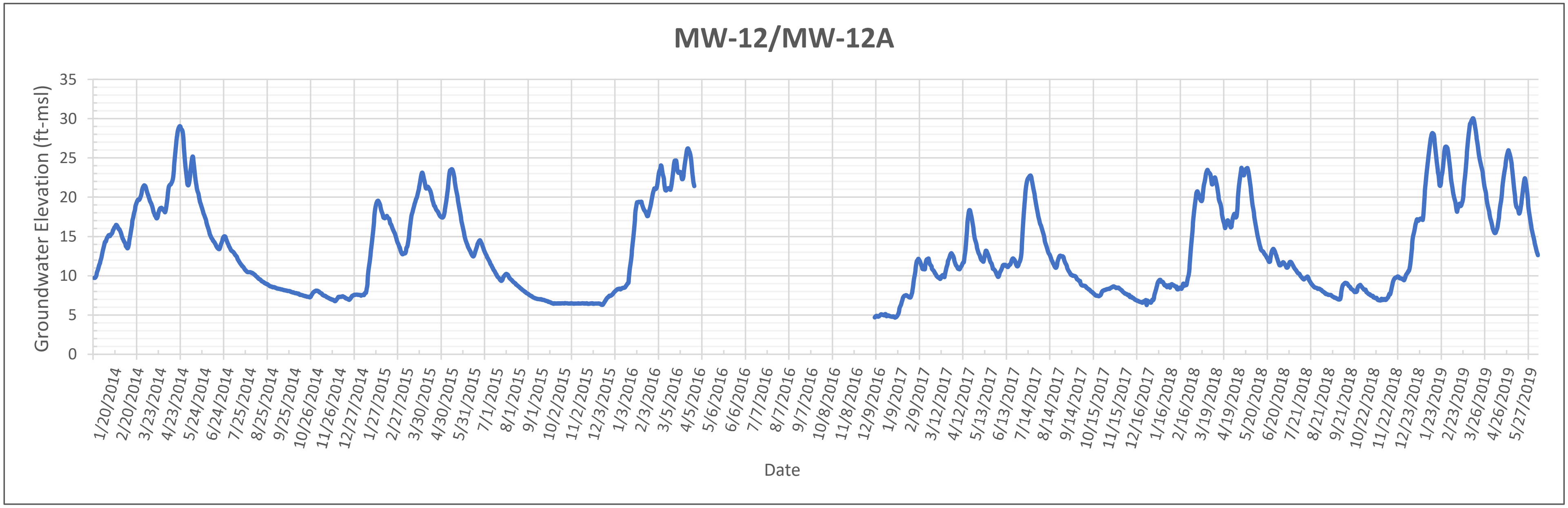

MW-8
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
1/15/2014
2/10/2014
3/8/2014
4/3/2014
4/29/2014
5/25/2014
6/20/2014
7/16/2014
8/11/2014
9/6/2014
10/2/2014
10/28/2014
11/23/2014
12/19/2014
1/14/2015
2/9/2015
3/7/2015
4/2/2015
4/28/2015
5/24/2015
6/19/2015
7/15/2015
8/10/2015
9/5/2015
10/1/2015
10/27/2015
11/22/2015
12/18/2015
1/13/2016
2/8/2016
3/5/2016
3/31/2016
4/26/2016
5/22/2016
6/17/2016
7/13/2016
8/8/2016
9/3/2016
9/29/2016
10/25/2016
11/20/2016
12/16/2016
1/11/2017
2/6/2017
3/4/2017
3/30/2017
4/25/2017
5/21/2017
6/16/2017
7/12/2017
8/7/2017
9/2/2017
9/28/2017
10/24/2017
11/19/2017
12/15/2017
1/10/2018
2/5/2018
3/3/2018
3/29/2018
4/24/2018
5/20/2018
Date

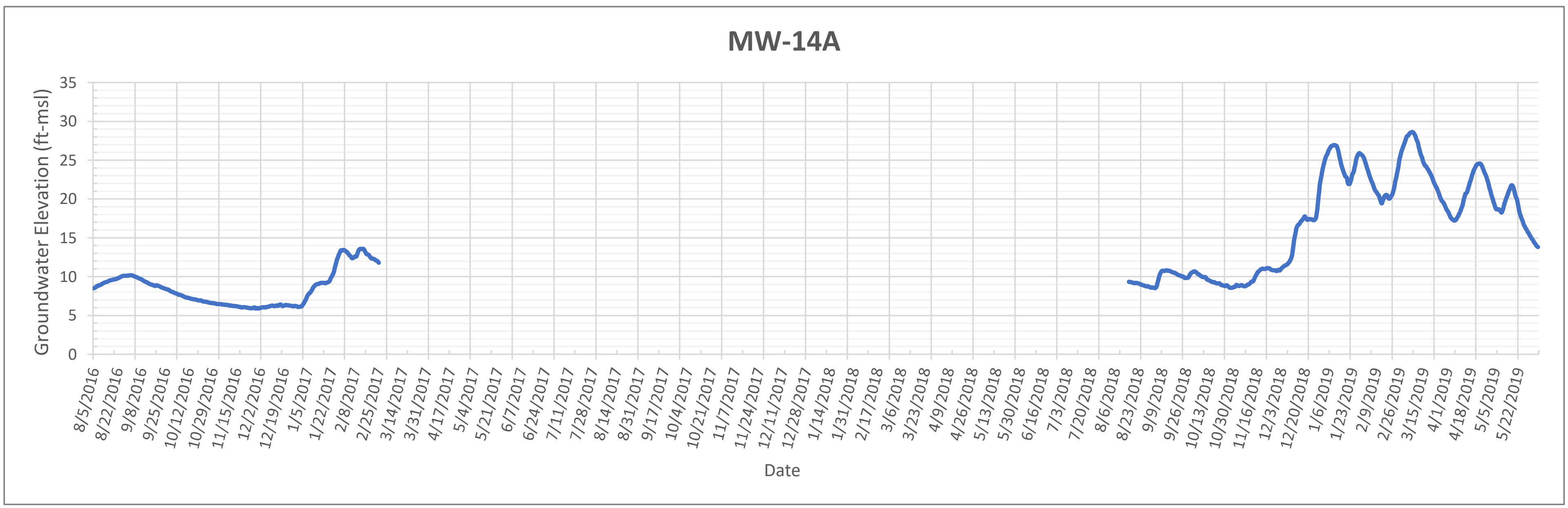

MW-9
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
1/20/2014
2/20/2014
3/23/2014
4/23/2014
5/24/2014
6/24/2014
7/25/2014
8/25/2014
9/25/2014
10/26/2014
11/26/2014
12/27/2014
1/27/2015
2/27/2015
3/30/2015
4/30/2015
5/31/2015
7/1/2015
8/1/2015
9/1/2015
10/2/2015
11/2/2015
12/3/2015
1/3/2016
2/3/2016
3/5/2016
4/5/2016
5/6/2016
6/6/2016
7/7/2016
8/7/2016
9/7/2016
10/8/2016
11/8/2016
12/9/2016
1/9/2017
2/9/2017
3/12/2017
4/12/2017
5/13/2017
6/13/2017
7/14/2017
8/14/2017
9/14/2017
10/15/2017
11/15/2017
12/16/2017
1/16/2018
2/16/2018
3/19/2018
4/19/2018
5/20/2018
6/20/2018
7/21/2018
8/21/2018
9/21/2018
10/22/2018
11/22/2018
12/23/2018
1/23/2019
2/23/2019
3/26/2019
4/26/2019
5/27/2019
Date

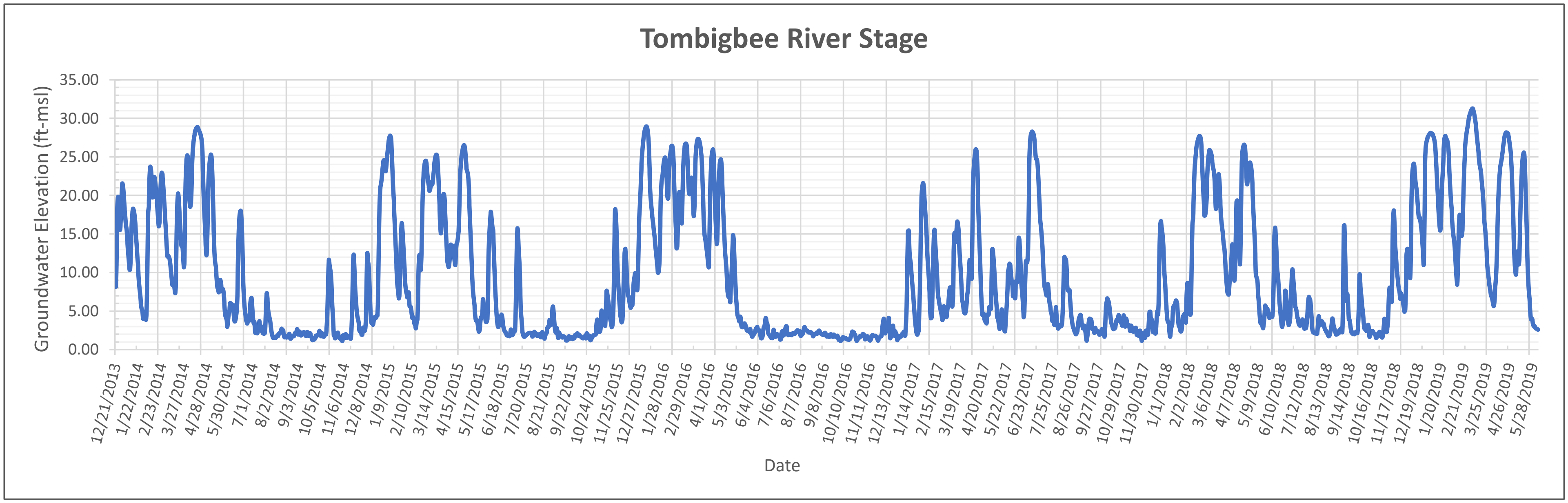

MW-10
Groundwater Elevation (ft-msl)
35
30
25
20
15
10
5
0
1/20/2014
2/20/2014
3/23/2014
4/23/2014
5/24/2014
6/24/2014
7/25/2014
8/25/2014
9/25/2014
10/26/2014
11/26/2014
12/27/2014
1/27/2015
2/27/2015
3/30/2015
4/30/2015
5/31/2015
7/1/2015
8/1/2015
9/1/2015
10/2/2015
11/2/2015
12/3/2015
1/3/2016
2/3/2016
3/5/2016
4/5/2016
5/6/2016
6/6/2016
7/7/2016
8/7/2016
9/7/2016
10/8/2016
11/8/2016
12/9/2016
1/9/2017
2/9/2017
3/12/2017
4/12/2017
5/13/2017
6/13/2017
7/14/2017
8/14/2017
9/14/2017
10/15/2017
11/15/2017
12/16/2017
1/16/2018
2/16/2018
3/19/2018
4/19/2018
5/20/2018
6/20/2018
7/21/2018
8/21/2018
9/21/2018
10/22/2018
11/22/2018
12/23/2018
1/23/2019
2/23/2019
3/26/2019
4/26/2019
5/27/2019
Date


PZ-11
Groundwater Elevation (ft-msl)
Date
0
5
10
15
20
25
30
35


MW-11
Groundwater Elevation (ft-msl)
Date
0
5
10
15
20
25
30
35


MW-12/MW-12A
Groundwater Elevation (ft-msl)
Date
0
5
10
15
20
25
30
35


MW-14A
Groundwater Elevation (ft-msl)
Date
0
5
10
15
20
25
30
35


Tombigbee River Stage
Groundwater Elevation (ft-msl)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
12/21/2013
1/22/2014
2/23/2014
3/27/2014
4/28/2014
5/30/2014
7/1/2014
8/2/2014
9/3/2014
10/5/2014
11/6/2014
12/8/2014
1/9/2015
2/10/2015
3/14/2015
4/15/2015
5/17/2015
6/18/2015
7/20/2015
8/21/2015
9/22/2015
10/24/2015
11/25/2015
12/27/2015
1/28/2016
2/29/2016
4/1/2016
5/3/2016
6/4/2016
7/6/2016
8/7/2016
9/8/2016
10/10/2016
11/11/2016
12/13/2016
1/14/2017
2/15/2017
3/19/2017
4/20/2017
5/22/2017
6/23/2017
7/25/2017
8/26/2017
9/27/2017
10/29/2017
11/30/2017
1/1/2018
2/2/2018
3/6/2018
4/7/2018
5/9/2018
6/10/2018
7/12/2018
8/13/2018
9/14/2018
10/16/2018
11/17/2018
12/19/2018
1/20/2019
2/21/2019
3/25/2019
4/26/2019
5/28/2019
Date

APPENDIX E

EXAMPLE FIELD SAMPLING LOG FORM

GROUNDWATER SAMPLING LOG

SITE NAME: **Charles R. Lowman Generating Facility**	SITE LOCATION: **Leroy, Washington County, Alabama**	
WELL NO:	SAMPLE METHOD:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL DEPTH (feet):	STATIC WATER LEVEL DEPTH (feet):
PURGING INITIATED AT:		PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	PUMPING RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (µmhos/cm or µS/cm)	DISSOLVED OXYGEN (circle mg/L or % saturation)	TURBIDITY (NTUs)	ORP (Mv)	COLOR (describe)	ODOR (describe)

SAMPLING DATA

SAMPLE DATE:	SAMPLE COLLECTION TIME:
SAMPLED BY (PRINT):	SAMPLER(S) SIGNATURES:
REMARKS:	

GROUNDWATER SAMPLING LOG

Groundwater Level Measurements
Charles R. Lowman Power Plant

Well/ Piezometer Number.	Casing Elevation ft-amsl	Total Depth ft - btc	Bottom Elevation ft-amsl	Water Level Date:
				ft - btc
MW-1	29.17	24.30	4.87	
MW-2	38.18	36.47	1.71	
MW-3	28.55	24.58	3.97	
MW-4	36.40	28.32	8.08	
MW-5	37.41	29.35	8.06	
MW-5A	37.23	39.02	-1.79	
PZ-6	49.30	44.30	5.00	
MW-6	30.14	29.26	0.88	
MW-7	34.20	32.65	1.55	
MW-8	32.91	37.68	-4.77	
MW-9	32.63	29.01	3.62	
MW-10	34.14	41.46	-7.32	
PZ-11R	44.75	47.31	-2.56	
MW-11	45.29	43.10	2.19	
MW-12	43.31	38.42	4.89	
MW-12A	43.39	46.31	-2.92	
MW-13	42.26	29.25	13.01	
MW-13A	41.61	62.90	-21.29	
MW-14	38.56	29.48	9.08	

MW-14A	38.50	38.98	-0.48	
MW-15	31.51	33.18	-1.67	
MW-16	34.70	42.23	-7.53	
MW-17	36.23	41.70	-5.47	
MW-18	32.64	53.03	-20.39	
MW-19	50.76	53.13	-2.37	
MW-20	30.01	33.41	-3.40	
MW-21	30.00	36.45	-6.45	
MW-22	30.24	33.55	-3.31	
MW-23	38.86	43.85	-4.99	
River Stage				

QA/QC Samples	**Date**	**Time**
Field Blank	____________________	_____________
Rinsate Blank	____________________	_____________
Duplicate ( )	____________________	_____________

Well Volume Calculation: (Total Depth – Static Water Level) x 0.163 (gallons per foot in 2” well) = 1 Well Volume
Divide: 1 Well Volume by purge rate to get amount of time needed to purge 1 well volume

APPENDIX F

EXAMPLE CHAIN OF CUSTODY FORM

Chain of Custody Record

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager:	Site Contact:	Date:	COC No:
Site :	Tel/Fax:	Lab Contact:	Carrier:	_______ of ______ COCs
Address:	**Analysis Turnaround Time**			Sampler:
City/State/Zip:	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
Phone	TAT if different from Below __________			Walk-in Client:
Fax:	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)																	Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____________

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for__________ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (^{o}C): Obs'd:_________ Corr'd:__________ Therm ID No.:____________

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

APPENDIX G
VARIANCE REQUEST LETTER

POWERSOUTH®
ENERGY COOPERATIVE
A Touchstone Energy® Cooperative

Keith Stephens, Ph.D.
MANAGER, ENVIRONMENTAL SERVICES DEPARTMENT

August 18, 2020

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

Re: Request for Variance under Coal Combustion Residual (CCR) Regulations

Dear Mr. Story:

PowerSouth Energy Cooperative is the owner and operator of the Charles R. Lowman Power Plant located near Leroy, Alabama. PowerSouth's operations to manage and dispose of CCR at the Lowman Plant are subject to the CCR regulations of the Alabama Department of Environmental Management (ADEM). To that end, PowerSouth submitted a CCR permit application to ADEM on December 5, 2018.

The purpose of this letter is to request variances from several provisions of ADEM's CCR regulations and, should ADEM concur in PowerSouth's request, that ADEM's permits reflect its approval of our request. In all cases, our proposals would not result in requirements any less stringent than federal CCR regulations as is required under ADEM Admin. Code r. 335-13-15-.15. As such, they are also protective of human health and the environment. The variance requests are discussed in greater detail below and are as follows.

1. 335-13-15-.06(6)(h)2.: Rely on maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA) at 40 C.F.R. § 257.95(h)(2).

2. 335-13-15-.07(2)(a) & (b): Cease placing CCR and non-CCR wastestreams in CCR units by April 11, 2021, as required by 40 C.F.R. § 257.101(a) & (b).

3. 335-13-15-.07(3)(d)3.(i)(III) & (IV): Allow the final grade of the cover system to be lower than 5% or greater than 25%.

4. Appendix IV: Rely on the constituents found at 40 C.F.R. Part 257, Appendix IV, for purposes of assessment monitoring.

1. Request to Rely on Maximum Contaminant Levels (MCLs) Established by EPA at 40 C.F.R. § 257.95(h)(2)

Under ADEM Admin. Code r. 335-13-15-.06(6)(h)2., if a maximum contaminant level (MCL) has not been established for a constituent, the groundwater protection standard (GWPS) is the background concentration. However, EPA has established GWPS by rule for certain constituents. PowerSouth requests that ADEM grant a variance from its regulations and allow PowerSouth to rely on the GWPS found at in 40 C.F.R. § 257.95(h)(2), namely, 6 micrograms per liter (μg/L) for cobalt, 15 μg/L for lead, 40 μg/L for lithium, and 100 μg/L for molybdenum.

At the time of approving these GWPS, EPA concluded that they were protective of human health and the environment. In adding these values to the federal rule for these constituents, EPA stated as follows (83 Fed. Reg. 36,435, 36,444 (footnotes omitted)):

> These levels were derived using the same methodology that EPA proposed to require States to use to establish alternative GWPS (See, 83 FR 11598-11599, 11613). The methodology follows Agency guidelines for assessment of human health risks of an environmental pollutant. This means that these GWPSs are expected to be concentrations to which the human population could be exposed to on a daily basis without an appreciable risk of deleterious effects during a lifetime.
>
> Specifically, EPA used the equations in the Risk Assessment Guidance for Superfund (RAGS) Part B to calculate these revised GWPS. RAGS Part B provides guidance on using drinking water ingestion rates and toxicity values to derive risk-based remediation goals. The use of these methods, consistent with EPA risk assessment guidelines addresses commenters' concerns about protecting sensitive populations. EPA relied upon relevant exposure information from the 2008 *Child-Specific Exposure Factors Handbook*, the *Exposure Factors Handbook: 2011 Edition* and the 2014 *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard*. Values based on residential receptors were used to capture the range of current and future potential receptors. EPA identified toxicity values according to the hierarchy established in the 2003 Office of Solid Waste and Emergency Response Directive 9285.7–53, which encourages prioritization of values from sources that are current, transparent and publicly available, and that have been peer reviewed. Finally, EPA used the same toxicity values (reference doses) that were used in the risk assessment supporting the 2015 CCR Rule. Cancer slope factors (CSF) were not identified for any of the relevant constituents. The finalized GWPS for cobalt, lithium, and molybdenum were set using a target based on a HQ = 1 for Participating State Directors to follow.

For these reasons, approving this request does not "threaten the public health or unreasonably create environmental pollution" for purposes of ADEM Admin. Code r. 335-13-15-.15.

To be clear, we do not request a variance from ADEM Admin. Code r. 335-13-15-.06(6)(h)3. In other words, if the background concentration of cobalt, lead, lithium, or molybdenum is higher than the value specified at § 257.95(h)(2) of EPA's regulations, we anticipate the GWPS would be the background concentration.

2. Request to Cease Placing CCR and Non-CCR Wastestreams in CCR Units by April 11, 2021

PowerSouth requests that ADEM allow PowerSouth to rely on the April 11, 2021 cease placement deadline provided in 40 C.F.R. § 257.101(a) & (b). In promulgating the federal cease placement deadline,[1] EPA recognized that more time was needed for facilities to develop and implement alternative capacity technologies. EPA explained that the deadline of April 11, 2021, is consistent with existing law because "requiring facilities to cease receipt of waste as soon as is technically feasible necessarily meets the RCRA 4004(a) standard, as EPA cannot impose more stringent requirements than those that can be successfully implemented by at least some entities."[2] To support this point, EPA reiterated that, "similar to the concept behind a force majeure provision, EPA cannot impose protective measures under this provision [RCRA § 4004(a)] that are not technically feasible for any facility to implement."[3]

The requested change in the cease receipt date preserves the status quo for a relatively short period of time at the Lowman Plant. The presence of Appendix III and IV constituents as now documented via PowerSouth's groundwater monitoring program is having no discernible effect on local flora or fauna or other environmental values. Thus, this request does not "threaten the public health or unreasonably create environmental pollution" for purposes of ADEM Admin. r. 335-13-15-.15.

3. Request to Allow the Final Grade of the Cover System to Be Lower than 5% or Greater than 25%

PowerSouth requests that ADEM grant variances from the state rule's provisions that require a minimum final grade of the cover system of 5% and a maximum final grade of 25%. PowerSouth anticipates providing ADEM additional information as to the final plans for the CCR closure area at Lowman. However, we anticipate a safe and effective configuration is likely to be available at grades that could be lower than 5% or higher than 25% in some areas.

Those parameters make sense in the context of municipal solid waste landfills, which are subject to the slope limits found at ADEM Admin. Code 4. 335-13-15-.07(3)(d)3.(i)(III) & (IV). Municipal garbage includes a wide variety of materials which may be relatively susceptible to degrading and decomposition, which can give off methane and other gases and induce uneven settlement over time. The slope limits thus attempt both to preserve a sufficient slope for the shedding of stormwater and to promote stability. By contrast, CCR is inert, homogenous, and stable over time. CCR stacked in place and protected by a low-permeability cap will remain stable compared to municipal waste in a landfill. Subject to review of closure plans by ADEM and by PowerSouth's qualified civil engineers, it is not necessary to limit slopes between 5% and 25% for purposes of closing a CCR unit. For that reason, allowing for final grades outside those parameters does not "threaten the public health or unreasonably create environmental pollution."

---

[1] The EPA Administrator signed the final rule extending the cease-receipt deadline on July 29, 2020. The rule is available on the agency's website. EPA, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; A Holistic Approach to Closure Part A: Deadline to Initiate Closure (July 29, 2020), available at https://www.epa.gov/coalash/pre-publication-copy-final-rule-holistic-approach-closure-part-deadline-initiate-closure-and.

[2] *Id.* at 75.

[3] *Id.* at 28.

4. Request to Rely on the Constituents Found at 40 C.F.R. Part 257, Appendix IV, for Purposes of Assessment Monitoring

ADEM's regulations include boron on Appendix IV, which means assessment monitoring and corrective action must account for that parameter. By contrast, EPA included boron on Appendix III for detection monitoring but not Appendix IV. We request ADEM's permission to follow EPA's regulations as to this issue.

The purpose of detection monitoring is to "provide an early detection of whether contaminants were migrating from the CCR unit."[4] As EPA explained in the context of its 2015 CCR regulations:

> EPA selected contaminants for the detection monitoring phase that are present in CCRs and would move rapidly through the subsurface, such as boron and sulfate. By requiring monitoring of these key parameters, including pH, TDS, fluoride and chloride, which are long proven as precursor contaminants to higher toxicity CCR contaminants, leakage from CCR disposal units will be caught in a timely manner. In other words, these are the contaminants that would be expected to be detected earliest in any monitoring program.[5]

In other words, boron is useful as an early indicator and appropriate for *detection* monitoring, but it is not among the "higher toxicity" constituents reserved for assessment monitoring and corrective action.

The absence of an MCL for boron is not an accident. EPA specifically considered and rejected a proposal to establish an MCL for boron in 2008. EPA found then that boron was "ubiquitous" and occurred naturally in the environment from a variety of natural sources, while at the same time any "known adverse public health effects" were scarce. [6] EPA found that attempting to regulate "boron in drinking water will not present a meaningful opportunity for health risk reduction for persons served by public water systems."[7]

In any event, regardless of whether or not boron is included as an Appendix IV parameter, we will continue to monitor for this parameter going forward, because it will continue to be included on Appendix III. Should any new information provide reasons to review boron concentrations, that opportunity will continue to be available by virtue of our ongoing detection monitoring.

Thank you for your consideration of this request. Please feel free to contact me if we can provide any additional information or assistance.

Regards,

Keith Stephens, Ph.D.
Manager, Environmental Services Department

---

[4] 80 Fed. Reg. 21,301, 21,397 (Apr. 17, 2015).

[5] EPA, Comment Summary and Response Document, Volume 9: Groundwater and Corrective Action, Doc. No. EPA-HQ-RCRA-2009-0640-12132, at 57 (Dec. 2014), available at https://beta.regulations.gov/document/EPA-HQ-RCRA-2009-0640-12132.

[6] EPA, Health Effects Support Document for Boron, EPA Doc. No. EPA-822-R-08-002, at 9-8 (Jan. 2008), available at https://www.epa.gov/sites/production/files/2014-09/documents/health_effects_support_document_for_boron .pdf.

[7] *Id.*

POWERSOUTH ENERGY COOPERATIVE
LOWMAN POWER PLANT
STATISTICAL ANALYSIS PLAN

Prepared for

CDG Engineers & Associates, Inc.
Andalusia, AL 36421

Prepared by

Groundwater Stats Consulting
Mobile, Alabama

February 2021

POWERSOUTH ENERGY COOPERATIVE
LOWMAN POWER PLANT
STATISTICAL ANALYSIS PLAN

Kristina L. Rayner
Groundwater Stats Consulting, LLC
Originator

Mr. Alan Barck, P.E.
CDG Engineers & Associates, Inc.
Reviewer

Copyright © 2020, Groundwater Stats Consulting. All Rights Reserved.

TABLE OF CONTENTS

1.0 Introduction 3
2.0 Background 4
2.1 Background Screening 4
2.1.1 Outlier Testing 5
2.1.2 Testing and Adjusting for Seasonal Effects 5
2.1.3 Temporal Trend Testing 5
2.1.4 Sample Size 6
2.1.5 Non-Detect Data 7
2.2 Updating Interwell Background 7
2.2.1 Adding to the Background Well Network 8
2.2.2 Removing Wells and Data from Background 9
2.3 Updating Intrawell Background 7
3.0 Statistical Approach for Detection Monitoring 11
3.1 Statistical Method 11
3.2 Prediction Limits 12
3.3 Criteria for Using the Interwell Statistical Methodology 12
3.3.1 Aquifer Designation and Monitoring Wells 12
3.4 Criteria for Using an Intrawell Statistical Methodology 13
3.4.1 Screening of Prospective Historical Background Data 13
3.4.2 Stable Naturally Occurring Concentrations 13
3.5 Site-Wide False Positive Rates (SWFPR) and Statistical Power 14
3.6 Determination of Future Compliance Observations Falling Within Background Limits 14
3.7 Statistical Power 15
4.0 Statistical Approach for Assessment Monitoring & Corrective Action 15
4.1 Assessment Monitoring 15
4.2 Corrective Action 16
5.0 Site-Specific Statistical Analysis Methods 17
5.1 Detection Monitoring Program 17
5.1.1 Parametric Prediction Limits 18
5.1.2 Nonparametric Prediction Limits 18
5.1.3 Retesting Strategy 19
5.1.4 Background Data Set 19
5.2 Assessment Monitoring Program 19

5.3 Corrective Action Monitoring Program 21
6.0 Bibliography 22

APPENDICES

Appendix A Background Screening and Compliance Evaluation

1.0 INTRODUCTION

This updated Statistical Analysis Plan (SAP) describes the site-specific statistical analysis approach that will be used to evaluate groundwater at PowerSouth Energy Cooperative's Lowman Power Plant 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 as follows:

Upgradient Wells: MW-1 and MW-2
Downgradient Wells: MW-3, MW-4, MW-5, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-12A, MW-13, MW-13A, MW-14, MW-14A, MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, and MW-23

Groundwater sampling at the Lowman Power Plant began in 2016 and at least 8 background samples have been collected. 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 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 limits 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 every 2 years 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, this facility does 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 March 2016. The monitoring well network is described above.

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

Groundwater quality data will be evaluated through use of interwell prediction limits, combined with a 1-of-2 resampling strategy for boron, calcium, chloride, fluoride, pH, sulfate and TDS. If a statistical exceedance is found, the resample strategy allows for collection of one independent resample to determine whether the initial exceedance is verified.

When 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. If a resample is not collected, the initial exceedance will be considered a confirmed exceedance. 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, the Lowman Energy Center Ponds 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 26 background samples for interwell tests
w= 25 (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

[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.

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.

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. Additionally, the Sen's Slope/Mann Kendall trend test will be used to evaluate the most recent measurements to determine whether concentration levels are statistically significantly increasing, decreasing, or stabilizing.

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 a statistically significant level (SSL).

With Department approval, the background limits will be updated and compared to the 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

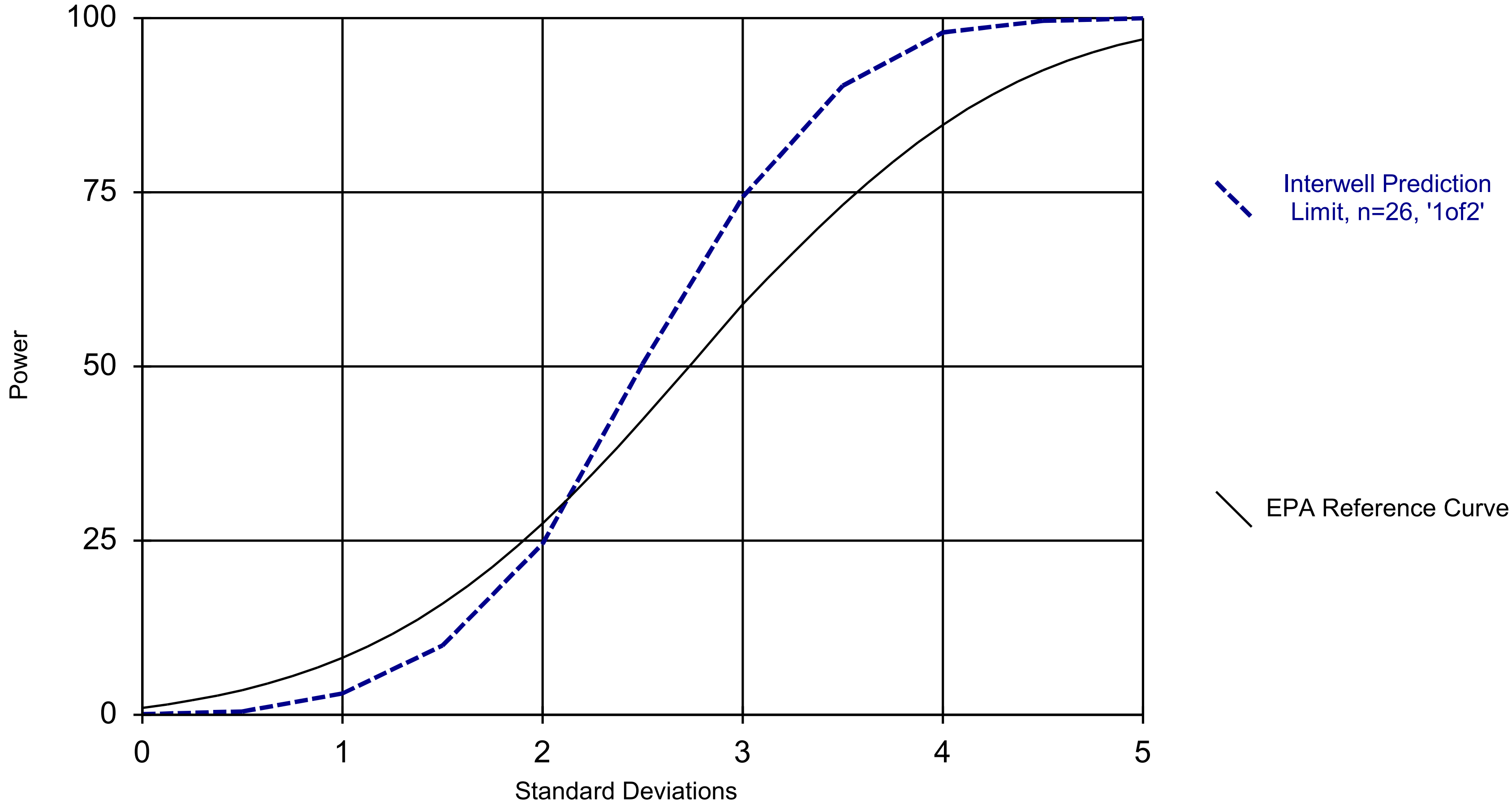
Appendix A
Background Screening and Compliance Evaluation

Copyright © 2020, Groundwater Stats Consulting, LLC. All Rights Reserved.

Figures

Copyright © 2020, Groundwater Stats Consulting, LLC. All Rights Reserved.

Power Curve



Kappa = 2.423, based on 25 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 11/20/2020 8:08 AM   View: PL's Intra State

Plant Scherer   Client: Southern Company   Data: Scherer Cell 1 CCR

Appendix A
Background Screening and Compliance Evaluation

Copyright © 2020, Groundwater Stats Consulting, LLC. All Rights Reserved.

November 28, 2017

CDG Engineers & Associates, Inc.
Attn: Mr. Alan Barck
1840 East Three Notch Street
Andalusia, AL 36421

Dear Mr. Barck,

Groundwater Stats Consulting, formerly the statistical consulting division at Sanitas Technologies, is pleased to provide the statistical analysis of groundwater data at the PowerSouth Energy Cooperative's Lowman Power Plant for the Coal Combustion Residuals (CCR) program. 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).

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was reviewed by Dr. Jim Loftis, professor emeritus of Civil and Environmental Engineering at Colorado State University and consultant to Groundwater Stats Consulting. The monitoring well network consists of the following wells: upgradient wells MW-1 and MW-2; and downgradient wells MW-4, MW-5, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-12A, MW-13, MW-14, and MW-14A.

Sampling began for the CCR program in March 2016, and a total of 9 samples have been collected at most wells for the parameters listed below. Wells MW-5, MW-12, and MW-14, however, are periodically dry which was the case during the October 2017 sample event, and as a result have fewer data points. The CCR Rule requires collection of at least 8 samples at a given well prior to performing statistical analyses. While data from these wells are included on the time series graphs and box plots, no prediction limit comparisons were included due to the limited data sets.

Time series and box plots are provided for all wells for the following Appendix III constituents: boron, calcium, chloride, fluoride, pH, sulfate, and TDS. The time series plots display concentrations over time for each well while the box plots provide visual representation of variation within a given well and across all wells.

Appendix III – Background Evaluation

Outlier Screening and Trend Tests

Time series plots were used to initially screen for suspected outliers, trends, and seasonal patterns. Outliers and trends in background data result in increased variation and statistical limits that are not conservative from a regulatory perspective, if not addressed. When outliers are confirmed, these values are flagged in the computer database with “o” in order to deselect prior to construction of statistical limits. Flagged values appear as a disconnected, lighter symbol on the time series graphs. Well MW-12 had a few reported high values that were not identified as outliers through the Tukey box plot method and, therefore, were not flagged. No other values were identified as outliers during this analysis.

Box plots provide visual representation of variation within individual wells and between all wells. Data were further evaluated through the Analysis of Variance test to determine whether observed variation is statistically significant, and guide the decision logic for determining an appropriate statistical limit as discussed below.

No seasonal patterns were visually apparent in the any of the detected data; therefore, no deseasonalizing adjustments were made to the data. When seasonal patterns are observed, data may be optionally deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release.

The Sen’s Slope/Mann Kendall trend test was used to evaluate all data to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data used in background to establish statistical limits are typically not included as part of the background data used for construction of prediction limits. This step serves to eliminate the trend and, thus, reduce variation in background. When statistically significant decreasing trends are present, earlier data are evaluated to determine whether earlier concentration levels are significantly different than current reported concentrations and will be deselected as necessary. When the historical records of data are truncated for the reasons above, a summary report will be provided to show the date ranges used in construction of the statistical limits.

The results of the trend analyses showed a statistically significant decreasing trend for pH in well MW-9, and statistically significant increasing trends for calcium and TDS in well MW-9. These trends are relatively low in magnitude when compared to average concentrations; therefore, no adjustments were made to the data sets. No other statistically significant trends were identified for any of the Appendix III parameters.

Natural systems continuously evolve due to physical changes made to the environment and unrelated to the site. To accommodate these types of changes, data for all wells and constituents are re-evaluated for the purpose of updating statistical limits. Improved sample size results in statistical limits that provide better representation of the true background population. In the case of interwell prediction limits, when a minimum of 2 new data points are available at each upgradient well, data will be evaluated to determine whether newer measurements are representative of earlier measurements in which case they may be incorporated into background.

Determination of Statistical Method

The Analysis of Variance (ANOVA) was used to identify the most appropriate statistical approach for the Lowman Power Plant. Interwell tests, which compare downgradient well data to statistical limits constructed from pooled upgradient well data, 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 parameters.

In cases where downgradient concentrations are elevated relative to upgradient concentrations, an independent study and hydrogeological investigation would be required to identify local geochemical conditions and expected groundwater quality for the region to justify an intrawell approach. Such an assessment is beyond the scope of services provided by Groundwater Stats Consulting.

The ANOVA noted no variation in groundwater among upgradient wells for fluoride and pH. Boron contained 100% nondetects in upgradient wells; therefore, the ANOVA test could not be performed. As a result, interwell tests are recommended for boron, fluoride and pH. The ANOVA identified spatial variation in groundwater upgradient of the site for calcium, chloride, sulfate and TDS, indicating intrawell methods should be considered for these parameters if no pre-existing impacts from the unit are suspected in downgradient wells. Additional testing was conducted as described below to determine intrawell eligibility.

Intrawell limits constructed from carefully screened background data from within each well serve to provide statistical limits that are conservative (i.e. lower) from a regulatory perspective, and that will rapidly identify a change in more recent compliance data from within a given well. This statistical method removes the element of variation from across wells and eliminates the chance of mistaking natural spatial variation for a release from the facility. Prior to performing intrawell prediction limits, it is necessary to demonstrate that water at downgradient wells is not suspected to have existing impacts from the practices of the facility.

First, to establish baseline upgradient concentrations, tolerance limits (either parametric or nonparametric as appropriate) were constructed using pooled upgradient well data for each of the Appendix III parameters recommended for intrawell analyses. Parametric tolerance limits were constructed with a target of 99% confidence and 95% coverage. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. As more data are collected, the background population is better represented and the confidence and coverage levels increase.

Next, to determine whether average downgradient concentrations are elevated relative to the upgradient well baseline concentrations established by the tolerance limits above, confidence intervals were constructed on downgradient wells for each of the Appendix III parameters exhibiting spatial variation. The results showed that at least one confidence interval exceeded its respective limit for each of the parameters tested.

When the entire confidence interval exceeds a background standard, it is an indication that downgradient concentrations are elevated above background levels. Therefore, interwell methods are recommended initially in lieu of intrawell methods until further research identifies whether the elevated downgradient concentrations are likely the result of natural geological conditions, an off-site source, or may be the result of the facility. After such a study, data would be re-evaluated to determine the most appropriate statistical Detection Monitoring method.

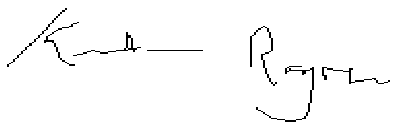
Appendix III - Statistical Limits

Interwell prediction limits were constructed as recommended in the CCR Rule (2015) and in the EPA Unified Guidance (2009), based on a 1-of-2 resample plan using pooled upgradient well data from wells MW-1 and MW-2 for boron, calcium, chloride, fluoride, pH, sulfate, and TDS. The most recent sample from each downgradient well was compared to the statistical limits. In the event of an initial exceedance of compliance well data, a resample may be collected to determine whether the initial exceedance is confirmed, in which case a statistically significant increase (SSI) is identified. If the resample falls within the statistical limit, the initial exceedance is considered to be a false positive result and, therefore, no further action is necessary.

Parametric prediction limits were constructed when background data followed a normal or transformed-normal distribution. Non-parametric prediction limits are provided for data sets with greater than 50% nondetects, and for data sets which do not follow a normal or transformed-normal distribution. Downgradient measurements were compared to these background limits. Exceedances were noted in at least one well for boron, calcium, chloride, fluoride, pH, sulfate, and TDS. A summary table of well/constituent pairs found to exceed their respective limits follows this letter. A summary table of the wells found to exceed their respective background limits follows this letter.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality at the Lowman Power Plant. If you have any questions or comments, please feel free to contact me.

Sincerely,



Kristina L. Rayner
Groundwater Statistician

Interwell Prediction Limit Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:07 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	0.05	n/a	10/10/2017	1.9	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-5A	0.05	n/a	10/10/2017	7.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-6	0.05	n/a	10/11/2017	0.43	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-7	0.05	n/a	10/11/2017	7.2	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-8	0.05	n/a	10/11/2017	0.098	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-9	0.05	n/a	10/9/2017	5.5	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-10	0.05	n/a	10/11/2017	0.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-11	0.05	n/a	10/10/2017	7.8	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-12A	0.05	n/a	10/10/2017	0.83	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-13	0.05	n/a	10/10/2017	0.55	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-14A	0.05	n/a	10/10/2017	3.6	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-4	29	n/a	10/10/2017	290	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-5A	29	n/a	10/10/2017	300	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-6	29	n/a	10/11/2017	86	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-7	29	n/a	10/11/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-8	29	n/a	10/11/2017	76	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-9	29	n/a	10/9/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-10	29	n/a	10/11/2017	94	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-11	29	n/a	10/10/2017	580	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-12A	29	n/a	10/10/2017	120	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-13	29	n/a	10/10/2017	72	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-14A	29	n/a	10/10/2017	210	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-4	4.489	n/a	10/10/2017	470	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-5A	4.489	n/a	10/10/2017	230	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-6	4.489	n/a	10/11/2017	33	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-7	4.489	n/a	10/11/2017	44	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-8	4.489	n/a	10/11/2017	45	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-9	4.489	n/a	10/9/2017	310	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-10	4.489	n/a	10/11/2017	86	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-11	4.489	n/a	10/10/2017	460	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-12A	4.489	n/a	10/10/2017	83	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-13	4.489	n/a	10/10/2017	13	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-14A	4.489	n/a	10/10/2017	220	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Fluoride (mg/L)	MW-4	0.1	n/a	10/10/2017	0.39	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-5A	0.1	n/a	10/10/2017	2.2	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-6	0.1	n/a	10/11/2017	0.24	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-7	0.1	n/a	10/11/2017	2.3	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-8	0.1	n/a	10/11/2017	0.19	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-9	0.1	n/a	10/9/2017	0.12	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-11	0.1	n/a	10/10/2017	2.1	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
pH (SU)	MW-6	5.899	3.974	10/11/2017	6.07	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-7	5.899	3.974	10/11/2017	6.16	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-8	5.899	3.974	10/11/2017	6.4	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-11	5.899	3.974	10/10/2017	6.58	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-13	5.899	3.974	10/10/2017	5.92	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
Sulfate (mg/L)	MW-4	20.22	n/a	10/10/2017	520	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-5A	20.22	n/a	10/10/2017	140	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-6	20.22	n/a	10/11/2017	120	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-7	20.22	n/a	10/11/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-9	20.22	n/a	10/9/2017	420	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-10	20.22	n/a	10/11/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-11	20.22	n/a	10/10/2017	920	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-12A	20.22	n/a	10/10/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-13	20.22	n/a	10/10/2017	63	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-14A	20.22	n/a	10/10/2017	390	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2

Interwell Prediction Limit Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:07 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	**MW-4**	**172.8**	**n/a**	**10/10/2017**	**1900**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-5A**	**172.8**	**n/a**	**10/10/2017**	**1300**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-6**	**172.8**	**n/a**	**10/11/2017**	**410**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-7**	**172.8**	**n/a**	**10/11/2017**	**710**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-8**	**172.8**	**n/a**	**10/11/2017**	**280**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-9**	**172.8**	**n/a**	**10/9/2017**	**1500**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-10**	**172.8**	**n/a**	**10/11/2017**	**520**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-11**	**172.8**	**n/a**	**10/10/2017**	**2800**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-12A**	**172.8**	**n/a**	**10/10/2017**	**620**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-13**	**172.8**	**n/a**	**10/10/2017**	**250**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-14A**	**172.8**	**n/a**	**10/10/2017**	**1200**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**

Outlier Analysis - Upgradient Wells

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (mg/L)	MW-4	No	n/a	NP	6	1.917	0.5193	ln(x)	ShapiroWilk
Boron (mg/L)	MW-5A	No	n/a	NP	4	14.25	1.893	ln(x)	ShapiroWilk
Boron (mg/L)	MW-6	No	n/a	NP	6	0.3333	0.04274	ln(x)	ShapiroWilk
Boron (mg/L)	MW-7	No	n/a	NP	6	8.85	3.227	ln(x)	ShapiroWilk
Boron (mg/L)	MW-8	No	n/a	NP	6	0.1385	0.1219	ln(x)	ShapiroWilk
Boron (mg/L)	MW-9	No	n/a	NP	6	3.95	1.039	ln(x)	ShapiroWilk
Boron (mg/L)	MW-10	No	n/a	NP	6	0.4067	0.1481	ln(x)	ShapiroWilk
Boron (mg/L)	MW-11	No	n/a	NP	6	9.792	4.827	x^3	ShapiroWilk
Boron (mg/L)	MW-12A	No	n/a	NP	4	0.9425	0.2599	ln(x)	ShapiroWilk
Boron (mg/L)	MW-13	No	n/a	NP	5	1.072	0.3078	ln(x)	ShapiroWilk
Boron (mg/L)	MW-14A	No	n/a	NP	4	4.975	0.732	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-4	No	n/a	NP	6	283.3	15.06	x^6	ShapiroWilk
Calcium (mg/L)	MW-5A	No	n/a	NP (nrm)	4	445	70	unknown	ShapiroWilk
Calcium (mg/L)	MW-6	No	n/a	NP	6	81.5	17.11	sqrt(x)	ShapiroWilk
Calcium (mg/L)	MW-7	No	n/a	NP	6	310	134.9	normal	ShapiroWilk
Calcium (mg/L)	MW-8	No	n/a	NP	6	70.17	8.542	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-9	No	n/a	NP	6	111.5	48.43	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-10	No	n/a	NP	6	114	22.63	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-11	No	n/a	NP	6	448.3	190.5	x^2	ShapiroWilk
Calcium (mg/L)	MW-12A	No	n/a	NP	4	152.5	17.08	x^5	ShapiroWilk
Calcium (mg/L)	MW-13	No	n/a	NP	5	97	29.19	x^2	ShapiroWilk
Calcium (mg/L)	MW-14A	No	n/a	NP	4	192.5	22.17	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-4	No	n/a	NP	6	473.3	56.45	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-5A	No	n/a	NP (nrm)	4	317.5	51.88	unknown	ShapiroWilk
Chloride (mg/L)	MW-6	No	n/a	NP	6	42.17	7.305	normal	ShapiroWilk
Chloride (mg/L)	MW-7	No	n/a	NP	6	214.5	133.4	x^(1/3)	ShapiroWilk
Chloride (mg/L)	MW-8	No	n/a	NP	6	38.65	21.84	x^5	ShapiroWilk
Chloride (mg/L)	MW-9	No	n/a	NP	6	189	130.4	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-10	No	n/a	NP	6	110.2	20.79	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-11	No	n/a	NP	6	333.8	143	x^2	ShapiroWilk
Chloride (mg/L)	MW-12A	No	n/a	NP	4	100	13.74	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-13	No	n/a	NP	5	82.8	63.07	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-14A	No	n/a	NP	4	220	8.165	normal	ShapiroWilk
Fluoride (mg/L)	MW-4	No	n/a	NP	6	0.3583	0.03545	x^(1/3)	ShapiroWilk
Fluoride (mg/L)	MW-5A	No	n/a	NP	4	1.625	0.3775	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-6	No	n/a	NP	6	0.1567	0.07448	normal	ShapiroWilk
Fluoride (mg/L)	MW-7	No	n/a	NP	6	1.282	0.3459	normal	ShapiroWilk
Fluoride (mg/L)	MW-8	No	n/a	NP	6	0.145	0.01761	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-9	No	n/a	NP	6	0.11	0.01265	x^2	ShapiroWilk
Fluoride (mg/L)	MW-10	No	n/a	NP (nrm)	6	0.05833	0.009832	unknown	ShapiroWilk
Fluoride (mg/L)	MW-11	No	n/a	NP	6	1.558	0.7902	x^2	ShapiroWilk
Fluoride (mg/L)	MW-12A	No	n/a	NP (nrm)	4	0.055	0.03	unknown	ShapiroWilk
Fluoride (mg/L)	MW-13	No	n/a	NP	5	0.07	0.01	normal	ShapiroWilk
Fluoride (mg/L)	MW-14A	No	n/a	NP (nrm)	4	0.0625	0.025	unknown	ShapiroWilk
pH (SU)	MW-4	No	n/a	NP	6	4.67	0.6098	x^6	ShapiroWilk
pH (SU)	MW-5A	No	n/a	NP (nrm)	4	6.45	0.05774	unknown	ShapiroWilk
pH (SU)	MW-6	No	n/a	NP	6	6.227	0.1745	x^6	ShapiroWilk
pH (SU)	MW-7	No	n/a	NP	6	6.395	0.1331	ln(x)	ShapiroWilk
pH (SU)	MW-8	No	n/a	NP	6	6.605	0.1015	x^6	ShapiroWilk
pH (SU)	MW-9	No	n/a	NP	6	6.312	0.1429	x^6	ShapiroWilk
pH (SU)	MW-10	No	n/a	NP	6	4.217	0.6846	ln(x)	ShapiroWilk
pH (SU)	MW-11	No	n/a	NP	6	6.368	1.188	x^6	ShapiroWilk
pH (SU)	MW-12A	No	n/a	NP	4	6.125	0.15	x^6	ShapiroWilk
pH (SU)	MW-13	No	n/a	NP	5	6.368	0.1998	x^6	ShapiroWilk
pH (SU)	MW-14A	No	n/a	NP	4	5.95	0.2517	x^6	ShapiroWilk

Outlier Analysis - Upgradient Wells

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Sulfate (mg/L)	MW-4	No	n/a	NP	6	573.3	88.92	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-5A	No	n/a	NP	4	732.5	133.8	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-6	No	n/a	NP	6	111.3	30.53	normal	ShapiroWilk
Sulfate (mg/L)	MW-7	No	n/a	NP	6	465	263.2	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-8	No	n/a	NP	6	10	6.387	sqrt(x)	ShapiroWilk
Sulfate (mg/L)	MW-9	No	n/a	NP	6	269.5	168.5	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-10	No	n/a	NP	6	246.7	28.75	x^6	ShapiroWilk
Sulfate (mg/L)	MW-11	No	n/a	NP	6	761.7	339.6	normal	ShapiroWilk
Sulfate (mg/L)	MW-12A	No	n/a	NP	4	297.5	67.02	x^6	ShapiroWilk
Sulfate (mg/L)	MW-13	No	n/a	NP	5	148	54.04	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-14A	No	n/a	NP	4	347.5	37.75	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4	No	n/a	NP	6	1685	715.6	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-5A	No	n/a	NP	4	2200	294.4	x^5	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-6	No	n/a	NP	6	403.3	52.79	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-7	No	n/a	NP	6	1485	773.2	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-8	No	n/a	NP	6	288.3	43.55	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-9	No	n/a	NP	6	890	426	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-10	No	n/a	NP	6	616.7	73.39	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-11	No	n/a	NP	6	2253	958.1	x^2	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-12A	No	n/a	NP	4	750	58.88	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-13	No	n/a	NP	5	502	170.2	x^(1/3)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-14A	No	n/a	NP (nrm)	4	1125	50	unknown	ShapiroWilk

Outlier Analysis - Downgradient Wells

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (mg/L)	MW-4	No	n/a	NP	6	1.917	0.5193	ln(x)	ShapiroWilk
Boron (mg/L)	MW-5A	No	n/a	NP	4	14.25	1.893	ln(x)	ShapiroWilk
Boron (mg/L)	MW-6	No	n/a	NP	6	0.3333	0.04274	ln(x)	ShapiroWilk
Boron (mg/L)	MW-7	No	n/a	NP	6	8.85	3.227	ln(x)	ShapiroWilk
Boron (mg/L)	MW-8	No	n/a	NP	6	0.1385	0.1219	ln(x)	ShapiroWilk
Boron (mg/L)	MW-9	No	n/a	NP	6	3.95	1.039	ln(x)	ShapiroWilk
Boron (mg/L)	MW-10	No	n/a	NP	6	0.4067	0.1481	ln(x)	ShapiroWilk
Boron (mg/L)	MW-11	No	n/a	NP	6	9.792	4.827	x^3	ShapiroWilk
Boron (mg/L)	MW-12A	No	n/a	NP	4	0.9425	0.2599	ln(x)	ShapiroWilk
Boron (mg/L)	MW-13	No	n/a	NP	5	1.072	0.3078	ln(x)	ShapiroWilk
Boron (mg/L)	MW-14A	No	n/a	NP	4	4.975	0.732	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-4	No	n/a	NP	6	283.3	15.06	x^6	ShapiroWilk
Calcium (mg/L)	MW-5A	No	n/a	NP (nrm)	4	445	70	unknown	ShapiroWilk
Calcium (mg/L)	MW-6	No	n/a	NP	6	81.5	17.11	sqrt(x)	ShapiroWilk
Calcium (mg/L)	MW-7	No	n/a	NP	6	310	134.9	normal	ShapiroWilk
Calcium (mg/L)	MW-8	No	n/a	NP	6	70.17	8.542	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-9	No	n/a	NP	6	111.5	48.43	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-10	No	n/a	NP	6	114	22.63	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-11	No	n/a	NP	6	448.3	190.5	x^2	ShapiroWilk
Calcium (mg/L)	MW-12A	No	n/a	NP	4	152.5	17.08	x^5	ShapiroWilk
Calcium (mg/L)	MW-13	No	n/a	NP	5	97	29.19	x^2	ShapiroWilk
Calcium (mg/L)	MW-14A	No	n/a	NP	4	192.5	22.17	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-4	No	n/a	NP	6	473.3	56.45	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-5A	No	n/a	NP (nrm)	4	317.5	51.88	unknown	ShapiroWilk
Chloride (mg/L)	MW-6	No	n/a	NP	6	42.17	7.305	normal	ShapiroWilk
Chloride (mg/L)	MW-7	No	n/a	NP	6	214.5	133.4	x^(1/3)	ShapiroWilk
Chloride (mg/L)	MW-8	No	n/a	NP	6	38.65	21.84	x^5	ShapiroWilk
Chloride (mg/L)	MW-9	No	n/a	NP	6	189	130.4	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-10	No	n/a	NP	6	110.2	20.79	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-11	No	n/a	NP	6	333.8	143	x^2	ShapiroWilk
Chloride (mg/L)	MW-12A	No	n/a	NP	4	100	13.74	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-13	No	n/a	NP	5	82.8	63.07	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-14A	No	n/a	NP	4	220	8.165	normal	ShapiroWilk
Fluoride (mg/L)	MW-4	No	n/a	NP	6	0.3583	0.03545	x^(1/3)	ShapiroWilk
Fluoride (mg/L)	MW-5A	No	n/a	NP	4	1.625	0.3775	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-6	No	n/a	NP	6	0.1567	0.07448	normal	ShapiroWilk
Fluoride (mg/L)	MW-7	No	n/a	NP	6	1.282	0.3459	normal	ShapiroWilk
Fluoride (mg/L)	MW-8	No	n/a	NP	6	0.145	0.01761	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-9	No	n/a	NP	6	0.11	0.01265	x^2	ShapiroWilk
Fluoride (mg/L)	MW-10	No	n/a	NP (nrm)	6	0.05833	0.009832	unknown	ShapiroWilk
Fluoride (mg/L)	MW-11	No	n/a	NP	6	1.558	0.7902	x^2	ShapiroWilk
Fluoride (mg/L)	MW-12A	No	n/a	NP (nrm)	4	0.055	0.03	unknown	ShapiroWilk
Fluoride (mg/L)	MW-13	No	n/a	NP	5	0.07	0.01	normal	ShapiroWilk
Fluoride (mg/L)	MW-14A	No	n/a	NP (nrm)	4	0.0625	0.025	unknown	ShapiroWilk
pH (SU)	MW-4	No	n/a	NP	6	4.67	0.6098	x^6	ShapiroWilk
pH (SU)	MW-5A	No	n/a	NP (nrm)	4	6.45	0.05774	unknown	ShapiroWilk
pH (SU)	MW-6	No	n/a	NP	6	6.227	0.1745	x^6	ShapiroWilk
pH (SU)	MW-7	No	n/a	NP	6	6.395	0.1331	ln(x)	ShapiroWilk
pH (SU)	MW-8	No	n/a	NP	6	6.605	0.1015	x^6	ShapiroWilk
pH (SU)	MW-9	No	n/a	NP	6	6.312	0.1429	x^6	ShapiroWilk
pH (SU)	MW-10	No	n/a	NP	6	4.217	0.6846	ln(x)	ShapiroWilk
pH (SU)	MW-11	No	n/a	NP	6	6.368	1.188	x^6	ShapiroWilk
pH (SU)	MW-12A	No	n/a	NP	4	6.125	0.15	x^6	ShapiroWilk
pH (SU)	MW-13	No	n/a	NP	5	6.368	0.1998	x^6	ShapiroWilk
pH (SU)	MW-14A	No	n/a	NP	4	5.95	0.2517	x^6	ShapiroWilk

Outlier Analysis - Downgradient Wells

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Sulfate (mg/L)	MW-4	No	n/a	NP	6	573.3	88.92	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-5A	No	n/a	NP	4	732.5	133.8	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-6	No	n/a	NP	6	111.3	30.53	normal	ShapiroWilk
Sulfate (mg/L)	MW-7	No	n/a	NP	6	465	263.2	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-8	No	n/a	NP	6	10	6.387	sqrt(x)	ShapiroWilk
Sulfate (mg/L)	MW-9	No	n/a	NP	6	269.5	168.5	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-10	No	n/a	NP	6	246.7	28.75	x^6	ShapiroWilk
Sulfate (mg/L)	MW-11	No	n/a	NP	6	761.7	339.6	normal	ShapiroWilk
Sulfate (mg/L)	MW-12A	No	n/a	NP	4	297.5	67.02	x^6	ShapiroWilk
Sulfate (mg/L)	MW-13	No	n/a	NP	5	148	54.04	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-14A	No	n/a	NP	4	347.5	37.75	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4	No	n/a	NP	6	1685	715.6	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-5A	No	n/a	NP	4	2200	294.4	x^5	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-6	No	n/a	NP	6	403.3	52.79	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-7	No	n/a	NP	6	1485	773.2	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-8	No	n/a	NP	6	288.3	43.55	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-9	No	n/a	NP	6	890	426	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-10	No	n/a	NP	6	616.7	73.39	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-11	No	n/a	NP	6	2253	958.1	x^2	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-12A	No	n/a	NP	4	750	58.88	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-13	No	n/a	NP	5	502	170.2	x^(1/3)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-14A	No	n/a	NP (nrm)	4	1125	50	unknown	ShapiroWilk

Trend Tests Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:32 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	**MW-9**	**105.9**	**25**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**
pH (SU)	**MW-9**	**-0.3701**	**-27**	**-25**	**Yes**	**9**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-9**	**714.3**	**22**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**

Analysis of Variance

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:23 AM

Constituent	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Calc.	Alpha	Method
Boron (mg/L)	n/a	n/a	n/a	No	No	0.008333	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	No	Yes	11.53	0.05	NP (eq. var.)
Chloride (mg/L)	n/a	n/a	n/a	No	Yes	8.545	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	No	Yes	8.554	0.05	NP (normality)
pH (SU)	n/a	n/a	n/a	No	Yes	10.69	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	No	No	0	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	No	Yes	27.87	0.05	Param.

Tolerance Limits - Appendix III

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:25 AM

Constituent	Upper Lim.	Lower Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium (mg/L)	29	n/a	16	n/a	n/a	0	n/a	n/a	0.4401	NP Inter(normality)
Chloride (mg/L)	4.97	n/a	16	2.268	0.8923	18.75	None	No	0.01	Inter
Fluoride (mg/L)	0.1	n/a	16	n/a	n/a	62.5	n/a	n/a	0.4401	NP Inter(normality)
pH (SU)	6.241	3.632	18	4.937	0.3979	0	None	No	0.01	Inter
Total Dissolved Solids (mg/L)	194.7	n/a	16	75.38	39.4	0	None	No	0.01	Inter

Confidence Interval Summary Table - Significant Results Appendix III

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	2.582	1.485	0.05	Yes	8	2.025	0.5392	0	None	sqrt(x)	0.01	Param.
Boron (mg/L)	MW-5A	17.03	7.399	0.05	Yes	6	12.22	3.507	0	None	No	0.01	Param.
Boron (mg/L)	MW-6	0.3988	0.2937	0.05	Yes	8	0.3463	0.04955	0	None	No	0.01	Param.
Boron (mg/L)	MW-7	11.61	5.693	0.05	Yes	8	8.65	2.79	0	None	No	0.01	Param.
Boron (mg/L)	MW-9	5.369	3.131	0.05	Yes	8	4.25	1.056	0	None	No	0.01	Param.
Boron (mg/L)	MW-10	0.5506	0.2794	0.05	Yes	8	0.415	0.128	0	None	No	0.01	Param.
Boron (mg/L)	MW-11	13.64	4.419	0.05	Yes	8	9.031	4.352	0	None	No	0.01	Param.
Boron (mg/L)	MW-12	12	0.77	0.05	Yes	4	3.713	5.528	0	None	No	0.0625	NP (normality)
Boron (mg/L)	MW-12A	1.194	0.5663	0.05	Yes	6	0.88	0.2284	0	None	No	0.01	Param.
Boron (mg/L)	MW-13	1.382	0.6204	0.05	Yes	7	1.001	0.3208	0	None	No	0.01	Param.
Boron (mg/L)	MW-14A	5.737	3.496	0.05	Yes	6	4.617	0.8159	0	None	No	0.01	Param.
Calcium (mg/L)	MW-4	304.3	270.7	29	Yes	8	287.5	15.81	0	None	No	0.01	Param.
Calcium (mg/L)	MW-5	322.6	61.25	29	Yes	4	170	61.64	0	None	sqrt(x)	0.01	Param.
Calcium (mg/L)	MW-5A	480	300	29	Yes	6	401.7	86.81	0	None	No	0.0155	NP (normality)
Calcium (mg/L)	MW-6	100.4	67.61	29	Yes	8	84	15.46	0	None	No	0.01	Param.
Calcium (mg/L)	MW-7	418.1	159.4	29	Yes	8	288.8	122.1	0	None	No	0.01	Param.
Calcium (mg/L)	MW-8	83.31	62.94	29	Yes	8	73.13	9.613	0	None	No	0.01	Param.
Calcium (mg/L)	MW-9	189.1	73.11	29	Yes	8	131.1	54.73	0	None	No	0.01	Param.
Calcium (mg/L)	MW-10	132.6	89.41	29	Yes	8	111	20.37	0	None	No	0.01	Param.
Calcium (mg/L)	MW-11	636.2	273.8	29	Yes	8	455	171	0	None	No	0.01	Param.
Calcium (mg/L)	MW-12	600	110	29	Yes	4	242.5	238.7	0	None	No	0.0625	NP (normality)
Calcium (mg/L)	MW-12A	172.5	107.5	29	Yes	6	140	23.66	0	None	No	0.01	Param.
Calcium (mg/L)	MW-13	122.9	62.01	29	Yes	7	92.43	25.61	0	None	No	0.01	Param.
Calcium (mg/L)	MW-14A	233.5	169.8	29	Yes	6	201.7	23.17	0	None	No	0.01	Param.
Chloride (mg/L)	MW-4	527.8	424.7	4.97	Yes	8	476.3	48.68	0	None	No	0.01	Param.
Chloride (mg/L)	MW-5A	368.5	225.8	4.97	Yes	6	301.7	53.45	0	None	x^2	0.01	Param.
Chloride (mg/L)	MW-6	48.72	33.78	4.97	Yes	8	41.25	7.046	0	None	No	0.01	Param.
Chloride (mg/L)	MW-7	321.2	49.06	4.97	Yes	8	185.1	128.4	0	None	No	0.01	Param.
Chloride (mg/L)	MW-8	58.29	17.93	4.97	Yes	8	38.11	19.04	0	None	No	0.01	Param.
Chloride (mg/L)	MW-9	350.3	88.22	4.97	Yes	8	219.3	123.6	0	None	No	0.01	Param.
Chloride (mg/L)	MW-10	124.9	87.39	4.97	Yes	8	105.9	19.64	0	None	ln(x)	0.01	Param.
Chloride (mg/L)	MW-11	483.9	209.4	4.97	Yes	8	346.6	129.5	0	None	No	0.01	Param.
Chloride (mg/L)	MW-12	520	80	4.97	Yes	4	195.5	216.4	0	None	No	0.0625	NP (normality)
Chloride (mg/L)	MW-12A	113	78.81	4.97	Yes	6	95.5	12.91	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-13	133.3	12.43	4.97	Yes	7	66.57	58.96	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-14A	237.5	209.1	4.97	Yes	6	223.3	10.33	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-4	0.3964	0.3286	0.1	Yes	8	0.3625	0.03196	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-5A	2.234	1.099	0.1	Yes	6	1.667	0.4131	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-7	1.96	0.9621	0.1	Yes	8	1.461	0.4709	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-8	0.1834	0.1291	0.1	Yes	8	0.1563	0.0256	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-11	2.283	1.234	0.1	Yes	8	1.706	0.7223	0	None	x^2	0.01	Param.
pH (SU)	MW-11	6.879	6.641	6.24	Yes	9	6.76	0.1063	0	None	No	0.005	Param.
Sulfate (mg/L)	MW-4	661.7	488.3	22.68	Yes	8	575	81.77	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-5A	953.3	213.3	22.68	Yes	6	583.3	269.3	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-6	143.1	86.45	22.68	Yes	8	114.8	26.7	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-7	676.2	171.3	22.68	Yes	8	423.8	238.1	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-9	485.1	139.2	22.68	Yes	8	312.1	163.2	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-10	268.3	221.6	22.68	Yes	8	245	25.07	0	None	x^3	0.01	Param.
Sulfate (mg/L)	MW-11	1083	459	22.68	Yes	8	771.3	294.6	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-12	1544	58.73	22.68	Yes	4	377.5	329.6	0	None	ln(x)	0.01	Param.
Sulfate (mg/L)	MW-12A	362.1	181.2	22.68	Yes	6	271.7	65.85	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-13	196.7	67.04	22.68	Yes	7	131.9	54.57	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-14A	460.3	293	22.68	Yes	6	376.7	60.88	0	None	No	0.01	Param.
Total Dissolved Solids (mg/L)	MW-4	2228	1283	194.7	Yes	8	1726	610.2	0	None	x^2	0.01	Param.
Total Dissolved Solids (mg/L)	MW-5	1544	300.9	194.7	Yes	4	922.5	273.8	0	None	No	0.01	Param.

Confidence Interval Summary Table - Significant Results Appendix III

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	**MW-5A**	**2581**	**1319**	**194.7**	**Yes**	**6**	**1950**	**459.3**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-6**	**451.1**	**356.4**	**194.7**	**Yes**	**8**	**403.8**	**44.7**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-7**	**2097**	**583.1**	**194.7**	**Yes**	**8**	**1340**	**714.1**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-8**	**325.5**	**247**	**194.7**	**Yes**	**8**	**286.3**	**37.01**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-9**	**1477**	**557.7**	**194.7**	**Yes**	**8**	**1018**	**433.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-10**	**674.6**	**522.9**	**194.7**	**Yes**	**8**	**598.8**	**71.6**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-11**	**3166**	**1339**	**194.7**	**Yes**	**8**	**2253**	**861.4**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-12**	**2700**	**530**	**194.7**	**Yes**	**4**	**1120**	**1056**	**0**	**None**	**No**	**0.0625**	**NP (normality)**
Total Dissolved Solids (mg/L)	**MW-12A**	**831.2**	**558.8**	**194.7**	**Yes**	**6**	**695**	**99.15**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-13**	**649.5**	**239**	**194.7**	**Yes**	**7**	**444.3**	**172.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-14A**	**1200**	**1100**	**194.7**	**Yes**	**6**	**1133**	**51.64**	**0**	**None**	**No**	**0.0155**	**NP (normality)**

Interwell Prediction Limits

Interwell Prediction Limit Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:07 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	0.05	n/a	10/10/2017	1.9	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-5A	0.05	n/a	10/10/2017	7.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-6	0.05	n/a	10/11/2017	0.43	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-7	0.05	n/a	10/11/2017	7.2	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-8	0.05	n/a	10/11/2017	0.098	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-9	0.05	n/a	10/9/2017	5.5	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-10	0.05	n/a	10/11/2017	0.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-11	0.05	n/a	10/10/2017	7.8	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-12A	0.05	n/a	10/10/2017	0.83	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-13	0.05	n/a	10/10/2017	0.55	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-14A	0.05	n/a	10/10/2017	3.6	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-4	29	n/a	10/10/2017	290	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-5A	29	n/a	10/10/2017	300	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-6	29	n/a	10/11/2017	86	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-7	29	n/a	10/11/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-8	29	n/a	10/11/2017	76	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-9	29	n/a	10/9/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-10	29	n/a	10/11/2017	94	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-11	29	n/a	10/10/2017	580	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-12A	29	n/a	10/10/2017	120	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-13	29	n/a	10/10/2017	72	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-14A	29	n/a	10/10/2017	210	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-4	4.489	n/a	10/10/2017	470	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-5A	4.489	n/a	10/10/2017	230	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-6	4.489	n/a	10/11/2017	33	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-7	4.489	n/a	10/11/2017	44	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-8	4.489	n/a	10/11/2017	45	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-9	4.489	n/a	10/9/2017	310	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-10	4.489	n/a	10/11/2017	86	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-11	4.489	n/a	10/10/2017	460	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-12A	4.489	n/a	10/10/2017	83	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-13	4.489	n/a	10/10/2017	13	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-14A	4.489	n/a	10/10/2017	220	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Fluoride (mg/L)	MW-4	0.1	n/a	10/10/2017	0.39	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-5A	0.1	n/a	10/10/2017	2.2	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-6	0.1	n/a	10/11/2017	0.24	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-7	0.1	n/a	10/11/2017	2.3	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-8	0.1	n/a	10/11/2017	0.19	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-9	0.1	n/a	10/9/2017	0.12	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-11	0.1	n/a	10/10/2017	2.1	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
pH (SU)	MW-6	5.899	3.974	10/11/2017	6.07	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-7	5.899	3.974	10/11/2017	6.16	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-8	5.899	3.974	10/11/2017	6.4	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-11	5.899	3.974	10/10/2017	6.58	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-13	5.899	3.974	10/10/2017	5.92	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
Sulfate (mg/L)	MW-4	20.22	n/a	10/10/2017	520	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-5A	20.22	n/a	10/10/2017	140	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-6	20.22	n/a	10/11/2017	120	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-7	20.22	n/a	10/11/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-9	20.22	n/a	10/9/2017	420	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-10	20.22	n/a	10/11/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-11	20.22	n/a	10/10/2017	920	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-12A	20.22	n/a	10/10/2017	230	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-13	20.22	n/a	10/10/2017	63	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	MW-14A	20.22	n/a	10/10/2017	390	Yes	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2

Interwell Prediction Limit Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:07 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	**MW-4**	**172.8**	**n/a**	**10/10/2017**	**1900**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-5A**	**172.8**	**n/a**	**10/10/2017**	**1300**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-6**	**172.8**	**n/a**	**10/11/2017**	**410**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-7**	**172.8**	**n/a**	**10/11/2017**	**710**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-8**	**172.8**	**n/a**	**10/11/2017**	**280**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-9**	**172.8**	**n/a**	**10/9/2017**	**1500**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-10**	**172.8**	**n/a**	**10/11/2017**	**520**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-11**	**172.8**	**n/a**	**10/10/2017**	**2800**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-12A**	**172.8**	**n/a**	**10/10/2017**	**620**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-13**	**172.8**	**n/a**	**10/10/2017**	**250**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-14A**	**172.8**	**n/a**	**10/10/2017**	**1200**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**

Interwell Prediction Limit Summary Table - All Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:07 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	0.05	n/a	10/10/2017	1.9	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-5A	0.05	n/a	10/10/2017	7.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-6	0.05	n/a	10/11/2017	0.43	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-7	0.05	n/a	10/11/2017	7.2	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-8	0.05	n/a	10/11/2017	0.098	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-9	0.05	n/a	10/9/2017	5.5	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-10	0.05	n/a	10/11/2017	0.4	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-11	0.05	n/a	10/10/2017	7.8	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-12A	0.05	n/a	10/10/2017	0.83	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-13	0.05	n/a	10/10/2017	0.55	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-14A	0.05	n/a	10/10/2017	3.6	Yes	16	n/a	n/a	87.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-4	29	n/a	10/10/2017	290	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-5A	29	n/a	10/10/2017	300	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-6	29	n/a	10/11/2017	86	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-7	29	n/a	10/11/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-8	29	n/a	10/11/2017	76	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-9	29	n/a	10/9/2017	190	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-10	29	n/a	10/11/2017	94	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-11	29	n/a	10/10/2017	580	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-12A	29	n/a	10/10/2017	120	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-13	29	n/a	10/10/2017	72	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Calcium (mg/L)	MW-14A	29	n/a	10/10/2017	210	Yes	16	n/a	n/a	0	n/a	n/a	0.005041	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-4	4.489	n/a	10/10/2017	470	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-5A	4.489	n/a	10/10/2017	230	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-6	4.489	n/a	10/11/2017	33	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-7	4.489	n/a	10/11/2017	44	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-8	4.489	n/a	10/11/2017	45	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-9	4.489	n/a	10/9/2017	310	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-10	4.489	n/a	10/11/2017	86	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-11	4.489	n/a	10/10/2017	460	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-12A	4.489	n/a	10/10/2017	83	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-13	4.489	n/a	10/10/2017	13	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Chloride (mg/L)	MW-14A	4.489	n/a	10/10/2017	220	Yes	16	2.115	0.9601	18.75	Kaplan-Meier	No	0.0005374	Param Inter 1 of 2
Fluoride (mg/L)	MW-4	0.1	n/a	10/10/2017	0.39	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-5A	0.1	n/a	10/10/2017	2.2	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-6	0.1	n/a	10/11/2017	0.24	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-7	0.1	n/a	10/11/2017	2.3	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-8	0.1	n/a	10/11/2017	0.19	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-9	0.1	n/a	10/9/2017	0.12	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-10	0.1	n/a	10/11/2017	0.06	No	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-11	0.1	n/a	10/10/2017	2.1	Yes	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-12A	0.1	n/a	10/10/2017	0.04	No	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-13	0.1	n/a	10/10/2017	0.1	No	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-14A	0.1	n/a	10/10/2017	0.04	No	16	n/a	n/a	62.5	n/a	n/a	0.005041	NP Inter (NDs) 1 of 2
pH (SU)	MW-4	5.899	3.974	10/10/2017	4.63	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-5A	5.899	3.974	10/10/2017	5.84	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-6	5.899	3.974	10/11/2017	6.07	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-7	5.899	3.974	10/11/2017	6.16	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-8	5.899	3.974	10/11/2017	6.4	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-9	5.899	3.974	10/9/2017	5.47	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-10	5.899	3.974	10/11/2017	4.05	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-11	5.899	3.974	10/10/2017	6.58	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-12A	5.899	3.974	10/10/2017	5.38	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-13	5.899	3.974	10/10/2017	5.92	Yes	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2
pH (SU)	MW-14A	5.899	3.974	10/10/2017	5.09	No	18	4.937	0.3979	0	None	No	0.0002687	Param Inter 1 of 2

Interwell Prediction Limit Summary Table - All Results

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/15/2017, 5:07 AM

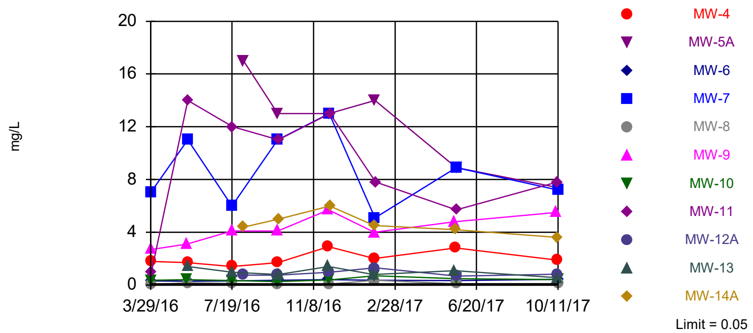
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Sulfate (mg/L)	**MW-4**	**20.22**	**n/a**	**10/10/2017**	**520**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-5A**	**20.22**	**n/a**	**10/10/2017**	**140**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-6**	**20.22**	**n/a**	**10/11/2017**	**120**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-7**	**20.22**	**n/a**	**10/11/2017**	**230**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-8	20.22	n/a	10/11/2017	2.9	No	16	15.13	2.062	0	None	No	0.0005374	Param Inter 1 of 2
Sulfate (mg/L)	**MW-9**	**20.22**	**n/a**	**10/9/2017**	**420**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-10**	**20.22**	**n/a**	**10/11/2017**	**230**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-11**	**20.22**	**n/a**	**10/10/2017**	**920**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-12A**	**20.22**	**n/a**	**10/10/2017**	**230**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-13**	**20.22**	**n/a**	**10/10/2017**	**63**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-14A**	**20.22**	**n/a**	**10/10/2017**	**390**	**Yes**	**16**	**15.13**	**2.062**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-4**	**172.8**	**n/a**	**10/10/2017**	**1900**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-5A**	**172.8**	**n/a**	**10/10/2017**	**1300**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-6**	**172.8**	**n/a**	**10/11/2017**	**410**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-7**	**172.8**	**n/a**	**10/11/2017**	**710**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-8**	**172.8**	**n/a**	**10/11/2017**	**280**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-9**	**172.8**	**n/a**	**10/9/2017**	**1500**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-10**	**172.8**	**n/a**	**10/11/2017**	**520**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-11**	**172.8**	**n/a**	**10/10/2017**	**2800**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-12A**	**172.8**	**n/a**	**10/10/2017**	**620**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-13**	**172.8**	**n/a**	**10/10/2017**	**250**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-14A**	**172.8**	**n/a**	**10/10/2017**	**1200**	**Yes**	**16**	**75.38**	**39.4**	**0**	**None**	**No**	**0.0005374**	**Param Inter 1 of 2**

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11...

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 16 background values. 87.5% NDs. Annual per-constituent alpha = 0.132. Individual comparison alpha = 0.005041 (1 of 2). Comparing 11 points to limit. Assumes 3 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Boron   Analysis Run 11/15/2017 5:06 AM   View: Interwell PLs

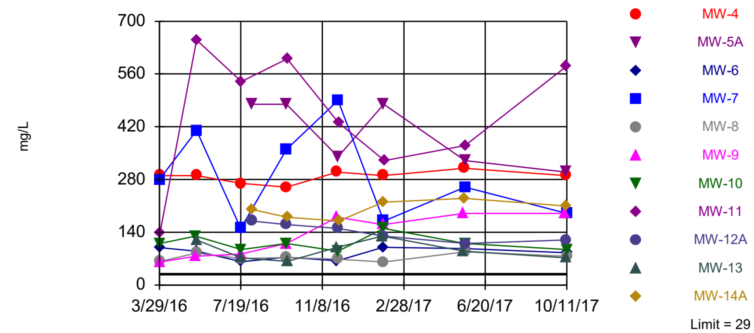
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11...

Prediction Limit

Interwell Non-parametric



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 16 background values. Annual per-constituent alpha = 0.132. Individual comparison alpha = 0.005041 (1 of 2). Comparing 11 points to limit. Assumes 3 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Calcium   Analysis Run 11/15/2017 5:06 AM   View: Interwell PLs

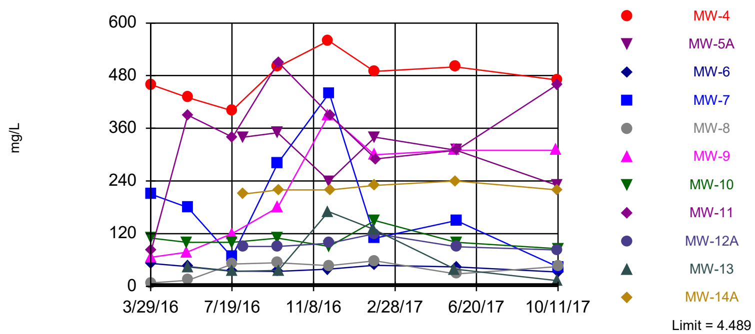
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11...

Prediction Limit

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=2.115, Std. Dev.=0.9601, n=16, 18.75% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9253, critical = 0.844. Kappa = 2.473 (c=7, w=14, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0005374. Comparing 11 points to limit. Assumes 3 future values.

Constituent: Chloride   Analysis Run 11/15/2017 5:06 AM   View: Interwell PLs

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

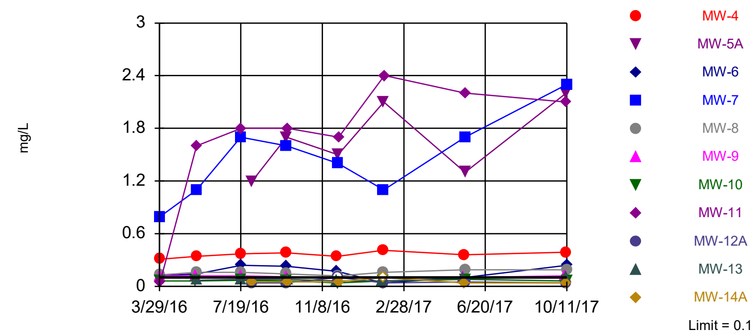
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-11

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 16 background values. 62.5% NDs. Annual per-constituent alpha = 0.132. Individual comparison alpha = 0.005041 (1 of 2). Comparing 11 points to limit. Assumes 3 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Fluoride   Analysis Run 11/15/2017 5:06 AM   View: Interwell PLs

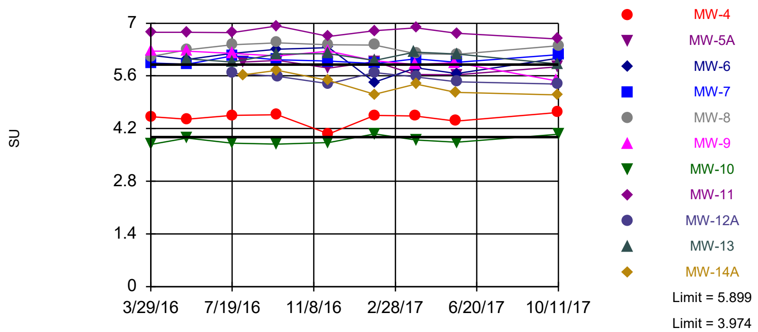
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Exceeds Limits: MW-6, MW-7, MW-8, MW-11, MW-13

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=4.937, Std. Dev.=0.3979, n=18. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8895, critical = 0.858. Kappa = 2.418 (c=7, w=14, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0002687. Comparing 11 points to limit. Assumes 3 future values.

Constituent: pH Analysis Run 11/15/2017 5:06 AM View: Interwell PLs

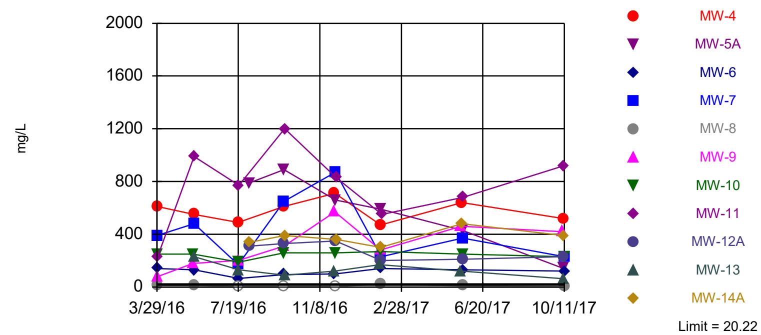
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12A...

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=15.13, Std. Dev.=2.062, n=16. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9331, critical = 0.844. Kappa = 2.473 (c=7, w=14, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0005374. Comparing 11 points to limit. Assumes 3 future values.

Constituent: Sulfate Analysis Run 11/15/2017 5:06 AM View: Interwell PLs

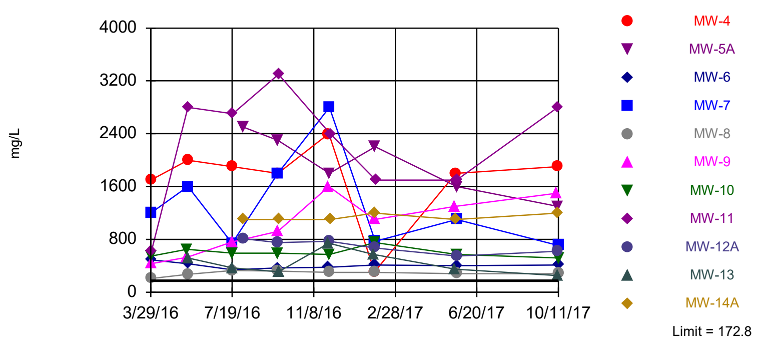
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Exceeds Limit: MW-4, MW-5A, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11...

Prediction Limit

Interwell Parametric

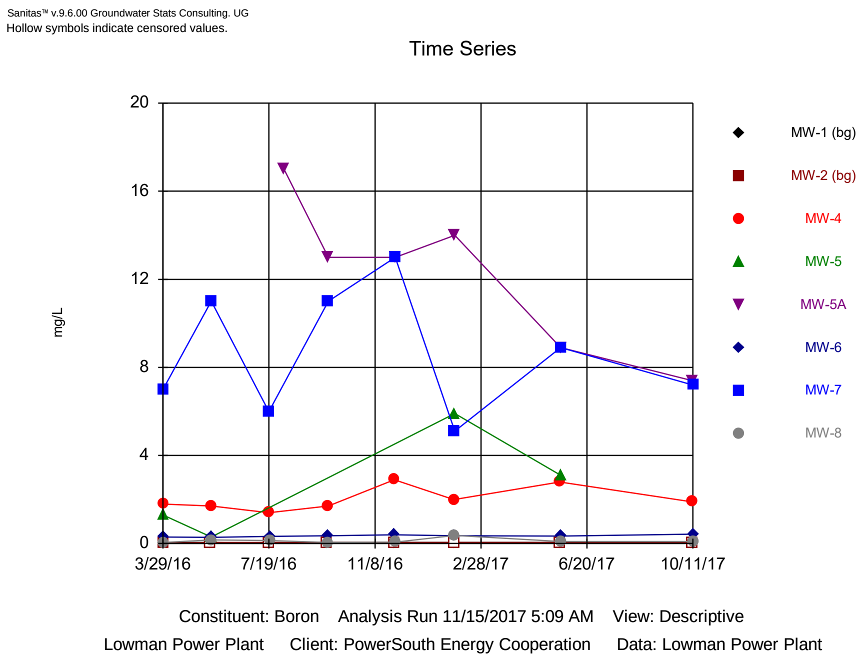


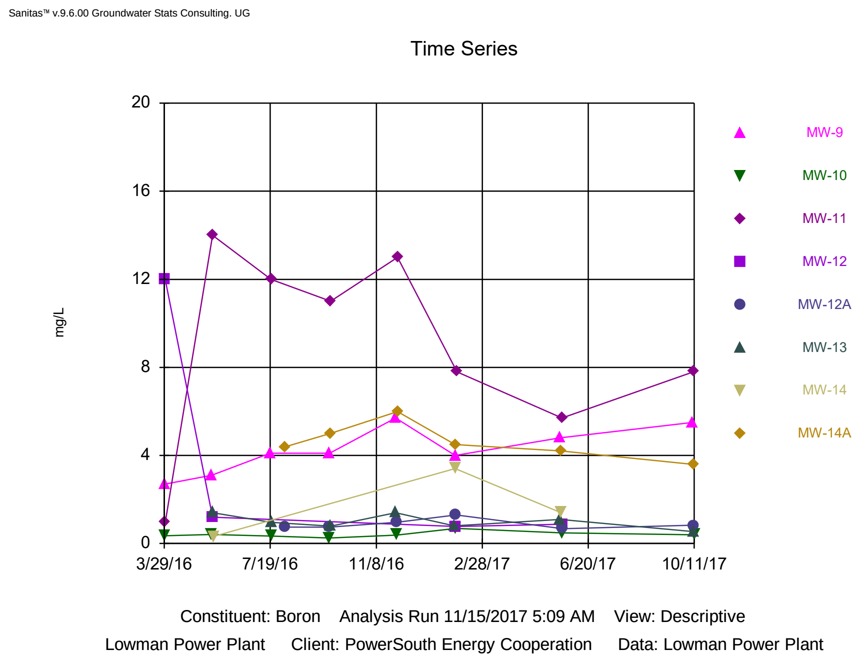
Background Data Summary: Mean=75.38, Std. Dev.=39.4, n=16. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9216, critical = 0.844. Kappa = 2.473 (c=7, w=14, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0005374. Comparing 11 points to limit. Assumes 3 future values.

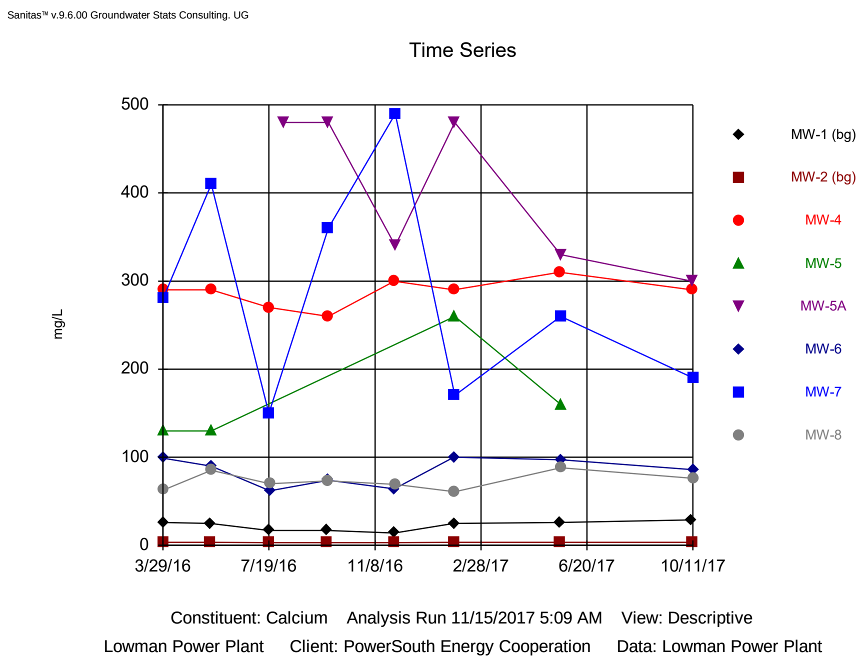
Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:06 AM View: Interwell PLs

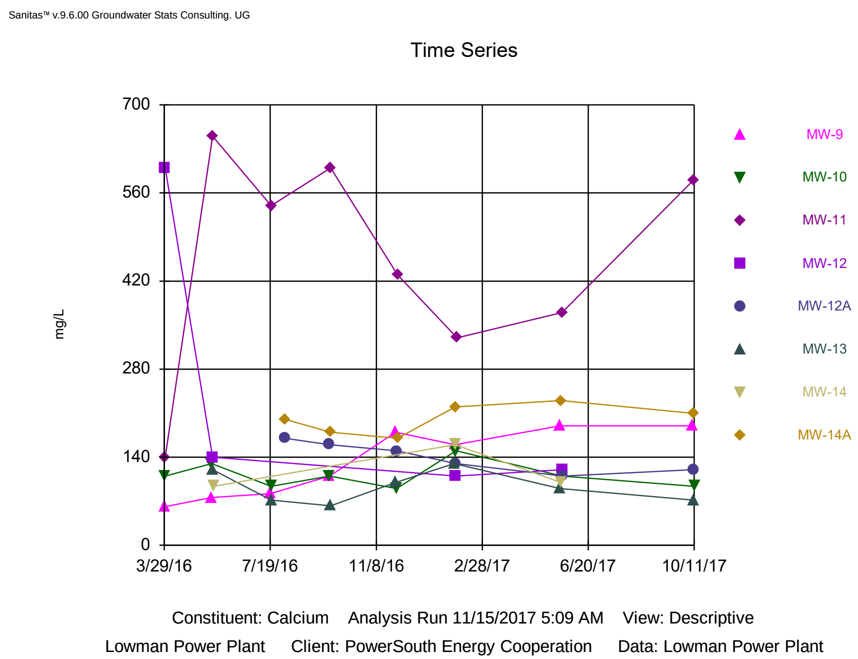
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Time Series & Box Plots


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.
Time Series
mg/L
20
16
12
8
4
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-1 (bg)
MW-2 (bg)
MW-4
MW-5
MW-5A
MW-6
MW-7
MW-8
Constituent: Boron Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Time Series
mg/L
20
16
12
8
4
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-9
MW-10
MW-11
MW-12
MW-12A
MW-13
MW-14
MW-14A
Constituent: Boron Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Time Series
mg/L
500
400
300
200
100
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-1 (bg)
MW-2 (bg)
MW-4
MW-5
MW-5A
MW-6
MW-7
MW-8
Constituent: Calcium Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Time Series
mg/L
700
560
420
280
140
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-9
MW-10
MW-11
MW-12
MW-12A
MW-13
MW-14
MW-14A
Constituent: Calcium Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Time Series

Constituent: Boron (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	<0.05	0.022 (J)	1.8	1.3		0.3	7	
3/30/2016								0.051
5/18/2016	<0.05	<0.05						
5/19/2016			1.7	0.29		0.28	11	0.16
7/19/2016	0.024 (J)	<0.05	1.4				6	
7/20/2016						0.32		0.13
8/4/2016					17			
9/19/2016	<0.05	<0.05						
9/20/2016			1.7		13	0.35	11	0.049 (J)
11/29/2016	<0.05	<0.05	2.9			0.4		
11/30/2016					13		13	0.071
1/31/2017	<0.05	<0.05	2			0.35		
2/1/2017				5.9	14		5.1	0.37
5/23/2017	<0.05	<0.05	2.8					
5/24/2017				3.1	8.9	0.34	8.9	0.097
10/9/2017	<0.05							
10/10/2017		<0.05	1.9		7.4			
10/11/2017						0.43	7.2	0.098

Time Series

Constituent: Boron (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	2.7							
3/30/2016		0.35	0.95	12				
5/18/2016	3.1	0.41						
5/19/2016			14	1.2		1.4		
5/20/2016							0.32	
7/19/2016	4.1							
7/20/2016		0.34	12			0.97		
8/4/2016					0.75			4.4
9/20/2016	4.1	0.26			0.75			
9/21/2016			11			0.79		5
11/29/2016	5.7					1.4		
11/30/2016		0.39			0.97			
12/1/2016			13					6
1/30/2017						0.8		
1/31/2017	4						3.4	4.5
2/1/2017		0.69		0.77	1.3			
2/2/2017			7.8					
5/22/2017	4.8					1.1		
5/23/2017							1.4	4.2
5/24/2017		0.48	5.7					
5/25/2017				0.88	0.68			
10/9/2017	5.5							
10/10/2017			7.8		0.83	0.55		3.6
10/11/2017		0.4						

Time Series

Constituent: Calcium (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

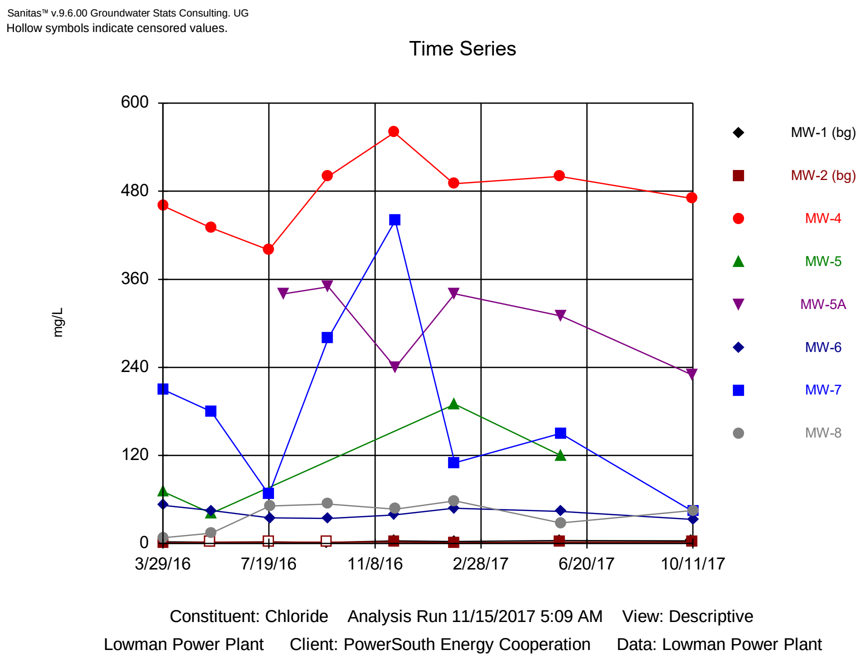
	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	26	3.6	290	130		99	280	
3/30/2016								63
5/18/2016	25	3.6						
5/19/2016			290	130		90	410	85
7/19/2016	17	3	270				150	
7/20/2016						62		70
8/4/2016					480			
9/19/2016	17	3.2						
9/20/2016			260		480	74	360	73
11/29/2016	14	3	300			64		
11/30/2016					340		490	69
1/31/2017	25	3.5	290			100		
2/1/2017				260	480		170	61
5/23/2017	26	3.6	310					
5/24/2017				160	330	97	260	88
10/9/2017	29							
10/10/2017		3.6	290		300			
10/11/2017						86	190	76

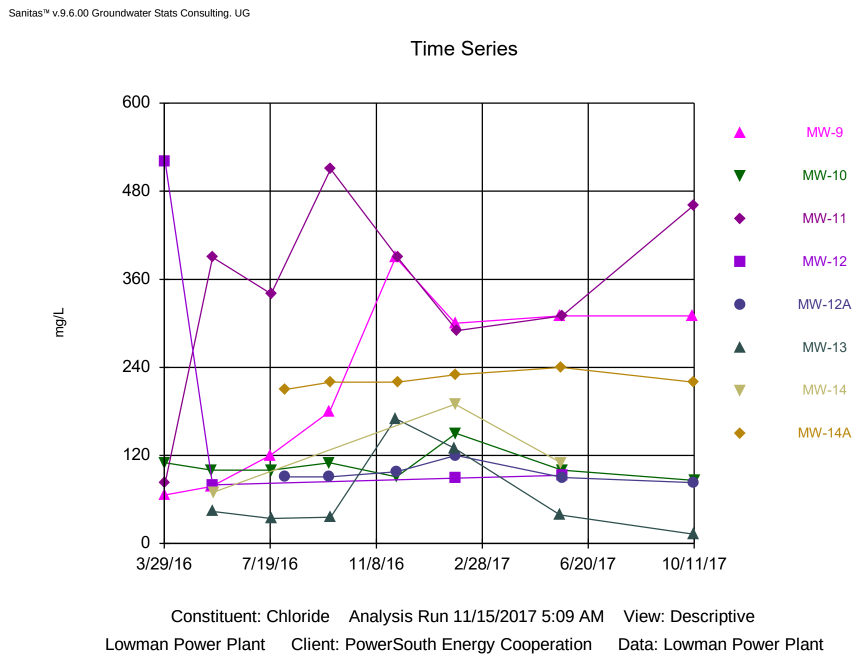
Time Series

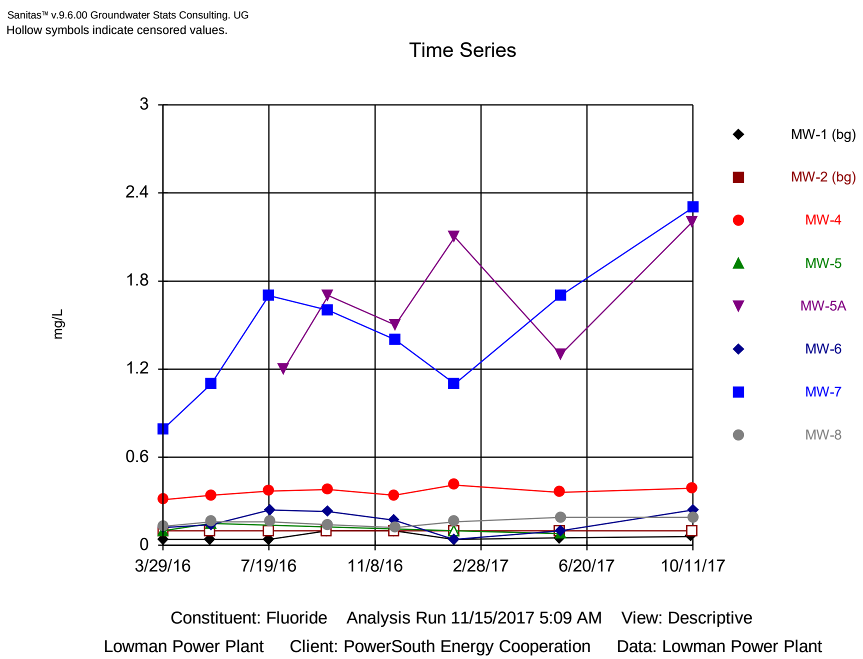
Constituent: Calcium (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

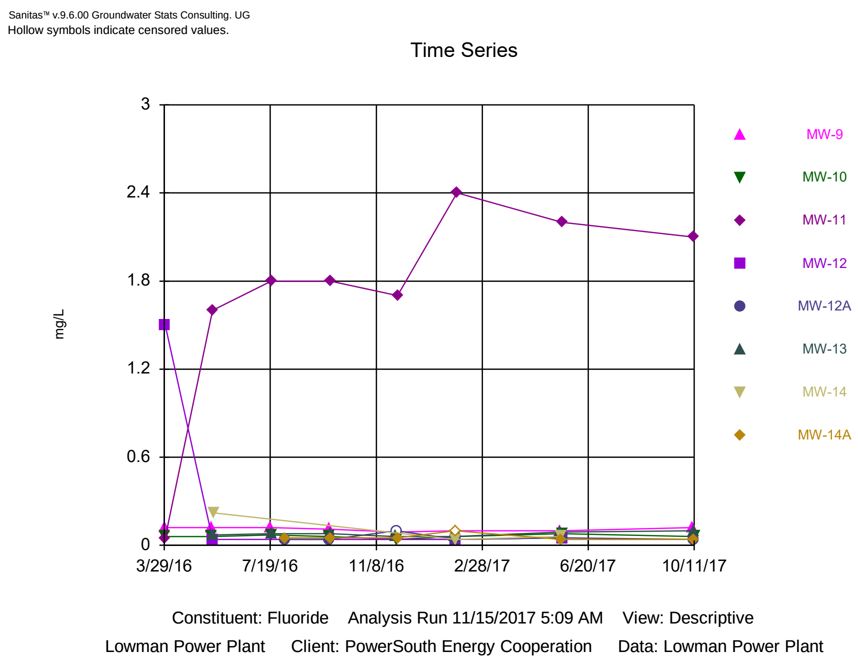
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	61							
3/30/2016		110	140	600				
5/18/2016	76	130						
5/19/2016			650	140		120		
5/20/2016							94	
7/19/2016	82							
7/20/2016		94	540			72		
8/4/2016					170			200
9/20/2016	110	110			160			
9/21/2016			600			63		180
11/29/2016	180					100		
11/30/2016		90			150			
12/1/2016			430					170
1/30/2017						130		
1/31/2017	160						160	220
2/1/2017		150		110	130			
2/2/2017			330					
5/22/2017	190					90		
5/23/2017							100	230
5/24/2017		110	370					
5/25/2017				120	110			
10/9/2017	190							
10/10/2017			580		120	72		210
10/11/2017		94						


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.
Time Series
mg/L
600
480
360
240
120
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-1 (bg)
MW-2 (bg)
MW-4
MW-5
MW-5A
MW-6
MW-7
MW-8
Constituent: Chloride Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Time Series
mg/L
600
480
360
240
120
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-9
MW-10
MW-11
MW-12
MW-12A
MW-13
MW-14
MW-14A
Constituent: Chloride Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.
Time Series
mg/L
3
2.4
1.8
1.2
0.6
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-1 (bg)
MW-2 (bg)
MW-4
MW-5
MW-5A
MW-6
MW-7
MW-8
Constituent: Fluoride Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.
Time Series
mg/L
3
2.4
1.8
1.2
0.6
0
3/29/16
7/19/16
11/8/16
2/28/17
6/20/17
10/11/17
MW-9
MW-10
MW-11
MW-12
MW-12A
MW-13
MW-14
MW-14A
Constituent: Fluoride Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Time Series

Constituent: Chloride (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	2.5	0.89 (J)	460	71		52	210	
3/30/2016								7.9
5/18/2016	2.1	<2						
5/19/2016			430	41		45	180	14
7/19/2016	2.2	<2	400				67	
7/20/2016						35		51
8/4/2016					340			
9/19/2016	1.4 (J)	<2						
9/20/2016			500		350	34	280	54
11/29/2016	3.5	2.2	560			39		
11/30/2016					240		440	47
1/31/2017	2.9	1.1 (J)	490			48		
2/1/2017				190	340		110	58
5/23/2017	4	1.9 (J)	500					
5/24/2017				120	310	44	150	28
10/9/2017	3.8							
10/10/2017		1.8 (J)	470		230			
10/11/2017						33	44	45

Time Series

Constituent: Chloride (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	66							
3/30/2016		110	83	520				
5/18/2016	78	100						
5/19/2016			390	80		44		
5/20/2016							70	
7/19/2016	120							
7/20/2016		100	340			34		
8/4/2016					91			210
9/20/2016	180	110			91			
9/21/2016			510			36		220
11/29/2016	390					170		
11/30/2016		91			98			
12/1/2016			390					220
1/30/2017						130		
1/31/2017	300						190	230
2/1/2017		150		89	120			
2/2/2017			290					
5/22/2017	310					39		
5/23/2017							110	240
5/24/2017		100	310					
5/25/2017				93	90			
10/9/2017	310							
10/10/2017			460		83	13		220
10/11/2017		86						

Time Series

Constituent: Fluoride (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	0.04 (J)	<0.1	0.31	0.1		0.12	0.79	
3/30/2016								0.13
5/18/2016	0.04 (J)	<0.1						
5/19/2016			0.34	0.15		0.14	1.1	0.16
7/19/2016	0.04 (J)	<0.1	0.37				1.7	
7/20/2016						0.24		0.16
8/4/2016					1.2			
9/19/2016	<0.1	<0.1						
9/20/2016			0.38		1.7	0.23	1.6	0.14
11/29/2016	<0.1	<0.1	0.34			0.17		
11/30/2016					1.5		1.4	0.12
1/31/2017	0.04 (J)	<0.1	0.41			0.04 (J)		
2/1/2017				<0.1	2.1		1.1	0.16
5/23/2017	0.05 (J)	<0.1	0.36					
5/24/2017				0.08 (J)	1.3	0.1	1.7	0.19
10/9/2017	0.06 (J)							
10/10/2017		<0.1	0.39		2.2			
10/11/2017						0.24	2.3	0.19

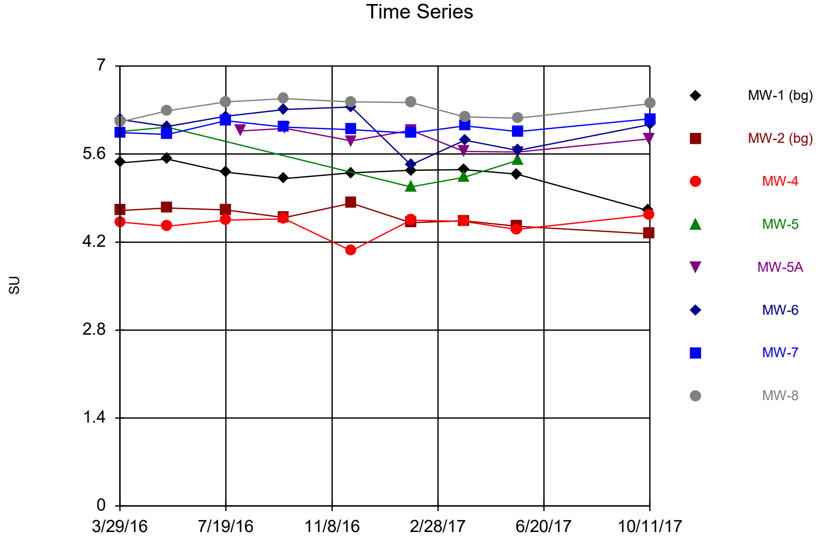
Time Series

Constituent: Fluoride (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

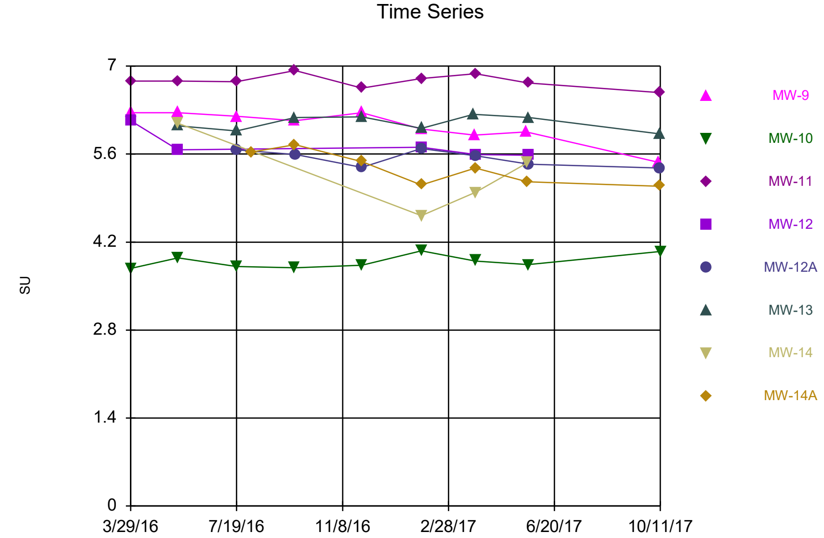
	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	0.12							
3/30/2016		0.06 (J)	0.05 (J)	1.5				
5/18/2016	0.12	0.06 (J)						
5/19/2016			1.6	0.04 (J)		0.07 (J)		
5/20/2016							0.22	
7/19/2016	0.12							
7/20/2016		0.07 (J)	1.8			0.08 (J)		
8/4/2016					0.04 (J)			0.05 (J)
9/20/2016	0.11	0.06 (J)			0.04 (J)			
9/21/2016			1.8			0.08 (J)		0.05 (J)
11/29/2016	0.09 (J)					0.06 (J)		
11/30/2016		0.04 (J)			<0.1			
12/1/2016			1.7					0.05 (J)
1/30/2017						0.06 (J)		
1/31/2017	0.1						0.04 (J)	<0.1
2/1/2017		0.06 (J)		0.04 (J)	0.04 (J)			
2/2/2017			2.4					
5/22/2017	0.1					0.09 (J)		
5/23/2017							0.06 (J)	0.04 (J)
5/24/2017		0.08 (J)	2.2					
5/25/2017				0.05 (J)	0.05 (J)			
10/9/2017	0.12							
10/10/2017			2.1		0.04 (J)	0.1		0.04 (J)
10/11/2017		0.06 (J)						

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



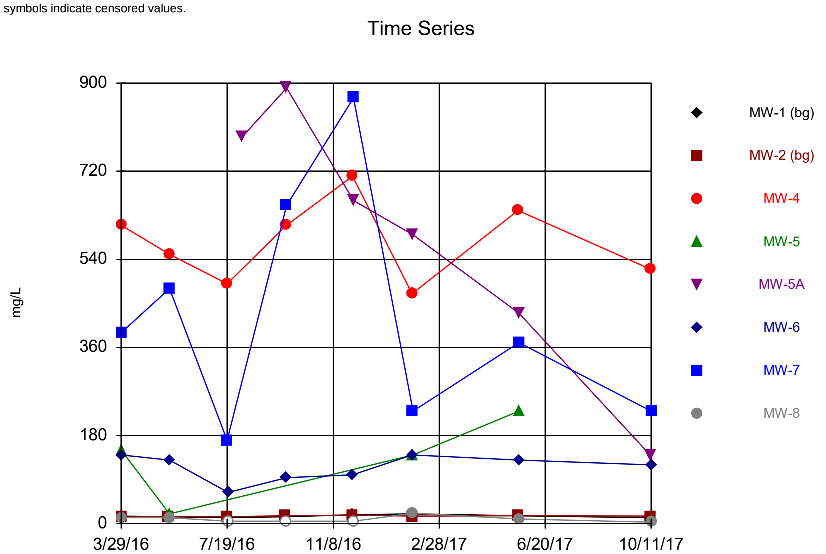
Constituent: pH Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



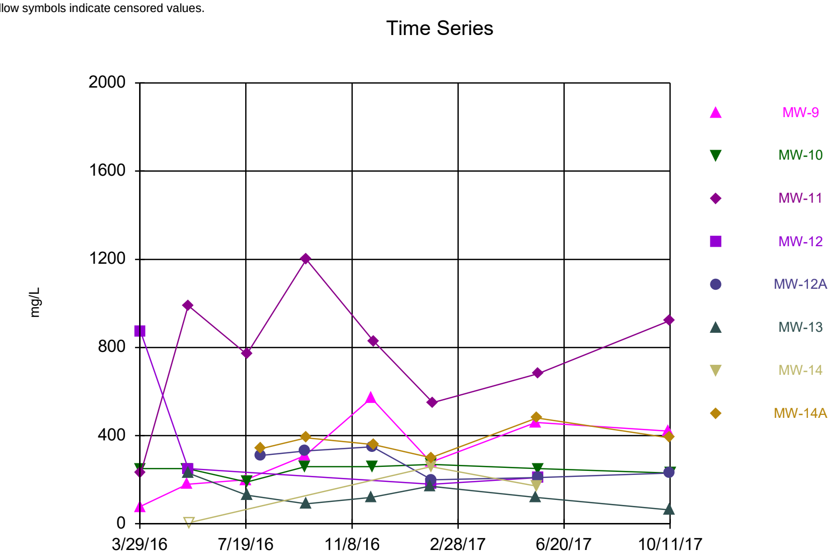
Constituent: pH Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.



Constituent: Sulfate Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.



Constituent: Sulfate Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Time Series

Constituent: pH (SU)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	5.46	4.7	4.52	5.96		6.15	5.94	6.11
5/18/2016	5.52	4.74	4.45	6.03		6.04	5.91	6.29
7/19/2016	5.31	4.71	4.55			6.2	6.13	6.43
8/4/2016					5.97			
9/19/2016	5.21	4.59	4.57			6.31	6.03	6.48
9/20/2016					6.01			
11/29/2016	5.3	4.82	4.06		5.81	6.35	5.99	6.43
1/31/2017	5.34	4.51	4.55	5.08	5.98	5.43	5.93	6.42
3/28/2017	5.35	4.54	4.53	5.23	5.64			
3/29/2017						5.82	6.05	6.19
5/23/2017	5.28	4.45	4.4					
5/24/2017				5.5	5.63	5.66	5.96	6.17
10/9/2017	4.7							
10/10/2017		4.33	4.63		5.84			
10/11/2017						6.07	6.16	6.4

Time Series

Constituent: pH (SU)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	6.26	3.78	6.76	6.13				
5/18/2016	6.26	3.95	6.76	5.67		6.05	6.09	
7/19/2016	6.2	3.81	6.75		5.67	5.97		
8/4/2016								5.63
9/19/2016	6.13	3.79	6.93			6.18		5.75
9/20/2016					5.59			
11/29/2016	6.26	3.83	6.65		5.39	6.19		5.48
1/31/2017	6	4.06	6.8	5.71	5.69	6.01	4.62	5.11
3/27/2017						6.23		
3/28/2017	5.9							
3/29/2017		3.9	6.88				4.99	5.38
3/30/2017				5.59	5.57			
5/22/2017	5.95							
5/23/2017							5.46	5.16
5/24/2017		3.84	6.73					
5/25/2017				5.58	5.44	6.18		
10/9/2017	5.47							
10/10/2017			6.58		5.38	5.92		5.09
10/11/2017		4.05						

Time Series

Constituent: Sulfate (mg/L)   Analysis Run 11/15/2017 5:09 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

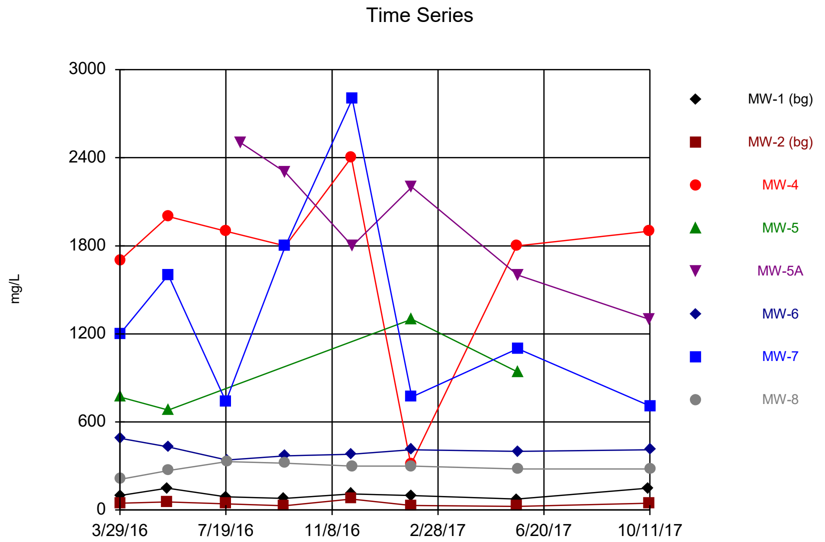
	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	15	14	610	150		140	390	
3/30/2016								12
5/18/2016	14	14						
5/19/2016			550	20		130	480	12
7/19/2016	12	14	490				170 (J)	
7/20/2016						64		<5
8/4/2016					790			
9/19/2016	14	16						
9/20/2016			610		890	94	650	<5
11/29/2016	18	17	710			100		
11/30/2016					660		870	<5
1/31/2017	20	15	470			140		
2/1/2017				140	590		230	21
5/23/2017	16	16	640					
5/24/2017				230	430	130	370	9.6
10/9/2017	12							
10/10/2017		15	520		140			
10/11/2017						120	230	2.9 (J)

Time Series

Constituent: Sulfate (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive

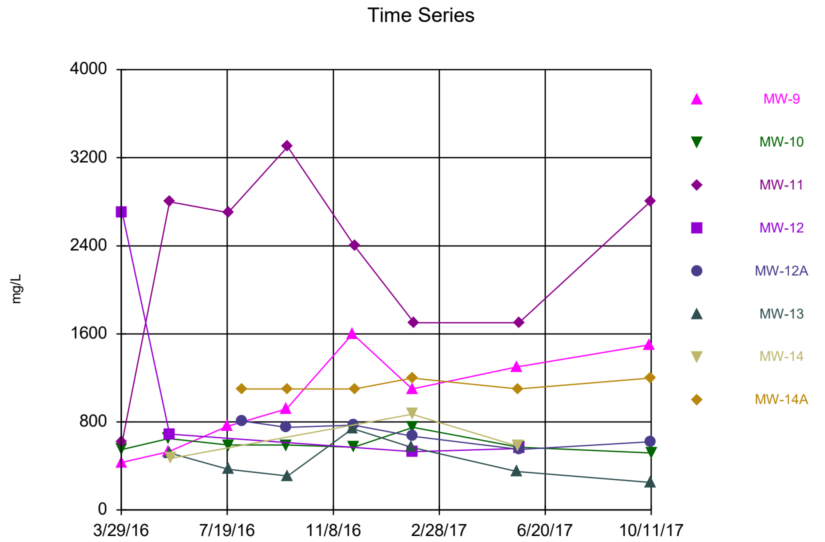
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	77							
3/30/2016		250	230	870				
5/18/2016	180	250						
5/19/2016			990	250		230		
5/20/2016							<5	
7/19/2016	200							
7/20/2016		190 (J)	770			130		
8/4/2016					310			340
9/20/2016	310	260			330			
9/21/2016			1200			90		390
11/29/2016	570					120		
11/30/2016		260			350			
12/1/2016			830					360
1/30/2017						170		
1/31/2017	280						260	300
2/1/2017		270		180	200			
2/2/2017			550					
5/22/2017	460					120		
5/23/2017							170	480
5/24/2017		250	680					
5/25/2017				210	210			
10/9/2017	420							
10/10/2017			920		230	63		390
10/11/2017		230						



Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-1 (bg)	MW-2 (bg)	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-8
3/29/2016	100	46	1700	770		490	1200	
3/30/2016								210
5/18/2016	150	56						
5/19/2016			2000	680		430	1600	270
7/19/2016	90	42	1900				740	
7/20/2016						340		330
8/4/2016					2500			
9/19/2016	80	30						
9/20/2016			1800		2300	370	1800	320
11/29/2016	110	76	2400			380		
11/30/2016					1800		2800	300
1/31/2017	98	32	310			410		
2/1/2017				1300	2200		770	300
5/23/2017	74	26	1800					
5/24/2017				940	1600	400	1100	280
10/9/2017	150							
10/10/2017		46	1900		1300			
10/11/2017						410	710	280

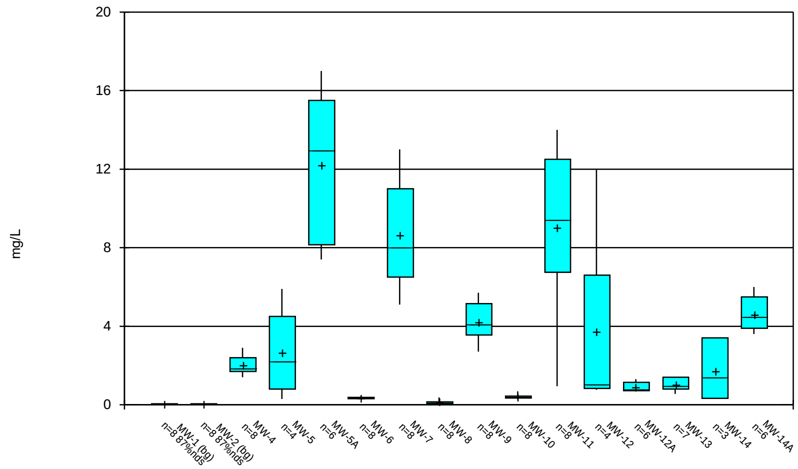
Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 11/15/2017 5:09 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

	MW-9	MW-10	MW-11	MW-12	MW-12A	MW-13	MW-14	MW-14A
3/29/2016	430							
3/30/2016		550	620	2700				
5/18/2016	530	650						
5/19/2016			2800	690		520		
5/20/2016							470	
7/19/2016	760							
7/20/2016		590	2700			370		
8/4/2016					810			1100
9/20/2016	920	590			750			
9/21/2016			3300			310		1100
11/29/2016	1600					740		
11/30/2016		570			770			
12/1/2016			2400					1100
1/30/2017						570		
1/31/2017	1100						870	1200
2/1/2017		750		530	670			
2/2/2017			1700					
5/22/2017	1300					350		
5/23/2017							580	1100
5/24/2017		570	1700					
5/25/2017				560	550			
10/9/2017	1500							
10/10/2017			2800		620	250		1200
10/11/2017		520						

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

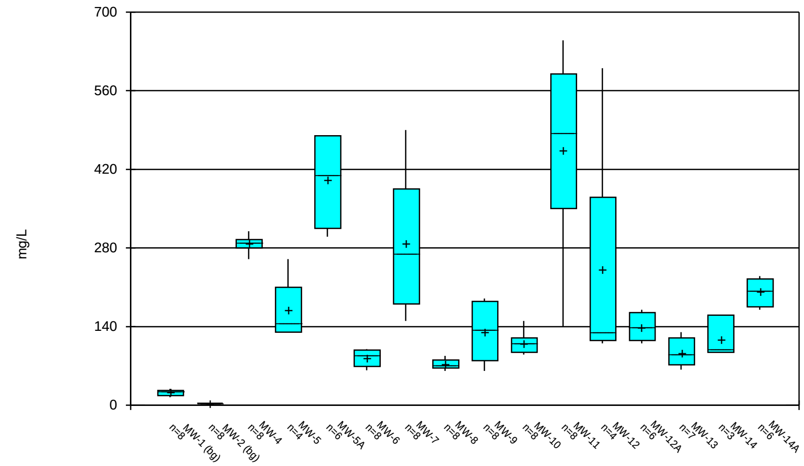
Box & Whiskers Plot



Constituent: Boron Analysis Run 11/16/2017 5:57 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

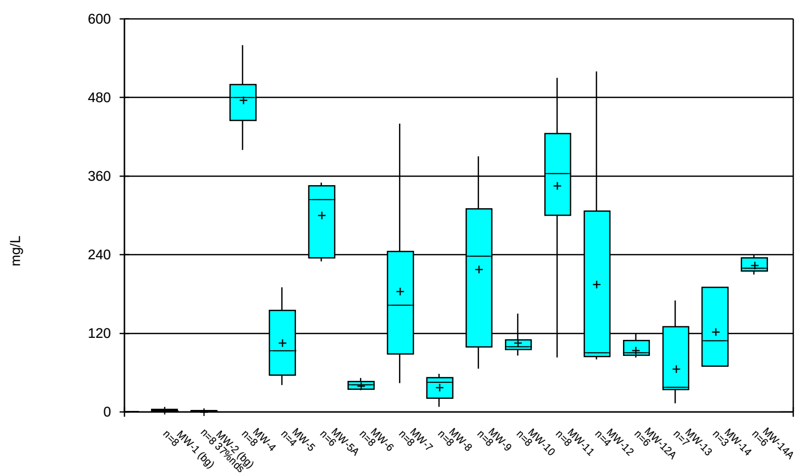
Box & Whiskers Plot



Constituent: Calcium Analysis Run 11/16/2017 5:57 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

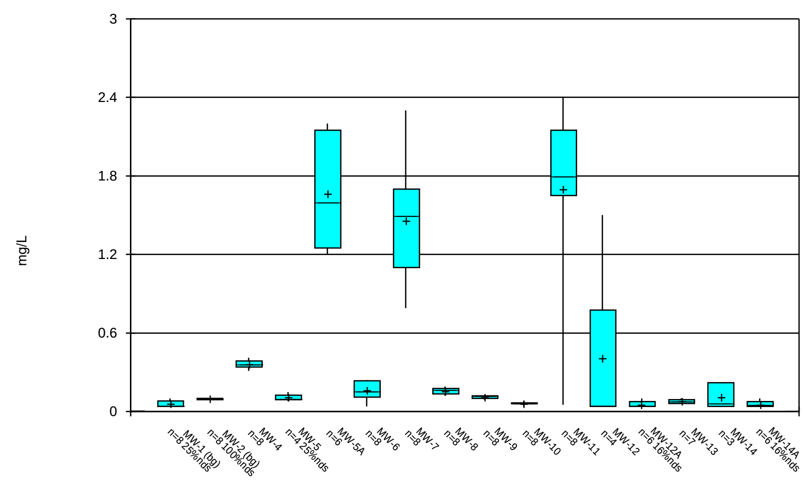
Box & Whiskers Plot



Constituent: Chloride Analysis Run 11/16/2017 5:57 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

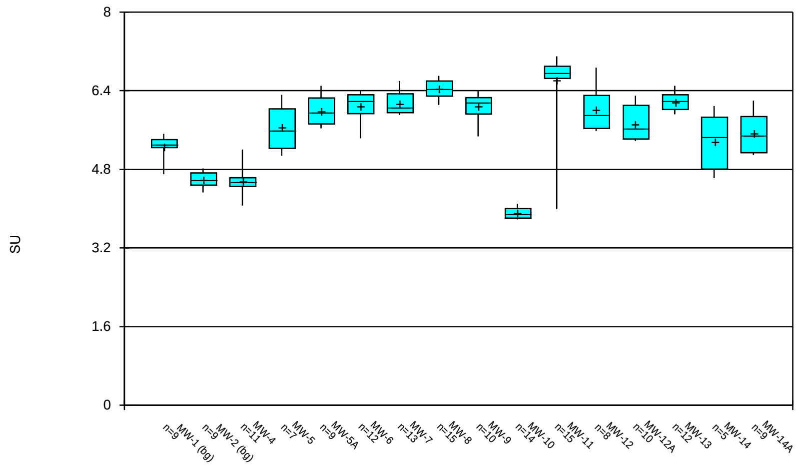
Box & Whiskers Plot



Constituent: Fluoride Analysis Run 11/16/2017 5:57 AM View: Descriptive
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Box & Whiskers Plot

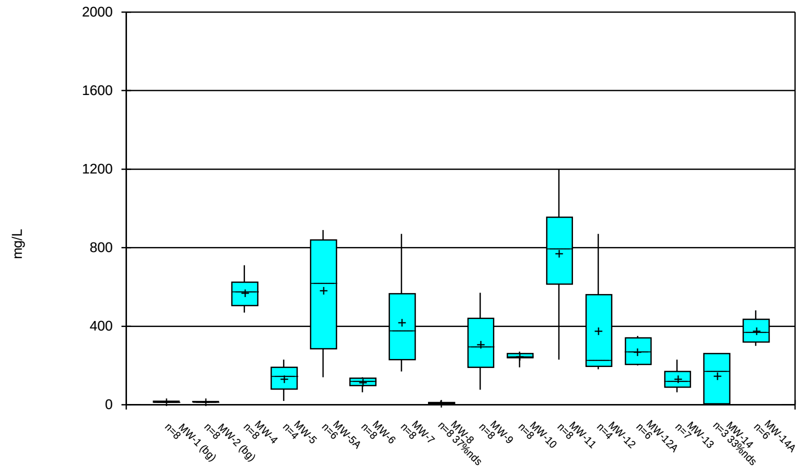


Constituent: pH   Analysis Run 11/16/2017 5:57 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Box & Whiskers Plot

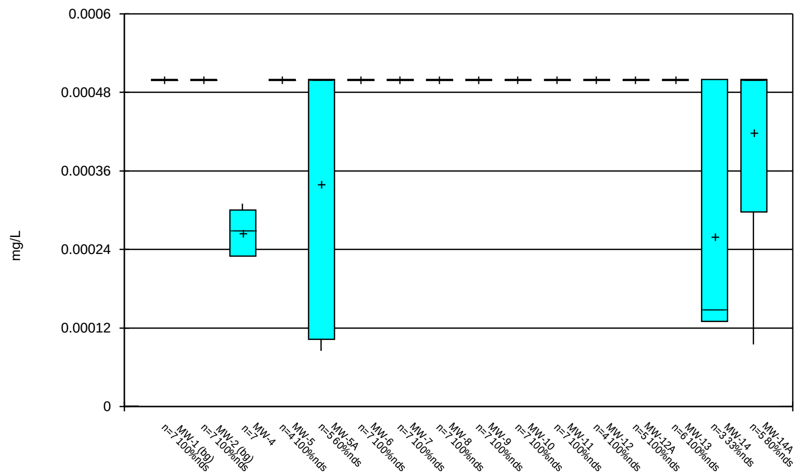


Constituent: Sulfate   Analysis Run 11/16/2017 5:57 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Thallium   Analysis Run 11/16/2017 5:57 AM   View: Descriptive

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Outlier Screening

Outlier Analysis - Upgradient Wells

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (mg/L)	MW-4	No	n/a	NP	6	1.917	0.5193	ln(x)	ShapiroWilk
Boron (mg/L)	MW-5A	No	n/a	NP	4	14.25	1.893	ln(x)	ShapiroWilk
Boron (mg/L)	MW-6	No	n/a	NP	6	0.3333	0.04274	ln(x)	ShapiroWilk
Boron (mg/L)	MW-7	No	n/a	NP	6	8.85	3.227	ln(x)	ShapiroWilk
Boron (mg/L)	MW-8	No	n/a	NP	6	0.1385	0.1219	ln(x)	ShapiroWilk
Boron (mg/L)	MW-9	No	n/a	NP	6	3.95	1.039	ln(x)	ShapiroWilk
Boron (mg/L)	MW-10	No	n/a	NP	6	0.4067	0.1481	ln(x)	ShapiroWilk
Boron (mg/L)	MW-11	No	n/a	NP	6	9.792	4.827	x^3	ShapiroWilk
Boron (mg/L)	MW-12A	No	n/a	NP	4	0.9425	0.2599	ln(x)	ShapiroWilk
Boron (mg/L)	MW-13	No	n/a	NP	5	1.072	0.3078	ln(x)	ShapiroWilk
Boron (mg/L)	MW-14A	No	n/a	NP	4	4.975	0.732	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-4	No	n/a	NP	6	283.3	15.06	x^6	ShapiroWilk
Calcium (mg/L)	MW-5A	No	n/a	NP (nrm)	4	445	70	unknown	ShapiroWilk
Calcium (mg/L)	MW-6	No	n/a	NP	6	81.5	17.11	sqrt(x)	ShapiroWilk
Calcium (mg/L)	MW-7	No	n/a	NP	6	310	134.9	normal	ShapiroWilk
Calcium (mg/L)	MW-8	No	n/a	NP	6	70.17	8.542	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-9	No	n/a	NP	6	111.5	48.43	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-10	No	n/a	NP	6	114	22.63	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-11	No	n/a	NP	6	448.3	190.5	x^2	ShapiroWilk
Calcium (mg/L)	MW-12A	No	n/a	NP	4	152.5	17.08	x^5	ShapiroWilk
Calcium (mg/L)	MW-13	No	n/a	NP	5	97	29.19	x^2	ShapiroWilk
Calcium (mg/L)	MW-14A	No	n/a	NP	4	192.5	22.17	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-4	No	n/a	NP	6	473.3	56.45	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-5A	No	n/a	NP (nrm)	4	317.5	51.88	unknown	ShapiroWilk
Chloride (mg/L)	MW-6	No	n/a	NP	6	42.17	7.305	normal	ShapiroWilk
Chloride (mg/L)	MW-7	No	n/a	NP	6	214.5	133.4	x^(1/3)	ShapiroWilk
Chloride (mg/L)	MW-8	No	n/a	NP	6	38.65	21.84	x^5	ShapiroWilk
Chloride (mg/L)	MW-9	No	n/a	NP	6	189	130.4	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-10	No	n/a	NP	6	110.2	20.79	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-11	No	n/a	NP	6	333.8	143	x^2	ShapiroWilk
Chloride (mg/L)	MW-12A	No	n/a	NP	4	100	13.74	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-13	No	n/a	NP	5	82.8	63.07	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-14A	No	n/a	NP	4	220	8.165	normal	ShapiroWilk
Fluoride (mg/L)	MW-4	No	n/a	NP	6	0.3583	0.03545	x^(1/3)	ShapiroWilk
Fluoride (mg/L)	MW-5A	No	n/a	NP	4	1.625	0.3775	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-6	No	n/a	NP	6	0.1567	0.07448	normal	ShapiroWilk
Fluoride (mg/L)	MW-7	No	n/a	NP	6	1.282	0.3459	normal	ShapiroWilk
Fluoride (mg/L)	MW-8	No	n/a	NP	6	0.145	0.01761	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-9	No	n/a	NP	6	0.11	0.01265	x^2	ShapiroWilk
Fluoride (mg/L)	MW-10	No	n/a	NP (nrm)	6	0.05833	0.009832	unknown	ShapiroWilk
Fluoride (mg/L)	MW-11	No	n/a	NP	6	1.558	0.7902	x^2	ShapiroWilk
Fluoride (mg/L)	MW-12A	No	n/a	NP (nrm)	4	0.055	0.03	unknown	ShapiroWilk
Fluoride (mg/L)	MW-13	No	n/a	NP	5	0.07	0.01	normal	ShapiroWilk
Fluoride (mg/L)	MW-14A	No	n/a	NP (nrm)	4	0.0625	0.025	unknown	ShapiroWilk
pH (SU)	MW-4	No	n/a	NP	6	4.67	0.6098	x^6	ShapiroWilk
pH (SU)	MW-5A	No	n/a	NP (nrm)	4	6.45	0.05774	unknown	ShapiroWilk
pH (SU)	MW-6	No	n/a	NP	6	6.227	0.1745	x^6	ShapiroWilk
pH (SU)	MW-7	No	n/a	NP	6	6.395	0.1331	ln(x)	ShapiroWilk
pH (SU)	MW-8	No	n/a	NP	6	6.605	0.1015	x^6	ShapiroWilk
pH (SU)	MW-9	No	n/a	NP	6	6.312	0.1429	x^6	ShapiroWilk
pH (SU)	MW-10	No	n/a	NP	6	4.217	0.6846	ln(x)	ShapiroWilk
pH (SU)	MW-11	No	n/a	NP	6	6.368	1.188	x^6	ShapiroWilk
pH (SU)	MW-12A	No	n/a	NP	4	6.125	0.15	x^6	ShapiroWilk
pH (SU)	MW-13	No	n/a	NP	5	6.368	0.1998	x^6	ShapiroWilk
pH (SU)	MW-14A	No	n/a	NP	4	5.95	0.2517	x^6	ShapiroWilk

Outlier Analysis - Upgradient Wells

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Sulfate (mg/L)	MW-4	No	n/a	NP	6	573.3	88.92	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-5A	No	n/a	NP	4	732.5	133.8	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-6	No	n/a	NP	6	111.3	30.53	normal	ShapiroWilk
Sulfate (mg/L)	MW-7	No	n/a	NP	6	465	263.2	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-8	No	n/a	NP	6	10	6.387	sqrt(x)	ShapiroWilk
Sulfate (mg/L)	MW-9	No	n/a	NP	6	269.5	168.5	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-10	No	n/a	NP	6	246.7	28.75	x^6	ShapiroWilk
Sulfate (mg/L)	MW-11	No	n/a	NP	6	761.7	339.6	normal	ShapiroWilk
Sulfate (mg/L)	MW-12A	No	n/a	NP	4	297.5	67.02	x^6	ShapiroWilk
Sulfate (mg/L)	MW-13	No	n/a	NP	5	148	54.04	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-14A	No	n/a	NP	4	347.5	37.75	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4	No	n/a	NP	6	1685	715.6	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-5A	No	n/a	NP	4	2200	294.4	x^5	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-6	No	n/a	NP	6	403.3	52.79	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-7	No	n/a	NP	6	1485	773.2	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-8	No	n/a	NP	6	288.3	43.55	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-9	No	n/a	NP	6	890	426	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-10	No	n/a	NP	6	616.7	73.39	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-11	No	n/a	NP	6	2253	958.1	x^2	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-12A	No	n/a	NP	4	750	58.88	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-13	No	n/a	NP	5	502	170.2	x^(1/3)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-14A	No	n/a	NP (nrm)	4	1125	50	unknown	ShapiroWilk

Outlier Analysis - Downgradient Wells

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (mg/L)	MW-4	No	n/a	NP	6	1.917	0.5193	ln(x)	ShapiroWilk
Boron (mg/L)	MW-5A	No	n/a	NP	4	14.25	1.893	ln(x)	ShapiroWilk
Boron (mg/L)	MW-6	No	n/a	NP	6	0.3333	0.04274	ln(x)	ShapiroWilk
Boron (mg/L)	MW-7	No	n/a	NP	6	8.85	3.227	ln(x)	ShapiroWilk
Boron (mg/L)	MW-8	No	n/a	NP	6	0.1385	0.1219	ln(x)	ShapiroWilk
Boron (mg/L)	MW-9	No	n/a	NP	6	3.95	1.039	ln(x)	ShapiroWilk
Boron (mg/L)	MW-10	No	n/a	NP	6	0.4067	0.1481	ln(x)	ShapiroWilk
Boron (mg/L)	MW-11	No	n/a	NP	6	9.792	4.827	x^3	ShapiroWilk
Boron (mg/L)	MW-12A	No	n/a	NP	4	0.9425	0.2599	ln(x)	ShapiroWilk
Boron (mg/L)	MW-13	No	n/a	NP	5	1.072	0.3078	ln(x)	ShapiroWilk
Boron (mg/L)	MW-14A	No	n/a	NP	4	4.975	0.732	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-4	No	n/a	NP	6	283.3	15.06	x^6	ShapiroWilk
Calcium (mg/L)	MW-5A	No	n/a	NP (nrm)	4	445	70	unknown	ShapiroWilk
Calcium (mg/L)	MW-6	No	n/a	NP	6	81.5	17.11	sqrt(x)	ShapiroWilk
Calcium (mg/L)	MW-7	No	n/a	NP	6	310	134.9	normal	ShapiroWilk
Calcium (mg/L)	MW-8	No	n/a	NP	6	70.17	8.542	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-9	No	n/a	NP	6	111.5	48.43	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-10	No	n/a	NP	6	114	22.63	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-11	No	n/a	NP	6	448.3	190.5	x^2	ShapiroWilk
Calcium (mg/L)	MW-12A	No	n/a	NP	4	152.5	17.08	x^5	ShapiroWilk
Calcium (mg/L)	MW-13	No	n/a	NP	5	97	29.19	x^2	ShapiroWilk
Calcium (mg/L)	MW-14A	No	n/a	NP	4	192.5	22.17	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-4	No	n/a	NP	6	473.3	56.45	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-5A	No	n/a	NP (nrm)	4	317.5	51.88	unknown	ShapiroWilk
Chloride (mg/L)	MW-6	No	n/a	NP	6	42.17	7.305	normal	ShapiroWilk
Chloride (mg/L)	MW-7	No	n/a	NP	6	214.5	133.4	x^(1/3)	ShapiroWilk
Chloride (mg/L)	MW-8	No	n/a	NP	6	38.65	21.84	x^5	ShapiroWilk
Chloride (mg/L)	MW-9	No	n/a	NP	6	189	130.4	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-10	No	n/a	NP	6	110.2	20.79	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-11	No	n/a	NP	6	333.8	143	x^2	ShapiroWilk
Chloride (mg/L)	MW-12A	No	n/a	NP	4	100	13.74	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-13	No	n/a	NP	5	82.8	63.07	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-14A	No	n/a	NP	4	220	8.165	normal	ShapiroWilk
Fluoride (mg/L)	MW-4	No	n/a	NP	6	0.3583	0.03545	x^(1/3)	ShapiroWilk
Fluoride (mg/L)	MW-5A	No	n/a	NP	4	1.625	0.3775	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-6	No	n/a	NP	6	0.1567	0.07448	normal	ShapiroWilk
Fluoride (mg/L)	MW-7	No	n/a	NP	6	1.282	0.3459	normal	ShapiroWilk
Fluoride (mg/L)	MW-8	No	n/a	NP	6	0.145	0.01761	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-9	No	n/a	NP	6	0.11	0.01265	x^2	ShapiroWilk
Fluoride (mg/L)	MW-10	No	n/a	NP (nrm)	6	0.05833	0.009832	unknown	ShapiroWilk
Fluoride (mg/L)	MW-11	No	n/a	NP	6	1.558	0.7902	x^2	ShapiroWilk
Fluoride (mg/L)	MW-12A	No	n/a	NP (nrm)	4	0.055	0.03	unknown	ShapiroWilk
Fluoride (mg/L)	MW-13	No	n/a	NP	5	0.07	0.01	normal	ShapiroWilk
Fluoride (mg/L)	MW-14A	No	n/a	NP (nrm)	4	0.0625	0.025	unknown	ShapiroWilk
pH (SU)	MW-4	No	n/a	NP	6	4.67	0.6098	x^6	ShapiroWilk
pH (SU)	MW-5A	No	n/a	NP (nrm)	4	6.45	0.05774	unknown	ShapiroWilk
pH (SU)	MW-6	No	n/a	NP	6	6.227	0.1745	x^6	ShapiroWilk
pH (SU)	MW-7	No	n/a	NP	6	6.395	0.1331	ln(x)	ShapiroWilk
pH (SU)	MW-8	No	n/a	NP	6	6.605	0.1015	x^6	ShapiroWilk
pH (SU)	MW-9	No	n/a	NP	6	6.312	0.1429	x^6	ShapiroWilk
pH (SU)	MW-10	No	n/a	NP	6	4.217	0.6846	ln(x)	ShapiroWilk
pH (SU)	MW-11	No	n/a	NP	6	6.368	1.188	x^6	ShapiroWilk
pH (SU)	MW-12A	No	n/a	NP	4	6.125	0.15	x^6	ShapiroWilk
pH (SU)	MW-13	No	n/a	NP	5	6.368	0.1998	x^6	ShapiroWilk
pH (SU)	MW-14A	No	n/a	NP	4	5.95	0.2517	x^6	ShapiroWilk

Outlier Analysis - Downgradient Wells

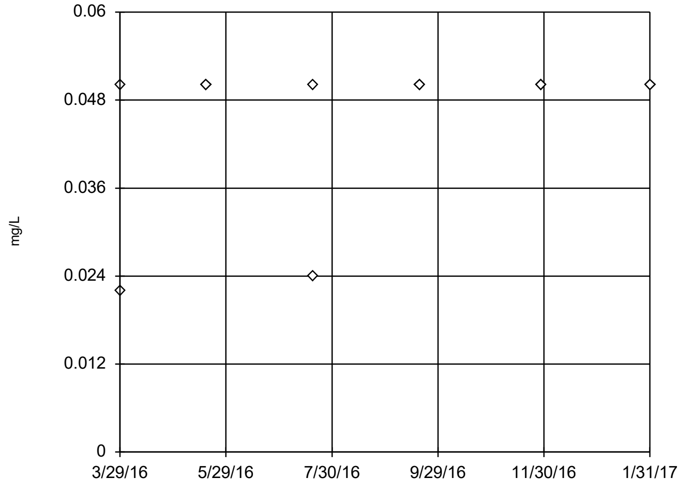
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/8/2017, 4:32 AM

Constituent	Well	Outlier	Value(s)	Method	N	Mean	Std. Dev.	Distribution	Normality Test
Sulfate (mg/L)	MW-4	No	n/a	NP	6	573.3	88.92	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-5A	No	n/a	NP	4	732.5	133.8	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-6	No	n/a	NP	6	111.3	30.53	normal	ShapiroWilk
Sulfate (mg/L)	MW-7	No	n/a	NP	6	465	263.2	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-8	No	n/a	NP	6	10	6.387	sqrt(x)	ShapiroWilk
Sulfate (mg/L)	MW-9	No	n/a	NP	6	269.5	168.5	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	MW-10	No	n/a	NP	6	246.7	28.75	x^6	ShapiroWilk
Sulfate (mg/L)	MW-11	No	n/a	NP	6	761.7	339.6	normal	ShapiroWilk
Sulfate (mg/L)	MW-12A	No	n/a	NP	4	297.5	67.02	x^6	ShapiroWilk
Sulfate (mg/L)	MW-13	No	n/a	NP	5	148	54.04	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-14A	No	n/a	NP	4	347.5	37.75	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4	No	n/a	NP	6	1685	715.6	x^3	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-5A	No	n/a	NP	4	2200	294.4	x^5	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-6	No	n/a	NP	6	403.3	52.79	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-7	No	n/a	NP	6	1485	773.2	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-8	No	n/a	NP	6	288.3	43.55	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-9	No	n/a	NP	6	890	426	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-10	No	n/a	NP	6	616.7	73.39	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-11	No	n/a	NP	6	2253	958.1	x^2	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-12A	No	n/a	NP	4	750	58.88	x^6	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-13	No	n/a	NP	5	502	170.2	x^(1/3)	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-14A	No	n/a	NP (nrm)	4	1125	50	unknown	ShapiroWilk

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

The results were invalidated, because the lower and upper quartiles are equal.

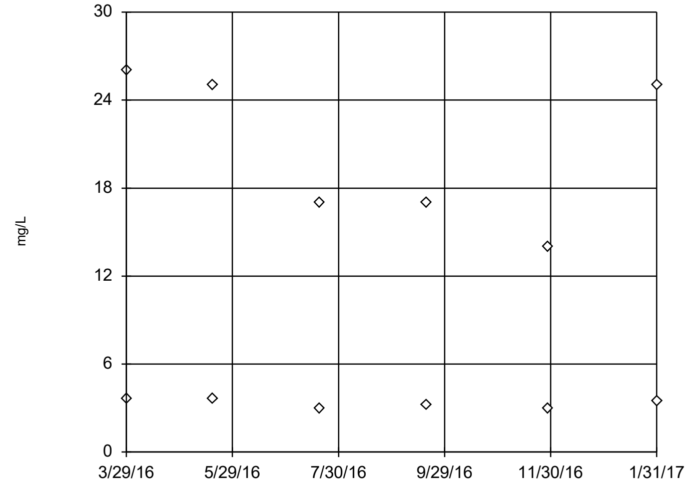
Constituent: Boron Analysis Run 11/8/2017 4:29 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 73.95, low cutoff = -49.6, based on IQR multiplier of 3.

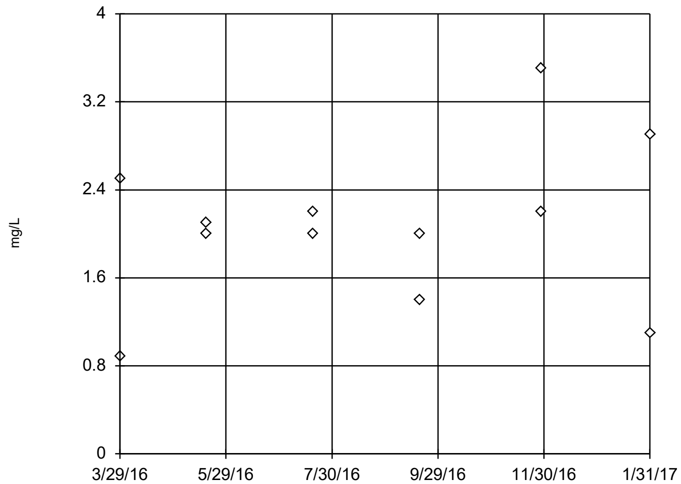
Constituent: Calcium Analysis Run 11/8/2017 4:29 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2



n = 12

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 4.3, low cutoff = -0.25, based on IQR multiplier of 3.

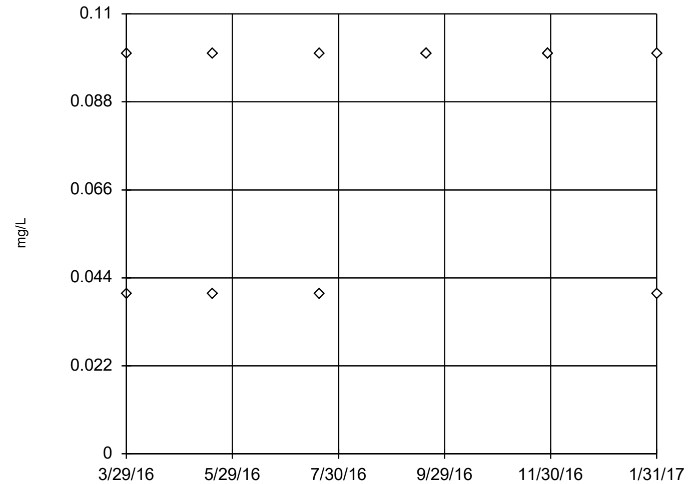
Constituent: Chloride Analysis Run 11/8/2017 4:29 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

MW-1,MW-2



n = 12

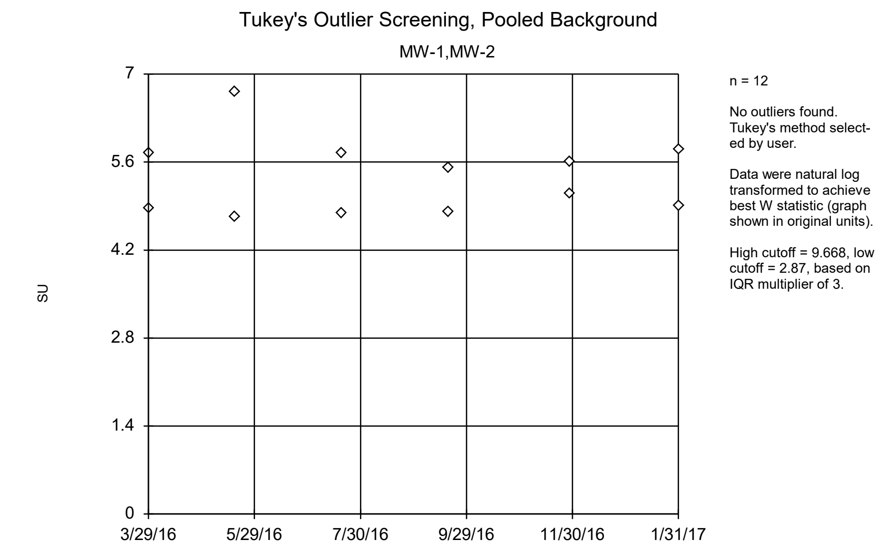
No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 0.28, low cutoff = -0.14, based on IQR multiplier of 3.

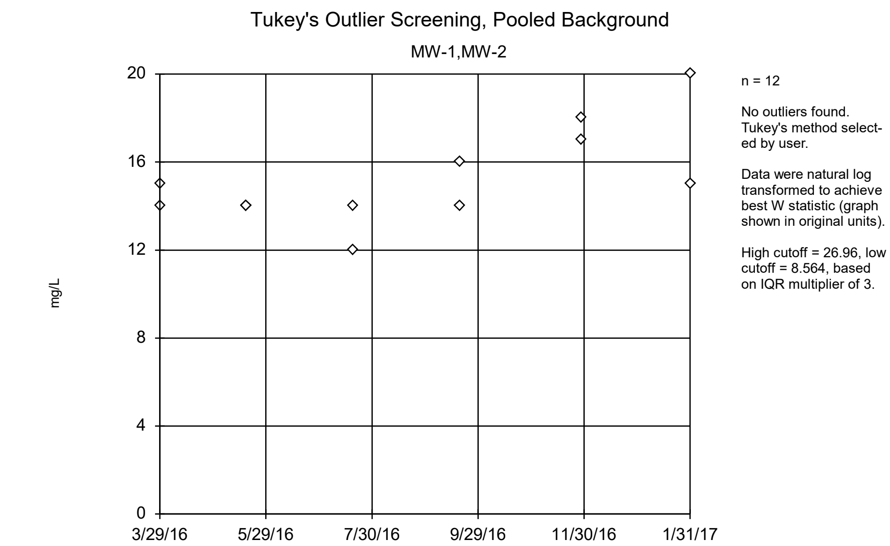
Constituent: Fluoride Analysis Run 11/8/2017 4:29 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



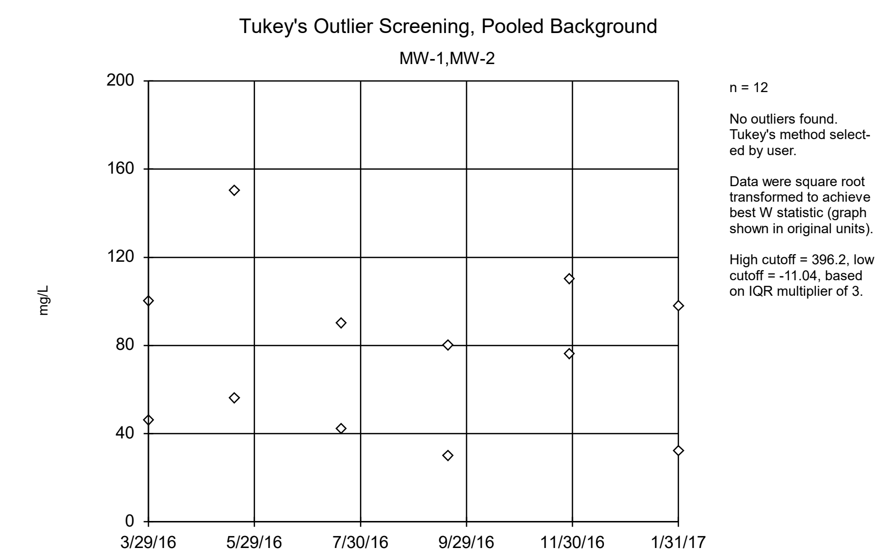
Constituent: pH Analysis Run 11/8/2017 4:29 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

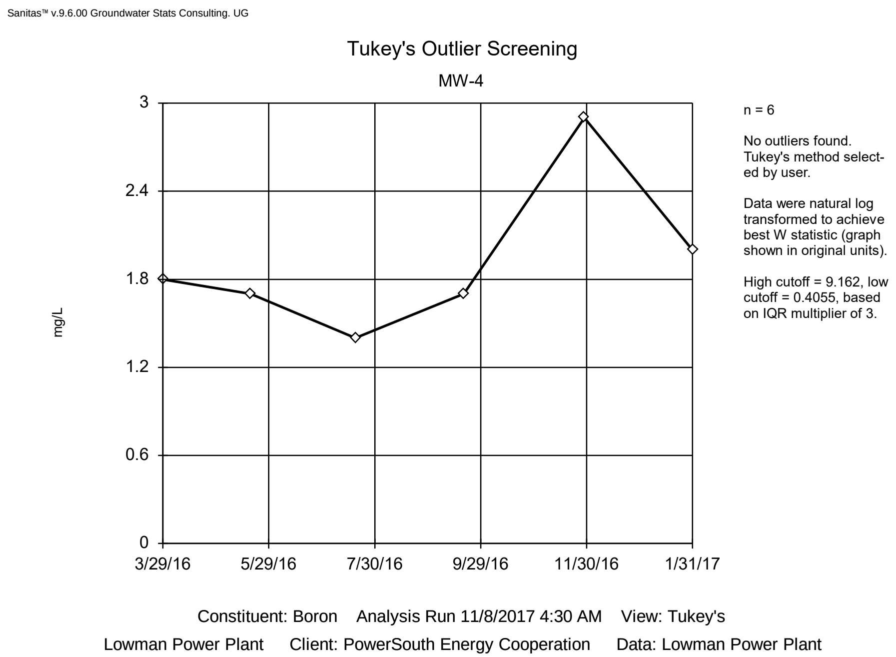


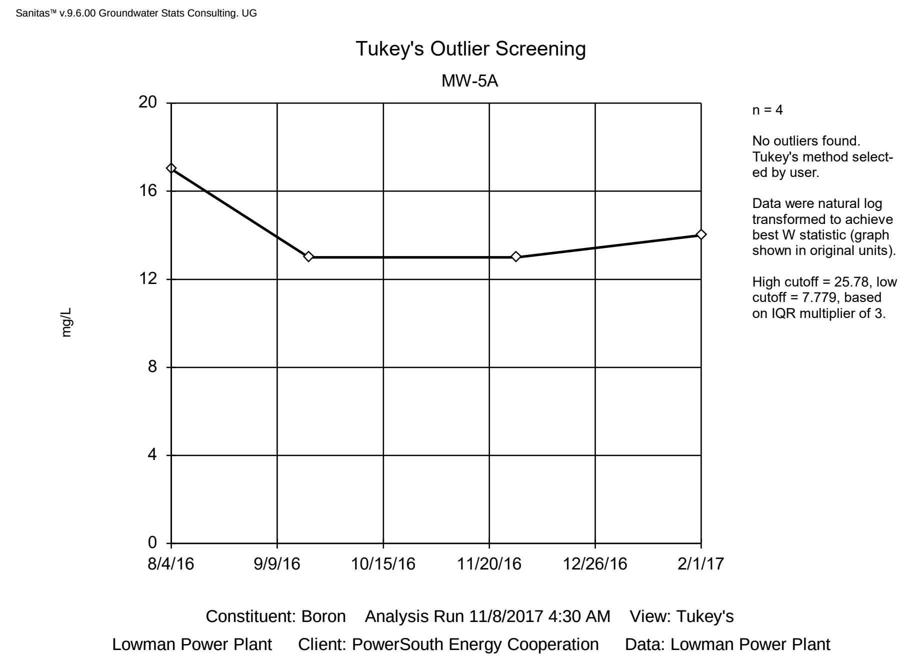
Constituent: Sulfate Analysis Run 11/8/2017 4:29 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

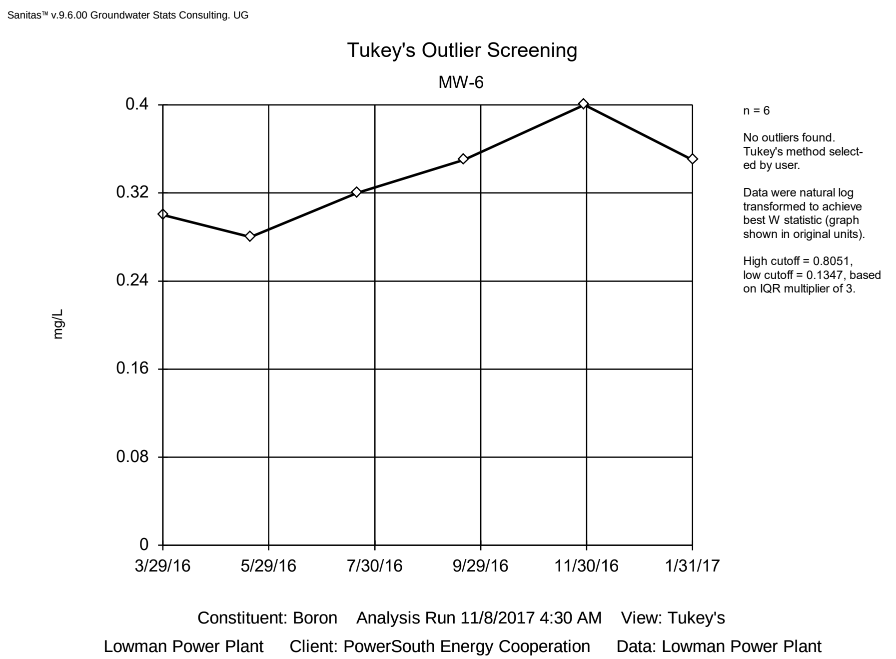
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

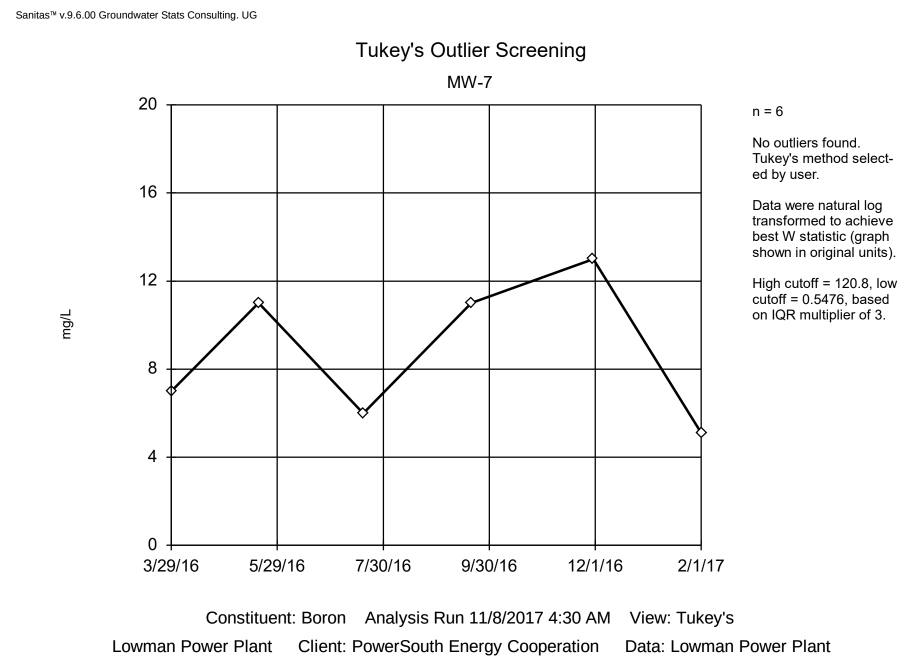


Constituent: Total Dissolved Solids Analysis Run 11/8/2017 4:29 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-4
3
2.4
1.8
1.2
0.6
0
mg/L
3/29/16
5/29/16
7/30/16
9/29/16
11/30/16
1/31/17
n = 6
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 = 9.162, low cutoff = 0.4055, based on IQR multiplier of 3.
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-5A
20
16
12
8
4
0
mg/L
8/4/16
9/9/16
10/15/16
11/20/16
12/26/16
2/1/17
n = 4
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 = 25.78, low cutoff = 7.779, based on IQR multiplier of 3.
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

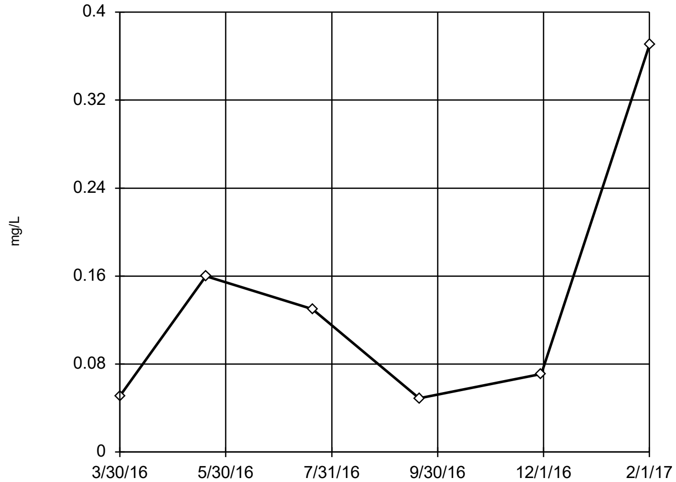

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-6
0.4
0.32
0.24
0.16
0.08
0
mg/L
3/29/16
5/29/16
7/30/16
9/29/16
11/30/16
1/31/17
n = 6
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.8051, low cutoff = 0.1347, based on IQR multiplier of 3.
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-7
20
16
12
8
4
0
mg/L
3/29/16
5/29/16
7/30/16
9/30/16
12/1/16
2/1/17
n = 6
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 = 120.8, low cutoff = 0.5476, based on IQR multiplier of 3.
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-8



n = 6

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 = 28.05, low cutoff = 0.0004336, based on IQR multiplier of 3.

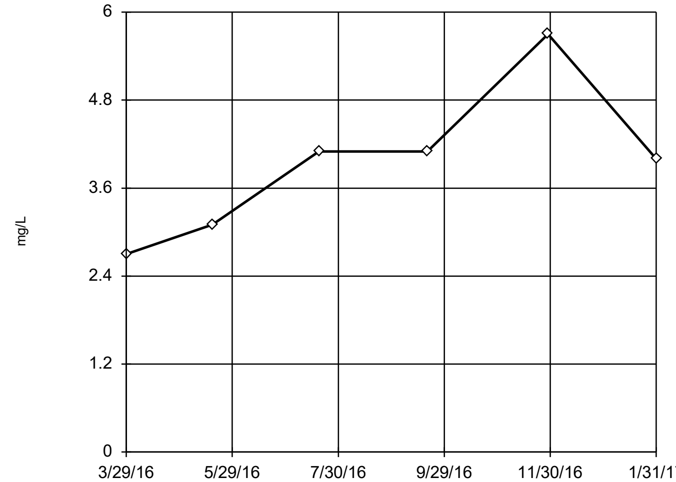
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-9



n = 6

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 = 22.55, low cutoff = 0.6201, based on IQR multiplier of 3.

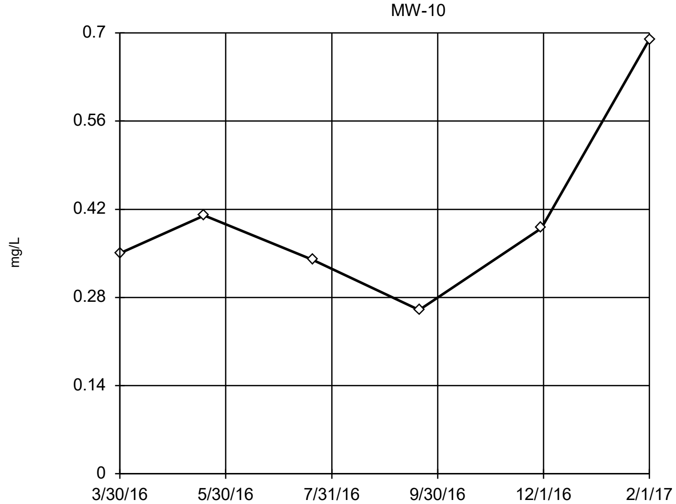
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



n = 6

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 = 3.045, low cutoff = 0.05193, based on IQR multiplier of 3.

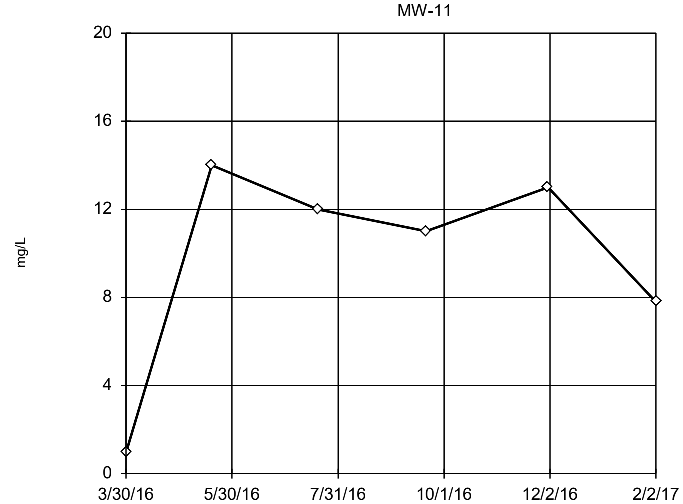
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-11



n = 6

No outliers found. Tukey's method selected by user.

Data were cube transformed to achieve best W statistic (graph shown in original units).

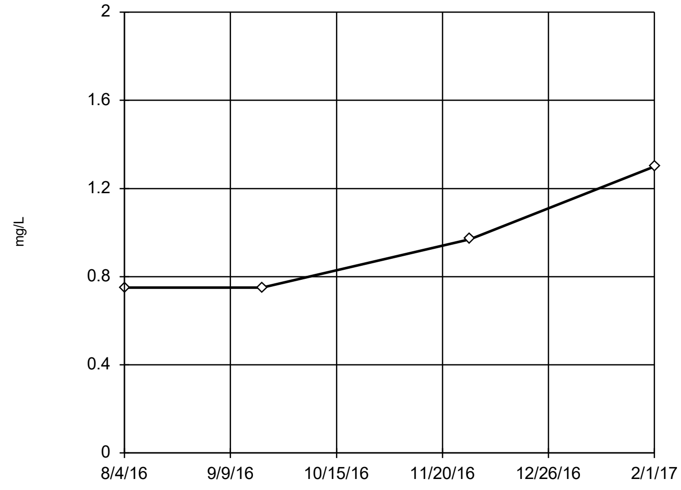
High cutoff = 20.93, low cutoff = -18.62, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Tukey's Outlier Screening

MW-12A



n = 4

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 = 3.769, low cutoff = 0.2234, based on IQR multiplier of 3.

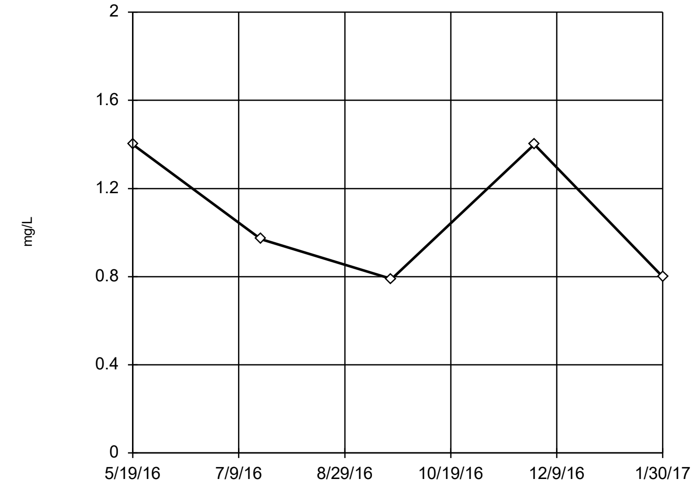
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-13



n = 5

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 = 7.646, low cutoff = 0.1456, based on IQR multiplier of 3.

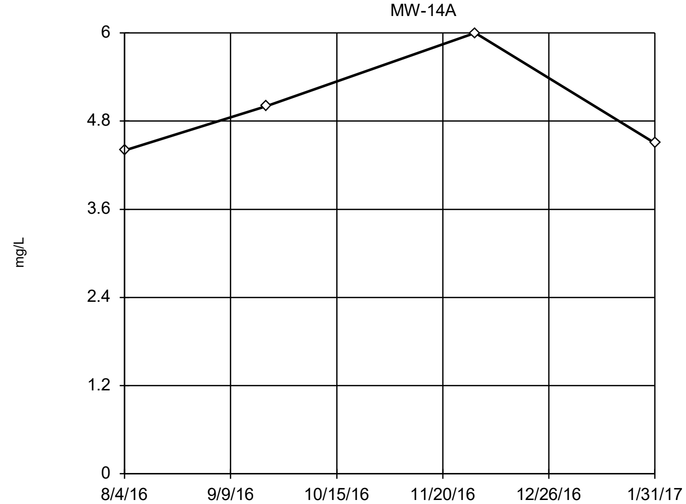
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-14A



n = 4

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 = 10.22, low cutoff = 2.386, based on IQR multiplier of 3.

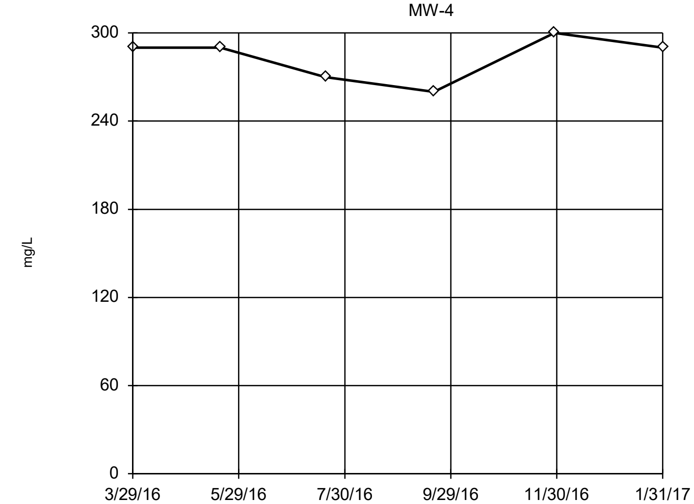
Constituent: Boron Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4



n = 6

No outliers found. Tukey's method selected by user.

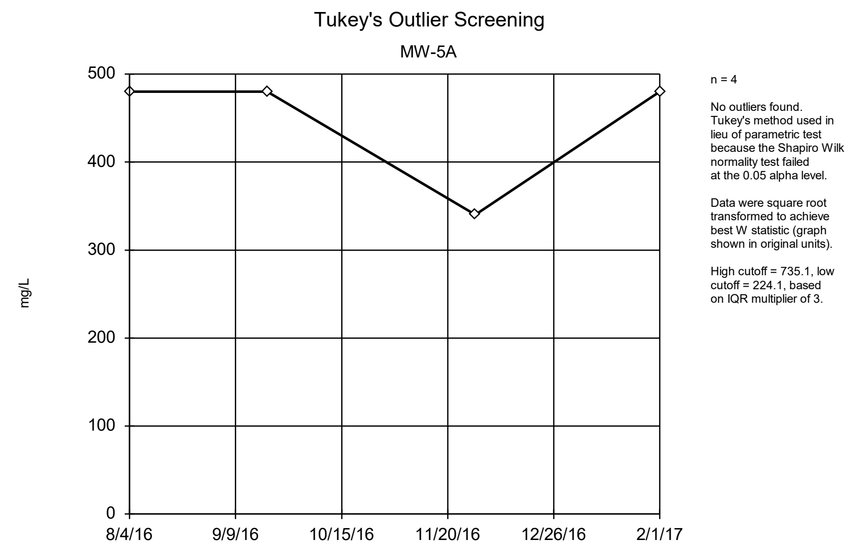
Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 342.1, low cutoff = -289.9, based on IQR multiplier of 3.

Constituent: Calcium Analysis Run 11/8/2017 4:30 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

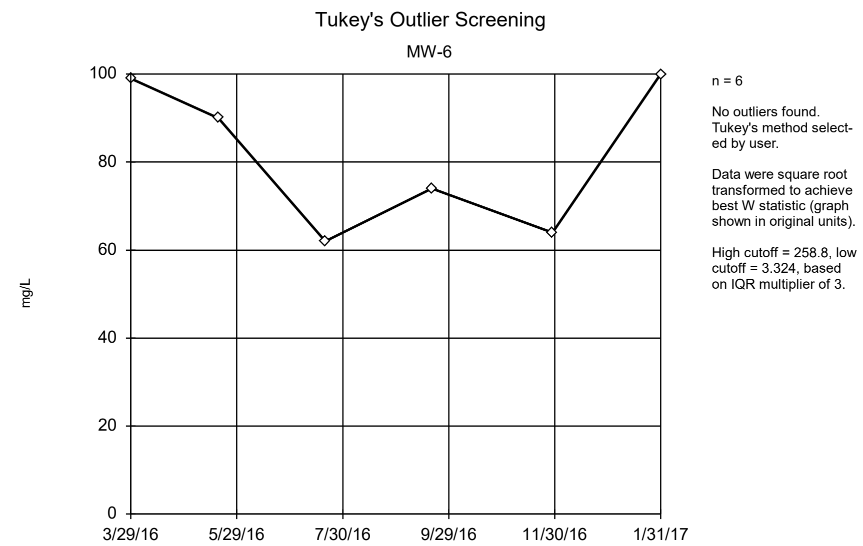
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Calcium   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

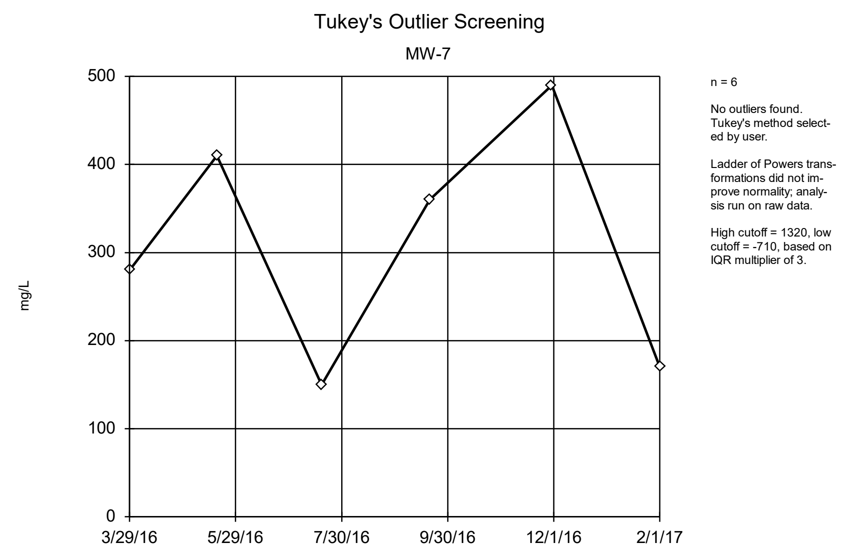
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Calcium   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

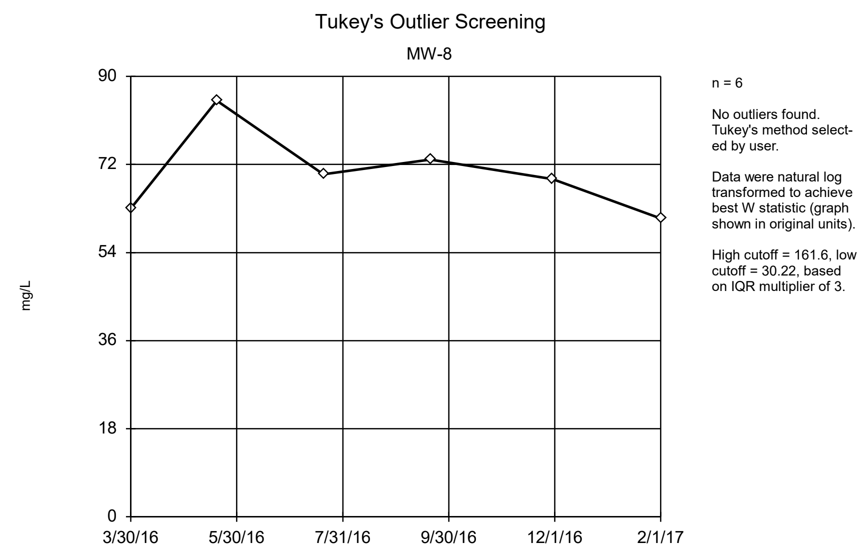
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Calcium   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

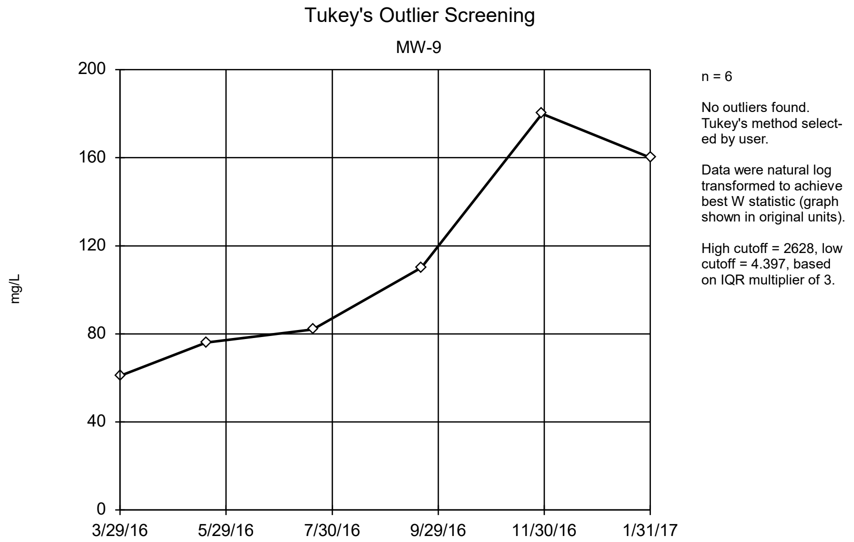
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



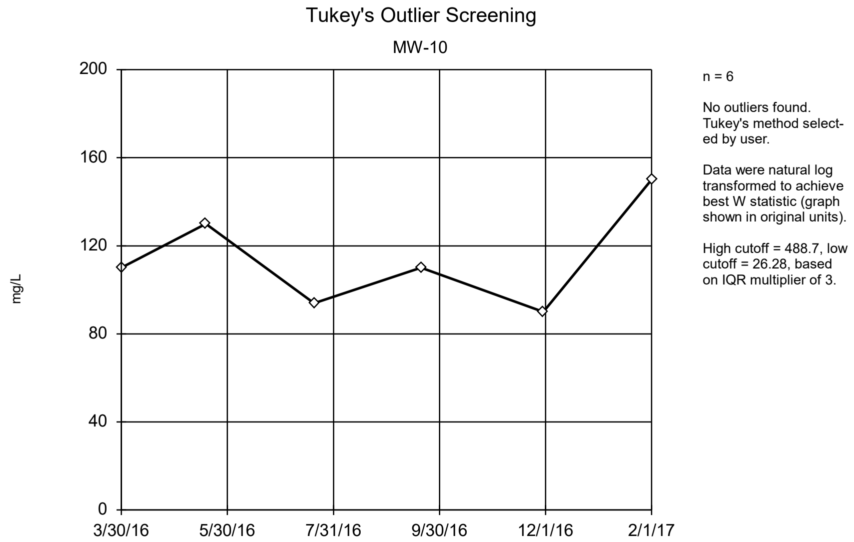
Constituent: Calcium   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant



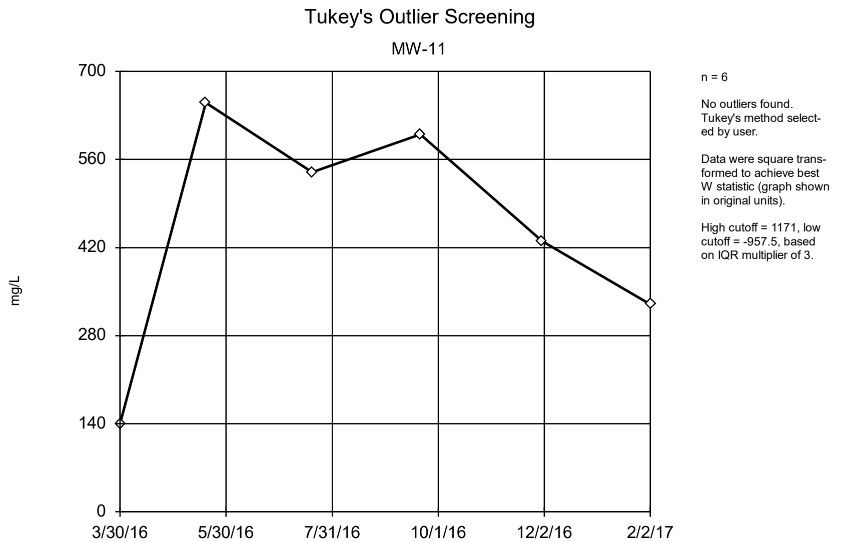
Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



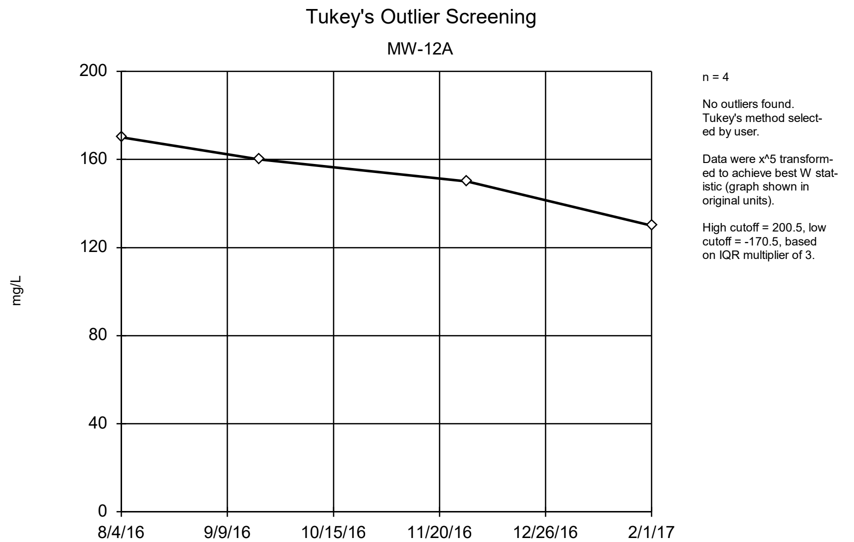
Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

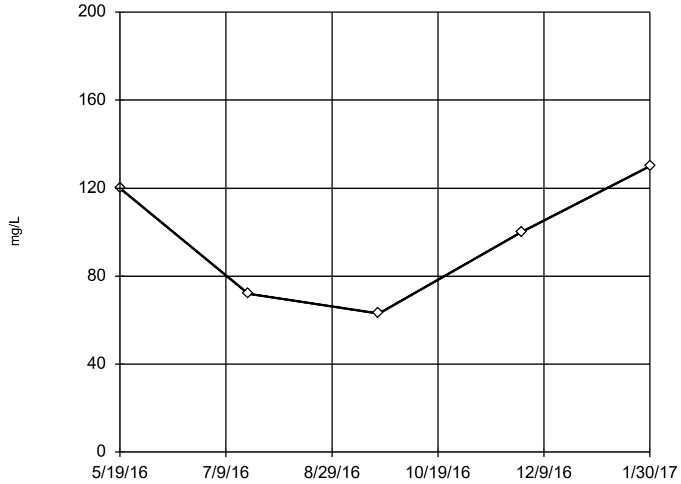


Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-13



n = 5

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 = 221.1, low cutoff = -169.2, based on IQR multiplier of 3.

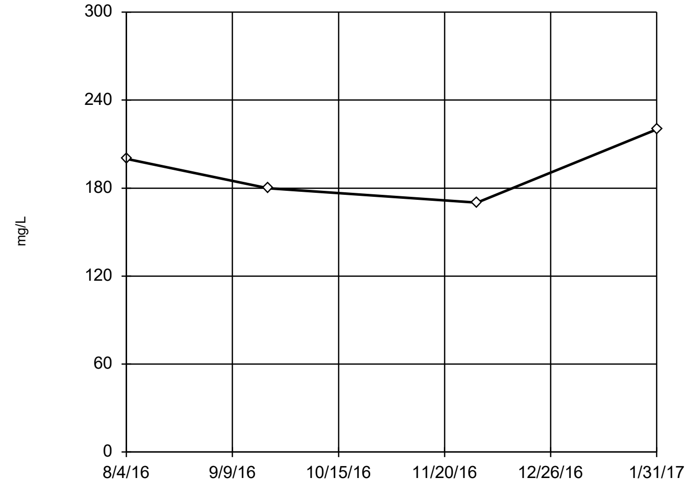
Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-14A



n = 4

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 = 361.7, low cutoff = 101.5, based on IQR multiplier of 3.

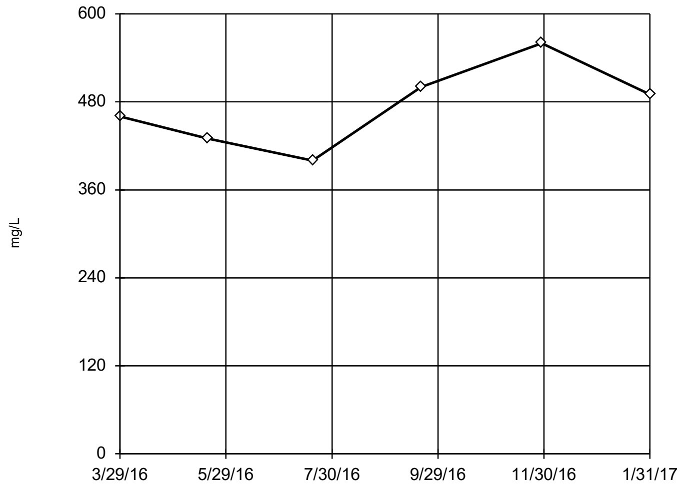
Constituent: Calcium Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4



n = 6

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 = 1099, low cutoff = 199.7, based on IQR multiplier of 3.

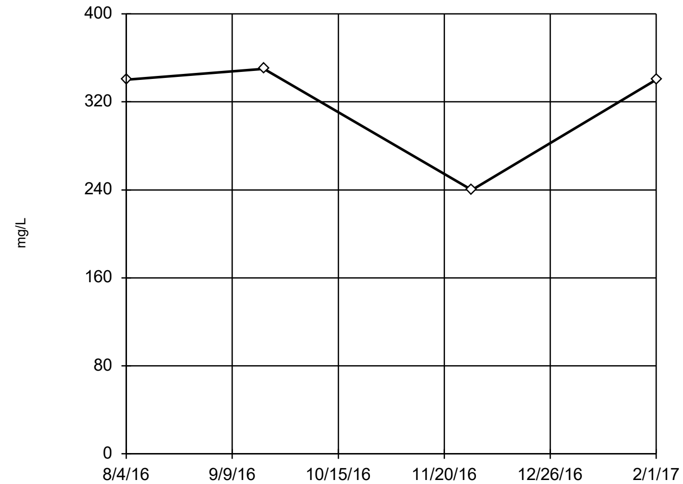
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-5A



n = 4

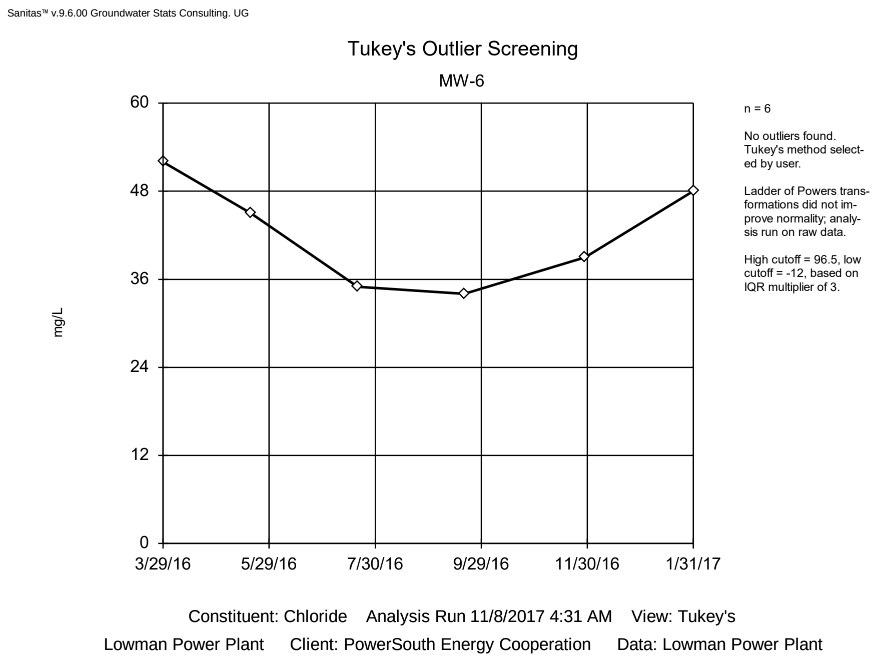
No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

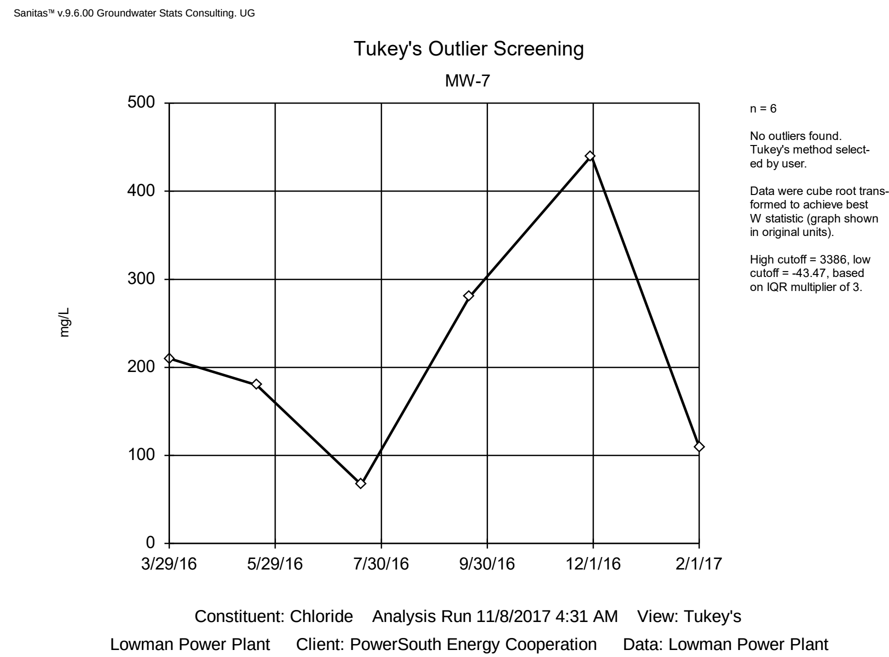
High cutoff = 401.1, low cutoff = -342.1, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

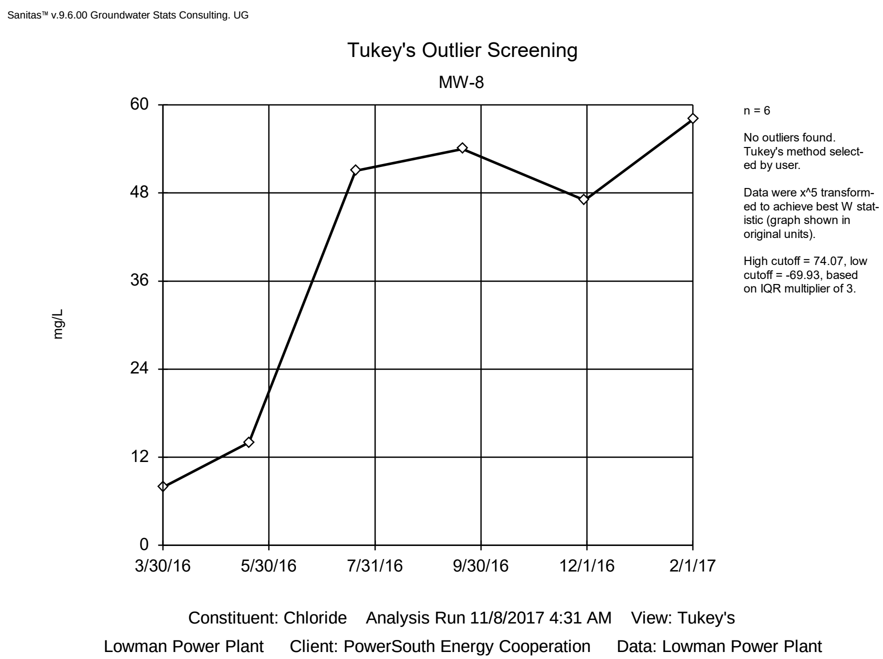
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



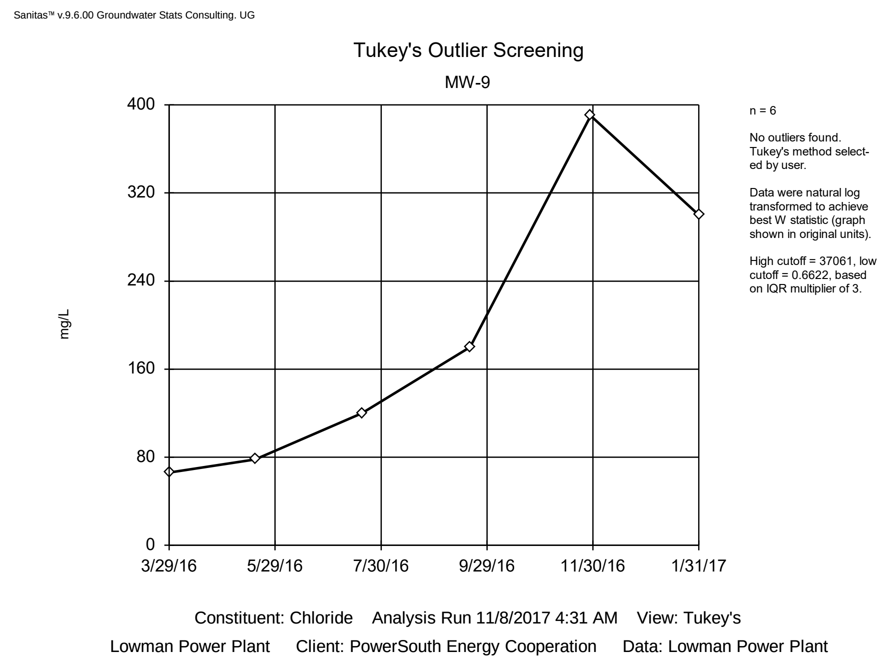
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-6
mg/L
n = 6
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 96.5, low cutoff = -12, based on IQR multiplier of 3.
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-7
mg/L
n = 6
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 3386, low cutoff = -43.47, based on IQR multiplier of 3.
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-8
mg/L
n = 6
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 = 74.07, low cutoff = -69.93, based on IQR multiplier of 3.
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

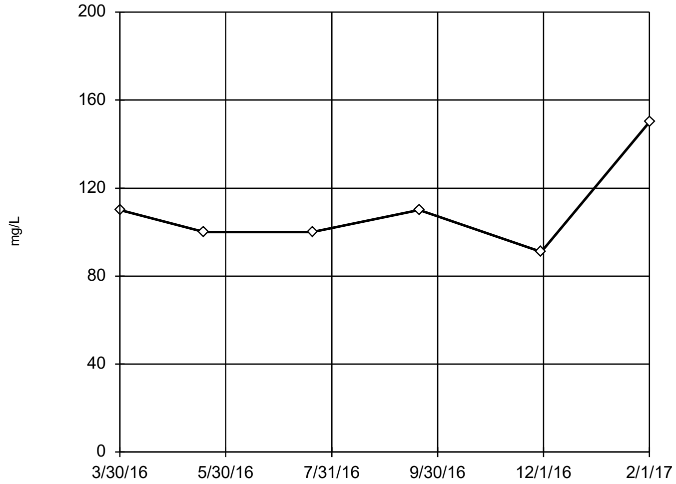


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-9
mg/L
n = 6
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 37061, low cutoff = 0.6622, based on IQR multiplier of 3.
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



n = 6

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 = 313.6, low cutoff = 39.07, based on IQR multiplier of 3.

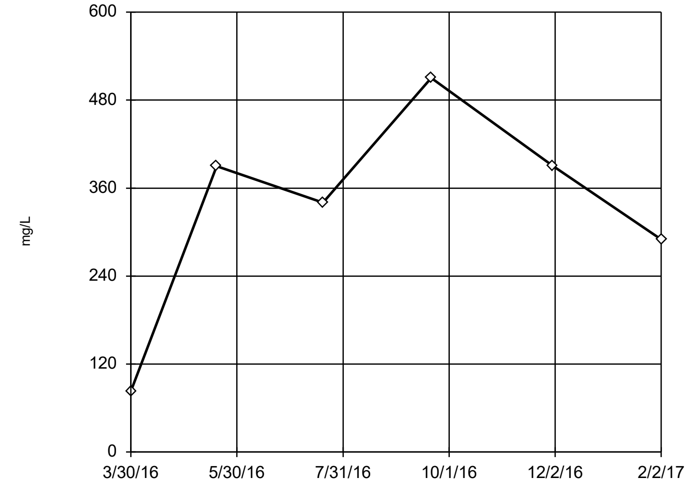
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-11



n = 6

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 = 829.4, low cutoff = -660.5, based on IQR multiplier of 3.

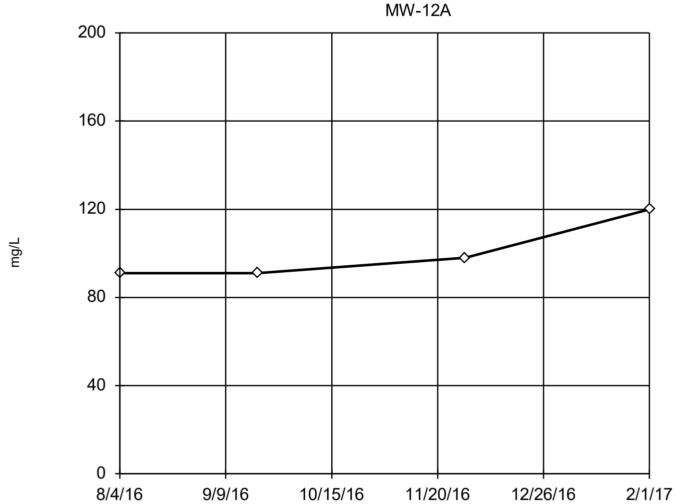
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-12A



n = 4

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 = 183.5, low cutoff = 53.77, based on IQR multiplier of 3.

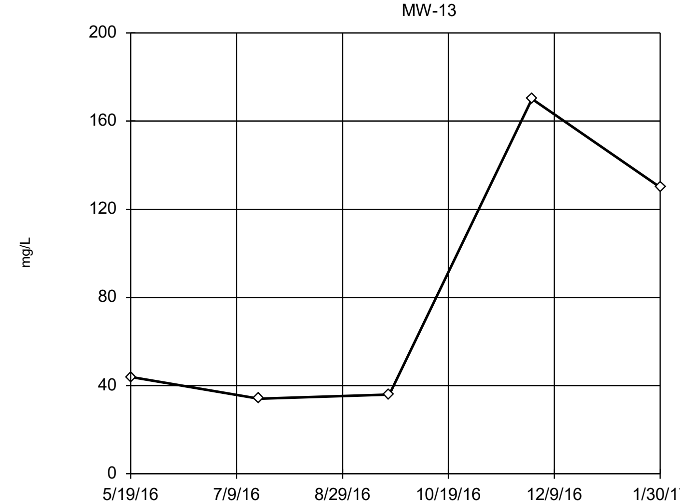
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-13



n = 5

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 = 11405, low cutoff = 0.456, based on IQR multiplier of 3.

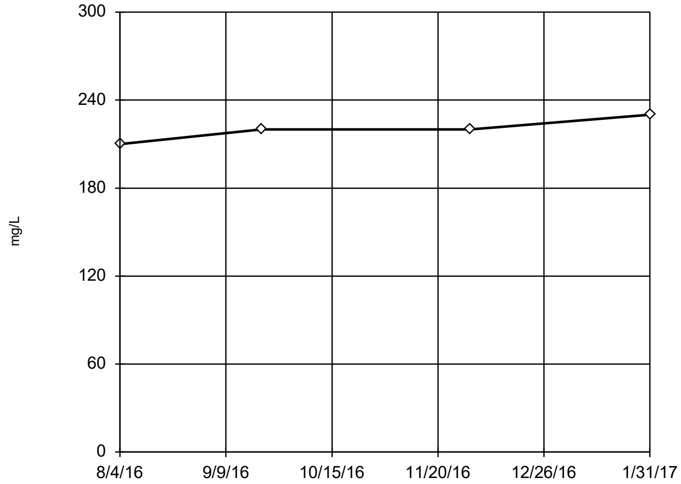
Constituent: Chloride Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-14A



n = 4

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 255, low cutoff = 185, based on IQR multiplier of 3.

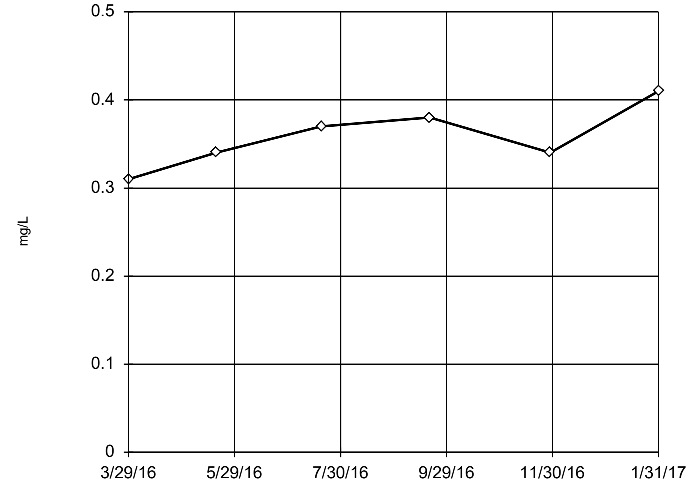
Constituent: Chloride   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4



n = 6

No outliers found. Tukey's method selected by user.

Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.6638, low cutoff = 0.1652, based on IQR multiplier of 3.

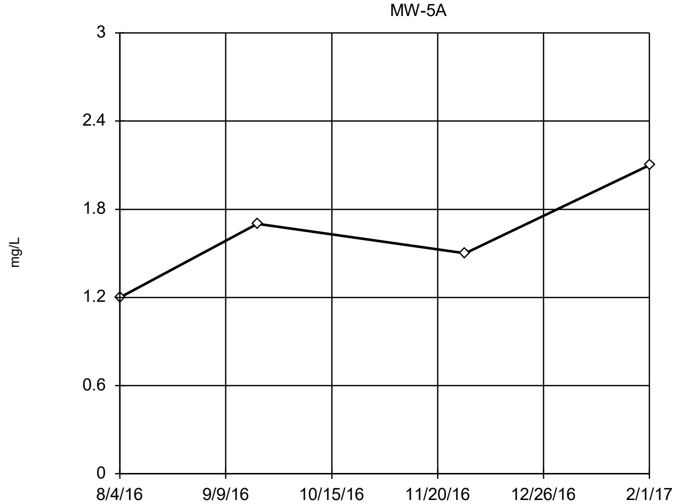
Constituent: Fluoride   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-5A



n = 4

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 = 5.277, low cutoff = 0.4803, based on IQR multiplier of 3.

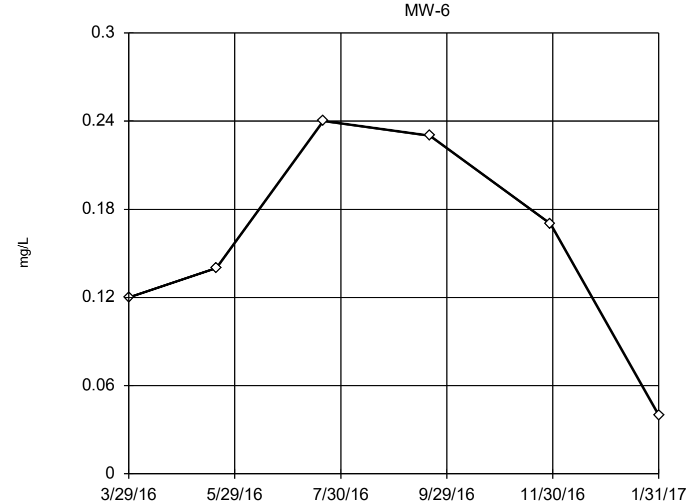
Constituent: Fluoride   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-6



n = 6

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

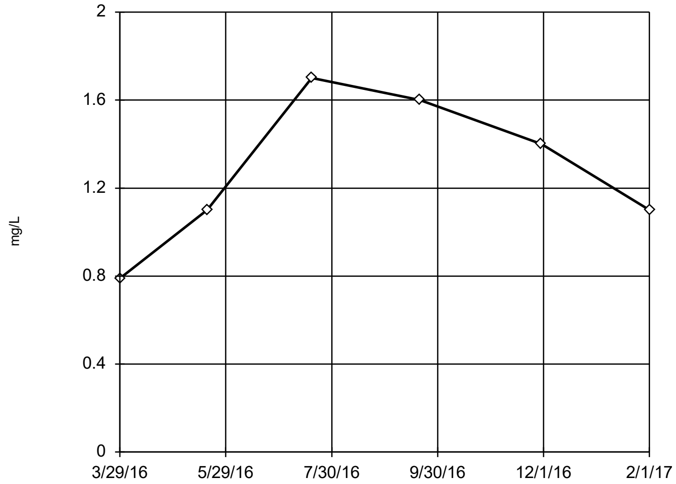
High cutoff = 0.7, low cutoff = -0.385, based on IQR multiplier of 3.

Constituent: Fluoride   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Tukey's Outlier Screening

MW-7



n = 6

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

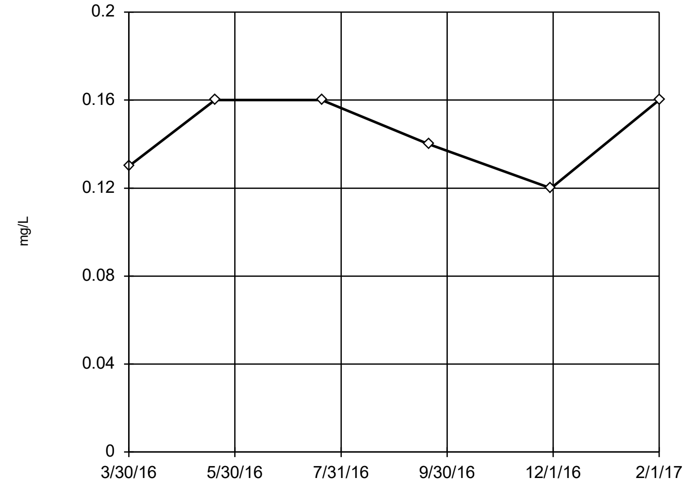
High cutoff = 3.765, low cutoff = -1.17, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-8



n = 6

No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

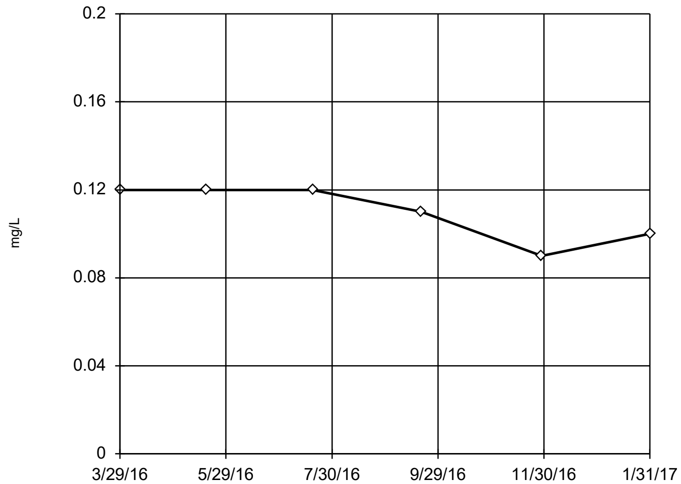
High cutoff = 0.3364, low cutoff = 0.05941, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-9



n = 6

No outliers found. Tukey's method selected by user.

Data were square transformed to achieve best W statistic (graph shown in original units).

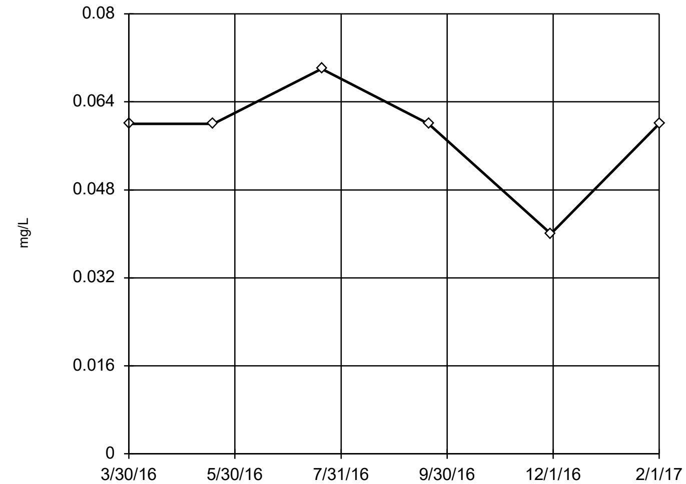
High cutoff = 0.1745, low cutoff = -0.08367, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



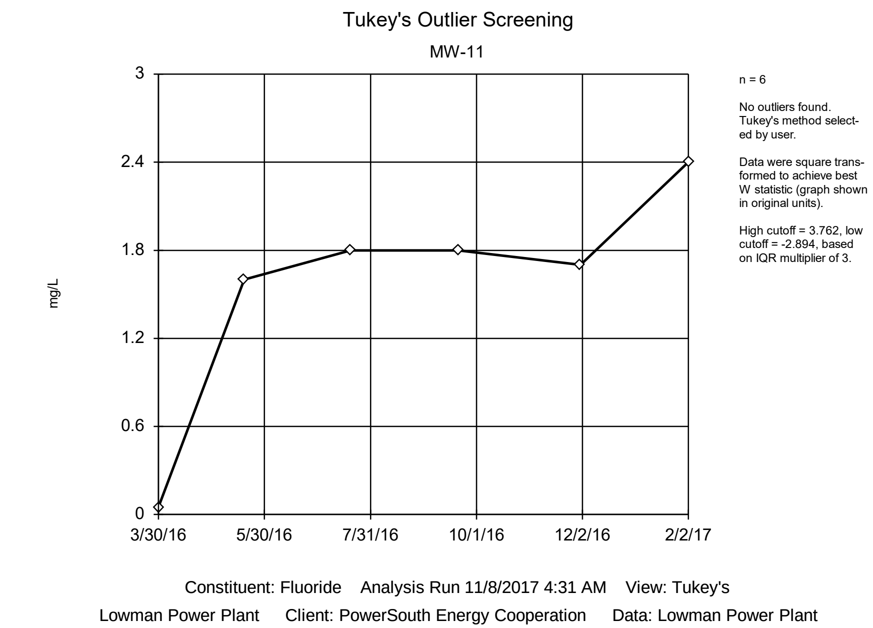
n = 6

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

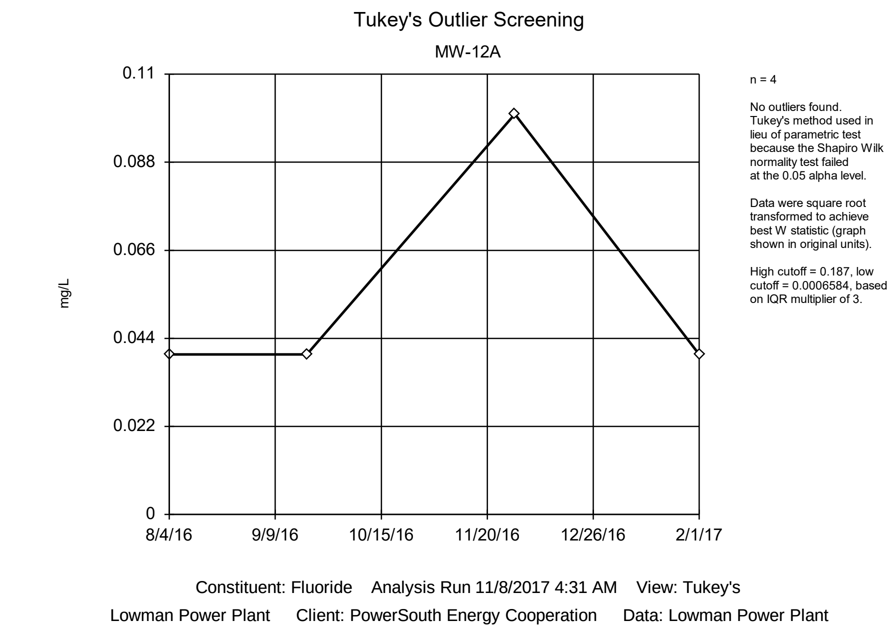
Data were x^4 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.08437, low cutoff = -0.07029, based on IQR multiplier of 3.

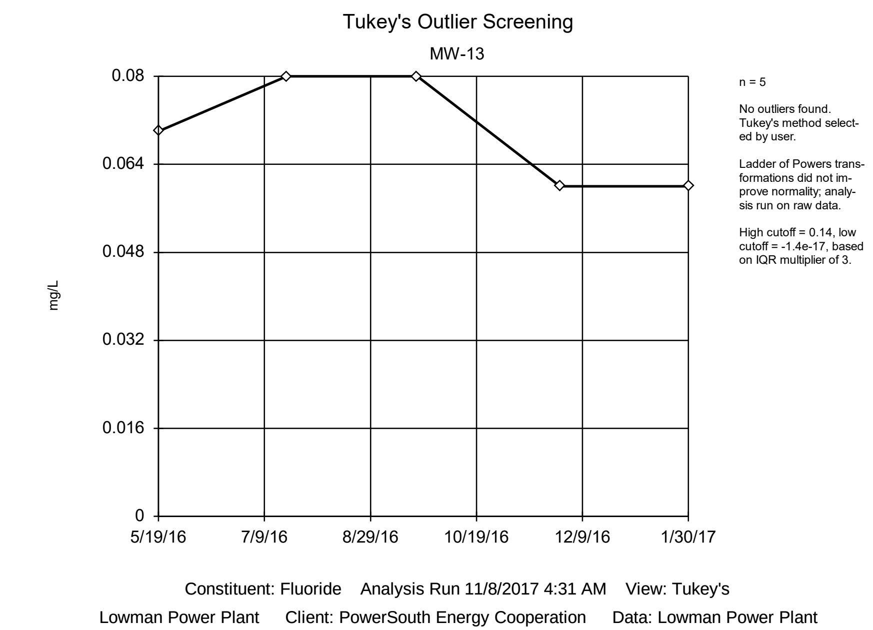
Constituent: Fluoride Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



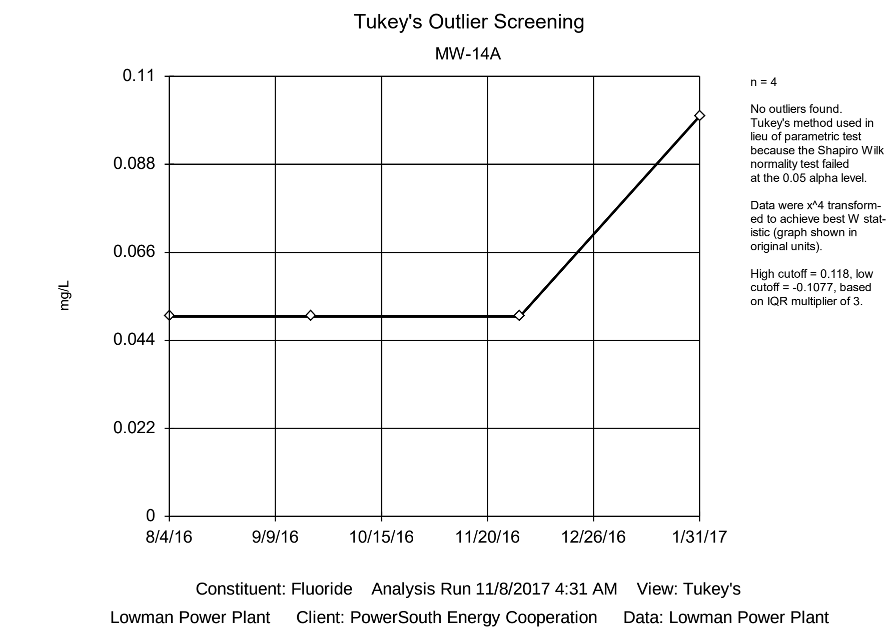
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

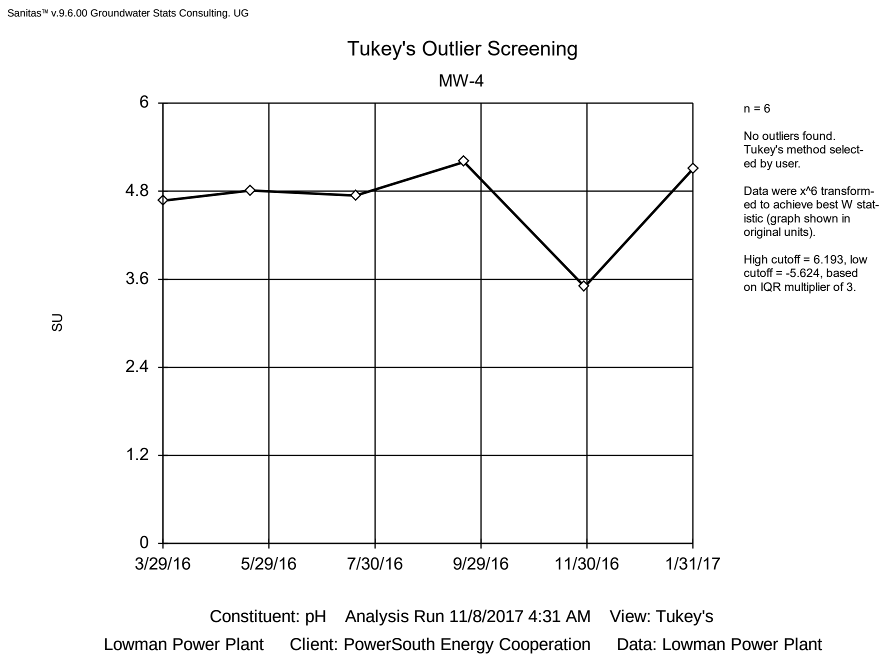


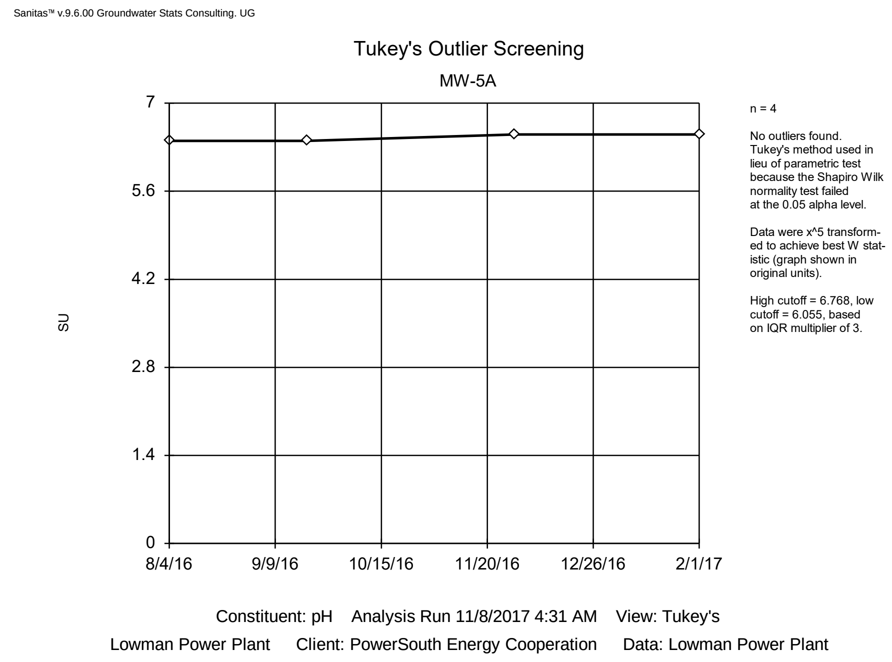
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

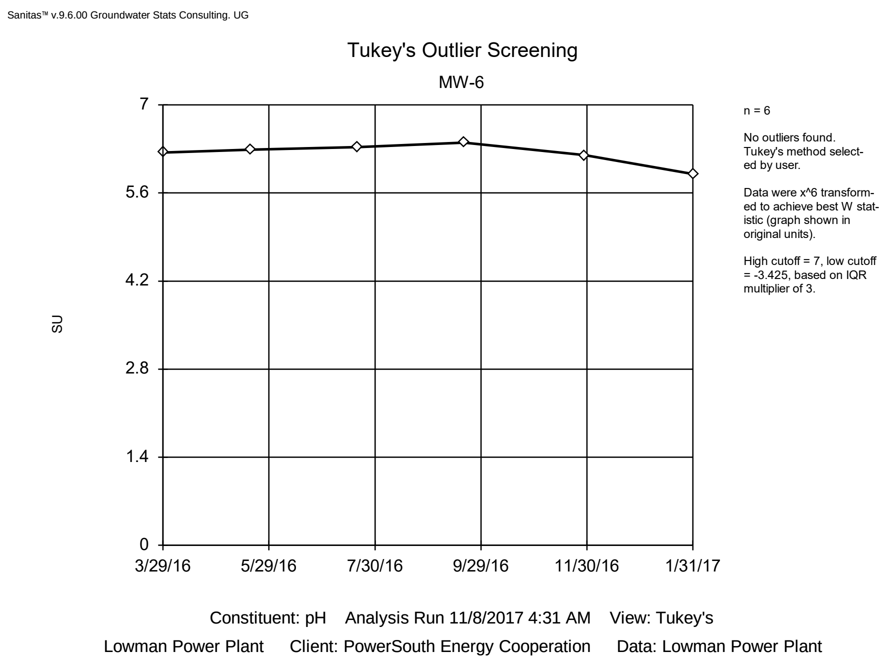


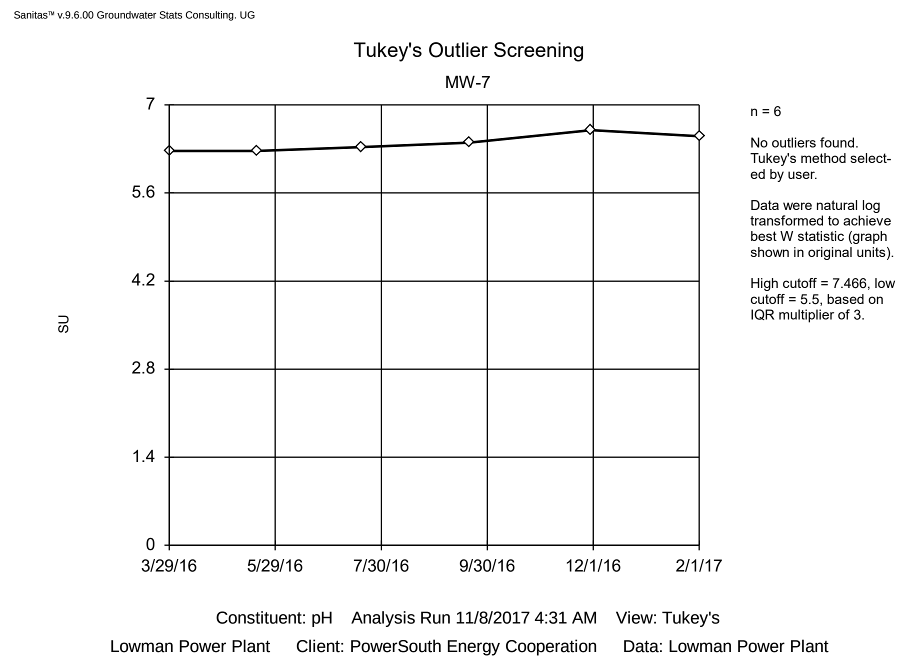
Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG




Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-4
SU
6
4.8
3.6
2.4
1.2
0
3/29/16
5/29/16
7/30/16
9/29/16
11/30/16
1/31/17
n = 6
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 = 6.193, low cutoff = -5.624, based on IQR multiplier of 3.
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-5A
SU
7
5.6
4.2
2.8
1.4
0
8/4/16
9/9/16
10/15/16
11/20/16
12/26/16
2/1/17
n = 4
No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.
Data were x^5 transformed to achieve best W statistic (graph shown in original units).
High cutoff = 6.768, low cutoff = 6.055, based on IQR multiplier of 3.
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

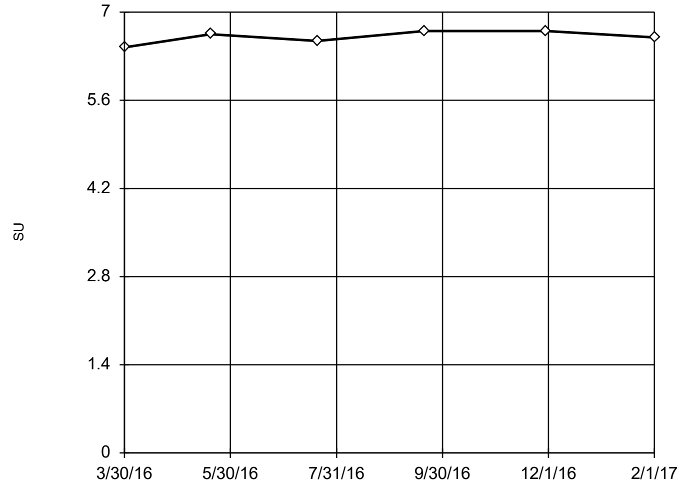

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-6
SU
7
5.6
4.2
2.8
1.4
0
3/29/16
5/29/16
7/30/16
9/29/16
11/30/16
1/31/17
n = 6
No outliers found. Tukey's method selected by user.
Data were x^6 transformed to achieve best W statistic (graph shown in original units).
High cutoff = 7, low cutoff = -3.425, based on IQR multiplier of 3.
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant


Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Tukey's Outlier Screening
MW-7
SU
7
5.6
4.2
2.8
1.4
0
3/29/16
5/29/16
7/30/16
9/30/16
12/1/16
2/1/17
n = 6
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 = 7.466, low cutoff = 5.5, based on IQR multiplier of 3.
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-8



n = 6

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 = 7.184, low cutoff = 5.504, based on IQR multiplier of 3.

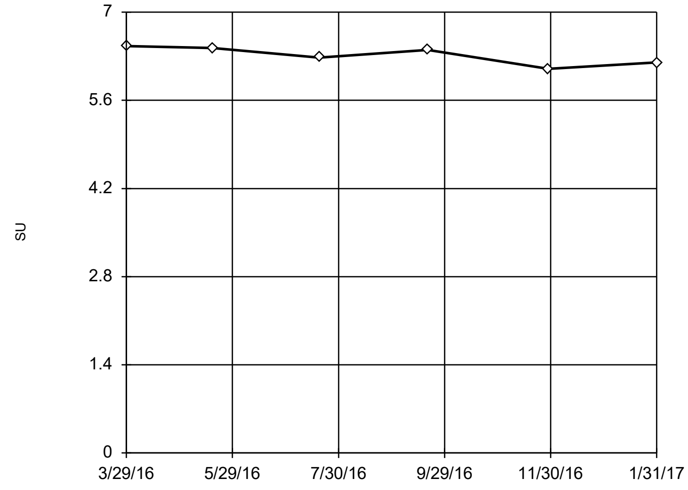
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-9



n = 6

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 = 7.064, low cutoff = 3.425, based on IQR multiplier of 3.

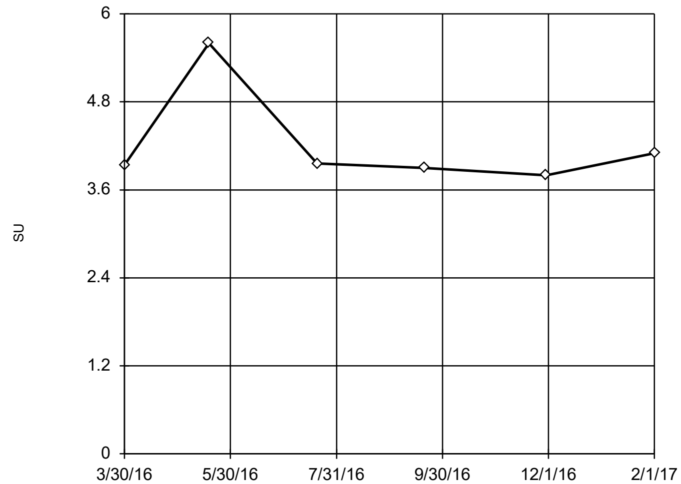
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



n = 6

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 = 9.24, low cutoff = 1.996, based on IQR multiplier of 3.

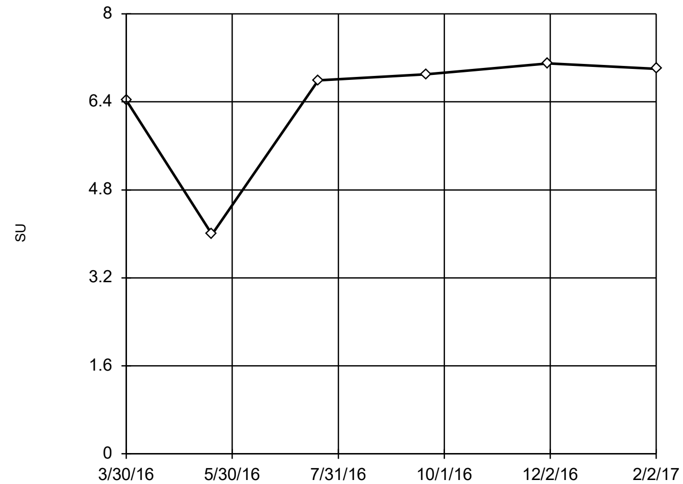
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-11



n = 6

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 = 8.509, low cutoff = -7.765, based on IQR multiplier of 3.

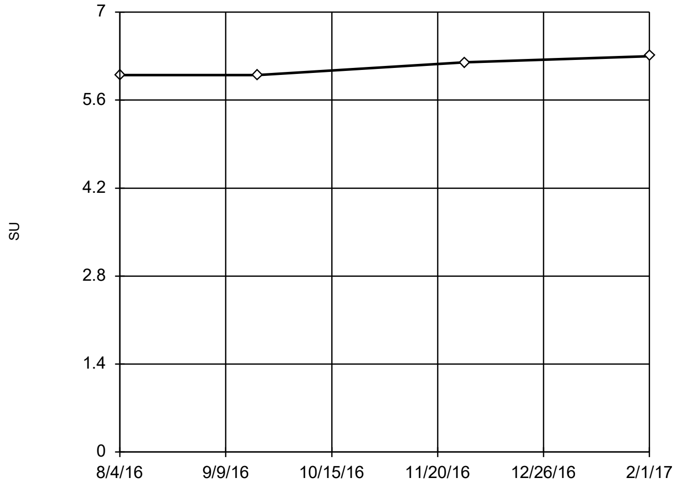
Constituent: pH Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-12A



n = 4

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 = 6.798, low cutoff = 4.438, based on IQR multiplier of 3.

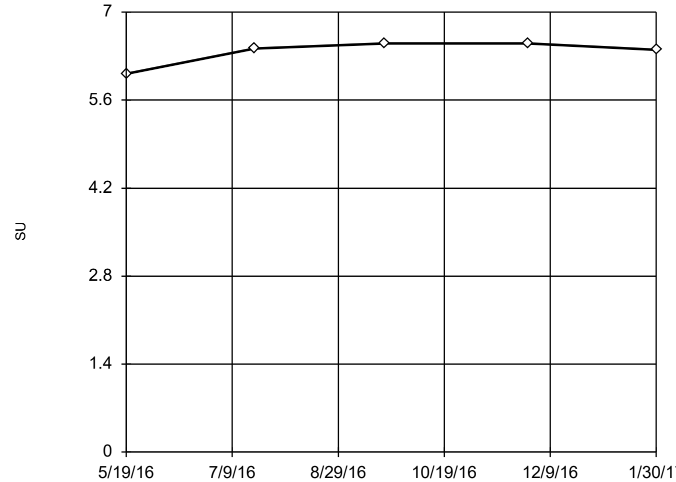
Constituent: pH   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-13



n = 5

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 = 7.092, low cutoff = 4.306, based on IQR multiplier of 3.

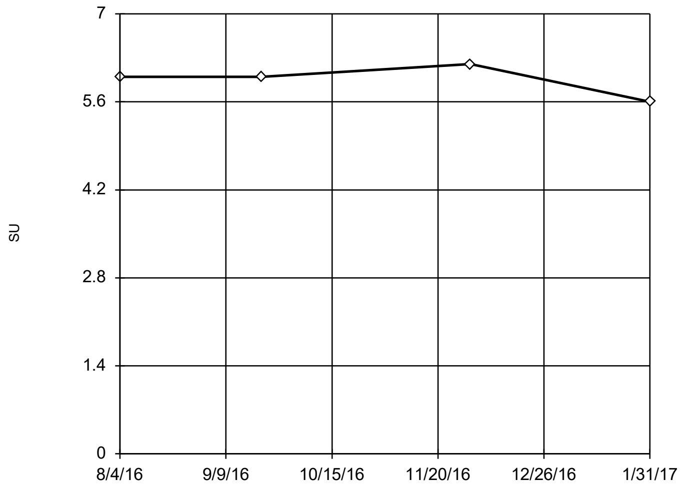
Constituent: pH   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-14A



n = 4

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 = 6.703, low cutoff = -2.399, based on IQR multiplier of 3.

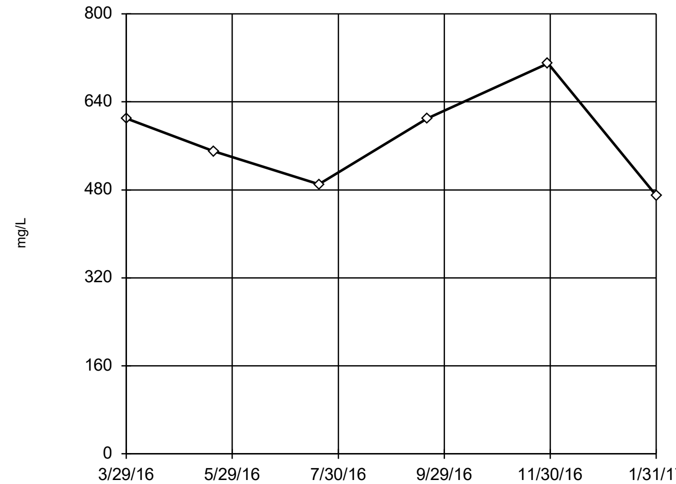
Constituent: pH   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-4



n = 6

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 = 1697, low cutoff = 186.1, based on IQR multiplier of 3.

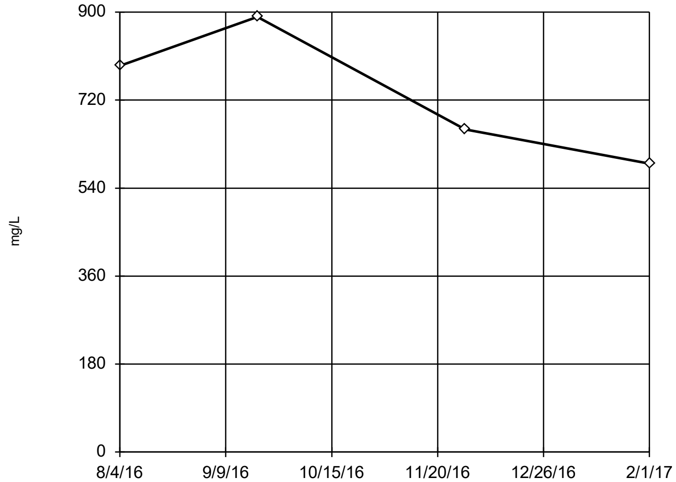
Constituent: Sulfate   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-5A



n = 4

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 = 2034, low cutoff = 257.2, based on IQR multiplier of 3.

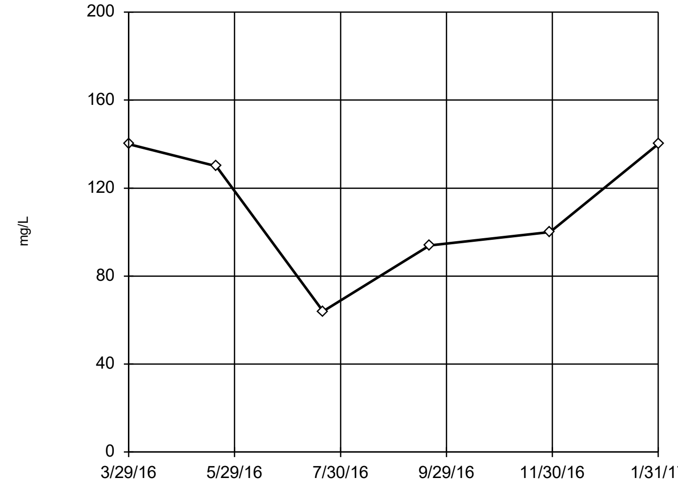
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-6



n = 6

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 323, low cutoff = -104, based on IQR multiplier of 3.

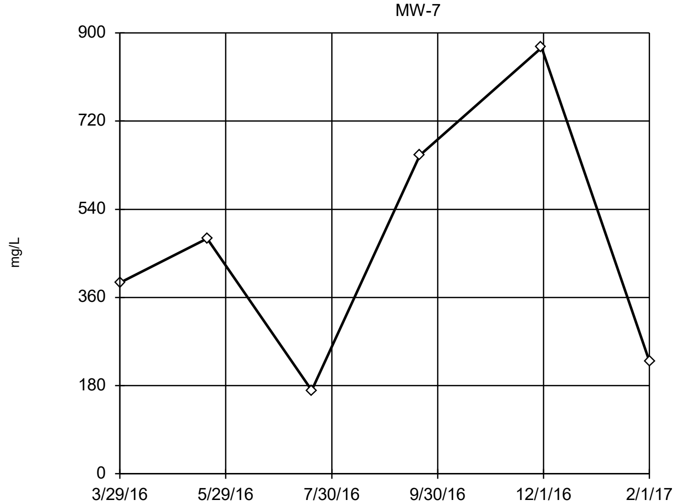
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-7



n = 6

No outliers found. Tukey's method selected by user.

Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6770, low cutoff = -63.05, based on IQR multiplier of 3.

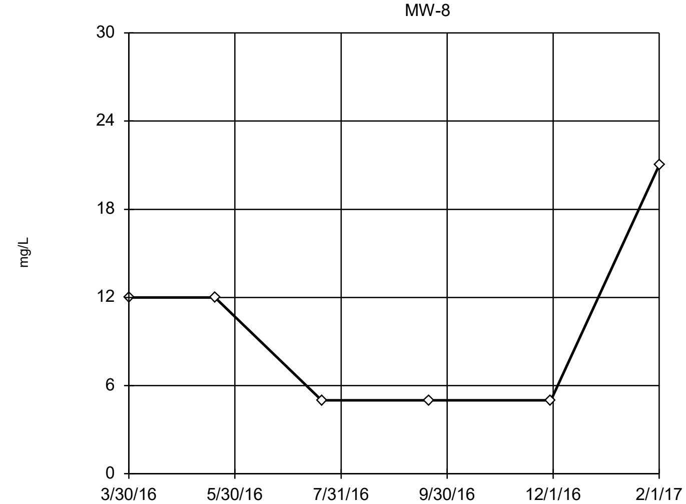
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-8



n = 6

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 = 88.08, low cutoff = -9.77, based on IQR multiplier of 3.

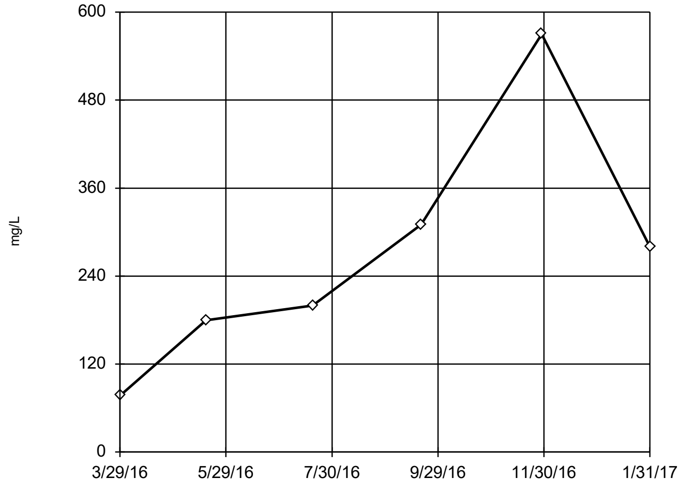
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-9



n = 6

No outliers found. Tukey's method selected by user.

Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 3559, low cutoff = -21.67, based on IQR multiplier of 3.

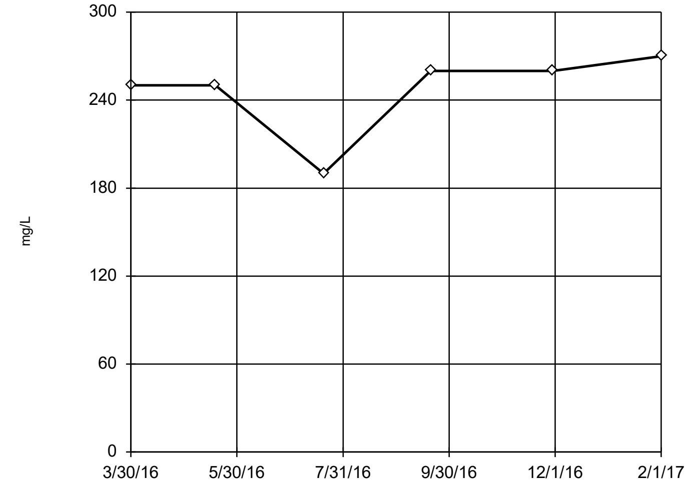
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



n = 6

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 = 313.9, low cutoff = -278.1, based on IQR multiplier of 3.

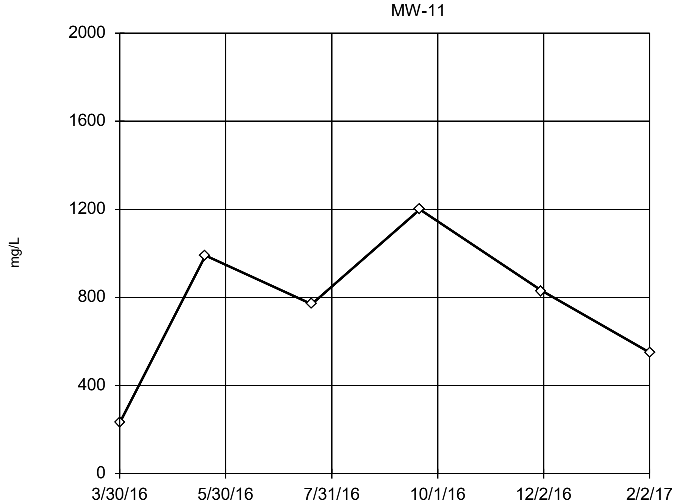
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-11



n = 6

No outliers found. Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 3210, low cutoff = -1725, based on IQR multiplier of 3.

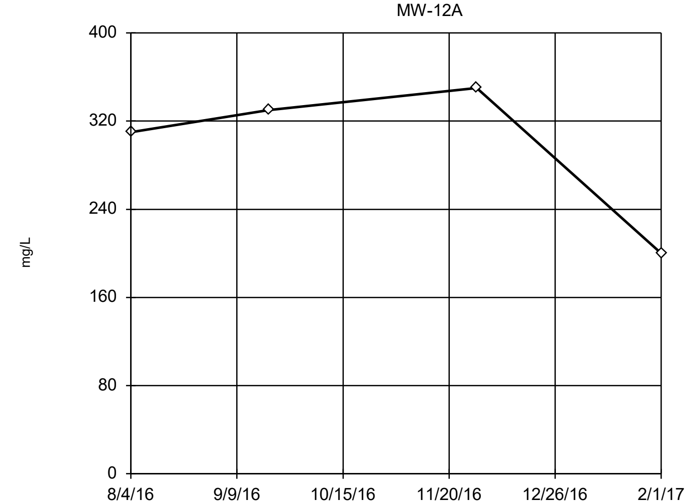
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-12A



n = 4

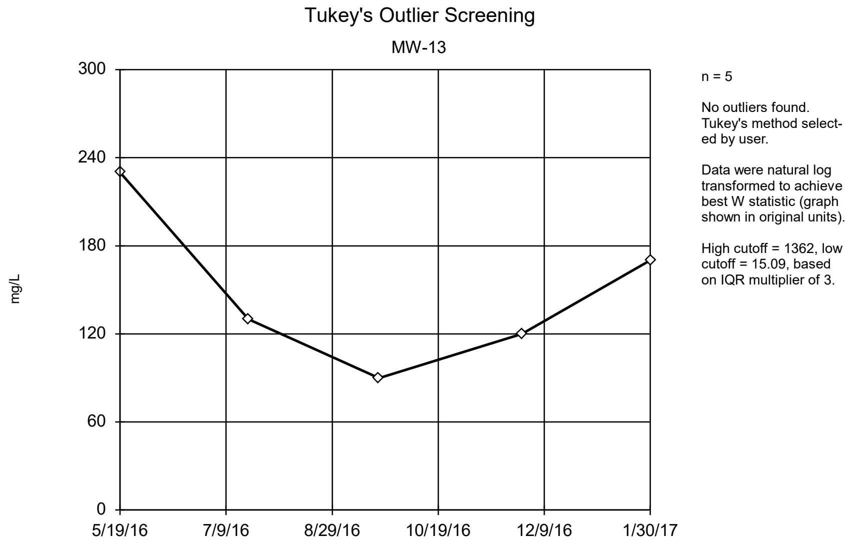
No outliers found. Tukey's method selected by user.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 411.2, low cutoff = -375.2, based on IQR multiplier of 3.

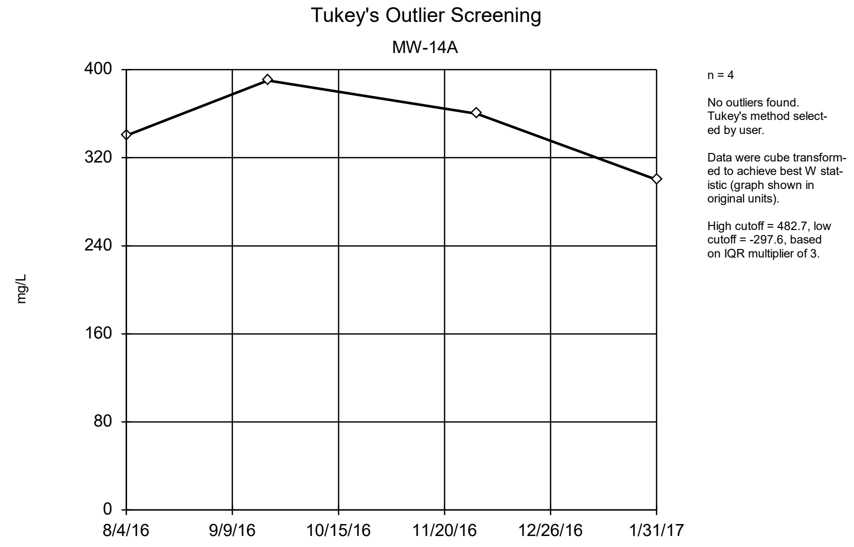
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



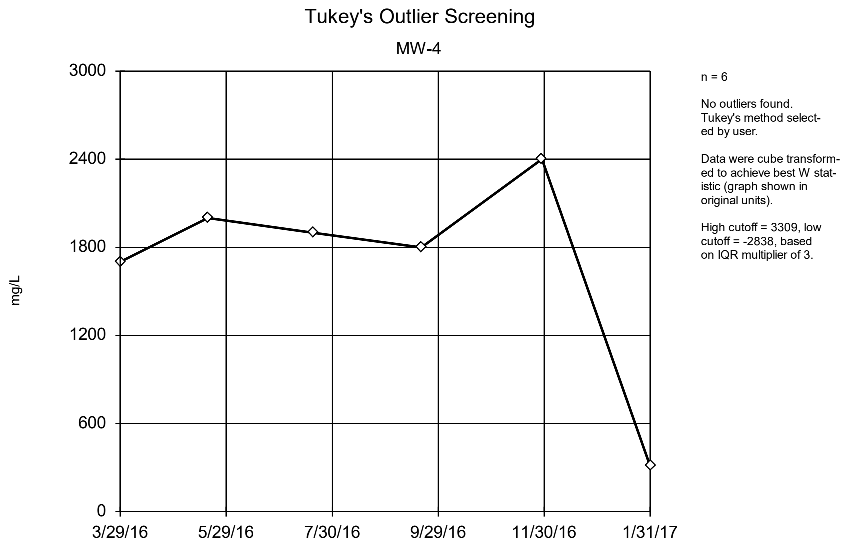
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



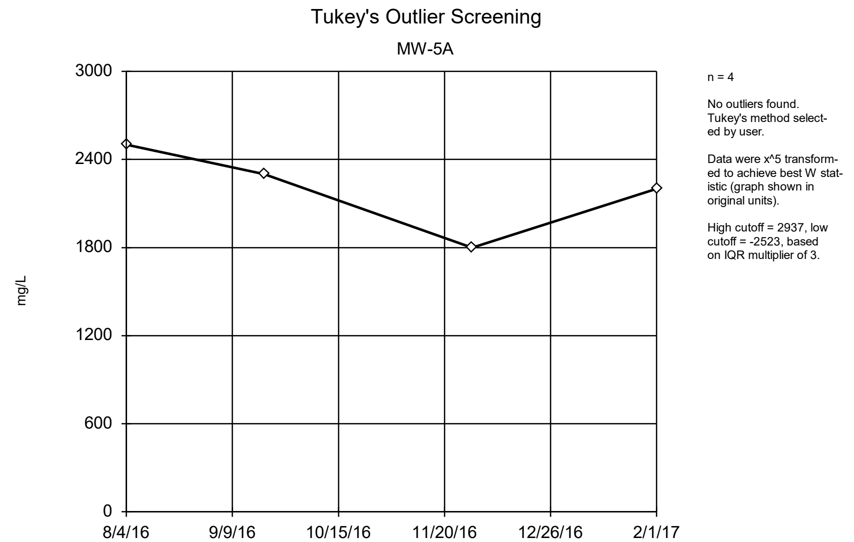
Constituent: Sulfate Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG



Constituent: Total Dissolved Solids Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

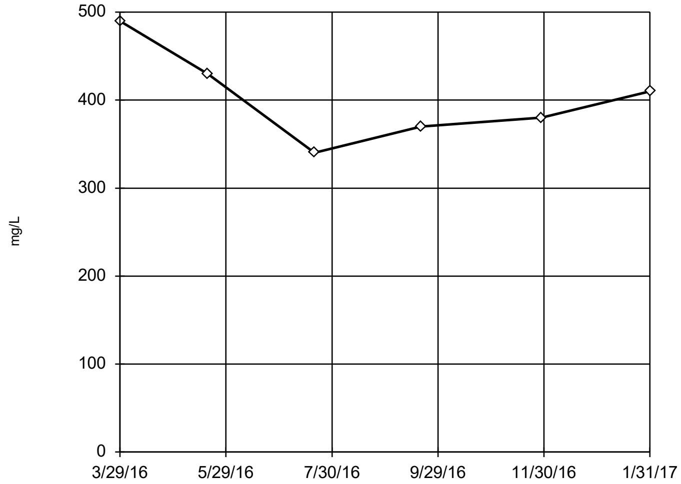


Constituent: Total Dissolved Solids Analysis Run 11/8/2017 4:31 AM View: Tukey's
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-6



n = 6

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 = 995, low cutoff = 163.6, based on IQR multiplier of 3.

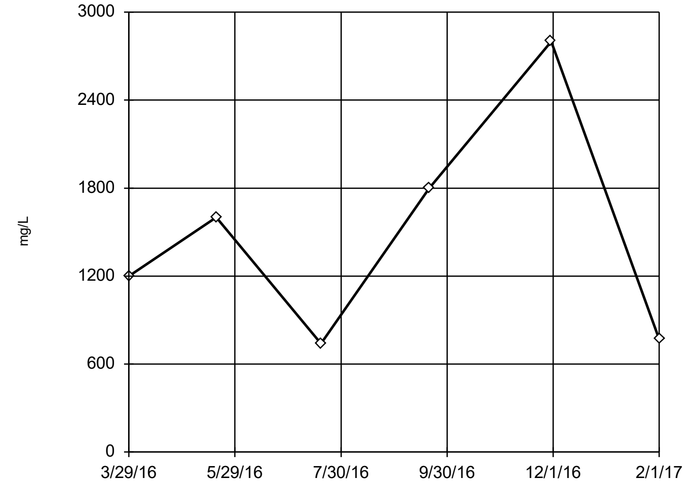
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-7



n = 6

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 = 59058, low cutoff = 28.69, based on IQR multiplier of 3.

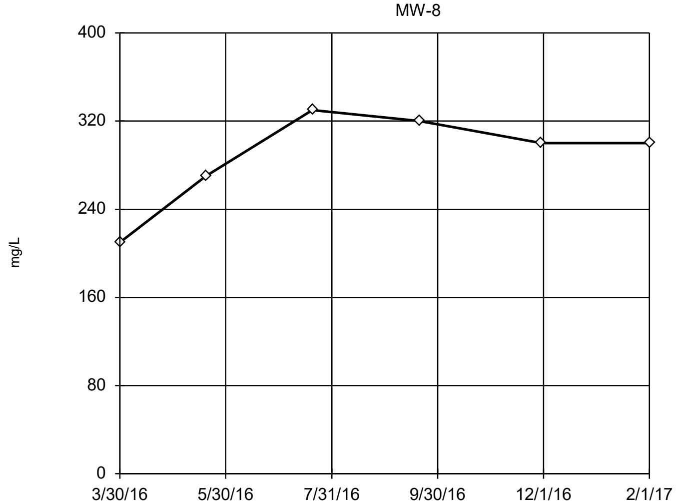
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-8



n = 6

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 = 398.8, low cutoff = -370.9, based on IQR multiplier of 3.

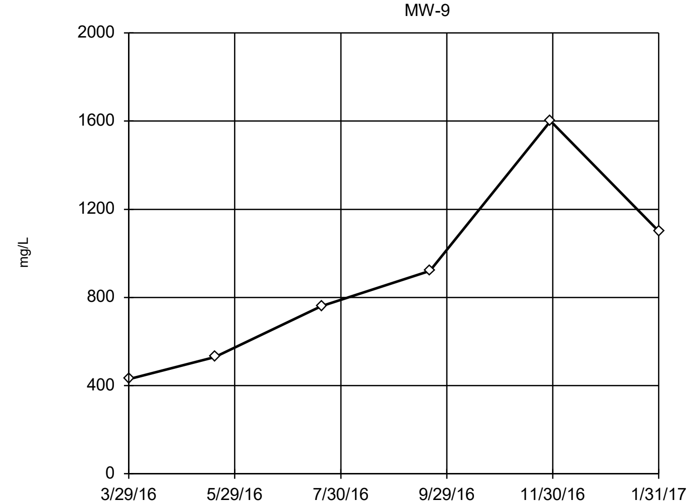
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-9



n = 6

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 = 28471, low cutoff = 22.24, based on IQR multiplier of 3.

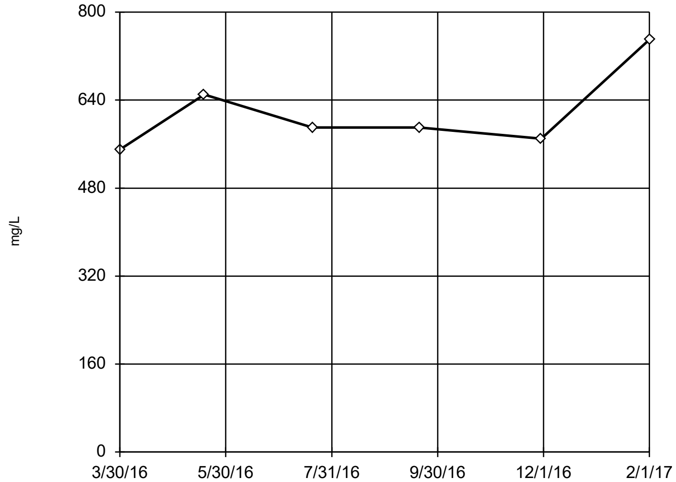
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-10



n = 6

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 = 1354, low cutoff = 288.7, based on IQR multiplier of 3.

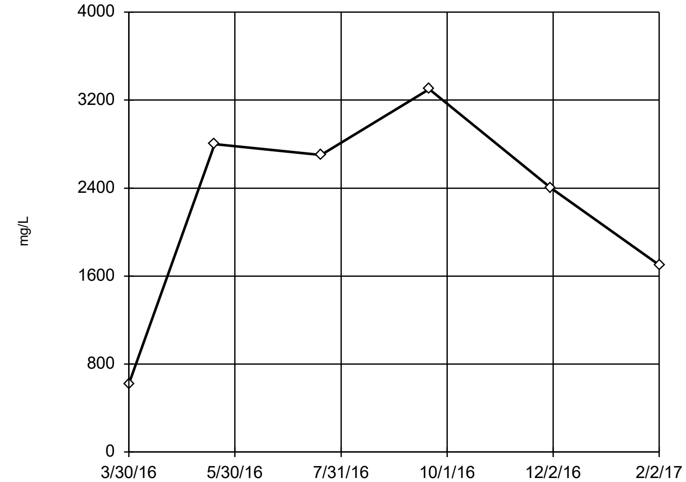
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-11



n = 6

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 = 5705, low cutoff = -4642, based on IQR multiplier of 3.

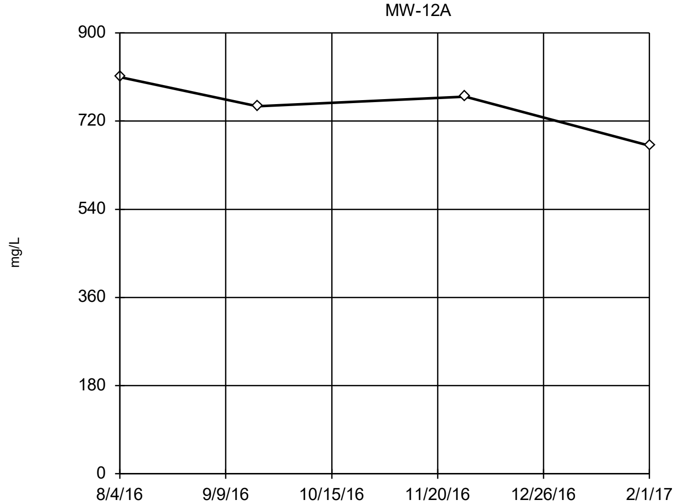
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-12A



n = 4

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 = 913, low cutoff = -764.3, based on IQR multiplier of 3.

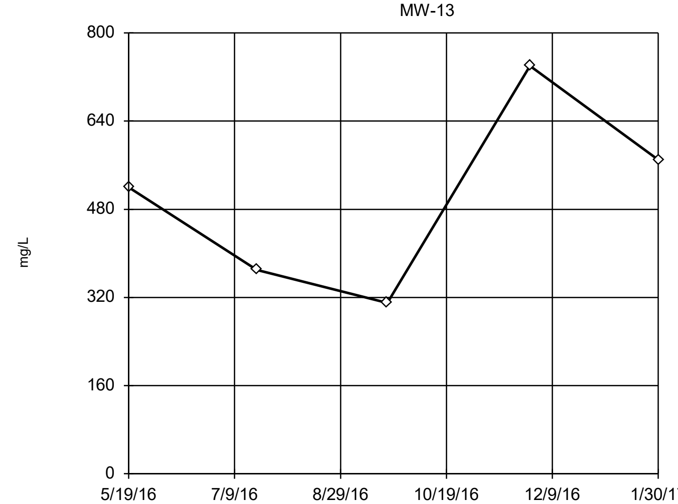
Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Tukey's Outlier Screening

MW-13



n = 5

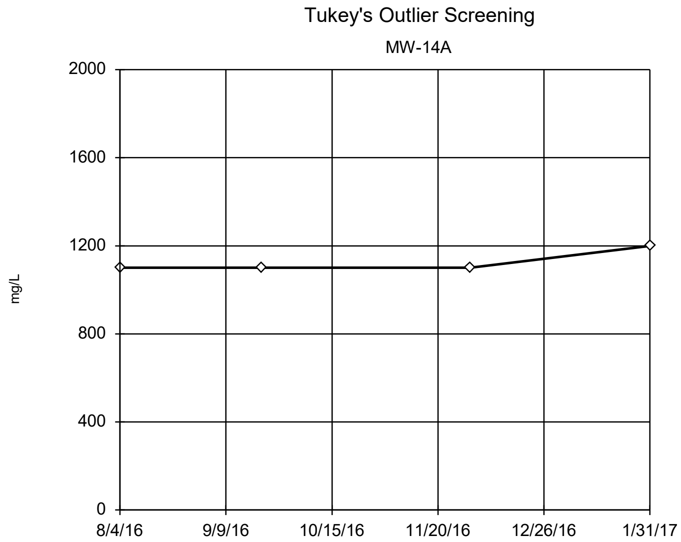
No outliers found. Tukey's method selected by user.

Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 2601, low cutoff = 6.744, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids   Analysis Run 11/8/2017 4:31 AM   View: Tukey's

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant



n = 4

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

Data were square root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 1304, low cutoff = 958.2, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids Analysis Run 11/8/2017 4:31 AM View: Tukey's

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Trend Tests

Trend Tests Summary Table - Significant Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:32 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	**MW-9**	**105.9**	**25**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**
pH (SU)	**MW-9**	**-0.3701**	**-27**	**-25**	**Yes**	**9**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	**MW-9**	**714.3**	**22**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**

Trend Tests Summary Table - All Results

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:32 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-1 (bg)	0	3	21	No	8	87.5	n/a	n/a	0.01	NP
Boron (mg/L)	MW-2 (bg)	0	7	21	No	8	87.5	n/a	n/a	0.01	NP
Boron (mg/L)	MW-4	0.3222	9	21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-5	2.166	2	8	No	4	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-5A	-6.51	-10	-14	No	6	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-6	0.08011	17	21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-7	-0.8338	-1	-21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-8	0.03021	4	21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-9	1.773	17	21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-10	0.06423	8	21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-11	-3.938	-7	-21	No	8	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-12	-5.125	-4	-8	No	4	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-12A	0.06759	2	14	No	6	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-13	-0.343	-8	-18	No	7	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-14	1.071	NaN	NaN	No	3	0	n/a	n/a	NaN	NP
Boron (mg/L)	MW-14A	-1.197	-7	-14	No	6	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-1 (bg)	1.473	5	21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-2 (bg)	0	3	21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-4	7.449	6	21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-5	27.8	3	8	No	4	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-5A	-152.1	-10	-14	No	6	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-6	-0.2745	0	21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-7	-94.25	-4	-21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-8	3.924	4	21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	**MW-9**	**105.9**	**25**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Calcium (mg/L)	MW-10	-5.214	-4	-21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-11	-34.6	-2	-21	No	8	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-12	-229.3	-4	-8	No	4	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-12A	-64.6	-13	-14	No	6	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-13	-20.98	-2	-18	No	7	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-14	5.951	NaN	NaN	No	3	0	n/a	n/a	NaN	NP
Calcium (mg/L)	MW-14A	32.59	5	14	No	6	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-1 (bg)	1.261	14	21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-2 (bg)	0	-1	-21	No	8	37.5	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-4	33.68	7	21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-5	60.21	2	8	No	4	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-5A	-59.35	-8	-14	No	6	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-6	-6.409	-10	-21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-7	-96.46	-8	-21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-8	17.56	8	21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-9	219.2	21	21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-10	-9.345	-8	-21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-11	73.7	5	21	No	8	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-12	-178.7	0	8	No	4	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-12A	-1.478	-4	-14	No	6	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-13	-17.15	-3	-18	No	7	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-14	39.67	NaN	NaN	No	3	0	n/a	n/a	NaN	NP
Chloride (mg/L)	MW-14A	29.92	8	14	No	6	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-1 (bg)	0.009278	9	21	No	8	25	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-2 (bg)	0	0	21	No	8	100	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-4	0.04842	15	21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-5	-0.04126	-3	-8	No	4	25	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-5A	0.8137	7	14	No	6	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-6	0.004728	1	21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-7	0.6438	14	21	No	8	0	n/a	n/a	0.01	NP

Trend Tests Summary Table - All Results

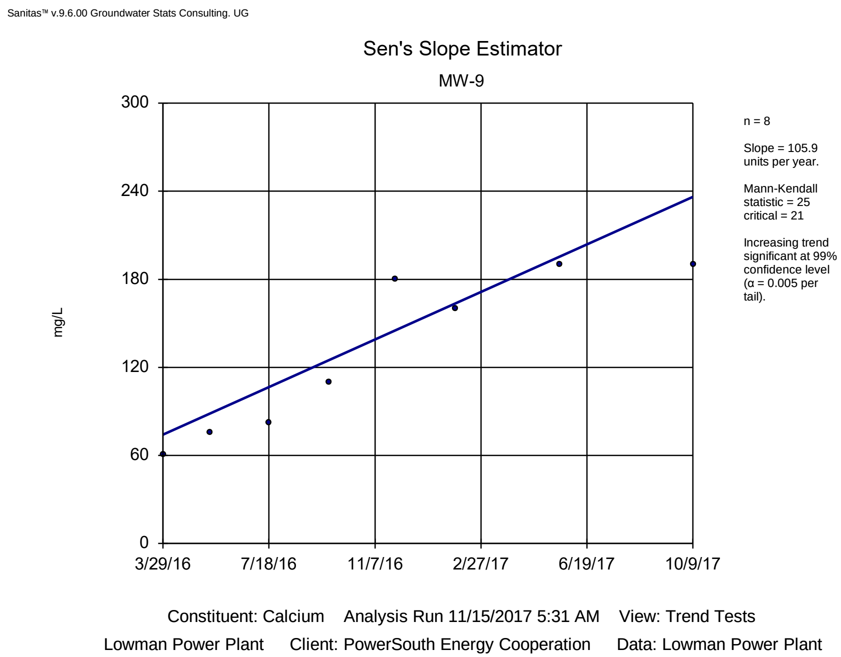
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:32 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Fluoride (mg/L)	MW-8	0.03257	12	21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-9	-0.01619	-9	-21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-10	0	2	21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-11	0.5939	17	21	No	8	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-12	-0.6286	-1	-8	No	4	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-12A	0	1	14	No	6	16.67	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-13	0.01633	7	18	No	7	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	MW-14	-0.1587	NaN	NaN	No	3	0	n/a	n/a	NaN	NP
Fluoride (mg/L)	MW-14A	-0.008449	-5	-14	No	6	16.67	n/a	n/a	0.01	NP
pH (SU)	MW-1 (bg)	-0.2172	-16	-25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-2 (bg)	-0.2435	-22	-25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-4	0.04614	5	25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-5	-0.4601	-2	-12	No	5	0	n/a	n/a	0.01	NP
pH (SU)	MW-5A	-0.2028	-9	-18	No	7	0	n/a	n/a	0.01	NP
pH (SU)	MW-6	-0.2406	-6	-25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-7	0.06184	10	25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-8	-0.0215	-3	-25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	**MW-9**	**-0.3701**	**-27**	**-25**	**Yes**	**9**	**0**	**n/a**	**n/a**	**0.01**	**NP**
pH (SU)	MW-10	0.08613	16	25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-11	-0.04573	-9	-25	No	9	0	n/a	n/a	0.01	NP
pH (SU)	MW-12	-0.446	-8	-12	No	5	0	n/a	n/a	0.01	NP
pH (SU)	MW-12A	-0.2217	-11	-18	No	7	0	n/a	n/a	0.01	NP
pH (SU)	MW-13	0.0257	1	21	No	8	0	n/a	n/a	0.01	NP
pH (SU)	MW-14	0.8739	0	8	No	4	0	n/a	n/a	0.01	NP
pH (SU)	MW-14A	-0.5428	-15	-18	No	7	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-1 (bg)	0.4345	2	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-2 (bg)	0.9999	11	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-4	-10.76	-1	-21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-5	119.6	2	8	No	4	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-5A	-549.2	-13	-14	No	6	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-6	0	0	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-7	-60.72	-3	-21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-8	-2.036	-8	-21	No	8	37.5	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-9	232.5	18	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-10	0	2	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-11	113.7	2	21	No	8	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-12	-335.6	-4	-8	No	4	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-12A	-94.81	-3	-14	No	6	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-13	-66.05	-10	-18	No	7	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-14	163.7	NaN	NaN	No	3	33.33	n/a	n/a	NaN	NP
Sulfate (mg/L)	MW-14A	42.25	4	14	No	6	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-1 (bg)	-5.636	-3	-21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-2 (bg)	-14.81	-7	-21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-4	0	0	21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-5	201.9	2	8	No	4	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-5A	-1014	-13	-14	No	6	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-6	-7.157	-1	-21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-7	-202.9	-6	-21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-8	0	0	21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	**MW-9**	**714.3**	**22**	**21**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.01**	**NP**
Total Dissolved Solids (mg/L)	MW-10	-26.69	-6	-21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-11	0	0	21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-12	-1041	-4	-8	No	4	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-12A	-217.9	-11	-14	No	6	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-13	-168.6	-7	-18	No	7	0	n/a	n/a	0.01	NP

Trend Tests Summary Table - All Results

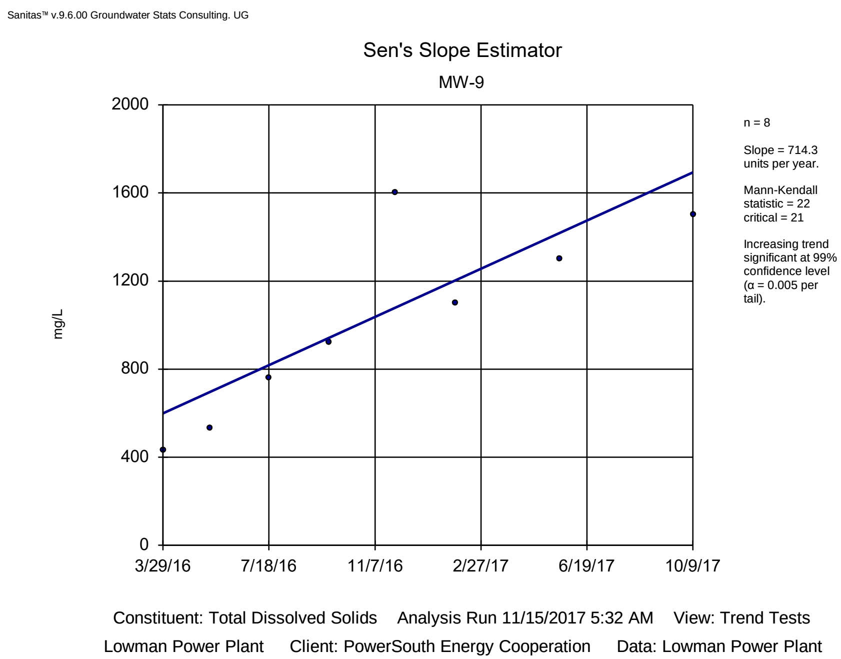
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:32 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-14	109.1	NaN	NaN	No	3	0	n/a	n/a	NaN	NP
Total Dissolved Solids (mg/L)	MW-14A	0	6	14	No	6	0	n/a	n/a	0.01	NP



Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Sen's Slope Estimator
MW-9
mg/L
300
240
180
120
60
0
3/29/16
7/18/16
11/7/16
2/27/17
6/19/17
10/9/17
n = 8
Slope = 105.9 units per year.
Mann-Kendall statistic = 25 critical = 21
Increasing trend significant at 99% confidence level (α = 0.005 per tail).
Constituent: Calcium Analysis Run 11/15/2017 5:31 AM View: Trend Tests
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Sen's Slope Estimator
MW-9
SU
7
5.6
4.2
2.8
1.4
0
3/29/16
7/18/16
11/7/16
2/27/17
6/19/17
10/9/17
n = 9
Slope = -0.3701 units per year.
Mann-Kendall statistic = -27 critical = -25
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).
Constituent: pH Analysis Run 11/15/2017 5:31 AM View: Trend Tests
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant



Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG
Sen's Slope Estimator
MW-9
mg/L
2000
1600
1200
800
400
0
3/29/16
7/18/16
11/7/16
2/27/17
6/19/17
10/9/17
n = 8
Slope = 714.3 units per year.
Mann-Kendall statistic = 22 critical = 21
Increasing trend significant at 99% confidence level (α = 0.005 per tail).
Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:32 AM View: Trend Tests
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

ANOVA

Analysis of Variance

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:23 AM

Constituent	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Calc.	Alpha	Method
Boron (mg/L)	n/a	n/a	n/a	No	No	0.008333	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	No	Yes	11.53	0.05	NP (eq. var.)
Chloride (mg/L)	n/a	n/a	n/a	No	Yes	8.545	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	No	Yes	8.554	0.05	NP (normality)
pH (SU)	n/a	n/a	n/a	No	Yes	10.69	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	No	No	0	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	No	Yes	27.87	0.05	Param.

Non-Parametric ANOVA

Constituent: Boron   Analysis Run 11/15/2017 5:23 AM   View: ANOVA
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.008333

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.002757
Adjusted Kruskal-Wallis statistic (H') = 0.008333

Non-Parametric ANOVA

Constituent: Calcium   Analysis Run 11/15/2017 5:23 AM   View: ANOVA
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 11.53

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 11.29
Adjusted Kruskal-Wallis statistic (H') = 11.53

Parametric ANOVA

Constituent: Chloride   Analysis Run 11/15/2017 5:23 AM   View: ANOVA
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 8.545

Tabulated F statistic = 4.6 with 1 and 14 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	15500	1	15500	27.87
Error Within Groups	7786	14	556.1	
Total	23286	15		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.05, calculated = 0.9707, critical = 0.887. Levene's Equality of Variance test passed. Calculated = 4.437, tabulated = 4.6.

Non-Parametric ANOVA

Constituent: Fluoride   Analysis Run 11/15/2017 5:23 AM   View: ANOVA
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 8.554

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.353
Adjusted Kruskal-Wallis statistic (H') = 8.554

Non-Parametric ANOVA

Constituent: pH Analysis Run 11/15/2017 5:23 AM View: ANOVA
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 10.69

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 10.67
Adjusted Kruskal-Wallis statistic (H') = 10.69

Parametric ANOVA

Constituent: Sulfate   Analysis Run 11/15/2017 5:23 AM   View: ANOVA
Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0

Tabulated F statistic = 4.6 with 1 and 14 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	15500	1	15500	27.87
Error Within Groups	7786	14	556.1	
Total	23286	15		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.05, calculated = 0.9331, critical = 0.887. Levene's Equality of Variance test passed. Calculated = 4.378, tabulated = 4.6.

Parametric ANOVA

Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:23 AM View: ANOVA
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

For observations made between 3/29/2016 and 10/10/2017 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 27.87

Tabulated F statistic = 4.6 with 1 and 14 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	15500	1	15500	27.87
Error Within Groups	7786	14	556.1	
Total	23286	15		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.05, calculated = 0.9107, critical = 0.887. Levene's Equality of Variance test passed. Calculated = 2.561, tabulated = 4.6.

Confidence Intervals

Confidence Interval Summary Table - Significant Results Appendix III

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	2.582	1.485	0.05	Yes	8	2.025	0.5392	0	None	sqrt(x)	0.01	Param.
Boron (mg/L)	MW-5A	17.03	7.399	0.05	Yes	6	12.22	3.507	0	None	No	0.01	Param.
Boron (mg/L)	MW-6	0.3988	0.2937	0.05	Yes	8	0.3463	0.04955	0	None	No	0.01	Param.
Boron (mg/L)	MW-7	11.61	5.693	0.05	Yes	8	8.65	2.79	0	None	No	0.01	Param.
Boron (mg/L)	MW-9	5.369	3.131	0.05	Yes	8	4.25	1.056	0	None	No	0.01	Param.
Boron (mg/L)	MW-10	0.5506	0.2794	0.05	Yes	8	0.415	0.128	0	None	No	0.01	Param.
Boron (mg/L)	MW-11	13.64	4.419	0.05	Yes	8	9.031	4.352	0	None	No	0.01	Param.
Boron (mg/L)	MW-12	12	0.77	0.05	Yes	4	3.713	5.528	0	None	No	0.0625	NP (normality)
Boron (mg/L)	MW-12A	1.194	0.5663	0.05	Yes	6	0.88	0.2284	0	None	No	0.01	Param.
Boron (mg/L)	MW-13	1.382	0.6204	0.05	Yes	7	1.001	0.3208	0	None	No	0.01	Param.
Boron (mg/L)	MW-14A	5.737	3.496	0.05	Yes	6	4.617	0.8159	0	None	No	0.01	Param.
Calcium (mg/L)	MW-4	304.3	270.7	29	Yes	8	287.5	15.81	0	None	No	0.01	Param.
Calcium (mg/L)	MW-5	322.6	61.25	29	Yes	4	170	61.64	0	None	sqrt(x)	0.01	Param.
Calcium (mg/L)	MW-5A	480	300	29	Yes	6	401.7	86.81	0	None	No	0.0155	NP (normality)
Calcium (mg/L)	MW-6	100.4	67.61	29	Yes	8	84	15.46	0	None	No	0.01	Param.
Calcium (mg/L)	MW-7	418.1	159.4	29	Yes	8	288.8	122.1	0	None	No	0.01	Param.
Calcium (mg/L)	MW-8	83.31	62.94	29	Yes	8	73.13	9.613	0	None	No	0.01	Param.
Calcium (mg/L)	MW-9	189.1	73.11	29	Yes	8	131.1	54.73	0	None	No	0.01	Param.
Calcium (mg/L)	MW-10	132.6	89.41	29	Yes	8	111	20.37	0	None	No	0.01	Param.
Calcium (mg/L)	MW-11	636.2	273.8	29	Yes	8	455	171	0	None	No	0.01	Param.
Calcium (mg/L)	MW-12	600	110	29	Yes	4	242.5	238.7	0	None	No	0.0625	NP (normality)
Calcium (mg/L)	MW-12A	172.5	107.5	29	Yes	6	140	23.66	0	None	No	0.01	Param.
Calcium (mg/L)	MW-13	122.9	62.01	29	Yes	7	92.43	25.61	0	None	No	0.01	Param.
Calcium (mg/L)	MW-14A	233.5	169.8	29	Yes	6	201.7	23.17	0	None	No	0.01	Param.
Chloride (mg/L)	MW-4	527.8	424.7	4.97	Yes	8	476.3	48.68	0	None	No	0.01	Param.
Chloride (mg/L)	MW-5A	368.5	225.8	4.97	Yes	6	301.7	53.45	0	None	x^2	0.01	Param.
Chloride (mg/L)	MW-6	48.72	33.78	4.97	Yes	8	41.25	7.046	0	None	No	0.01	Param.
Chloride (mg/L)	MW-7	321.2	49.06	4.97	Yes	8	185.1	128.4	0	None	No	0.01	Param.
Chloride (mg/L)	MW-8	58.29	17.93	4.97	Yes	8	38.11	19.04	0	None	No	0.01	Param.
Chloride (mg/L)	MW-9	350.3	88.22	4.97	Yes	8	219.3	123.6	0	None	No	0.01	Param.
Chloride (mg/L)	MW-10	124.9	87.39	4.97	Yes	8	105.9	19.64	0	None	ln(x)	0.01	Param.
Chloride (mg/L)	MW-11	483.9	209.4	4.97	Yes	8	346.6	129.5	0	None	No	0.01	Param.
Chloride (mg/L)	MW-12	520	80	4.97	Yes	4	195.5	216.4	0	None	No	0.0625	NP (normality)
Chloride (mg/L)	MW-12A	113	78.81	4.97	Yes	6	95.5	12.91	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-13	133.3	12.43	4.97	Yes	7	66.57	58.96	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-14A	237.5	209.1	4.97	Yes	6	223.3	10.33	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-4	0.3964	0.3286	0.1	Yes	8	0.3625	0.03196	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-5A	2.234	1.099	0.1	Yes	6	1.667	0.4131	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-7	1.96	0.9621	0.1	Yes	8	1.461	0.4709	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-8	0.1834	0.1291	0.1	Yes	8	0.1563	0.0256	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-11	2.283	1.234	0.1	Yes	8	1.706	0.7223	0	None	x^2	0.01	Param.
pH (SU)	MW-11	6.879	6.641	6.24	Yes	9	6.76	0.1063	0	None	No	0.005	Param.
Sulfate (mg/L)	MW-4	661.7	488.3	22.68	Yes	8	575	81.77	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-5A	953.3	213.3	22.68	Yes	6	583.3	269.3	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-6	143.1	86.45	22.68	Yes	8	114.8	26.7	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-7	676.2	171.3	22.68	Yes	8	423.8	238.1	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-9	485.1	139.2	22.68	Yes	8	312.1	163.2	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-10	268.3	221.6	22.68	Yes	8	245	25.07	0	None	x^3	0.01	Param.
Sulfate (mg/L)	MW-11	1083	459	22.68	Yes	8	771.3	294.6	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-12	1544	58.73	22.68	Yes	4	377.5	329.6	0	None	ln(x)	0.01	Param.
Sulfate (mg/L)	MW-12A	362.1	181.2	22.68	Yes	6	271.7	65.85	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-13	196.7	67.04	22.68	Yes	7	131.9	54.57	0	None	No	0.01	Param.
Sulfate (mg/L)	MW-14A	460.3	293	22.68	Yes	6	376.7	60.88	0	None	No	0.01	Param.
Total Dissolved Solids (mg/L)	MW-4	2228	1283	194.7	Yes	8	1726	610.2	0	None	x^2	0.01	Param.
Total Dissolved Solids (mg/L)	MW-5	1544	300.9	194.7	Yes	4	922.5	273.8	0	None	No	0.01	Param.

Confidence Interval Summary Table - Significant Results Appendix III

Lowman Power Plant   Client: PowerSouth Energy Cooperation   Data: Lowman Power Plant   Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	**MW-5A**	**2581**	**1319**	**194.7**	**Yes**	**6**	**1950**	**459.3**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-6**	**451.1**	**356.4**	**194.7**	**Yes**	**8**	**403.8**	**44.7**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-7**	**2097**	**583.1**	**194.7**	**Yes**	**8**	**1340**	**714.1**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-8**	**325.5**	**247**	**194.7**	**Yes**	**8**	**286.3**	**37.01**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-9**	**1477**	**557.7**	**194.7**	**Yes**	**8**	**1018**	**433.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-10**	**674.6**	**522.9**	**194.7**	**Yes**	**8**	**598.8**	**71.6**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-11**	**3166**	**1339**	**194.7**	**Yes**	**8**	**2253**	**861.4**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-12**	**2700**	**530**	**194.7**	**Yes**	**4**	**1120**	**1056**	**0**	**None**	**No**	**0.0625**	**NP (normality)**
Total Dissolved Solids (mg/L)	**MW-12A**	**831.2**	**558.8**	**194.7**	**Yes**	**6**	**695**	**99.15**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-13**	**649.5**	**239**	**194.7**	**Yes**	**7**	**444.3**	**172.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-14A**	**1200**	**1100**	**194.7**	**Yes**	**6**	**1133**	**51.64**	**0**	**None**	**No**	**0.0155**	**NP (normality)**

Confidence Interval Summary Table - All Results Appendix III

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	MW-4	2.582	1.485	0.05	Yes	8	2.025	0.5392	0	None	sqrt(x)	0.01	Param.
Boron (mg/L)	MW-5	8.233	-2.938	0.05	No	4	2.648	2.46	0	None	No	0.01	Param.
Boron (mg/L)	MW-5A	17.03	7.399	0.05	Yes	6	12.22	3.507	0	None	No	0.01	Param.
Boron (mg/L)	MW-6	0.3988	0.2937	0.05	Yes	8	0.3463	0.04955	0	None	No	0.01	Param.
Boron (mg/L)	MW-7	11.61	5.693	0.05	Yes	8	8.65	2.79	0	None	No	0.01	Param.
Boron (mg/L)	MW-8	0.217	0.04618	0.05	No	8	0.1283	0.1048	0	None	x^(1/3)	0.01	Param.
Boron (mg/L)	MW-9	5.369	3.131	0.05	Yes	8	4.25	1.056	0	None	No	0.01	Param.
Boron (mg/L)	MW-10	0.5506	0.2794	0.05	Yes	8	0.415	0.128	0	None	No	0.01	Param.
Boron (mg/L)	MW-11	13.64	4.419	0.05	Yes	8	9.031	4.352	0	None	No	0.01	Param.
Boron (mg/L)	MW-12	12	0.77	0.05	Yes	4	3.713	5.528	0	None	No	0.0625	NP (normality)
Boron (mg/L)	MW-12A	1.194	0.5663	0.05	Yes	6	0.88	0.2284	0	None	No	0.01	Param.
Boron (mg/L)	MW-13	1.382	0.6204	0.05	Yes	7	1.001	0.3208	0	None	No	0.01	Param.
Boron (mg/L)	MW-14A	5.737	3.496	0.05	Yes	6	4.617	0.8159	0	None	No	0.01	Param.
Calcium (mg/L)	MW-4	304.3	270.7	29	Yes	8	287.5	15.81	0	None	No	0.01	Param.
Calcium (mg/L)	MW-5	322.6	61.25	29	Yes	4	170	61.64	0	None	sqrt(x)	0.01	Param.
Calcium (mg/L)	MW-5A	480	300	29	Yes	6	401.7	86.81	0	None	No	0.0155	NP (normality)
Calcium (mg/L)	MW-6	100.4	67.61	29	Yes	8	84	15.46	0	None	No	0.01	Param.
Calcium (mg/L)	MW-7	418.1	159.4	29	Yes	8	288.8	122.1	0	None	No	0.01	Param.
Calcium (mg/L)	MW-8	83.31	62.94	29	Yes	8	73.13	9.613	0	None	No	0.01	Param.
Calcium (mg/L)	MW-9	189.1	73.11	29	Yes	8	131.1	54.73	0	None	No	0.01	Param.
Calcium (mg/L)	MW-10	132.6	89.41	29	Yes	8	111	20.37	0	None	No	0.01	Param.
Calcium (mg/L)	MW-11	636.2	273.8	29	Yes	8	455	171	0	None	No	0.01	Param.
Calcium (mg/L)	MW-12	600	110	29	Yes	4	242.5	238.7	0	None	No	0.0625	NP (normality)
Calcium (mg/L)	MW-12A	172.5	107.5	29	Yes	6	140	23.66	0	None	No	0.01	Param.
Calcium (mg/L)	MW-13	122.9	62.01	29	Yes	7	92.43	25.61	0	None	No	0.01	Param.
Calcium (mg/L)	MW-14A	233.5	169.8	29	Yes	6	201.7	23.17	0	None	No	0.01	Param.
Chloride (mg/L)	MW-4	527.8	424.7	4.97	Yes	8	476.3	48.68	0	None	No	0.01	Param.
Chloride (mg/L)	MW-5	253.2	-42.22	4.97	No	4	105.5	65.07	0	None	No	0.01	Param.
Chloride (mg/L)	MW-5A	368.5	225.8	4.97	Yes	6	301.7	53.45	0	None	x^2	0.01	Param.
Chloride (mg/L)	MW-6	48.72	33.78	4.97	Yes	8	41.25	7.046	0	None	No	0.01	Param.
Chloride (mg/L)	MW-7	321.2	49.06	4.97	Yes	8	185.1	128.4	0	None	No	0.01	Param.
Chloride (mg/L)	MW-8	58.29	17.93	4.97	Yes	8	38.11	19.04	0	None	No	0.01	Param.
Chloride (mg/L)	MW-9	350.3	88.22	4.97	Yes	8	219.3	123.6	0	None	No	0.01	Param.
Chloride (mg/L)	MW-10	124.9	87.39	4.97	Yes	8	105.9	19.64	0	None	ln(x)	0.01	Param.
Chloride (mg/L)	MW-11	483.9	209.4	4.97	Yes	8	346.6	129.5	0	None	No	0.01	Param.
Chloride (mg/L)	MW-12	520	80	4.97	Yes	4	195.5	216.4	0	None	No	0.0625	NP (normality)
Chloride (mg/L)	MW-12A	113	78.81	4.97	Yes	6	95.5	12.91	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-13	133.3	12.43	4.97	Yes	7	66.57	58.96	0	None	sqrt(x)	0.01	Param.
Chloride (mg/L)	MW-14A	237.5	209.1	4.97	Yes	6	223.3	10.33	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-4	0.3964	0.3286	0.1	Yes	8	0.3625	0.03196	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-5	0.1753	0.03971	0.1	No	4	0.1075	0.02986	25	None	No	0.01	Param.
Fluoride (mg/L)	MW-5A	2.234	1.099	0.1	Yes	6	1.667	0.4131	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-6	0.2379	0.08211	0.1	No	8	0.16	0.07348	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-7	1.96	0.9621	0.1	Yes	8	1.461	0.4709	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-8	0.1834	0.1291	0.1	Yes	8	0.1563	0.0256	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-9	0.12	0.09	0.1	No	8	0.11	0.01195	0	None	No	0.004	NP (normality)
Fluoride (mg/L)	MW-10	0.08	0.04	0.1	No	8	0.06125	0.01126	0	None	No	0.004	NP (normality)
Fluoride (mg/L)	MW-11	2.283	1.234	0.1	Yes	8	1.706	0.7223	0	None	x^2	0.01	Param.
Fluoride (mg/L)	MW-12	1.5	0.04	0.1	No	4	0.4075	0.7283	0	None	No	0.0625	NP (normality)
Fluoride (mg/L)	MW-12A	0.1	0.04	0.1	No	6	0.05167	0.02401	16.67	None	No	0.0155	NP (normality)
Fluoride (mg/L)	MW-13	0.09491	0.05937	0.1	No	7	0.07714	0.01496	0	None	No	0.01	Param.
Fluoride (mg/L)	MW-14A	0.1	0.04	0.1	No	6	0.055	0.02258	16.67	None	No	0.0155	NP (normality)
pH (SU)	MW-4	4.63	4.06	6.24	No	9	4.473	0.1687	0	None	No	0.002	NP (normality)
pH (SU)	MW-5	6.436	4.684	6.24	No	5	5.56	0.4254	0	None	No	0.005	Param.
pH (SU)	MW-5A	6.062	5.618	6.24	No	7	5.84	0.1583	0	None	No	0.005	Param.

Confidence Interval Summary Table - All Results Appendix III

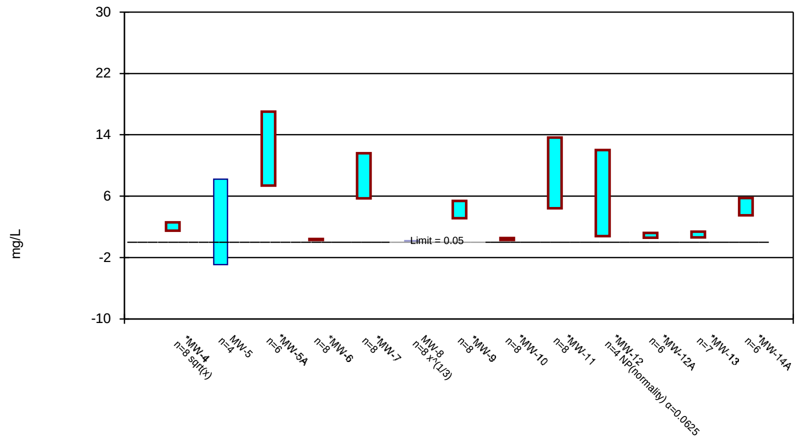
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant Printed 11/15/2017, 5:28 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH (SU)	MW-6	6.348	5.659	6.24	No	9	6.003	0.3083	0	None	No	0.005	Param.
pH (SU)	MW-7	6.11	5.912	6.24	No	9	6.011	0.0888	0	None	No	0.005	Param.
pH (SU)	MW-8	6.478	6.171	6.24	No	9	6.324	0.1371	0	None	No	0.005	Param.
pH (SU)	MW-9	6.307	5.78	6.24	No	9	6.048	0.258	0	None	x^5	0.005	Param.
pH (SU)	MW-10	4.01	3.77	6.24	No	9	3.89	0.1077	0	None	No	0.005	Param.
pH (SU)	**MW-11**	**6.879**	**6.641**	**6.24**	**Yes**	**9**	**6.76**	**0.1063**	**0**	**None**	**No**	**0.005**	**Param.**
pH (SU)	MW-12	6.13	5.58	6.24	No	5	5.736	0.2269	0	None	No	0.031	NP (normality)
pH (SU)	MW-12A	5.714	5.351	6.24	No	7	5.533	0.1294	0	None	No	0.005	Param.
pH (SU)	MW-13	6.237	5.946	6.24	No	8	6.091	0.1178	0	None	No	0.005	Param.
pH (SU)	MW-14	7.143	3.437	6.24	No	4	5.29	0.6345	0	None	No	0.005	Param.
pH (SU)	MW-14A	5.74	5.003	6.24	No	7	5.371	0.2628	0	None	No	0.005	Param.
Sulfate (mg/L)	**MW-4**	**661.7**	**488.3**	**22.68**	**Yes**	**8**	**575**	**81.77**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	MW-5	331.6	-61.62	22.68	No	4	135	86.6	0	None	No	0.01	Param.
Sulfate (mg/L)	**MW-5A**	**953.3**	**213.3**	**22.68**	**Yes**	**6**	**583.3**	**269.3**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-6**	**143.1**	**86.45**	**22.68**	**Yes**	**8**	**114.8**	**26.7**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-7**	**676.2**	**171.3**	**22.68**	**Yes**	**8**	**423.8**	**238.1**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	MW-8	15.78	-2.35	22.68	No	8	9.063	5.947	37.5	Cohen`s	No	0.01	Param.
Sulfate (mg/L)	**MW-9**	**485.1**	**139.2**	**22.68**	**Yes**	**8**	**312.1**	**163.2**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-10**	**268.3**	**221.6**	**22.68**	**Yes**	**8**	**245**	**25.07**	**0**	**None**	**x^3**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-11**	**1083**	**459**	**22.68**	**Yes**	**8**	**771.3**	**294.6**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-12**	**1544**	**58.73**	**22.68**	**Yes**	**4**	**377.5**	**329.6**	**0**	**None**	**ln(x)**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-12A**	**362.1**	**181.2**	**22.68**	**Yes**	**6**	**271.7**	**65.85**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-13**	**196.7**	**67.04**	**22.68**	**Yes**	**7**	**131.9**	**54.57**	**0**	**None**	**No**	**0.01**	**Param.**
Sulfate (mg/L)	**MW-14A**	**460.3**	**293**	**22.68**	**Yes**	**6**	**376.7**	**60.88**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-4**	**2228**	**1283**	**194.7**	**Yes**	**8**	**1726**	**610.2**	**0**	**None**	**x^2**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-5**	**1544**	**300.9**	**194.7**	**Yes**	**4**	**922.5**	**273.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-5A**	**2581**	**1319**	**194.7**	**Yes**	**6**	**1950**	**459.3**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-6**	**451.1**	**356.4**	**194.7**	**Yes**	**8**	**403.8**	**44.7**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-7**	**2097**	**583.1**	**194.7**	**Yes**	**8**	**1340**	**714.1**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-8**	**325.5**	**247**	**194.7**	**Yes**	**8**	**286.3**	**37.01**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-9**	**1477**	**557.7**	**194.7**	**Yes**	**8**	**1018**	**433.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-10**	**674.6**	**522.9**	**194.7**	**Yes**	**8**	**598.8**	**71.6**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-11**	**3166**	**1339**	**194.7**	**Yes**	**8**	**2253**	**861.4**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-12**	**2700**	**530**	**194.7**	**Yes**	**4**	**1120**	**1056**	**0**	**None**	**No**	**0.0625**	**NP (normality)**
Total Dissolved Solids (mg/L)	**MW-12A**	**831.2**	**558.8**	**194.7**	**Yes**	**6**	**695**	**99.15**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-13**	**649.5**	**239**	**194.7**	**Yes**	**7**	**444.3**	**172.8**	**0**	**None**	**No**	**0.01**	**Param.**
Total Dissolved Solids (mg/L)	**MW-14A**	**1200**	**1100**	**194.7**	**Yes**	**6**	**1133**	**51.64**	**0**	**None**	**No**	**0.0155**	**NP (normality)**

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



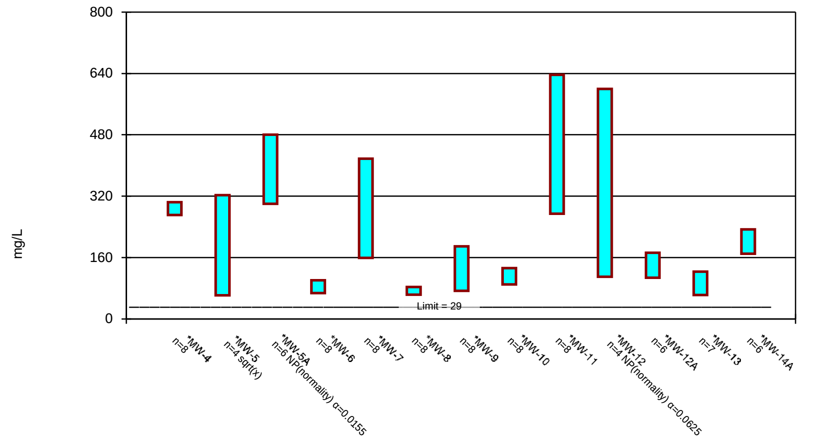
Constituent: Boron Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



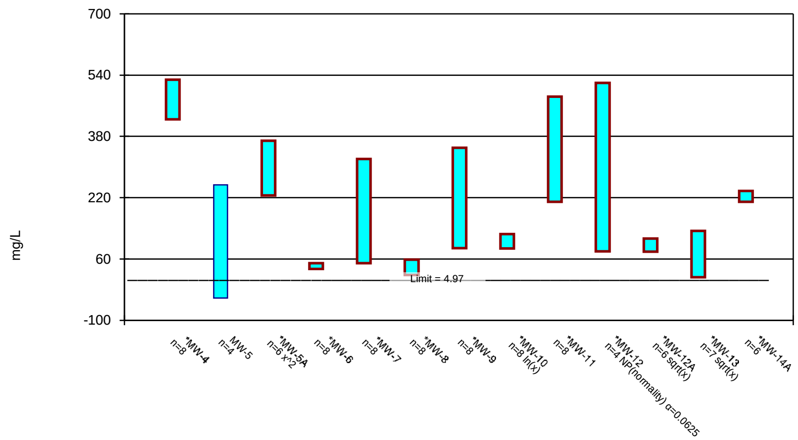
Constituent: Calcium Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



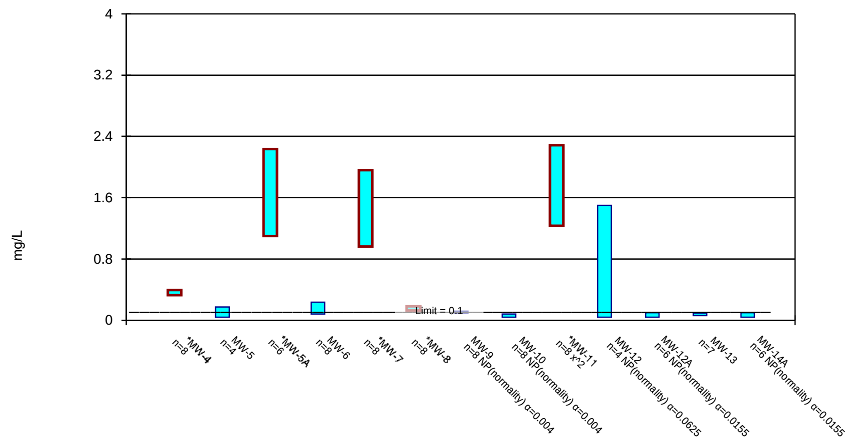
Constituent: Chloride Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



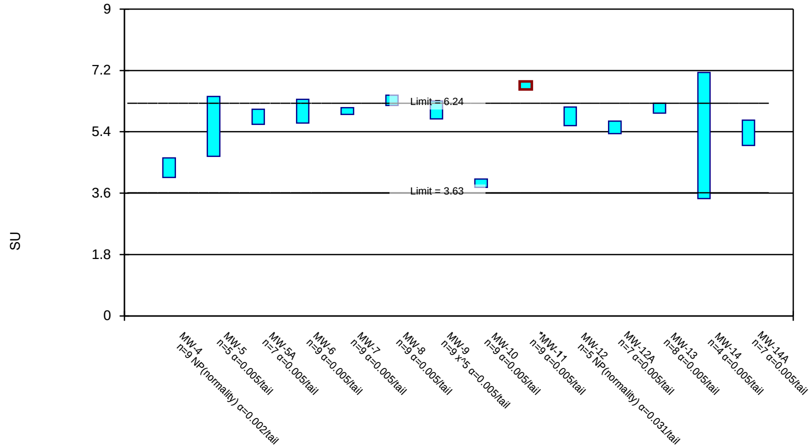
Constituent: Fluoride Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III

Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Normality Test: Shapiro Wilk, alpha based on n.

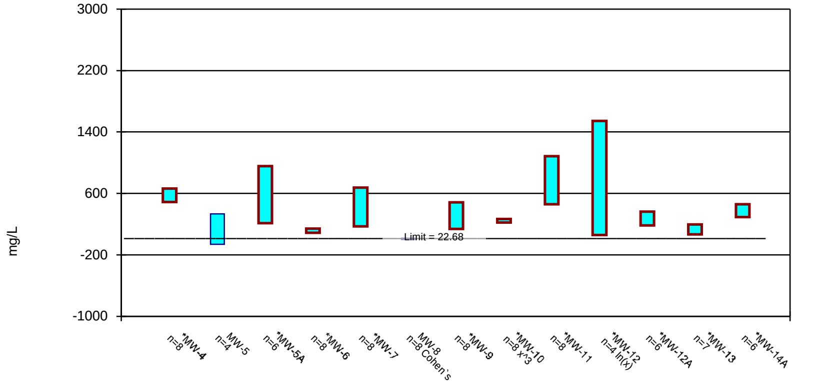


Constituent: pH Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

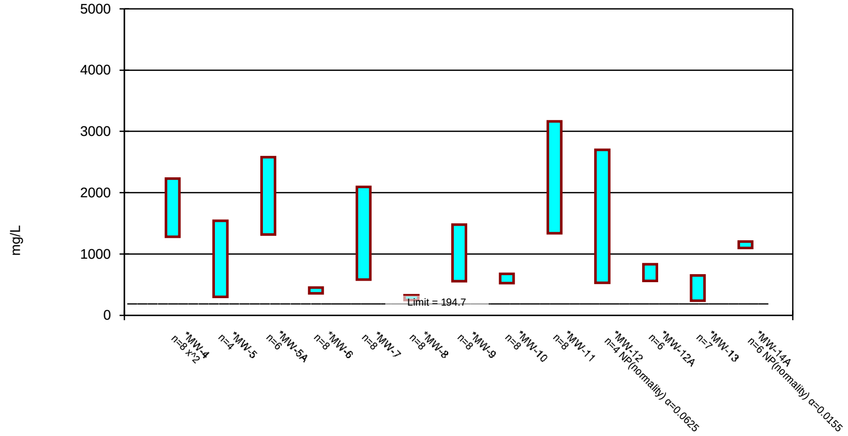


Constituent: Sulfate Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant

Sanitas™ v.9.6.00 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Total Dissolved Solids Analysis Run 11/15/2017 5:27 AM View: Confidence Intervals - App III
Lowman Power Plant Client: PowerSouth Energy Cooperation Data: Lowman Power Plant