PRELIMINARY DETERMINATION

PERMIT MODIFICATION
Black Warrior Solid Waste Disposal Facility
3301 Landfill Drive
Coker, Alabama 35452

Black Warrior Solid Waste Disposal Facility
Permit No. 63-01

September 8, 2026

Three Notch Group, on behalf of Black Warrior Solid Waste Disposal Authority has submitted to the Alabama Department of Environmental Management (ADEM) an application to modify the Solid Waste Disposal Facility Permit for the Black Warrior Solid Waste Disposal Facility (Permit No. 63-01). The permit modification includes a modification of the operations plan to include a public convenience/drop-off area, additional severe wet weather operating provisions, and revision of operating hours. All other permit conditions will remain the same.

The Black Warrior Solid Waste Disposal Facility is located in Sections 2 and 11, Township 21 South, Range 11 West in Tuscaloosa County, Alabama.

The Land Division has determined that the permit application meets the applicable requirements of ADEM's Administrative Code Division 13 regulations.

Technical Contact:

Hunter Baker
Solid Waste Engineering Section
Land Division

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SOLID WASTE PERMIT

Permittee:	Black Warrior Solid Waste Disposal Authority 3301 Landfill Drive Coker, Alabama 35452
Landfill Name:	Black Warrior Solid Waste Disposal Facility
Landfill Location:	Sections 2 and 11, Township 21 South, Range 11 West Tuscaloosa County, Alabama
Permit No.	63-01
Landfill Type:	Municipal Solid Waste

Pursuant to the Solid Wastes and Recyclable Materials Management Act, Code of Alabama 1975, §§22-27-1, et seq., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM), this permit is issued to Black Warrior Solid Waste Disposal Authority (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the Black Warrior Solid Waste Disposal Facility.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions set forth herein (including those in all attachments), and the applicable regulations contained in Chapters ADEM Admin. Code 335-13-1 through 335-13-16 of the ADEM Administrative Code (referred to as the "ADEM Admin. Code"). Rules cited are set forth in this document for the purpose of Permittee reference. A Rule that is cited incorrectly in this document does not constitute grounds for noncompliance on the part of the Permittee. Applicable ADEM Administrative Codes are those that are in effect on the date of issuance of this permit or the revisions approved after permit issuance.

This permit is based on the information submitted to ADEM on October 1, 2021 for permit renewal, and on September 22, 2023 and February 3, 2026 for permit modification, and as amended, and is hereby known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform ADEM of deviations from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

This permit is effective as of **October 7, 2022,** and modified on **January 16, 2025 and ?????,** and shall remain in effect until **October 6, 2032,** unless suspended or revoked.

_____ _____

Alabama Department of Environmental Management Date Signed

SECTION I. STANDARD CONDITIONS.

A. Effect of Permit. The Permittee is allowed to dispose of nonhazardous solid waste in accordance with the conditions of this permit and ADEM Admin. Code ADEM Admin. Code 335-13. Issuance of this permit does not convey property rights of any sort or an exclusive privilege, nor does it authorize the injury to persons or property, the invasion of other private rights, or the infringement of state or local laws or regulations. Except for actions brought under Code of Alabama 1975, §§22-27-1, *et seq*., as amended, compliance with the conditions of this permit shall be deemed to be compliance with applicable requirements in effect as of the date of issuance of this permit and future revisions.

B. Permit Actions. This permit may be suspended, revoked or modified for cause. The filing of a request for a permit modification or the notification of planned changes or anticipated noncompliance on the part of the Permittee, and the suspension or revocation does not stay the applicability or enforceability of permit condition.

C. Severability. The provisions of this permit are severable, and if a provision of this permit, or the application of a provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

D. Definitions. For the purpose of this permit, terms used herein shall have the same meaning as those in Admin. Code 335-13, unless this permit specifically provides otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. "EPA" means the United States Environmental Protection Agency.

2. "Permit Application" means all permit application forms, design plans, operational plans, closure plans, technical data, reports, specifications, plats, geological and hydrological reports, and other materials which are submitted to ADEM in pursuit of a solid waste disposal permit.

E. Duties and Requirements.

1. Duty to Comply. The Permittee must comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by a variance granted by ADEM. A permit noncompliance, other than noncompliance authorized by a variance, constitutes a violation of Code of Alabama 1975, §§22-27-1 et seq., as amended, and is grounds for enforcement action, permit suspension, revocation, modification, and/or denial of a permit renewal application.

2. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The renewal application must be submitted to ADEM at least 180 days before this permit expires.

3. Permit Expiration. This permit and all conditions therein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application as required by Section I.E.2., and, through no fault of the Permittee, ADEM has not made a final decision regarding the renewal application.

4. Need to Halt or Reduce Activity Not A Defense. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

5. Duty to Mitigate. In the event of noncompliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

6. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with the conditions of this permit.

7. Duty to Provide Information. If requested, the Permittee shall furnish to ADEM, within a reasonable time, the information that ADEM may reasonably need to determine whether cause exists for denying, suspending, revoking, or modifying this permit, or to determine compliance with this permit. If requested, the Permittee shall also furnish ADEM with copies of records kept as a requirement of this permit.

8. Inspection and Entry. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the employees of ADEM or their authorized representative to:

   a. Enter at reasonable times the Permittee's premises where the regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.

   b. Have access to and copy, at reasonable times, the records that must be kept under the conditions of this permit.

   c. Inspect, at reasonable times, the facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.

   d. Sample or monitor, at reasonable times, the substances or parameters at a location for the purposes of assuring permit compliance or as otherwise authorized by Code of Alabama 1975, §§22-27-1 *et seq*.

9. Monitoring, Corrective Actions, and Records.

   a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from ADEM Admin. Code ADEM Admin. Code 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), other appropriate EPA methods, or as specified in the Application. All field tests must be conducted using approved EPA test kits and procedures.

   b. The Permittee shall retain records, at the location specified in Section I.I., of all monitoring, or corrective action information, including all calibration and maintenance records, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record or for periods elsewhere specified in this permit. These periods may be extended by the request of ADEM at any time and are automatically extended during the course of an unresolved enforcement action regarding this facility.

   c. Records of monitoring and corrective action information shall include.

      i. The exact place, date, and time of sampling or measurement.

      ii. The individual(s) and company who performed the sampling or measurements.

      iii. The date(s) analyses were performed.

      iv. The individual(s) and company who performed the analyses.

v. The analytical techniques or methods used.

vi. The results of such analyses.

d. The Permittee shall submit all monitoring and corrective action results at the interval specified elsewhere in this permit.

10. Reporting Planned Changes. The Permittee shall notify ADEM, in the form of a request for permit modification, at least 120 days prior to a change in the permitted service area, increase in the waste received, or change in the design or operating procedure as described in this permit, including planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

11. Transfer of Permit. This permit may be transferred to a new owner or operator. All requests for transfer of permits shall be submitted electronically via the Department-approved electronic system. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of this permit.

12. Certification of Construction. The Permittee may not commence disposal of waste in a new cell or phase until the Permittee has submitted to ADEM, by certified mail or hand delivery, a letter signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with the permit. An engineer must attest or certify that the installation, seaming, etc., as proposed or as depicted on the plan or layout specified above would meet the standards or criteria prescribed, or required by the manufacturers of the components and ADEM's regulations, and that the panels or components would be expected to perform satisfactorily, without failure, to the required standards over a normally expected lifetime or performance period for typical panels or components. ADEM must inspect the constructed cells or phases before the owner or operator can commence waste disposal unless the Permittee is notified that ADEM will waive the inspection.

13. Compliance Schedules. Reports of compliance or noncompliance with or progress reports on interim and final requirements contained in a compliance schedule required and approved by ADEM shall be submitted no later than 14 days following each schedule date.

14. Other Noncompliance. The Permittee shall report all instances of noncompliance with the permit at the time monitoring reports are submitted.

15. Other Information. If the Permittee becomes aware that information required by the Application was not submitted or was incorrect in the Application or in a report to ADEM, the Permittee shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to ADEM, within a reasonable time, information related to compliance with the permit.

F. Design and Operation of Facility. The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or an unplanned sudden or nonsudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

G. Inspection Requirements.

1. The Permittee shall comply with all requirements set forth under ADEM Admin. Code 335-13.

2. The Permittee shall conduct random inspections of incoming loads.

3. Records of all inspections shall be included in the operating record.

H. Recordkeeping and Reporting.

1. The Permittee shall maintain a written operating record at the location specified in Section I.I. The operating record shall include:

   a. Documentation of inspection and maintenance activities.

   b. Daily Volume reports.

   c. Personnel training documents and records.

   d. Solid/Hazardous Waste Determination Forms for Industrial Wastes, and associated ADEM disposal approval correspondence for special wastes, industrial wastes, etc.

   e. Groundwater monitoring records.

   f. Explosive gas monitoring records.

   g. Surface water and leachate monitoring records. Leachate monitoring must be performed before transporting to a publicly owned treatment works. Monitoring is subject to applicable conditions of Section VII. of the permit.

   h. Copies of this Permit and the Application.

   i. Copies of all variances granted by ADEM, including copies of all approvals of special operating conditions (such as approvals for open burning,).

2. Quarterly Volume Report. Beginning with the effective date of this permit, the Permittee shall submit, within thirty (30) days after the end of each calendar quarter, a report summarizing the daily waste receipts for the previous (just ended) quarter. Copies of the quarterly reports shall be maintained in the operating record.

3. Monitoring and Corrective Action Reports. The Permittee shall submit reports on all monitoring and corrective activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year and the reports shall be submitted at least semi-annually. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be submitted on a quarterly basis, and the reports should be submitted to ADEM and placed in the operating record within 30 days of the monitoring event. Copies of the semi-annual groundwater and quarterly explosive gas monitoring reports shall be maintained in the operating record.

4. Availability, Retention, and Disposition of Records.

   a. All records, including plans, required under this permit or ADEM Admin. Code 335-13 must be furnished upon request, and made available at reasonable times for inspection by an officer, employee, or representative of ADEM.

   b. All records, including plans, required under this permit or ADEM Admin. Code 335-13 shall be retained by the Permittee for a period of at least three years. The retention period for all records is extended automatically during the course of an unresolved enforcement action regarding the facility, or as requested by ADEM.

   c. A copy of records of waste disposal locations and quantities must be submitted to ADEM and local land authority upon closure of the facility.

I. Documents to be Maintained by the Permittee. The Permittee shall maintain at Black Warrior Solid Waste Disposal Facility the following documents and amendments, revisions and modifications to these documents until an engineer certifies closure:

1. Operating record.

2. Closure Plan.

J. Mailing Location. All reports, notifications, or other submissions which are required by this permit should be sent via signed mail (i.e. certified mail, express mail delivery service, etc.) or hand delivered to:

1. Mailing Address.
Chief, Land Division
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

2. Physical Address.
Chief, Land Division
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, Alabama 36110-2400

K. Signatory Requirement. Signatory Requirement. All applications, reports required by permits, or other information requested by the Department shall be signed and certified electronically by a responsible official under the following conditions:

1. If an individual, by the applicant.

2. If a city, county, or other municipality or governmental entity, by the ranking elected official, or by a duly authorized representative of that person.

3. If a corporation, organization, or other legal entity, by a principal executive officer, of at least the level of Vice President, or by a duly authorized representative of that person.

Any document submitted electronically is assumed by the Department to have been submitted on behalf of the responsible official.

The applicant assumes the responsibility of assuring himself that any electronic document submitted on his behalf would have been certified by his written signature.

L. Confidential Information. The Permittee may claim information submitted as confidential pursuant to ADEM Admin. Code 335-1-1-.06.

M. State Laws and Regulations. Nothing in this permit shall be construed to preclude the initiation of a legal action or to relieve the Permittee from the responsibilities, liabilities, or penalties established pursuant to an applicable state law or regulation.

SECTION II. GENERAL OPERATING CONDITIONS.

A. Operation of Facility. The Permittee shall operate and maintain the disposal facility consistent with the Application, this permit, and ADEM Admin. Code 335-13.

B. Open Burning. The Permittee shall not allow open burning without prior written approval from ADEM and other appropriate agencies. A burn request should be submitted electronically to the Department via the

Department-approved electronic system, outlining why that burn request should be granted. This request should include, but not be limited to, specifically what areas will be utilized, types of waste to be burned, the projected starting and completion dates for the project, and the projected days and hours of operation. The approval, if granted, shall be included in the operating record.

C. Prevention of Unauthorized Disposal. The Permittee shall follow the approved procedures for the detecting and preventing the disposal of free liquids, regulated hazardous waste, PCB's, and medical waste at the facility.

D. Unauthorized Discharge. The Permittee shall operate the disposal facility in such a manner that there will be no water pollution or unauthorized discharge. A discharge from the disposal facility or practice thereof may require a National Pollutant Discharge Elimination System permit under the Alabama Water Pollution Control Act.

E. Industrial and Medical Waste Disposal. The Permittee shall dispose of industrial process waste as required by ADEM Admin. Code 335-13, and as specified in the Application. The Permittee, prior to disposal of industrial waste and/or medical waste, shall obtain from each generator a written certification that the material to be disposed does not contain free liquids, regulated hazardous wastes, regulated medical waste, or regulated PCB wastes.

F. Boundary Markers. The Permittee shall ensure that the facility is identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

G. Certified Operator. The Permittee shall be required to have an operator certified by the Department on-site during hours of operation, in accordance with the requirements of ADEM Admin. Code 335-13-12.

SECTION III. SPECIFIC MSW LANDFILL REQUIREMENTS.

A. Waste Identification and Management.

1. Subject to the terms of this permit, the Permittee may dispose of the nonhazardous solid wastes listed in Section III.B. Disposal of other waste streams is prohibited, except waste that is granted a temporary or one-time waiver by the Director.

2. The permitted facility boundary for the Black Warrior Solid Waste Disposal Facility is approximately 459.64 acres with a solid waste disposal area of 142.24 acres.

3. The maximum average daily volume of waste disposed at the facility, as contained in the permit application, shall not exceed 1500 tons/day. Should the average daily volume exceed this value by 20% or 100 tons/day, whichever is less, for two (2) consecutive quarters the permittee shall be required to modify the permit in accordance with ADEM Admin. Code 335-13-5-.06(2)(b)2. An increase in maximum average daily volume shall not be approved by ADEM unless the permittee has received local approval for the increased maximum average daily volume. The average daily volume shall be computed as specified by ADEM Admin. Code 335-13-4-.22(2)(g).

B. Waste Streams. The Permittee may accept for disposal nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, dried sludge, ashes, paper and other similar type materials. Special waste approved by ADEM may also be accepted.

C. Service Area. The service area for this landfill shall be all counties in Alabama.

D. Special Waste. The Permittee may dispose of special wastes in accordance with ADEM Admin. Code 335-13.

1. Asbestos Waste. The Permittee shall dispose of asbestos waste in accordance with ADEM Admin. Code 335-13-4-.26.
2. Foundry Sand. The Permittee shall dispose of foundry waste in accordance with ADEM Admin. Code 335-13-4-.26.

3. Petroleum Contaminated Waste. The Permittee shall dispose of petroleum contaminated waste in accordance with ADEM Admin. Code 335-13-4-.26.

4. Municipal Solid Waste Ash. The Permittee shall dispose of municipal solid waste ash in accordance with ADEM Admin. Code 335-13-4-.26.

E. Liner Requirements. The Permittee shall install a composite liner system as described in the Application consisting of a minimum of two feet of clay with a hydraulic conductivity of 1×10^{-7} cm/sec of less, overlain by a textured 60 mil. High Density Polyethylene (HDPE). The 60 mil. HDPE will be overlain with either an HDPE drainage net overlain with a geotextile filter fabric and two feet of on site soil cover or with one foot of sand with a hydraulic conductivity of 2×10^{-2} cm/sec or greater and one foot of on site material. The base of the composite liner system shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-.4-.11(2)a.

F Septic Tank Pumpings and Sewage Sludge. The Permittee shall not dispose of septic tank pumpings and/or sewage sludge unless specifically approved in writing by ADEM.

G. Large Dead Animals and Highly Putrescible Wastes. The Permittee shall handle the disposal of large dead animals and/or highly putrescible waste as required by ADEM Admin. Code 335-13-4-.22(1)(j). Disposal is allowed only in the municipal solid waste disposal area.

H. Cover Requirements. The Permittee shall cover all wastes as required by ADEM Admin. Code 335-13. The Permittee has been approved to utilize commercial tarp systems (See Section X., 2.) and non-hazardous solid waste clarifier sludge, cooling tower sludge, steckle dust all generated from NUCOR Steel Tuscaloosa, Inc., and VERDac Landfill Cover Pellets as alternate daily cover (See Section X., 3.). The Permittee shall be required to cover the active cell with six inches of earthen cover at the conclusion of each week's activities.

I. Waste Compaction. All waste shall be thoroughly compacted with adequate landfill equipment before the daily or weekly cover is applied. A completed daily cell shall not exceed fifteen feet in vertical thickness measured perpendicular to the slope of the preceding cell (See Section X., 1.).

J. Daily Cells. All waste shall be confined to an area as small as possible within a single working face and spread to a depth not exceeding two feet prior to compaction, and such compaction shall be accomplished on a face slope not to exceed 4 to 1or as otherwise approved by ADEM.

K. Security. The Permittee shall provide artificial and/or natural barriers, which prevent entry of unauthorized vehicular traffic to the facility.

L. All Weather Access Roads. The Permittee shall provide an all-weather access road to the dumping face that is wide enough to allow passage of collection vehicles.

M. Adverse Weather Disposal. The Permittee shall provide for disposal activities in adverse weather conditions.

N. Personnel. The Permittee shall maintain adequate personnel to ensure continued and smooth operation of the facility.

O. Equipment. The Permittee shall provide the landfill equipment as required by ADEM Admin. Code 335-13-4-.22(1)(f).

P. Environmental Monitoring and Treatment Structures. The Permittee shall provide protection and proper maintenance of environmental monitoring and treatment structures.

Q. Vector Control. The Permittee shall provide for vector control as required by ADEM Admin. Code 335-13.

R. Bulk or Noncontainerized Liquid Waste. The Permittee shall not dispose of bulk or noncontainerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin. Code 335-13-4-.22(1)(k) are met.

S. Empty Containers. The Permittee shall render empty containers larger than normally found in household waste unsuitable for holding liquids prior to delivery to the landfill unit unless otherwise approved by ADEM.

T. Other Requirements. ADEM may enhance or reduce the requirements for operating and maintaining the landfill as deemed necessary by the Land Division.

U. Other Permits. The Permittee shall operate the landfill according to this and other applicable permits.

V. Scavenging and Salvaging Operations. The Permittee shall prevent scavenging and salvaging operations, except as part of a controlled recycling effort.

W. Signs. The Permittee shall provide a sign outlining instructions for use of the site. The sign shall be posted and have the information required by ADEM Admin. Code 335-13-4-.22(1)(i).

X. Litter Control. The Permittee shall control litter.

Y. Fire Control. The Permittee shall provide fire control measures.

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS.

A. The Permittee shall install and/or maintain a groundwater monitoring system, as specified below.

1. The permittee shall maintain the groundwater monitoring wells and piezometers identified in Table 1 at the locations specified in the Application, and any other groundwater monitoring wells which are added during the active life and the post closure care period.

2. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of a plume of contamination or as otherwise deemed necessary to maintain compliance with the ADEM Admin. Code 335-13.

3. Prior to installing additional groundwater monitoring wells, the Permittee shall submit a report to ADEM with a permit modification request specifying the design, location and installation of additional monitoring wells. This report shall be submitted within one hundred and twenty (120) days prior to the installation which, at a minimum, shall include.

    a. Well construction techniques including proposed casing depths, proposed total depth, and proposed screened interval of well(s);

    b. Well development method(s);

    c. A complete analysis of well construction materials;

    d. A schedule of implementation for construction; and

    e. Provisions for determining the lithologic characteristics, hydraulic conductivity and grain-size distribution for the applicable aquifer unit(s) at the location of the new well(s).

B. Groundwater Monitoring Requirements.

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer identified in Table 1 each time the well or piezometer is sampled and at least semi-annually throughout the active life and post-closure care period.

2. The Permittee shall determine the groundwater flow rate and direction in the first zone of saturation at least annually or each time groundwater is sampled and submit as required by ADEM Admin. Code 335-13.

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample, and analyze for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27, in all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code 335-13-4-.27(2)(j) and ADEM Admin. Code 335-13-4-.27(2)(a)(1). The records and results of this sampling and analysis activity shall be submitted to ADEM, within sixty (60) days of the date of sampling.

4. The Permittee shall sample, and analyze all monitoring wells identified in Table 1 for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27(3), on a semi-annual basis throughout the active life of the facility and the post-closure care period in accordance with ADEM Admin. Code 335-13-4-.27(3). Sampling shall be conducted during March and September of each year, beginning with the effective date of this permit. . The records and results of this sampling and analysis activity shall be submitted to ADEM, within ninety (90) days of the date of sampling.

5. In addition to the requirements of Sections IV., B.1., B.2., B.3. and B.4., the Permittee shall record water levels, mean sea level elevation measuring point, depth to water, and the results of field tests for pH and specific conductance at the time of sampling for each well.

6. The Permittee is approved for inter-well statistical methods as described by the Revised Groundwater Monitoring Plan, dated March 23, 2022.

C. Sampling and Analysis Procedures. The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Section IV.A. to provide a reliable indication of the quality of the groundwater.

1. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Application. Monitoring wells shall be bailed or pumped to remove at least four times the well volume of water. Slow recharge wells shall be bailed until dry. Wells shall be allowed to recharge prior to sampling.

2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.

3. Samples shall be tracked and controlled using the chain-of-custody and QA/QC procedures specified of the Application.

D. Recordkeeping and Reporting Requirements.

1. Recording of Results. For each sample and/or measurement taken pursuant to the requirements of this permit, the Permittee shall record the information required by Section I.E.9.c.

2. Recordkeeping. Records and results of all groundwater monitoring, sampling, and analysis activities conducted pursuant to the requirements of this permit shall be included in the operating record required by Section I.I.1.

E. Permit Modification. If the Permittee or ADEM determines that the groundwater monitoring system no longer satisfies the requirements of ADEM Admin. Code 335-13-4-.14 or Section IV.A. of this permit, the Permittee must, within 120 days, submit an application for a permit modification to make necessary and/or appropriate changes to the system.

TABLE 1
GROUNDWATER MONITORING WELLS.

Monitoring Well Number	Top of Casing (feet msl)	Part Monitoring
	Upgradient Wells	
MW-1	280.92	Entire Landfill
MW-2R	324.60	Entire Landfill
	Downgradient Wells	
MW-3R	272.25	Entire Landfill
MW-4	196.88	Entire Landfill
MW-5	225.02	Entire Landfill
MW-6	191.62	Entire Landfill
MW-7	199.56	Entire Landfill
MW-8	217.84	Entire Landfill
MW-9	270.14	Entire Landfill
MW-10	293.93	Entire Landfill

SECTION V. GAS MONITORING REQUIREMENTS.

The Permittee must install and maintain an explosive gas monitoring system in accordance with ADEM Admin. Code Division 13.

SECTION VI. MUNICIPAL SOLID WASTE LANDFILL AIR EMISSIONS.

This landfill may be subject to ADEM Admin. Code Division 3 and the Federal Clean Air Act. Contact the ADEM Air Division for applicable requirements and permits.

SECTION VII. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS.

The Permittee must collect and dispose of the leachate that is generated at the facility. The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner. Prior to initial disposal, the permittee shall provide the Department with a letter from the receiving publicly or privately owned treatment works, approving the acceptance of the leachate. Discharges to publicly or privately owned treatment works may be subject to the requirements of the ADEM Water Division's State Indirect Discharge (SID) Program. The permittee shall construct and maintain run-on and run-off control structures. Surface water discharges from drainage control structures shall be permitted through the ADEM Water Division's National Pollutant Discharge Elimination System (NPDES) Program.

SECTION VIII. CLOSURE AND POST- CLOSURE REQUIREMENTS.

The Permittee shall close the landfill and perform post-closure care of the landfill in accordance with ADEM Admin. Code 335-13.

A. Final Cover. The landfill shall be closed in accordance with the approved application and ADEM Admin. Code 335-13.

B. Vegetative Cover. The Permittee shall establish a vegetative or other appropriate cover within 90 days after completion of final grading requirements in the Application. Preparation of a vegetative cover shall include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

C. Notice of Intent. The Permittee shall place in the operating record and notify ADEM of their intent to close the landfill prior to beginning closure.

D. Completion of Closure Activities. The Permittee must complete closure activities of each landfill unit in accordance with the Closure Plan within 180 days of the last known receipt of waste.

E. Certification of Closure. Following closure of each unit, the Permittee must submit to ADEM a certification, signed by an engineer, verifying the closure has been completed according to the Closure Plan.

F. Post-Closure Care Period. Post-closure care activities shall be conducted after closure of each unit throughout the life of this permit and continuing for a period of thirty (30) years following closure of the facility. ADEM may shorten or extend the post-closure care period applicable to the solid waste disposal facility. The Permittee shall reapply in order to fulfill the post-closure care requirements of this permit.

G. Post-Closure Maintenance. The Permittee shall provide post closure maintenance of the facility to include regularly scheduled inspections. This shall include maintenance of the cover, vegetation, monitoring devices and pollution control equipment and correction of other deficiencies that may be observed by ADEM. Monitoring requirements shall continue throughout the post closure period as determined by ADEM unless all waste is removed and no unpermitted discharge to waters of the State have occurred.

H. Post-Closure Use of Property. The Permittee shall ensure that post closure use of the property never be allowed to disturb the integrity of the final cover, liner, or other components of the containment system. This shall preclude the growing of deep-rooted vegetation on the closed area.

I. Certification of Post-Closure. Following post-closure of each unit, the Permittee must submit to ADEM a certification, signed by an engineer, verifying the post-closure has been completed according to the Post-Closure Plan.

J. Notice in Deed to Property. The Permittee must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code 335-5 and shall record a notation onto the land deed containing the property utilized for disposal within 90 days after permit expiration, revocation or when closure requirements are achieved as determined by ADEM as stated in the Application. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility and beginning and closure dates of the disposal activity.

K. Recording Instrument. The Permittee shall submit a certified copy of the recording instrument to ADEM within 120 days after permit expiration, revocation, or as directed by ADEM as described in the Application.

L. Removal of Waste. If the Permittee or other person(s) wishes to remove waste, waste residues, the liner, or any contaminated soils, the owner must request and receive prior approval from ADEM.

SECTION IX. FINANCIAL ASSURANCE

A. The Permittee shall maintain detailed written cost estimates, in current dollars, at the landfill office and on file with ADEM in accordance with ADEM Admin. Code 335-13-4-.28.

B. All cost estimates must be updated annually as required by ADEM Admin. Code 335-13-4-28.

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code 335-13-4-28. into the landfill operating record and submitted to ADEM before the initial receipt of waste in the case of closure, post-closure care, or no later than 120 days after corrective action remedy has been selected.

D. The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed.

E. The financial assurance mechanisms must be legally valid, binding, and enforceable under state and federal law.

F. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code 335-13-4-28. by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in the financial assurance mechanism must be approved by the Department.

G. The Permittee shall increase the closure, post-closure or corrective action cost estimates and the amount of financial assurance if changes in the closure, post-closure or correction action plans or landfill conditions increase the maximum cost.

H. The Permittee may reduce the amount of financial assurance by submitting justification and a revised estimate to ADEM for approval.

SECTION X. VARIANCES AND SPECIAL CONDITIONS.

1. A variance is granted for the Black Warrior Solid Waste Disposal Facility from Rule ADEM Admin. Code 335-13-4-.22(1)(c) which states that a completed daily cell shall not exceed eight feet in vertical thickness measured perpendicular to the slope of the preceding cell. Under this variance, a completed cell shall not exceed fifteen feet in vertical thickness measured perpendicular to the slope of the preceding cell (See Section III., I.).

2. The Permittee has been granted approval to utilize commercial tarp systems as an alternate daily cover. The commercial tarp system must be approved by the manufacturer for landfill use and the Permittee shall be required to follow manufacturer's recommendations for installation and removal of the tarp system. At the conclusion of each week's operation, the Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth. (See Section III., H.)

3. The Permittee has been granted approval to utilize non-hazardous solid waste clarifier sludge, cooling tower sludge, steckle dust all generated from NUCOR Steel Tuscaloosa, Inc., and VERDac Landfill Cover Pellets as alternate daily cover. The clarifier sludge, cooling tower sludge, steckle dust, and VERDac Landfill Cover Pellets may only be used to cover interior slopes of the cells. All exterior slopes shall be covered with soil in accordance with the approved plans and permit. A minimum of six inches of clarifier sludge, cooling tower sludge, or steckle dust shall be applied as cover. Alternate daily cover must be applied in accordance with applicable manufacturer's specifications and the Application. The Permittee shall be required to cover the active cell with six inches of earthen cover at the conclusion of each week's activities. (See Section III., H.)

Any variance granted by the Department may be terminated by the Department whenever the Department finds, after notice and opportunity for hearing, that the petitioner is in violation of any requirement, condition, schedule, limitation or any other provision of the variance, or that operation under the variance does not meet the minimum requirements established by state and federal laws.

Permit Application

THREE NOTCH GROUP Environment & Infrastructure

January 30, 2026

Mr. Stephen Cobb, Chief
Land Division
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, AL 36110-2400

Re: Permit Modification Request
Solid Waste Permit No. 63-01
Black Warrior Solid Waste Facility
Tuscaloosa County, Alabama
R029925001

Dear Mr. Cobb,

On behalf of the Black Warrior Solid Waste Disposal Authority (Authority), Three Notch Group (Three Notch) hereby submits this request for a permit modification for the Black Warrior Solid Waste Facility (Solid Waste Permit No. 63-01). This request includes revisions to the facility's Operations Manual and supporting materials, as summarized below.

SUMMARY OF REVISIONS:

OPERATIONS MANUAL

- Revision of standard operating hours.
- Incorporation of a designated public convenience/drop-off area to improve site access control, traffic flow, and operational safety.
- Addition of severe wet weather operations provisions to provide operational flexibility during hazardous weather conditions while maintaining environmental compliance.

This permit modification submittal package is proved for ADEM approval and includes the following:

- ADEM Form 439 – Solid Waste Facility Permit Modification Application
- Updated Operations Manual (December 2025)

Please contact me at (256) 229-3842 or via email at john.triplett@3notch.com if you have any questions or need additional information.

Sincerely,
Three Notch Group, Inc.

John Triplett, P.E.
Project Manager

THREE NOTCH GROUP

BLACK WARRIOR SOLID WASTE FACILITY

OPERATIONS MANUAL

Black Warrior Solid Waste Facility

DATE
NOVEMBER 2025

PREPARED BY
Three Notch Group, Inc.
11 West Court Square
Andalusia, AL 36420

OPERATIONS MANUAL

FOR

BLACK WARRIER SOLID WASTE FACILITY

TUSCALOOSA COUNTY, ALABAMA

Prepared for:

BLACK WARRIOR SOLID WASTE AUTHORITY

NOVEMBER 2025

CONSULTING ENGINEER

THREE NOTCH GROUP

OPERATIONS MANUAL

BLACK WARRIOR SOLID WASTE FACILITY

TUSCALOOSA COUNTY, ALABAMA

NOVEMBER 2025

_____

R. Daniel Wells, P.E. #27032
Principal Engineer

CONSULTING ENGINEER

THREE NOTCH GROUP

TABLE OF CONTENTS

1 INTRODUCTION 1-1

1.1 PURPOSE 1-1

1.2 GENERAL FACILITY INFORMATION 1-1

1.3 CONTACT PERSONS 1-3

APPENDIX 1.1 – LOCAL APPROVAL DOCUMENTS

APPENDIX 1.2 – ADEM FORM 439

2 SITE EVALUATION 2-1

2.1 WETLANDS ASSESSMENT 2-1

2.2 THREATENED AND ENDANGERED SPECIES 2-1

2.3 ARCHAEOLOGICAL SURVEY AND CULTURAL RESOURCE 2-1

2.4 FLOODPLAINS 2-1

2.5 UNSTABLE AREAS 2-1

2.6 AIRPORTS 2-1

APPENDIX 2.1 – WETLANDS ASSESSMENT REPORT

APPENDIX 2.2 – THREATENED AND ENDANGERED SPECIES REPORT

APPENDIX 2.3 – ARCHAEOLOGICAL SURVEY AND CULTURAL RESOURCE INVENTORY

APPENDIX 2.4 – FLOOD MAP

APPENDIX 2.5 – HYDROGEOLOGICAL EVALUATION

APPENDIX 2.6 – FEDERAL AVIATION ADMINISTRATION (FAA) NOTIFICATIONS

3 LEACHATE MANAGEMENT PLAN 3-1

3.1 LANDFILL LINER SYSTEM 3-1

3.2 LEACHATE GENERATION 3-1

3.3 LEACHATE COLLECTION SYSTEM 3-3

APPENDIX 3.1 – HELP MODEL

4 STORMWATER MANAGEMENT PLAN 4-1

4.1 WATER QUALITY PROTECTION 4-1

4.2 STORMWATER RUN-ON CONTROL 4-1

4.3 STORMWATER RUN-OFF CONTROL 4-1

4.4 SEDIMENTATION PONDS 4-2

4.5 NPDES STORMWATER PERMIT 4-2

4.6 SEVERE WET WEATHER OPERATIONS 4-2
APPENDIX 4.1 – SEDIMENT POND CALCULATIONS
5 GROUNDWATER MONITORING PLAN 5-1
6 EXPLOSIVE GAS MONITORING AND REPORTING PLAN 6-1
6.1 EXPLOSIVE GAS MONITORING POINTS 6-1
6.2 EXPLOSIVE GAS MONITORING PROCEDURES 6-1
6.3 EXPLOSIVE GAS REPORTING PLAN 6-1
6.4 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM 6-2
7 WASTE INSPECTION PLAN 7-1
7.1 HAZARDOUS AND RESTRICTED WASTE DETECTION PLAN 7-1
8 CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL 8-1
8.1 CONCEPTS AND OVERVIEW OF THE QA/QC PLAN 8-1
8.2 SOIL COMPONENTS 8-3
8.3 GEOSYNTHETIC COMPONENTS 8-7
8.4 LEACHATE COLLECTION SYSTEM 8-23
8.5 MONITORING OF THE WORK 8-24
8.6 FINAL REPORT 8-25
9 CLOSURE AND POST-CLOSURE PLAN 9-1
9.1 CLOSURE 9-1
9.2 POST-CLOSURE 9-5

APPENDIX A – ACTIVE SOLID WASTE DISPOSAL FACILITY PERMIT
APPENDIX B – NPDES PERMIT
APPENDIX C – MAJOR SOURCE OPERATING PERMIT
APPENDIX D – FINANCIAL ASSURANCE
APPENDIX E – PETITIONS FOR VARIANCE

1 INTRODUCTION

1.1 PURPOSE

The Operations Manual, Black Warrior Solid Waste Facility, Tuscaloosa County, Alabama, has been prepared to document siting standards and hydrogeologic conditions at the Black Warrior Solid Waste Facility and address the regulatory requirements for the modification of the existing facility. This manual includes a presentation of all design features of the facility. It also includes operational standards prepared for use by landfill personnel in the daily operations and maintenance of the facility throughout its active life, closure, and post-closure care period.

The operations manual along with the accompanying Permit Plans, titled ***Black Warrior Solid Waste Facility Major Modification – Phase V, dated July 2023***, will collectively include the information required by ADEM to issue a Solid Waste Disposal Facility Permit for the modification to the landfill. The Operating Record is compiled by the Landfill Manager throughout the life of the facility and includes documentation of daily activities, inspections, monitoring, and other applicable information.

The Permittee will maintain the operating record in the Landfill Office for review by ADEM personnel during periodic site inspections.

1.2 GENERAL FACILITY INFORMATION

The Black Warrior Solid Waste Facility is located on U.S. Highway 82 west of the City of Northport, Alabama in Tuscaloosa County. The property contains 459.64 acres north of U.S. Highway 82 in Sections 1, 2, 11, and 12, Township 21 South, Range 11 West. The Black Warrior Solid Waste Facility was originally permitted on April 11, 1977 under Permit No. 63-01R which expired on April 30, 1992. Approval for vertical expansion was granted by ADEM on July 14, 1994, and the facility was approved to operate under vertical expansion until October 9, 1995.

On August 29, 1994, the Authority submitted to ADEM an application for lateral expansion of the facility and requested a permit transfer from the Tuscaloosa Solid Waste Disposal Authority to the Black Warrior Solid Waste Disposal Authority.

The landfill owner and operator is the Black Warrior Solid Waste Disposal Authority. The Authority is comprised of the City of Tuscaloosa, the City of Northport and the Tuscaloosa County Commission.

1.2.1 Hours of Operation

The hours of facility operation will be established by landfill management. Landfill personnel may be on duty outside of posted waste=receipt hours to prepare the facility for opening and to properly close the site after the daily operations. Standard operating hours the facility will receive waste are currently:

6:00 am to 5:00 pm Monday through Friday

6:30 am to 10:30 am Saturday

The standard hours may be adjusted by landfill management to meet the needs of haulers, respond to weather events, address operational or safety considerations, or accommodate other special conditions. A landfill attendant will be on duty during all hours of operation. The standard hours and days the facility is open to the public will be posted at the landfill entrance. The Department will be notified of any change in operating hours.

1.2.2 Unloading and Traffic Control

The following exhibit, titled ***Public Drop-Off Site Plan, dated November 2025***, illustrates a newly incorporated public convenience/roll-off area designed to improve traffic flow and enhance safety. This designated drop-off location will allow Individuals with small trucks and trailers to unload waste near the facility entrance, avoiding the working face of the landfill, reducing congestion, and minimizing potential safety hazards. Landfill personnel will oversee the removal, emptying, and replacement of the roll-off container on an as-needed basis to ensure it remains accessible to the public while remaining segregated from the main operational travel paths. These measures will allow landfill operations to continue safely and efficiently while accommodating public drop-off needs without disruption.

NO.	REVISION/SUBMISSION	DATE:

PROFESSIONAL SEAL:

COA: ECA105

ADDRESS:
6767 OLD MADISON PIKE,
SUITE 400
HUNTSVILLE, AL 35806
(256) 539-7470

THREE NOTCH GROUP

ENTRANCE IMPROVEMENTS BLACK WARRIOR SOLID WASTE DISPOSAL FACILITY
TUSCALOOSA COUNTY, COKER, ALABAMA

PROJECT NO: TNG2024002
DATE: 2025/11/25
SCALE: AS SHOWN
SHEET NO: 1 of 1

DRAWING TITLE:
PUBLIC DROP-OFF SITE PLAN

Y:\Sheets\0_ENGR\2024\002\03_DESIGN\4_RPT\1_PD.dwg

This document and its contents are property of Three Notch Group, Inc. and may not be distributed, reused, or modified without permission.

1.3 CONTACT PERSONS

BLACK WARRIOR SOLID WASTE DISPOSAL AUTHORITY:

Bob Lewis
Chairman
3301 Landfill Drive
Coker, AL 35452
Phone: (205) 339-7330
r.g.lewis@att.net

Fred Rogers
Executive Director
3301 Landfill Drive
Coker, AL 35452
Phone: (205) 339-7330
frogers@bwswa.com

THREE NOTCH GROUP, INC.

R. Daniel Wells, P.E.
P.O. Box 278
Andalusia, AL 36420
Phone: (334) 222-9431
daniel.wells@3notch.com

TTL, INC.

Jennifer Simpson, P.G.
P.O. Drawer 1128
3516 Greensboro Avenue
Tuscaloosa, AL 35403
Phone: (205) 345-0816
jennifer.simpson@ttlusa.com

APPENDIX 1.1

LOCAL APPROVAL

Black Warrior Solid Waste

Disposal Authority

3301 LANDFILL DRIVE * COKER, AL 35452

Telephone (205)339-7330

(205)339-7338

FAX (205)339-7304

March 7, 2013

Mr. Scott Collins
City Administrator
City of Northport
Northport City Hall
Northport, Alabama

Dear Mr. Collins:

The Black Warrior Solid Waste Disposal Authority ("BWSWA") requests Host Government Approval pursuant to *Alabama Code* Section 22-27-48 for expansion of our Black Warrior Solid Waste Facility, Northport, Alabama. We believe that our plan, with the limitations and commitments described below, addresses the concerns raised by our neighbors and will form the basis for continued safe and efficient disposal of solid waste in our Subtitle-D landfill for many years to come.

Our filing includes:

- This letter.
- Application for Host Government Approval, including
  - Summary addressing factors under Section 22-27-48
  - Map showing our existing landfill, together with the proposed expansion area, designated Area A, as well as adjacent lands acquired by BWSWA and designated as Area B and Area C.
  - Map showing Site Vicinity and Transportation Arteries
  - Legal description of Area A. Legal descriptions of Areas B and C are being prepared and will be available for use when required for the deeds described below.
- Name Reservation for Mt. Olive Farms I, LLC and proposed restrictive covenant to be placed on Area B lands
- Name Reservation for Mt. Olive Farms II, LLC and proposed restrictive covenant to be placed on Area C lands

- Application fee of $5,436
- Draft Advertisement
- Draft Resolution

Our request for Host Government Approval relates to Area A on the plat attached, which is the proposed landfill expansion. Area A is ideally suited to meet the factors to be considered under Section 22-27-48 by the Northport City Council when addressing Host Government Approval.

Recognizing the concerns raised by our neighbors, and subject to the Council's providing Host Government Approval, we are willing to formalize significant commitments with respect to the remaining non-landfill lands owned by BWSWA. These commitments are:

- As to the lakes and low-lying lands designated as Area B, BWSWA would organize a wholly owned subsidiary to be known as Mt. Olive Farms I, LLC, then conveying Area B to the LLC, subject to the proposed restrictive covenants confirming that that no waste will be placed on this land and that the land will be maintained as a buffer to shield our landfill from Rose Boulevard and areas to the east of Rose.

- As to the lands East of Rose Boulevard, designated as Area C, BWSWA would organize a wholly owned subsidiary to be known as Mt. Olive Farms II, LLC, then conveying Area C to the LLC, subject to the proposed restrictive covenants confirming that that no waste will be placed on this land.

We are also submitting a memo from our attorneys addressing zoning, which includes a recent decision of the Attorney General and selected cases.

We look forward to working with the City of Northport to complete Host Government approval and formation of the LLCs.

Ken Thrasher
Executive Director

Request For
Host Government Approval
For the
Black Warrior Solid Waste
Disposal Facility

Submitted to:

City of Northport

Northport, Alabama

Black Warrior Solid Waste Disposal Authority

3301 Landfill Drive
Coker, AL 35452
205-339-7330

March 07, 2013

The Black Warrior Solid Waste Disposal Authority is requesting Local Approval for the expansion of the Black Warrior Solid Waste Disposal Facility (BWSWDF), Permit No. 63-01. The existing facility is located within Sections 2 and 11, Township 21 South, Range 11, Northport, Tuscaloosa County, AL. The expansion will incorporate 205.93 acres to the east of the existing landfill, designated as Area A on Figure 1., attached. The expansion will increase the facility from 226.48 acres to 432.41 aces. The service area and average daily volume will remain the same; the State of Alabama and 1,500 tons/day.

As required by the Tuscaloosa County's Solid Waste Management Plan (SWMP), dated August 4, 2002, and the Code of Alabama Section 22-27-48, the governing body shall consider the following criteria in determining whether or not to recommend approval of the request. Each criteria is listed below and addressed as it relates to the Black Warrior Solid Waste Disposal Facility Expansion.

I. The relationship of the proposal with the jurisdiction's solid waste management need identified in its plan

The planned expansion is consistent with Tuscaloosa County's existing Solid Waste Management Plan, which states that the landfill has sufficient capacity through the life of the plan. The proposed expansion will ensure that capacity is available well beyond the life of the existing plan, ensuring the City of Northport and surrounding area will have sustainable operations for the foreseeable future.

II. The relationship of the proposal to local planned or existing development or the absence thereof, to major transportation arteries and to existing state primary and secondary roads

The facility is well located relative to existing development. The facility is located along US Highway 82 in the City of Northport and is approximately 6 miles from the City of Tuscaloosa. The facility is centrally located making the site easily accessible for the citizens and businesses of Northport. The major roads and transportation arteries around the facility are US Highway 82 and US Highway 43 and can be identified on Figure 2., attached.

III. The location of a proposed facility in relationship to existing industries in the state that generate large volumes of solid waste, or the relationship to the area projected for development of industries that will generate solid waste

Two of the largest solid waste generators the facility serves are the Cities of Northport and Tuscaloosa along with the smaller municipalities throughout Tuscaloosa County. Table III.1, on the following page, provides a summary of the major generators. The facility is also ideally located relative to the businesses and industries located in Northport and the surrounding area.

Table III.1 - Major Solid Waste Producers

Generator	Population	Proximity to Facility (mi)
City of Northport	22,117	2
City of Tuscaloosa	91,672	6
Tuscaloosa County (Total)	201,872	-

IV. Cost and availability of public services, facilities and improvements required to support a proposed facility and protect public health safety and environment

Because this project is an expansion of the existing facility, additional costs or improvements to utility services are expected to be minimal. All utilities required for the expansion can be easily accessed from either the existing facility or along US Highway 82. Utility services that would be required for a new facility in a remote location would be costly due to duplicate infrastructure and no access to sewer service. Costs associated with site access will be evaluated as part of the design process.

V. The impact of a proposed facility on public safety and provisions made to minimize the impact on public health and safety

The expansion is intended to extend the life of the landfill and will not cause an immediate increase in traffic. Daily volumes of waste accepted at the landfill are anticipated to remain at current levels in the immediate future. BWSWDF has a good history of compliance with state and federal regulations and stays on the forefront of new technology to minimize any impact on the health and safety of its employees and surrounding community.

VI. The social and economic impacts of a proposed facility on the affected community, including changes in property values and social or community perception

The proposed expansion of the BWSWDF will assist in controlling costs of waste disposal for the citizens of Northport, Tuscaloosa and Tuscaloosa County. The expansion ensures long-term disposal capacity at the existing landfill, therefore reducing the potential for increases to disposal costs due to increases in transportation costs, associated with long-hauling waste or the construction of a new facility in a remote area.

Figure 1-Landfill Overview Map

Black Warrior Solid Waste Authority

Northport, Tuscaloosa County, AL

CDG Engineers & associates

1840 E. Three Notch St.
Andalusia, AL 36420
(334) 222-9431
(334) 222-4018 FAX
www.cdge.com

Sheet No. 1

CDG Project No. 061229910

Drawn By:	JRA
Checked by:	RDW
Date:	February 2013

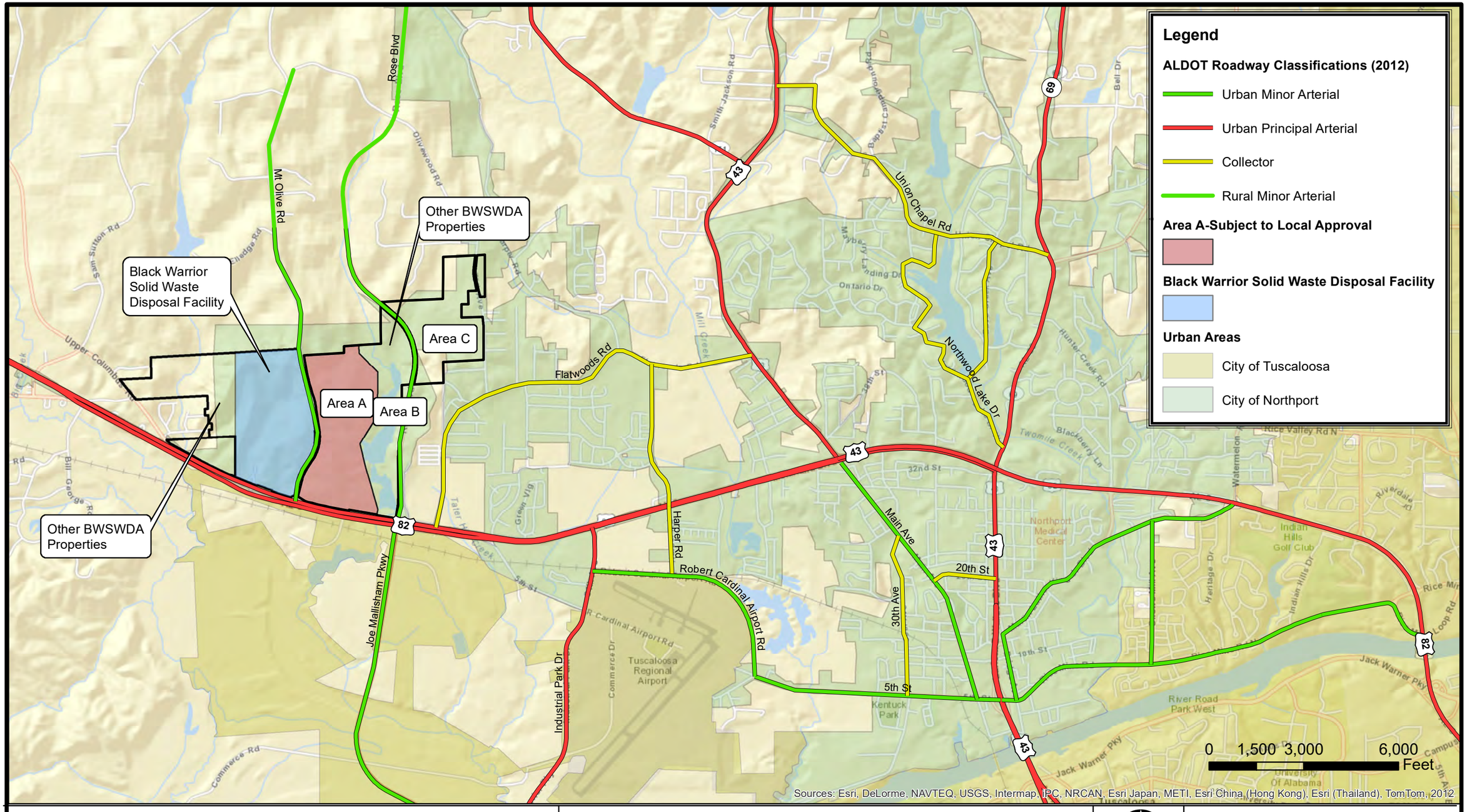


Figure 2-Site Vicinity and Transportation Map

Black Warrior Solid Waste Authority

Northport, Tuscaloosa County, AL

CDG Engineers & associates

1840 E. Three Notch St.
Andalusia, AL 36420
(334) 222-9431
(334) 222-4018 FAX
www.cdge.com

Sheet No. 2

CDG Project No. 061229910

Drawn By: JRA

Checked by: RDW

Date: February 2013

Area A Legal Description

Part of the West Half of Section 12, part of the Southwest Quarter of Section 1, part of the Southeast Quarter of the Southeast Quarter of Section 2, part of the East Half of the Northeast Quarter and part of the Northeast Quarter of the Southeast Quarter of Section 11, all in Township 21 South, Range 11 West, Tuscaloosa County, Alabama, containing 205.93 acres, more or less, and being more particularly described as follows:

Commence at an iron pipe and the Northeast Corner of the Southeast Quarter of the Southeast Quarter of Section 2, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence S00°25'31"E along the East boundary of said quarter-quarter a distance of 209.88 feet to a 1” iron pipe and the Point of Beginning; thence N86°46'49"E a distance of 831.22 feet to a concrete monument; thence N00°17'33"W a distance of 214.26 feet; thence N86°25'03"E a distance of 459.65 feet; thence S03°34'57"E a distance of 253.68 feet; thence S43°55'24"E a distance of 851.13 feet; thence S00°14'54"W a distance of 1358.75 feet; thence S31°58'46"W a distance of 1055.28 feet; thence S15°27'42"E a distance of 2146.65 feet; thence S07°53'50"W a distance of 169.63 feet to the North Right-of-Way Margin of U.S. Highway 82; thence along said right-of-way margin as follows: N80°57'03"W a distance of 773.21 feet; thence N80°43'09"W, on a curve to the right, having a delta angle of 00°12’53” and a radius of 32471.09 feet, a chord distance of 121.63 feet to a right-of-way monument; thence S09°30'22"W a distance of 25.00 feet; thence N77°52'54"W, on a curve to the right, having a delta angle of 05°13’29” and a radius of 15501.76 feet, a chord distance of 1413.11 feet to a right-of-way monument; thence N57°39'46"W a distance of 135.90 feet to the East Right-of-Way Margin of Mount Olive Road; thence along said East right-of-way margin as follows: N11°55'13"E a distance of 520.19 feet; thence N22°07'23"E, on a curve to the right, having a delta angle of 21°58’00” and a radius of 1053.57 feet, a chord distance of 401.46 feet to a capped rebar; thence N33°06'23"E a distance of 350.92 feet; thence N12°12'19"E, on a curve to the left, having a delta angle of 41°26’35” and a radius of 1493.57, a chord distance of 1056.93 feet; thence N08°32'24"W a distance of 65.49 feet; thence N81°28'21"E a distance of 20.04 feet; thence N08°31'39"W a distance of 200.00 feet; thence S81°28'21"W a distance of 20.04 feet; thence N08°32'24"W a distance of 450.82 feet; thence N12°47'32"W, on a curve to the left, having a delta angle of 08°37’05” and a radius of 2130.08 feet, a chord distance of 320.09 feet; thence N17°08'29"W a distance of 340.29 feet; thence N15°00'26"W, on a curve to the right, having a delta angle of 04°15’52” and a radius of 5509.65 feet, a chord distance of 409.97 feet; thence N12°50'15"W a distance of 309.00 feet; thence N09°26'33"W, on a curve to the right, having a delta angle of 06°47’26” and a radius of 2644.93 feet, a chord distance of 313.29 feet; thence, leaving said right-of-way margin, N86°19'12"E a distance of 336.81 feet to the Point of Beginning.

Beth Chapman
Secretary of State

P. O. Box 5616
Montgomery, AL 36103-5616

STATE OF ALABAMA

I, Beth Chapman, Secretary of State of Alabama, having custody of the Great and Principal Seal of said State, do hereby certify that

pursuant to the provisions of Title 10A, Chapter 1, Article 5, *Code of Alabama 1975*, and upon an examination of the entity records on file in this office, the following entity name is reserved as available:

Mt. Olive Farms I, LLC

This domestic limited liability company is proposed to be formed in Alabama and is for the exclusive use of Rosen Harwood, P.A., 2200 Jack Warner Pkwy, Ste 200, Tuscaloosa, AL 35401 for a period of one hundred twenty days beginning February 25, 2013 and expiring June 26, 2013.

In Testimony Whereof, I have hereunto set my hand and affixed the Great Seal of the State, at the Capitol, in the city of Montgomery, on this day.

February 25, 2013

Date

Beth Chapman

Beth Chapman **Secretary of State**

621-609

Mt. Olive Farms I, LLC

As to the lakes and low-lying lands designated as Area B, BWSWA would organize a wholly owned subsidiary to be known as Mt. Olive Farms I, LLC, then convey Area B to the LLC, subject to the following restrictive covenants:

> The Grantor does hereby covenant, for itself, its successors and its assigns, that (i) the land subject to this covenant shall not be developed as a landfill and (ii) such lands will be maintained by Grantor and its affiliates as a buffer. This covenant shall run with the land, and shall be binding upon Grantor, its successors and assigns. In maintaining the lands as a buffer Grantor shall use prudent timber management practices.

Beth Chapman
Secretary of State

P. O. Box 5616
Montgomery, AL 36103-5616

STATE OF ALABAMA

I, Beth Chapman, Secretary of State of Alabama, having custody of the Great and Principal Seal of said State, do hereby certify that

pursuant to the provisions of Title 10A, Chapter 1, Article 5, *Code of Alabama 1975*, and upon an examination of the entity records on file in this office, the following entity name is reserved as available:

Mt. Olive Farms II, LLC

This domestic limited liability company is proposed to be formed in Alabama and is for the exclusive use of Rosen Harwood, P.A., 2200 Jack Warner Pkwy, Ste 200, Tuscaloosa, AL 35401 for a period of one hundred twenty days beginning February 25, 2013 and expiring June 26, 2013.

In Testimony Whereof, I have hereunto set my hand and affixed the Great Seal of the State, at the Capitol, in the city of Montgomery, on this day.

February 25, 2013

Date

Beth Chapman

Beth Chapman **Secretary of State**

621-611

Mt. Olive Farms II, LLC

As to the lands East of Rose Boulevard designated as Area C, BWSWA would organize a wholly owned subsidiary to be known as Mt. Olive Farms II, LLC, then convey Area C to the LLC, subject to the following restrictive covenants:

> The Grantor does hereby covenant, for itself, its successors and its assigns, that the land subject to this covenant shall not be developed as a landfill. This covenant shall run with the land, and shall be binding upon Grantee, its successors and assigns.

NOTICE OF HEARING TO ACCEPT
PUBLIC COMMENT CONCERNING
APPROVAL OF
A Proposed Landfill Expansion for
The Black Warrior Solid Waste Disposal Authority

The City of Northport shall accept public comment concerning approval of a proposed expansion of the Black Warrior Solid Waste Disposal Facility owned and operated by the Black Warrior Solid Waste Disposal Authority. The expansion will increase the facility from 226.48 acres to 432.41 acres. The facility lies within Sections 2 and 11, Township 21 South, Range 11, and is located in the City of Northport, Tuscaloosa County. The service area of the facility will remain the State of Alabama and will continue to accept an average daily volume of up to 1,500 tons per day.

In determining whether to recommend local approval for the proposed expansion, the City of Northport shall consider each of the following:

1. The consistency of the proposal with the County's solid waste management need as identified in its plan;

2. The relationship of the proposal to local planned or existing development or the absence thereof, to major transportation arteries and to existing state primary and secondary roads;

3. The location of a proposed facility in relationship to existing industries that generate large volumes of solid waste, or the relationship to the areas projected for development of industries that will generate solid waste;

4. Costs and availability of public services, facilities and improvements required to support a proposed facility and protect public health, safety and the environment;

5. The impact of a proposed facility on public safety and provisions made to minimize the impact on public health and safety; and

6. The social and economic impacts of a proposed facility on the affected community, including changes in property values, and social or community perception.

Interested persons are invited to comment on this proposal at a public hearing to be held on May 6, 2013 at 6:00 p.m. at the City Council Chamber, Northport City Hall, Northport, Alabama. Anyone wishing to review this application or the Solid Waste Management Plan may contact Ken Thrasher at 205-339-7330.

ADVERTISE ON APRIL 3, 2013

ORDINANCE NO. _____

ORDINANCE GRANTING HOST GOVERNMENT APPROVAL FOR A PROPOSED EXPANSION OF THE BLACK WARRIOR SOLID WASTE DISPOSAL FACILITY

WHEREAS, the City of Northport, having received the application for local government approval from the Black Warrior Solid Waste Disposal Authority for a proposed major modification of its permit for its municipal solid waste disposal facility pursuant to the Alabama Solid Waste Disposal Act, Section 22-27-48 of the *Code of Alabama* (1975), as amended; and

WHEREAS, the Black Warrior Solid Waste Disposal Authority has proposed an expansion of its Black Warrior Solid Waste Disposal Facility from the existing 226.48 acres to 432.41 acres. The facility lies within Sections 2 and 11, Township 21 South, Range 11, and is located in the City of Northport, Tuscaloosa County, and

WHEREAS, the service area for the facility will remain the State of Alabama; and

WHEREAS, the maximum average daily volume will remain 1,500 tons per day, and

WHEREAS, the City of Northport did publish a NOTICE OF HEARING TO ACCEPT PUBLIC COMMENT CONCERNING APPROVAL OF A PROPOSED LANDFILL EXPANSION, and said notice was published at least 30 days prior to the hearing, and said notice was published in the Northport Gazette on the 3rd day of April, 2013; and

WHEREAS, a public hearing was held on the 6th day of May, 2013, at 6:00 p .m. at the Northport City Council Chamber, Northport City Hall in Northport, Alabama, to accept public comment concerning the approval of the permitting of the facility, and

WHEREAS, in determining whether to recommend local approval of the proposed modification of the permit for the Landfill Expansion, the City of Northport has carefully considered each of the following issues related to the proposal and found them consistent with the relevant provisions of state law:

1. The consistency of the proposal with the County's solid waste management need as identified in its plan;

2. The relationship of the proposal to local planned or existing development or the absence thereof, to major transportation arteries and to existing state primary and secondary roads;

3. The location of the facility in relationship to existing industries that generate large volumes of solid waste, or the relationship to the areas projected for development of industries that will generate solid waste;

4. Costs and availability of public services, facilities and improvements required to support a proposed facility and protect public health, safety and the environment;

5. The impact of the proposed expansion on public safety and provisions made to minimize the impact on public health and safety; and

6. The social and economic impacts of the proposed expansion on the affected community, including changes in property values, and social or community perception.

THEREFORE, BE IT ORDAINED that the City Council for the City of Northport hereby finds the application by the Black Warrior Solid Waste Disposal Authority for its proposed major modification of the permit for its municipal solid waste disposal facility is consistent with the Alabama Solid Waste Disposal Act, Section 22-27-48 of the *Code of* Alabama (1975), as amended, and hereby approves the proposed application for a major modification of its permit for the Black Warrior Solid Waste Disposal Facility Expansion.

This Ordinance shall become effective immediately upon its passage and advertisement as required by law.

Ordinance No. _____
Adopted by the City Council of the City of Northport in a public meeting this day of _____, 2013.

CITY COUNCIL OF THE
CITY OF NORTHPORT

COUNCIL OF THE CITY OF NORTHPORT

BY: _____
Jay Logan, its President

ATTEST:

_____
Scott Collins, City Clerk/Administrator

APPROVED this the _____ day of _____, 2013

_____
Bobby Herndon, Mayor

I hereby certify that the above and foregoing Ordinance was published on the _____ day of _____, 2013 in the Northport Gazette, a newspaper of general circulation published in the City of Northport.

_____
Scott Collins, City Clerk/Administrator

1st Reading; _____
Motion: _____
2nd Reading: _____
Motion By: _____
Second By: _____
Publication: _____

ORDINANCE NO. 1809
ORDINANCE GRANTING HOST GOVERNMENT APPROVAL FOR A PROPOSED EXPANSION OF THE BLACK WARRIOR SOLID WASTE DISPOSAL FACILITY

WHEREAS, the City of Northport, having received the application for local government approval from the Black Warrior Solid Waste Disposal Authority for a proposed major modification of its permit for its municipal solid waste disposal facility pursuant to the Alabama Solid Waste Disposal Act, Section 22-27-48 of the Code of Alabama (1975), as amended; and

WHEREAS, the Black Warrior Solid Waste Disposal Authority has proposed an expansion of its Black Warrior Solid Waste Disposal Facility from the existing 226.48 acres to 432.41 acres. The facility lies within Sections 2 and 11, Township 21 South, Range 11, and is located in the City of Northport, Tuscaloosa County, and

WHEREAS, the service area for the facility will remain the State of Alabama; and

WHEREAS, the maximum average daily volume will remain 1,500 tons per day, and

WHEREAS, the City of Northport did publish a NOTICE OF HEARING TO ACCEPT PUBLIC COMMENT CONCERNING APPROVAL OF A PROPOSED LANDFILL EXPANSION, and said notice was published at least 30 days prior to the hearing, and said notice was published in the Northport Gazette on the 3rd day of April, 2013; and

WHEREAS, in determining whether to recommend local approval of the proposed modification of the permit for the Landfill Expansion, the City of Northport has carefully considered each of the following issues related to the proposal and found them consistent with the relevant provisions of state law:

1. The consistency of the proposal with the County's solid waste management need as identified in its plan;

2. The relationship of the proposal to local planned or existing development or the absence thereof, to major transportation arteries and to existing state primary and secondary roads;

3. The location of the facility in relationship to existing industries that generate large volumes of solid waste, or the relationship to the areas projected for development of industries that will generate solid waste;

4. Costs and availability of public services, facilities and improvements required to support a proposed facility and protect public health, safety and the environment;

5. The impact of the proposed expansion on public safety and provisions made to minimize the impact on public health and safety; and

6. The social and economic impacts of the proposed expansion on the affected community, including changes in property values, and social or community perception.

THEREFORE, BE IT ORDAINED that the City Council for the City of Northport hereby finds the application by the Black Warrior Solid Waste Disposal Authority for its proposed major modification of the permit for its municipal solid waste disposal facility is consistent with the Alabama Solid Waste Disposal Act, Section 22-27-48 of the Code of Alabama (1975), as amended, and hereby approves the proposed application for a major modification of its permit for the Black Warrior Solid Waste Disposal Facility Expansion.

This Ordinance shall become effective immediately upon its passage and advertisement as required by law.

Adopted by the City Council of the City of Northport in a public meeting this 6th day of May, 2013.

The Northport Gazette
05/08/2013

GORDON ROSEN
R. BERNARD HARWOOD, JR.
J. SYDNEY COOK, III
JAMES J. SLEDGE
ROBERT M. SPENCE
BRYAN S. BRINYARK
PAIGE M. OLDSHUE
***BLAKE A. MADISON
†•W. BRADFORD ROANE, JR.
•JERRY C. OLDSHUE, JR.
••JEFFREY C. SMITH
DAVID E. RAINS
FOSTER C. ARNOLD
††MATTHEW Q. TOMPKINS
††JANE L. CALAMUSA
WILLIAM A. JONES
KRISTOFOR D. SODERGREN
RACHEL L. WEBBER
†††••CHAD L. HOBBS

ROSEN HARWOOD
ATTORNEYS AT LAW

•Board Certified - Creditors' Rights Law - American Board of Certification

••Board Certified - Civil Trial Advocacy - National Board of Trial Advocacy

•••Certified Information Privacy Professional

†Also admitted in Florida

††Also admitted in Mississippi

•Also admitted in Georgia

••Also admitted in Tennessee

MARY BETH WEAR CAVERT
S. SCOTT HICKMAN
JOSEPH N. HOCUTT, II
ELIZABETH S. GORDON
CHRISTOPHER L. FREDERICK
SETH A. NEWTON
KATHRYN O. POPE
KATIE B. THOMPSON
††ROBIN E. PATE
J. MITCHELL HASTINGS
††LORI M. CREEL
R. CHASE MALONE

OF COUNSEL:
D. WAYNE CHILDRESS

Writer's Email Address
broane@rosenharwood.com

March 7, 2013

BY HAND DELIVERY

Mr. Scott Collins
City Administrator
City of Northport
Northport City Hall
Northport, Alabama

RE: Memorandum Regarding Recent Attorney General's Opinion and Caselaw

Dear Mr. Collins:

Attached is a copy of my memorandum analyzing the recent Attorney General Opinion and related caselaw regarding zoning. We believe that this memorandum should be sufficient to address zoning, but if the City wishes to add this to the Planning Commission Agenda, we are available to attend the April Planning Commission Meeting and make an informational presentation.

Sincerely yours,

W. Bradford Roane, Jr.

WBR:db

Enclosure

GORDON ROSEN
R. BERNARD HARWOOD, JR.
J. SYDNEY COOK, III
JAMES J. SLEDGE
ROBERT M. SPENCE
BRYAN S. BRINYARK
PAIGE M. OLDSHUE
***BLAKE A. MADISON
†♦W. BRADFORD ROANE, JR.
*JERRY C. OLDSHUE, JR.
**JEFFREY C. SMITH
DAVID E. RAINS
FOSTER C. ARNOLD
††MATTHEW Q. TOMPKINS
††JANE L. CALAMUSA
WILLIAM A. JONES
KRISTOFOR D. SODERGREN
RACHEL L. WEBBER
††♦♦CHAD L. HOBBS

ROSEN HARWOOD
ATTORNEYS AT LAW

*Board Certified - Creditors' Rights Law - American Board of Certification

**Board Certified - Civil Trial Advocacy - National Board of Trial Advocacy

***Certified Information Privacy Professional

†Also admitted in Florida
††Also admitted in Mississippi
♦Also admitted in Georgia
♦♦Also admitted in Tennessee

MARY BETH WEAR CAVERT
S. SCOTT HICKMAN
JOSEPH N. HOCUTT, II
ELIZABETH S. GORDON
CHRISTOPHER L. FREDERICK
SETH A. NEWTON
KATHRYN O. POPE
KATIE B. THOMPSON
††ROBIN E. PATE
J. MITCHELL HASTINGS
††LORI M. CREEL
R. CHASE MALONE

OF COUNSEL:
D. WAYNE CHILDRESS

Writer's Email Address:
broane@rosenharwood.com

TO: ***Scott Collins, Northport City Administrator***

FROM: ***Brad Roane, as attorney for The Black Warrior Solid Waste Disposal Authority***

DATE: ***March 4, 2013***

RE: ***Zoning Issues – Recent Attorney General Opinion and Caselaw***

To follow up on our recent discussions, we wanted to provide the City staff with an expanded analysis of the recent Attorney General Opinion and supporting cases regarding governmental functions and zoning. We thank you for your consideration.

1. Recent Attorney General Opinion to City of Dothan February 12, 2012

The City of Dothan wanted to expand its landfill and was rejected by the Dothan Board of Zoning Adjustment. The Alabama Attorney General Opinion concluded that landfill operations by the City of Dothan are a governmental function, which is not subject to the jurisdiction of the Dothan Board of Zoning Adjustment.

The Attorney General relied on a line of cases:

Lauderdale County Board of Educ. V. Alexander (1959): Challenge to a Lauderdale County Board of Education shop for school busses in a City of Florence residential district. The Court found that the provision of school buses is a necessary governmental function to get children to school. The Court considered that when a city is engaged in a proprietary business, it is subject to its own zoning regulations, but when engaged in a governmental function, it is not subject to its own zoning regulations, and held that the City of Florence's zoning ordinance did not apply to the County Board of Education.

The Opinion provided further analysis of "governmental function":

a. A function is a 'governmental function' if it is the means by which the governing entity exercises the sovereign power for the benefit of all citizens. *Lane v. Zoning Bd. Of Adjustment for City of Talladega* (Ala. Civ. App. 1995). This case was a challenge to Talledega County building a jail in a residential district in the City of Talladega. The Court found that maintaining a jail is a governmental function required for the safety and welfare of citizens and held that the City of Talladega zoning ordinance did not apply to Talladega County's jail.

b. 'Governmental functions' include those which are required by statute. *Lane v. Zoning Bd. Of Adjustment for City of Talladega*. Talladega County must maintain a jail by statute, so maintaining a jail is a governmental function.

c. 'Governmental functions' also include those that are 'found in cases expressly declaring that a particular function is a governmental function. *Cunningham v. City of Attalla* (Ala. Civ. App. 2005). This case was a challenge to a warehouse owned by the City of Attalla in a residential district. Citing *Lauderdale* and *Lane*, the Court reasoned that the storage of city-owned vehicles and equipment is a governmental function and held that the zoning ordinance did not apply to the City of Attalla.

The Authority is performing a 'governmental function.' The City of Northport has specific authority to dispose of waste. Alabama Code §11-47-135. The enabling statute for the Authority (Ala. Code §11-89A-1 et seq) allows cities and counties to form a solid waste disposal authority to fulfill their governmental functions of disposal of waste, which is the case here. The Authority is fulfilling the governmental functions of safe disposal of waste for the City of Northport and is therefore performing a governmental function.

2. City of Selma v. Dallas County (2007)

The City of Selma challenged the Dallas County's erection of a radio tower for its E-911 service atop the county courthouse. E-911 service is required by the Alabama Homeland Security Act of 2003. The Court contrasted proprietary functions from government functions. Proprietary functions include essentially commercial transactions involving the purchase or sale of goods and services and other activities for the commercial benefit of a particular governmental agency. Because the tower was necessary for a governmental function, the City of Selma ordinance was unenforceable against Dallas County.

3. Alabama Disposal Solutions-Landfill LLC v. Town of Lowndesboro (Ala. Civ. App. 2002)

The Town of Lowndesboro enacted an ordinance prohibiting landfills within its town limits. A private landfill owner brought an action challenging the ordinance as unenforceable.

The Court analyzed the Alabama Solid Waste Act and found that municipalities and counties must develop a solid waste disposal plan. Since the Town of Lowndesboro participated in the solid waste disposal plan adopted by Lowndes County and did not develop its own plan, the Lowndes County solid waste disposal plan controls, and the county plan provided for disposal at the landfill partially within the Town limits. The Town of Lowndesboro's ordinance is in direct conflict with the Alabama Solid Waste Disposal Act, therefore the Town's ordinance is unenforceable against the private landfill owner.

In our case, the City of Northport participated in the development of the solid waste disposal plan adopted by Tuscaloosa County, therefore the Tuscaloosa County Solid Waste Disposal Plan controls. The Tuscaloosa County Plan, the West Alabama Regional Plan and the State of Alabama Plan are each consistent with disposal of solid waste at the Black Warrior Solid Waste Disposal Authority's solid waste disposal facility located within the limits of the City of Northport, therefore a City of Northport Zoning Ordinance prohibiting a solid waste disposal facility within its city limits would not be enforceable as conflicting with the Alabama Solid Waste Disposal Act.

4. Conclusion:

Based upon the analysis of cases from *Lauderdale* up to and including the Attorney General's Opinion of February 12, 2013, the Authority is performing a governmental function and the City of Northport Zoning Ordinance would not be enforceable against the Authority. Further, because the Tuscaloosa County Solid Waste Plan, the West Alabama Regional Solid Waste Disposal Plan and the State of Alabama Solid Waste Disposal Plans are each consistent with the Black Warrior Solid Waste Authority's solid waste disposal facility being located in the City of Northport, the Northport Zoning Ordinance prohibiting such a facility would be inconsistent with the Alabama Solid Waste Disposal Act and therefore unenforceable.

STATE OF ALABAMA
OFFICE OF THE ATTORNEY GENERAL

LUTHER STRANGE
ATTORNEY GENERAL

501 WASHINGTON AVENUE
P.O. BOX 300152
MONTGOMERY, AL 36130-0152
(334) 242-7300
WWW.AGO.ALABAMA.GOV

February 12, 2013

Honorable F. Lenton White
Attorney, City of Dothan
Legal Department
Post Office Box 2128
Dothan, Alabama 36302

Municipalities – Solid Waste Disposal – Zoning Board of Adjustment – Landfills – Houston County

The planned expansion of a landfill by the City of Dothan is a governmental function and is therefore exempt from the jurisdiction of the Dothan Board of Zoning Adjustment.

Dear Mr. White:

This opinion of the Attorney General is issued in response to your request on behalf of the City of Dothan.

QUESTION

Is the planned expansion of a landfill by the City of Dothan exempt from the jurisdiction of the Dothan Board of Zoning Adjustment?

FACTS AND ANALYSIS

According to your request, the City of Dothan currently owns and operates a solid waste disposal facility. To extend the life of the landfill, the city purchased property adjoining the present landfill. The property is currently zoned for agricultural use. Upon execution of the contract for purchase of the property, the City of Dothan applied to the Dothan Board of Zoning Adjustment for a special exception to the zoning regulations to allow the proposed use contingent upon the issuance of appropriate permits by the Alabama Department of Environmental Management. On December 5, 2012, however, the Dothan Board of Zoning Adjustment failed to approve the request of the City of Dothan.

Generally, "when a city is engaged in a proprietary business, it is subject to its own zoning regulations; but when engaged in a governmental function, it is not subject to its own zoning regulations." *Lauderdale County Bd. of Educ. v. Alexander*, 269 Ala. 79, 86, 110 So. 2d 911, 917-18 (1959). A function is a governmental function if it is the means by which the governing entity exercises the sovereign power for the benefit of all citizens. *Lane v. Zoning Bd. of Adjustment of City of Talladega*, 669 So. 2d 958, 959-60 (Ala. Civ. App. 1995). Governmental functions include those that are required by statute. *Id.* Governmental functions also include those that are "found in cases expressly declaring that a particular function" is a governmental function. *Cunningham v. City of Attalla*, 918 So. 2d 119, 125 (Ala. Civ. App. 2005), *citing Jackson v. City of Florence*, 294 Ala. 592, 320 So. 2d 68 (1975).

Cities and towns have the specific authority to dispose of garbage. ALA. CODE § 11-47-135 (2008). Moreover, "[i]n this state it has been consistently held that a municipality in operating a garbage disposal area is discharging a governmental function and not a proprietary function." *City of Birmingham v. Scogin*, 269 Ala. 679, 690, 115 So. 2d 505, 514 (1959). Accordingly, zoning regulations do not apply to a municipality's operation of a garbage disposal area, i.e., a landfill. *Id.*, 269 Ala. at 691, 115 So. 2d at 513; *Cunningham* at 123.

CONCLUSION

The planned expansion of a landfill by the City of Dothan is a governmental function and is therefore exempt from the jurisdiction of the Dothan Board of Zoning Adjustment.

I hope this opinion answers your question. If this Office can be of further assistance, please contact Ben Baxley of my staff.

Sincerely,

LUTHER STRANGE
Attorney General
By:

Brenda F. Smith

BRENDA F. SMITH
Chief, Opinions Division

LS/BB
1470111/166586

THIS INSTRUMENT PREPARED BY:
Ann L. Reardon
Rosen Harwood, P.A.
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401

Reference: Deed Book 1170, Page 757
Deed Book 2007, Page 11593

RESOLUTION 21-74
CONSENTING TO THE VACATION
OF A PUBLIC STREET IN THE CITY OF NORTHPORT

WHEREAS, the **Black Warrior Solid Waste Disposal Authority**, a public corporation, hereinafter called the Owner, duly filed a Declaration of Vacation of a street with the City of Northport ("the City") on the 18th day of March, 2021,alleging that it owns all of the land abutting a certain public street/alley in the City of Northport hereinafter described; and,

WHEREAS, said street/alley lies within the Corporate Limits of the City of Northport, Alabama, and the assent of the City Council of Northport, Alabama, the governing body of the said Municipality, to the vacation of said public street/alley has been requested and is desired by the Owner; and,

WHEREAS, pursuant to Ala. Code Sections 23-4-2 and 11-49-6 (1975), notice of a date for hearing was duly published in the Northport Gazette and abutting property owners and utility entities were notified by mail, all as required by law; and,

WHEREAS, on the date and time duly noticed and specified, a public hearing to determine the assent to the vacation and to discern the fair market value of the land added to that of the abutting landowners was held on the 21st day of June, 2021, and the abutting landowners either being present or having jointly consented to the same in the Declaration of Vacation or having waived their objection by their absence.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF NORTHPORT AS FOLLOWS:

It appears to the City Council of Northport that the vacation of said public street/alley is in the interest of the public that such street, alley or highway or portion thereof, be vacated and that said vacation as herein described will not deprive other property owners of their right, as they may have, to convenient and reasonable means of ingress to and from their property, nor will it adversely affect the interest of the public in any way and that the assent of said City Council be, and the same is hereby, given to the vacation of the following described public street in the City of Northport, County of Tuscaloosa, Alabama, to-wit:

See Exhibit "A" attached hereto and incorporated herein by reference.

BE IT FURTHER RESOLVED BY THE CITY COUNCIL OF NORTHPORT as follows:

1. That pursuant to Ala. Code §11-49-6 (1975), the fair market value of the land, taking into consideration the benefit to the City of Northport supplied by the Owner building out and dedicating the relocation of Mt. Olive Road and the cul-de-sac on Sutton Place (old Mt. Olive Road) to the City of Northport, added to that land owned by the following abutting landowners and publication costs are set out as follows:

Owner: Black Warrior Solid Waste Disposal Authority

Fair Market Value (considering the benefit to the City of Northport supplied by the Owner building out and dedicating the relocation of Mt. Olive Road and the cul-de-sac on Sutton Place (old Mt. Olive Road) to the City of Northport): None

Publication and other Costs: $980.00

Total: $980.00 which has already been paid to the City.

Failure by any land owner to tender payment of the Fair Market Value of the lands received and publication costs within 60 days of the adoption of this resolution by the City Council, shall nullify the assent of the City Council and render said street/alley vacation void. Payment has been tendered by guaranteed funds and already paid to The City of Northport.

2. That pursuant to Ala. Code §23-4-2 (1975), the City Clerk is hereby directed to publish this resolution in the Northport Gazette, a newspaper of general circulation, one time within 14 days of the adoption of this resolution.

3. That the Mayor be, and he hereby is, authorized to present a copy of this resolution duly certified as correct by the City Administrator of the City of Northport, the officer in charge of the records of said Municipality, to the landowners within 10 days of the date of publication of this resolution in order that same may be attached to and filed and recorded with the legal declaration of vacation of said above and foregoing described public street.

4. That this vacation is final and binding provided that an appeal is not filed by any interested person within 30 days of the adoption of this resolution to any trial court of competent jurisdiction and or appellate court of this State and is adjudicated in the appellants favor pursuant to procedures as set forth in Ala. Code §23-4-5 (1975) as amended by Acts of Alabama 2004- 323 which renders said vacation null and void.

5. That this resolution shall not be valid nor considered a lawful conveyance and said street shall not be deemed to be vacated until such time as the payment of the publication costs and Fair Market Value of the lands described herein have been received by the City. Upon tender to the City of all sums due, the City is relieved from any and all responsibility and liability for the maintenance and repair of said street. It is the responsibility of the owner to record the Resolution of Vacation with the Office of Probate Judge of Tuscaloosa County and the City shall not be held

1st Reading: June 21, 2021
Motion By: Bobo
2nd Reading: July 6, 2021
Motion By: Hogg
Second By: Bobo
Publication: July 14, 2021

to be contributory negligent for the failure, mistake, neglect or omission of the owner to record the Resolution of Vacation of public record.

6. That the Owner has confirmed to the satisfaction of the City of Northport that it is in good faith negotiations with those public utilities who currently have an easement or utilities located within the said right-of-way for a license agreement wherein the public utilities would have a license to locate their utility lines upon, under, within, though, or across the Owner's property, with any costs to move said utility lines under the terms of said license agreement to be borne by the Owner.

RESOLVED AND DONE this the 6th day of July, 2021

CITY COUNCIL OF THE
CITY OF NORTHPORT

BY: _____
Jeff Hogg, Its President

ATTEST:

_____
Glenda D. Webb, City Administrator

APPROVED this the 6th day of July, 2021.

_____
Bobby Herndon, Mayor

I hereby certify that the above and foregoing Ordinance was published on July 14, 2021, in the Northport Gazette, a newspaper of general circulation published in the City of Northport.

_____
Glenda D. Webb, City Administrator

STATE OF ALABAMA)
TUSCALOOSA COUNTY)

I, City Administrator of the City of Northport, Alabama, hereby certify that the foregoing is a full, true and correct copy of a resolution duly adopted by the City Council of Northport at a regular meeting of said Council held on the 6th day of July, 2021, as the same appears and remains of record in the record book in my office wherein are recorded the minutes of the proceedings of said Council.

IN WITNESS WHEREOF, I have hereunto affixed my signature and the official seal of said City of Northport, this the 7th day of July, 2021.

City Administrator

EXHIBIT "A"

THIS INSTRUMENT PREPARED BY:
Ann L. Reardon
Rosen Harwood, P.A.
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401

THIS INSTRUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION OR ON-SITE INSPECTION.

Source of Title: Deed Book 1170, Page 757
Deed Book 2007, Page 11593

STATE OF ALABAMA)
)
TUSCALOOSA COUNTY)

DECLARATION OF VACATION OF PUBLIC RIGHT-OF-WAY

KNOW ALL MEN BY THESE PRESENTS, that:

The **Black Warrior Solid Waste Disposal Authority,** an Alabama public corporation, is the owner of all the land abutting a PUBLIC RIGHT-OF-WAY, which is hereinafter more particularly described, and which public right-of-way said owner desires to vacate as provided in Ala. Code §23-4-20 (1975). The vacation of said public right-of-way, as hereinafter described, will not deprive other property owners of reasonable means of ingress and egress to and from their property nor will it adversely affect the interest of the general public in any way.

NOW, THEREFORE, pursuant to the provisions of Ala. Code §23-4-20 (1975), the undersigned owners do hereby declare the following described public right-of-way located in the City of Northport, Tuscaloosa County, Alabama, to be vacated:

See Exhibit "A" Attached hereto and incorporated herein by reference.

The said public right-of-way to be vacated is within the limits of the City of Northport and assent to the vacation of said public right-of-way will be obtained from the City Council, a copy of which, certified by the City Administrator, will be attached hereto and will be filed and recorded with this written Declaration of Vacation and will be made a part hereof.

IN WITNESS WHEREOF, the said Chairman of the Board of Directors for the Black Warrior Solid Waste Disposal Authority, Robert Lewis, has set his hand and seal hereto this 18th day of MARCH, 2021.

Black Warrior Solid Waste Disposal Authority

By: _____
Robert Lewis, its Chairman

STATE OF ALABAMA §

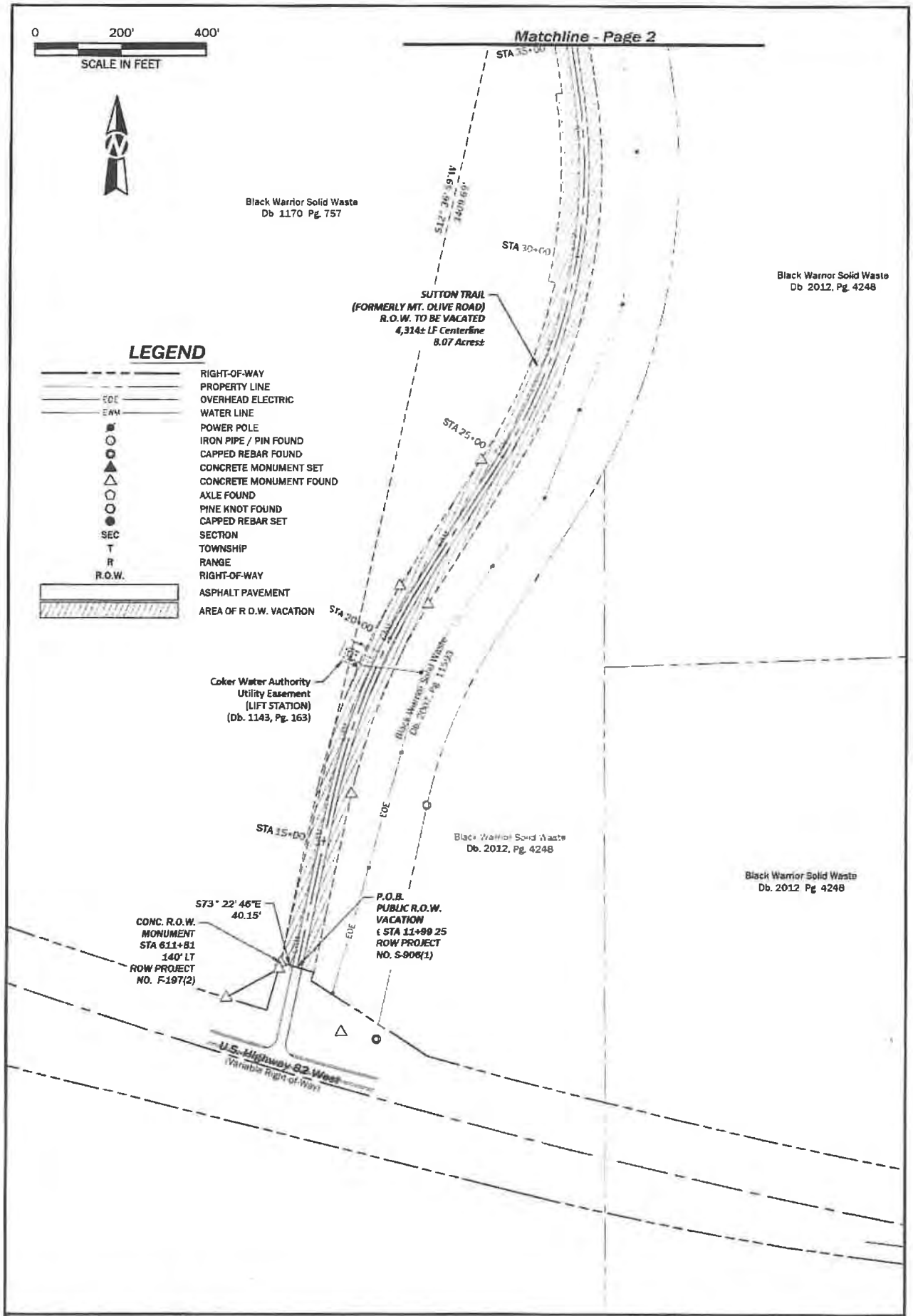
COUNTY OF TUSCALOOSA §

I, the undersigned, a Notary Public, in and for said County in said State, hereby certify that Robert Lewis, whose name as Chairman of the Black Warrior Solid Waste Disposal Authority, an Alabama public corporation, is signed to the foregoing Petition, and who is known to me, acknowledged before me on this day that, being informed of the contents of the Petition, he executed the same voluntarily with full authority on the day the same bears date.

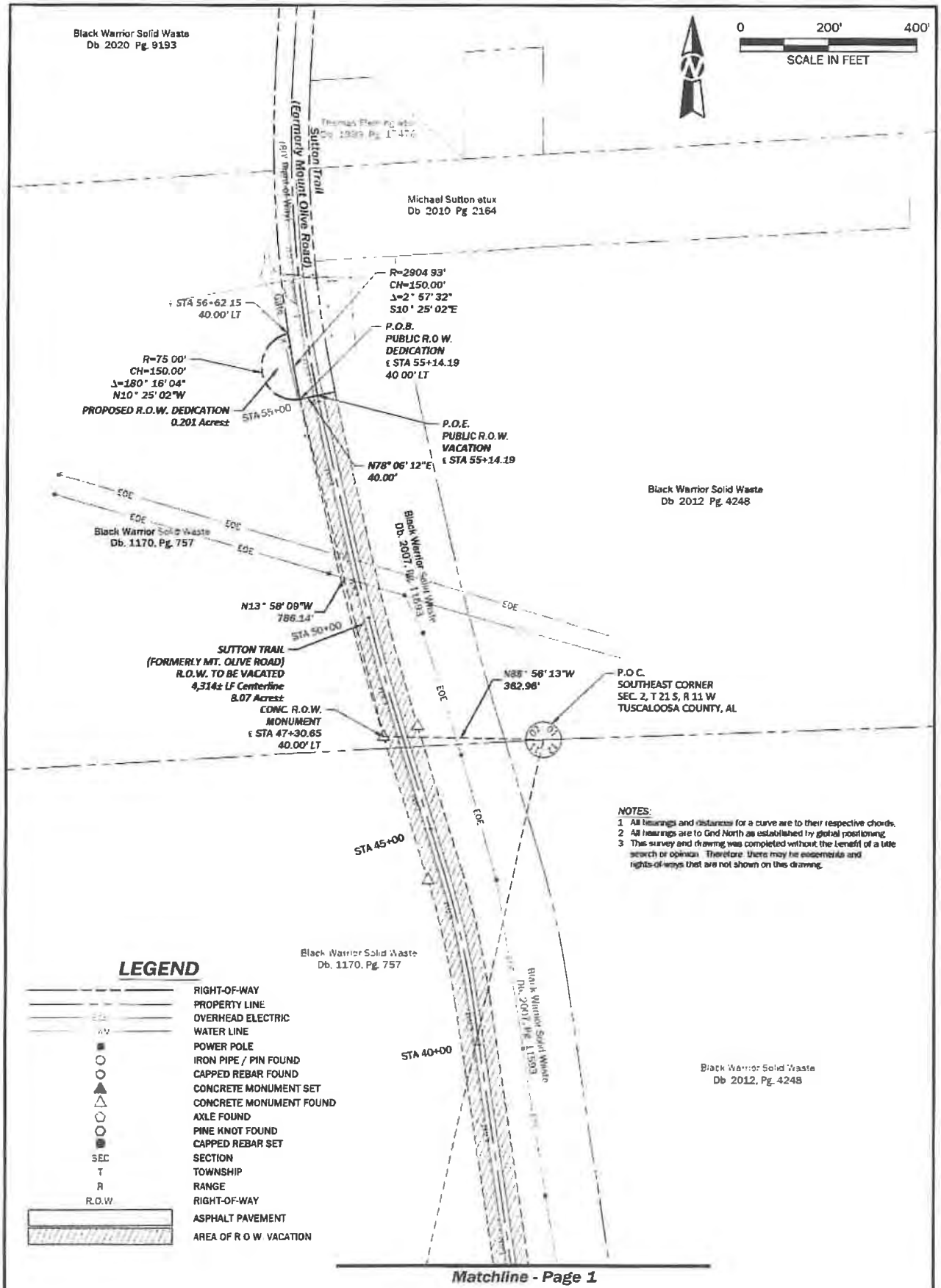
Given under my hand and official seal this 18th day of MARCH, 2021.

NOTARY PUBLIC
My Commission Expires: 1/9/2023

EXHIBIT A



TTL 2690 New Watermelon Road, Suite 2C | Tuscaloosa, AL 35406 205.561.3778 | www.ttlusa.com	Sutton Trail (Formerly Mount Olive Road) Right-of-way Vacation and Dedication BWSWDA Northport, Tuscaloosa County, Alabama	Right-of-Way Exhibit 1 of 4



TTL

2990 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Sutton Trail (Formerly Mount Olive Road)
Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title: *Right-of-Way Exhibit*

2 of 4

LEGAL DESCRIPTION

STATE OF ALABAMA)
COUNTY OF TUSCALOOSA)

Right-of-Way Vacation
Tuscaloosa County

All of that portion of the Right-of-Way of Sutton Trail (formerly Mount Olive Road) per Right-of-Way Project No. S906(1), beginning at U S. Highway 82 and running North for approximately 4,314 feet, from Centerline Station 11+99.25 to Centerline Station 55+14.19, lying and being in Sections 2 and 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama, containing 8.07 acres, more or less, said Beginning and Ending Points of the right-of-way to be vacated being more particularly described as follows:

POINT OF BEGINNING
As the POINT OF COMMENCEMENT, start at the Northeast corner of Section 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run South 12 degrees 36 minutes 59 seconds West a distance of 3,409.69 feet to a concrete Right-of-Way monument, said monument being 140 feet left of and at right angles to centerline Station 611+81 of U.S. Highway 82 as per Right-of-Way Project No. F197(2); thence run South 73 degrees 22 minutes 46 seconds East and perpendicular to the centerline of Sutton Trail (formerly Mount Olive Road) for a distance of 40.15 feet to the Point of Beginning at centerline Station 11+99.25 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

POINT OF ENDING
As the POINT OF COMMENCEMENT, start at the Southeast corner of Section 02, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run North 88 degrees 56 minutes 13 seconds West for a distance of 362.96 feet to a concrete Right-of-Way Monument at centerline Station 47+30.65 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1);
thence run North 13 degrees 58 minutes 09 seconds West a distance of 786.14 feet to a point on the existing right-of-way of said Sutton Trail, being 40.00 feet left of and at right angles to centerline Station 55+14.19 of said Sutton Trail; thence run North 78 degrees 06 minutes 12 seconds East and perpendicular to the centerline of said Sutton Trail for a distance of 40.00 feet to the Point of Ending at centerline Station 55+14.19 of said Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

THIS INSTRUMENT PREPARED BY:
Ann L. Reardon
Rosen Harwood, P.A.
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401

THIS INSTRUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION OR ON-SITE INSPECTION.

DEED Book 2021 Page 19185
Recorded 7/22/2021 4:28:09 PM
Ron Q. D. Anderson, III, Probate Judge
Tuscaloosa County, Alabama
Term/Cashier: PRO-RECORDING8/PCAMPBELL
Tran: 1641444
Probate Judge Fee $2.00
Recording Fee - By Page Count $51.00
Source of Title $1.25
No Tax Collected
Total: $54.25

Source of Title: Deed Book 1170, Page 757
Deed Book 2007, Page 11593

STATE OF ALABAMA)
)
TUSCALOOSA COUNTY)

DECLARATION OF VACATION OF PUBLIC RIGHT-OF-WAY

KNOW ALL MEN BY THESE PRESENTS, that:

The **Black Warrior Solid Waste Disposal Authority,** an Alabama public corporation, is the owner of all the land abutting a PUBLIC RIGHT-OF-WAY, which is hereinafter more particularly described, and which public right-of-way said owner desires to vacate as provided in Ala. Code §23-4-20 (1975). The vacation of said public right-of-way, as hereinafter described, will not deprive other property owners of reasonable means of ingress and egress to and from their property nor will it adversely affect the interest of the general public in any way.

NOW, THEREFORE, pursuant to the provisions of Ala. Code §23-4-20 (1975), the undersigned owners do hereby declare the following described public right-of-way located in the City of Northport, Tuscaloosa County, Alabama, to be vacated:

See Exhibit "A" Attached hereto and incorporated herein by reference.

The said public right-of-way to be vacated is within the limits of the City of Northport and assent to the vacation of said public right-of-way will be obtained from the City Council, a copy of which, certified by the City Administrator, will be attached hereto and will be filed and recorded with this written Declaration of Vacation and will be made a part hereof.

IN WITNESS WHEREOF, the said Chairman of the Board of Directors for the Black Warrior Solid Waste Disposal Authority, Robert Lewis, has set his hand and seal hereto this 18th day of MARCH, 2021.

Black Warrior Solid Waste Disposal Authority

By: _____
Robert Lewis, its Chairman

DEED Book 2021 Page 19186
Tuscaloosa County, Alabama

STATE OF ALABAMA §

COUNTY OF TUSCALOOSA §

I, the undersigned, a Notary Public, in and for said County in said State, hereby certify that Robert Lewis, whose name as Chairman of the Black Warrior Solid Waste Disposal Authority, an Alabama public corporation, is signed to the foregoing Petition, and who is known to me, acknowledged before me on this day that, being informed of the contents of the Petition, he executed the same voluntarily with full authority on the day the same bears date.

Given under my hand and official seal this 18th day of MARCH, 2021.

NOTARY PUBLIC
My Commission Expires: 1/9/2023

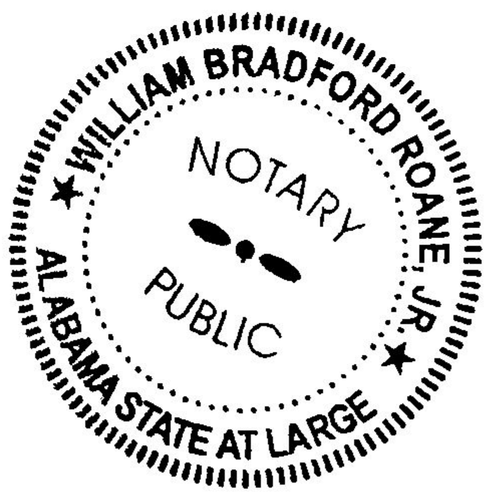


EXHIBIT A

0 200' 400'

SCALE IN FEET

DEED Book 2021 Page 19187
Tuscaloosa County, Alabama

Matchline - Page 2

STA 35+00

Black Warrior Solid Waste
Db. 1170, Pg. 757

S12° 36' 59"W
3409.69'

STA 30+00

SUTTON TRAIL
(FORMERLY MT. OLIVE ROAD)
R.O.W. TO BE VACATED
4,314± LF Centerline
8.07 Acres±

Black Warrior Solid Waste
Db. 2012, Pg. 4248

LEGEND

	RIGHT-OF-WAY
	PROPERTY LINE
EOE	OVERHEAD ELECTRIC
EWM	WATER LINE
	POWER POLE
	IRON PIPE / PIN FOUND
	CAPPED REBAR FOUND
	CONCRETE MONUMENT SET
	CONCRETE MONUMENT FOUND
	AXLE FOUND
	PINE KNOT FOUND
	CAPPED REBAR SET
SEC	SECTION
T	TOWNSHIP
R	RANGE
R.O.W.	RIGHT-OF-WAY
	ASPHALT PAVEMENT
	AREA OF R.O.W. VACATION

STA 25+00

STA 20+00

Coker Water Authority
Utility Easement
(LIFT STATION)
(Db. 1143, Pg. 163)

Black Warrior Solid Waste
Db. 2007, Pg. 11593

STA 15+00

Black Warrior Solid Waste
Db. 2012, Pg. 4248

Black Warrior Solid Waste
Db. 2012, Pg. 4248

S73° 22' 46"E
40.15'

CONC. R.O.W.
MONUMENT
STA 611+81
140' LT
ROW PROJECT
NO. F-197(2)

P.O.B.
PUBLIC R.O.W.
VACATION
℄ STA 11+99.25
ROW PROJECT
NO. S-906(1)

U.S. Highway 82 West
(Variable Right-of-Way)

TTL

2890 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Sutton Trail (Formerly Mount Olive Road)
Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title: *Right-of-Way Exhibit*

No	Date	Revision Description

Drawn By E M H / D L B | Checked By E M H
Date 01/2021 | Proj No. 18-10-02421.00
File Name 1802421 Survey dwg

Sheet No. 1 of 4

DEED Book 2021 Page 19188
Tuscaloosa County, Alabama

0 200' 400'
SCALE IN FEET

Black Warrior Solid Waste
Db. 2020, Pg. 9193

Thomas Fleming etux
Db. 1999, Pg. 17476

Michael Sutton etux
Db. 2010, Pg. 2164

(Formerly Mount Olive Road)
Sutton Trail
(80' Right-of-Way)

℄ STA 56+83.07
40.00' LT

R=25.00'
CH=30.13'
Δ=74°06'21"
N 28°32'01" E

℄ STA 56+59.50
58.25' LT

R=75.00'
CH=148.90'
Δ=166°08'15"
N 17°28'57" W

PROPOSED
R.O.W. DEDICATION
0.203 Acres±

STA 55+00

R=2904.93'
CH=171.20'
Δ=3°22'38"
S 10°12'29" E

P.O.B.
PUBLIC R.O.W.
DEDICATION
℄ STA 55+14.19
40.00' LT

P.O.E.
PUBLIC R.O.W.
VACATION
℄ STA 55+14.19

N78° 06' 12"E
40.00'

Black Warrior Solid Waste
Db. 2012, Pg. 4248

Black Warrior Solid Waste
Db. 1170, Pg. 757

Black Warrior Solid Waste
Db. 2007, Pg. 11593

N13° 58' 09"W
786.14'

STA 50+00

SUTTON TRAIL
(FORMERLY MT. OLIVE ROAD)
R.O.W. TO BE VACATED
4,314± LF Centerline
8.07 Acres±

N88° 56' 13"W
362.96'

P.O.C.
SOUTHEAST CORNER
SEC. 2, T 21 S, R 11 W
TUSCALOOSA COUNTY, AL

CONC. R.O.W.
MONUMENT
℄ STA 47+30.65
40.00' LT

STA 45+00

STA 40+00

Black Warrior Solid Waste
Db. 1170, Pg. 757

Black Warrior Solid Waste
Db. 2007, Pg. 11593

Black Warrior Solid Waste
Db. 2012, Pg. 4248

NOTES:

1. All bearings and distances for a curve are to their respective chords.
2. All bearings are to Grid North as established by global positioning
3. This survey and drawing was completed without the benefit of a title search or opinion. Therefore, there may be easements and rights-of-ways that are not shown on this drawing.

	RIGHT-OF-WAY
	PROPERTY LINE
EOE	OVERHEAD ELECTRIC
EWM	WATER LINE
	POWER POLE
	IRON PIPE / PIN FOUND
	CAPPED REBAR FOUND
	CONCRETE MONUMENT SET
	CONCRETE MONUMENT FOUND
	AXLE FOUND
	PINE KNOT FOUND
	CAPPED REBAR SET
SEC	SECTION
T	TOWNSHIP
R	RANGE
R.O.W.	RIGHT-OF-WAY
	ASPHALT PAVEMENT
	AREA OF R.O.W. VACATION

Matchline - Page 1

TTL
2890 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Sutton Trail (Formerly Mount Olive Road)
Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title
Right-of-Way Exhibit

No.	Date	Revision Description

Drawn By E M H / D L B | Checked By E M H
Date 01/2021 | Proj. No. 18-10-02421.00
File Name 1802421.Survey.dwg

Sheet No. 2 of 4

DEED Book 2021 Page 19189
Tuscaloosa County, Alabama

LEGAL DESCRIPTION

STATE OF ALABAMA)
COUNTY OF TUSCALOOSA)

Right-of-Way Vacation
Tuscaloosa County

All of that portion of the Right-of-Way of Sutton Trail (formerly Mount Olive Road) per Right-of-Way Project No. S906(1), beginning at U.S. Highway 82 and running North for approximately 4,314 feet, from Centerline Station 11+99.25 to Centerline Station 55+14.19, lying and being in Sections 2 and 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama, containing 8.07 acres, more or less, said Beginning and Ending Points of the right-of-way to be vacated being more particularly described as follows:

POINT OF BEGINNING
As the POINT OF COMMENCEMENT, start at the Northeast corner of Section 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run South 12 degrees 36 minutes 59 seconds West a distance of 3,409.69 feet to a concrete Right-of-Way monument, said monument being 140 feet left of and at right angles to centerline Station 611+81 of U.S. Highway 82 as per Right-of-Way Project No. F197(2); thence run South 73 degrees 22 minutes 46 seconds East and perpendicular to the centerline of Sutton Trail (formerly Mount Olive Road) for a distance of 40.15 feet to the Point of Beginning at centerline Station 11+99.25 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

POINT OF ENDING
As the POINT OF COMMENCEMENT, start at the Southeast corner of Section 02, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run North 88 degrees 56 minutes 13 seconds West for a distance of 362.96 feet to a concrete Right-of-Way Monument at centerline Station 47+30.65 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1);
thence run North 13 degrees 58 minutes 09 seconds West a distance of 786.14 feet to a point on the existing right-of-way of said Sutton Trail, being 40.00 feet left of and at right angles to centerline Station 55+14.19 of said Sutton Trail; thence run North 78 degrees 06 minutes 12 seconds East and perpendicular to the centerline of said Sutton Trail for a distance of 40.00 feet to the Point of Ending at centerline Station 55+14.19 of said Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

TTL
2890 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Mount Olive Road Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title
Boundary Survey

No.	Date	Revision Description

Drawn By: D L B	Checked By: E M H
Date: 1/28/2021	Proj. No.: 181002421.00
File Name: 1802421 Survey.dwg	

Sheet No. 3 of 4

DEED Book 2021 Page 19190
Tuscaloosa County, Alabama

THIS INSTRUMENT PREPARED BY:
Ann L. Reardon
Rosen Harwood, P.A.
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401

Reference: Deed Book 1170, Page 757
Deed Book 2007, Page 11593

RESOLUTION 21-74
CONSENTING TO THE VACATION
OF A PUBLIC STREET IN THE CITY OF NORTHPORT

WHEREAS, the **Black Warrior Solid Waste Disposal Authority**, a public corporation, hereinafter called the Owner, duly filed a Declaration of Vacation of a street with the City of Northport ("the City") on the 18th day of March, 2021,alleging that it owns all of the land abutting a certain public street/alley in the City of Northport hereinafter described; and,

WHEREAS, said street/alley lies within the Corporate Limits of the City of Northport, Alabama, and the assent of the City Council of Northport, Alabama, the governing body of the said Municipality, to the vacation of said public street/alley has been requested and is desired by the Owner; and,

WHEREAS, pursuant to Ala. Code Sections 23-4-2 and 11-49-6 (1975), notice of a date for hearing was duly published in the Northport Gazette and abutting property owners and utility entities were notified by mail, all as required by law; and,

WHEREAS, on the date and time duly noticed and specified, a public hearing to determine the assent to the vacation and to discern the fair market value of the land added to that of the abutting landowners was held on the 21st day of June, 2021, and the abutting landowners either being present or having jointly consented to the same in the Declaration of Vacation or having waived their objection by their absence.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF NORTHPORT AS FOLLOWS:

It appears to the City Council of Northport that the vacation of said public street/alley is in the interest of the public that such street, alley or highway or portion thereof, be vacated and that said vacation as herein described will not deprive other property owners of their right, as they may have, to convenient and reasonable means of ingress to and from their property, nor will it adversely affect the interest of the public in any way and that the assent of said City Council be, and the same is hereby, given to the vacation of the following described public street in the City of Northport, County of Tuscaloosa, Alabama, to-wit:

See Exhibit "A" attached hereto and incorporated herein by reference.

BE IT FURTHER RESOLVED BY THE CITY COUNCIL OF NORTHPORT as follows:

1. That pursuant to Ala. Code §11-49-6 (1975), the fair market value of the land, taking into consideration the benefit to the City of Northport supplied by the Owner building out and dedicating the relocation of Mt. Olive Road and the cul-de-sac on Sutton Place (old Mt. Olive Road) to the City of Northport, added to that land owned by the following abutting landowners and publication costs are set out as follows:

Owner: Black Warrior Solid Waste Disposal Authority

Fair Market Value (considering the benefit to the City of Northport supplied by the Owner building out and dedicating the relocation of Mt. Olive Road and the cul-de-sac on Sutton Place (old Mt. Olive Road) to the City of Northport): None

Publication and other Costs: $980.00

Total: $980.00 which has already been paid to the City.

Failure by any land owner to tender payment of the Fair Market Value of the lands received and publication costs within 60 days of the adoption of this resolution by the City Council, shall nullify the assent of the City Council and render said street/alley vacation void. Payment has been tendered by guaranteed funds and already paid to The City of Northport.

2. That pursuant to Ala. Code §23-4-2 (1975), the City Clerk is hereby directed to publish this resolution in the Northport Gazette, a newspaper of general circulation, one time within 14 days of the adoption of this resolution.

3. That the Mayor be, and he hereby is, authorized to present a copy of this resolution duly certified as correct by the City Administrator of the City of Northport, the officer in charge of the records of said Municipality, to the landowners within 10 days of the date of publication of this resolution in order that same may be attached to and filed and recorded with the legal declaration of vacation of said above and foregoing described public street.

4. That this vacation is final and binding provided that an appeal is not filed by any interested person within 30 days of the adoption of this resolution to any trial court of competent jurisdiction and or appellate court of this State and is adjudicated in the appellants favor pursuant to procedures as set forth in Ala. Code §23-4-5 (1975) as amended by Acts of Alabama 2004- 323 which renders said vacation null and void.

5. That this resolution shall not be valid nor considered a lawful conveyance and said street shall not be deemed to be vacated until such time as the payment of the publication costs and Fair Market Value of the lands described herein have been received by the City. Upon tender to the City of all sums due, the City is relieved from any and all responsibility and liability for the maintenance and repair of said street. It is the responsibility of the owner to record the Resolution of Vacation with the Office of Probate Judge of Tuscaloosa County and the City shall not be held

1st Reading: June 21, 2021
Motion By: Bobo
2nd Reading: July 6, 2021
Motion By: Hogg
Second By: Bobo
Publication: July 14, 2021

to be contributory negligent for the failure, mistake, neglect or omission of the owner to record the Resolution of Vacation of public record.

6. That the Owner has confirmed to the satisfaction of the City of Northport that it is in good faith negotiations with those public utilities who currently have an easement or utilities located within the said right-of-way for a license agreement wherein the public utilities would have a license to locate their utility lines upon, under, within, though, or across the Owner's property, with any costs to move said utility lines under the terms of said license agreement to be borne by the Owner.

RESOLVED AND DONE this the 6th day of July, 2021

CITY COUNCIL OF THE
CITY OF NORTHPORT

BY: _____
Jeff Hogg, Its President

ATTEST:

_____
Glenda D. Webb, City Administrator

APPROVED this the 6th day of July, 2021.

_____
Bobby Herndon, Mayor

I hereby certify that the above and foregoing Ordinance was published on July 14, 2021, in the Northport Gazette, a newspaper of general circulation published in the City of Northport.

_____
Glenda D. Webb, City Administrator

DEED Book 2021 Page 19194
Tuscaloosa County, Alabama

STATE OF ALABAMA)
TUSCALOOSA COUNTY)

I, City Administrator of the City of Northport, Alabama, hereby certify that the foregoing is a full, true and correct copy of a resolution duly adopted by the City Council of Northport at a regular meeting of said Council held on the 6th day of July, 2021, as the same appears and remains of record in the record book in my office wherein are recorded the minutes of the proceedings of said Council.

IN WITNESS WHEREOF, I have hereunto affixed my signature and the official seal of said City of Northport, this the 7th day of July, 2021.

City Administrator

EXHIBIT "A"

DEED Book 2021 Page 19196
Tuscaloosa County, Alabama

THIS INSTRUMENT PREPARED BY:
Ann L. Reardon
Rosen Harwood, P.A.
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401

THIS INSTRUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION OR ON-SITE INSPECTION.

Source of Title: Deed Book 1170, Page 757
Deed Book 2007, Page 11593

STATE OF ALABAMA)
)
TUSCALOOSA COUNTY)

DECLARATION OF VACATION OF PUBLIC RIGHT-OF-WAY

KNOW ALL MEN BY THESE PRESENTS, that:

The **Black Warrior Solid Waste Disposal Authority,** an Alabama public corporation, is the owner of all the land abutting a PUBLIC RIGHT-OF-WAY, which is hereinafter more particularly described, and which public right-of-way said owner desires to vacate as provided in Ala. Code §23-4-20 (1975). The vacation of said public right-of-way, as hereinafter described, will not deprive other property owners of reasonable means of ingress and egress to and from their property nor will it adversely affect the interest of the general public in any way.

NOW, THEREFORE, pursuant to the provisions of Ala. Code §23-4-20 (1975), the undersigned owners do hereby declare the following described public right-of-way located in the City of Northport, Tuscaloosa County, Alabama, to be vacated:

See Exhibit "A" Attached hereto and incorporated herein by reference.

The said public right-of-way to be vacated is within the limits of the City of Northport and assent to the vacation of said public right-of-way will be obtained from the City Council, a copy of which, certified by the City Administrator, will be attached hereto and will be filed and recorded with this written Declaration of Vacation and will be made a part hereof.

IN WITNESS WHEREOF, the said Chairman of the Board of Directors for the Black Warrior Solid Waste Disposal Authority, Robert Lewis, has set his hand and seal hereto this 18th day of March, 2021.

Black Warrior Solid Waste Disposal Authority

By: _____
Robert Lewis, its Chairman

DEED Book 2021 Page 19197
Tuscaloosa County, Alabama

STATE OF ALABAMA §

COUNTY OF TUSCALOOSA §

I, the undersigned, a Notary Public, in and for said County in said State, hereby certify that Robert Lewis, whose name as Chairman of the Black Warrior Solid Waste Disposal Authority, an Alabama public corporation, is signed to the foregoing Petition, and who is known to me, acknowledged before me on this day that, being informed of the contents of the Petition, he executed the same voluntarily with full authority on the day the same bears date.

Given under my hand and official seal this 18th day of March, 2021.

NOTARY PUBLIC
My Commission Expires: 1/9/2023

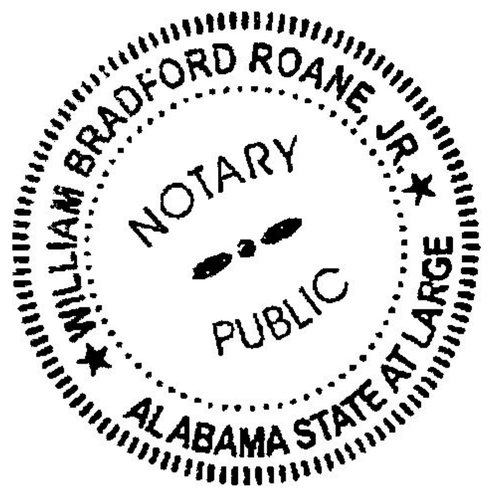


EXHIBIT A

0 200' 400'

SCALE IN FEET

Matchline - Page 2

DEED Book 2021 Page 19198
Tuscaloosa County, Alabama

Black Warrior Solid Waste
Db 1170 Pg 757

Black Warrior Solid Waste
Db 2012, Pg 4248

SUTTON TRAIL
(FORMERLY MT. OLIVE ROAD)
R.O.W. TO BE VACATED
4,314± LF Centerline
8.07 Acres±

S12° 36' 59"W
3409.69'

STA 35+00

STA 30+00

STA 25+00

STA 20+00

STA 15+00

LEGEND

	RIGHT-OF-WAY
	PROPERTY LINE
EOE	OVERHEAD ELECTRIC
EWM	WATER LINE
	POWER POLE
	IRON PIPE / PIN FOUND
	CAPPED REBAR FOUND
	CONCRETE MONUMENT SET
	CONCRETE MONUMENT FOUND
	AXLE FOUND
	PINE KNOT FOUND
	CAPPED REBAR SET
SEC	SECTION
T	TOWNSHIP
R	RANGE
R.O.W.	RIGHT-OF-WAY
	ASPHALT PAVEMENT
	AREA OF R.O.W. VACATION

Coker Water Authority
Utility Easement
(LIFT STATION)
(Db. 1143, Pg. 163)

Black Warrior Solid Waste
Db. 2007, Pg 11593

EOE

Black Warrior Solid Waste
Db. 2012, Pg. 4248

Black Warrior Solid Waste
Db. 2012 Pg 4248

S73° 22' 46"E
40.15'

CONC. R.O.W.
MONUMENT
STA 611+81
140' LT
ROW PROJECT
NO. F-197(2)

P.O.B.
PUBLIC R.O.W.
VACATION
℄ STA 11+89.25
ROW PROJECT
NO. S-906(1)

U.S. Highway 82 West
(Variable Right-of-Way)

TTL

2890 Inco Main Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Sutton Trail (Formerly Mount Olive Road)
Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Right-of-Way Exhibit

No.	Date	Revision Description

Sheet No.
1 of 4

DEED Book 2021 Page 19199
Tuscaloosa County, Alabama

Black Warrior Solid Waste
Db. 2020 Pg. 9193

Sutton Trail
(Formerly Mount Olive Road)
(81' Right-of-Way)

Michael Sutton etux
Db. 2010 Pg. 2164

0 200' 400'
SCALE IN FEET

℄ STA 56+62.15
40.00' LT

R=2904.93'
CH=150.00'
Δ=2° 57' 32"
S10° 25' 02"E

P.O.B.
PUBLIC R.O.W.
DEDICATION
℄ STA 55+14.19
40.00' LT

R=75.00'
CH=150.00'
Δ=180° 16' 04"
N10° 25' 02"W

PROPOSED R.O.W. DEDICATION
0.201 Acres±

STA 55+00

P.O.E.
PUBLIC R.O.W.
VACATION
℄ STA 55+14.19

N78° 06' 12"E
40.00'

EOE

Black Warrior Solid Waste
Db. 1170, Pg. 757

Black Warrior Solid Waste
Db. 2012, Pg. 4248

Black Warrior Solid Waste
Db. 2007, Pg. 11593

N13° 58' 09"W
786.14'

STA 50+00

SUTTON TRAIL
(FORMERLY MT. OLIVE ROAD)
R.O.W. TO BE VACATED
4,314± LF Centerline
8.07 Acres±

CONC. R.O.W.
MONUMENT
℄ STA 47+30.65
40.00' LT

N88° 56' 13"W
382.96'

P.O.C.
SOUTHEAST CORNER
SEC. 2, T 21 S, R 11 W
TUSCALOOSA COUNTY, AL

STA 45+00

STA 40+00

NOTES:
1 All bearings and distances for a curve are to their respective chords.
2 All bearings are to Grid North as established by global positioning.
3 This survey and drawing was completed without the benefit of a title search or opinion. Therefore, there may be easements and rights-of-ways that are not shown on this drawing.

LEGEND

	RIGHT-OF-WAY
	PROPERTY LINE
OHE	OVERHEAD ELECTRIC
W/L	WATER LINE
■	POWER POLE
○	IRON PIPE / PIN FOUND
○	CAPPED REBAR FOUND
▲	CONCRETE MONUMENT SET
△	CONCRETE MONUMENT FOUND
⬡	AXLE FOUND
⬡	PINE KNOT FOUND
●	CAPPED REBAR SET
SEC	SECTION
T	TOWNSHIP
R	RANGE
R.O.W.	RIGHT-OF-WAY
	ASPHALT PAVEMENT
	AREA OF R.O.W. VACATION

Matchline - Page 1

TTL
2890 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Sutton Trail (Formerly Mount Olive Road)
Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title
Right-of-Way Exhibit

Sheet No.
2 of 4

LEGAL DESCRIPTION

STATE OF ALABAMA)
COUNTY OF TUSCALOOSA)

Right-of-Way Vacation
Tuscaloosa County

All of that portion of the Right-of-Way of Sutton Trail (formerly Mount Olive Road) per Right-of-Way Project No. S906(1), beginning at U.S. Highway 82 and running North for approximately 4,314 feet, from Centerline Station 11+99.25 to Centerline Station 55+14.19, lying and being in Sections 2 and 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama, containing 8.07 acres, more or less, said Beginning and Ending Points of the right-of-way to be vacated being more particularly described as follows:

POINT OF BEGINNING
As the POINT OF COMMENCEMENT, start at the Northeast corner of Section 11, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run South 12 degrees 36 minutes 59 seconds West a distance of 3,409.69 feet to a concrete Right-of-Way monument, said monument being 140 feet left of and at right angles to centerline Station 611+81 of U.S. Highway 82 as per Right-of-Way Project No. F197(2); thence run South 73 degrees 22 minutes 46 seconds East and perpendicular to the centerline of Sutton Trail (formerly Mount Olive Road) for a distance of 40.15 feet to the Point of Beginning at centerline Station 11+99.25 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

POINT OF ENDING
As the POINT OF COMMENCEMENT, start at the Southeast corner of Section 02, Township 21 South, Range 11 West, Tuscaloosa County, Alabama; thence run North 88 degrees 56 minutes 13 seconds West for a distance of 362.96 feet to a concrete Right-of-Way Monument at centerline Station 47+30.65 of Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1);
thence run North 13 degrees 58 minutes 09 seconds West a distance of 786.14 feet to a point on the existing right-of-way of said Sutton Trail, being 40.00 feet left of and at right angles to centerline Station 55+14.19 of said Sutton Trail; thence run North 78 degrees 06 minutes 12 seconds East and perpendicular to the centerline of said Sutton Trail for a distance of 40.00 feet to the Point of Ending at centerline Station 55+14.19 of said Sutton Trail (formerly Mount Olive Road) as per Right-of-Way Project No. S-906(1).

TTL
2890 Rice Mine Road NE | Tuscaloosa, AL 35406
205.561.3778 | www.ttlusa.com

Mount Olive Road Right-of-way Vacation and Dedication

BWSWDA

Northport, Tuscaloosa County, Alabama

Sheet Title
Boundary Survey

No	Date	Revision Description

Drawn By: D L B	Checked By: E M H
Date: 1/28/2021	Proj No 181002421 00
File Name 1802421 Survey dwg	

DEED Book 2021 Page 19201
Tuscaloosa County, Alabama

DEPARTMENTAL SUMMARY OF REQUESTED ACTION
THE NORTHPORT CITY COUNCIL AGENDA

AGENDA ITEM NO. 7 (a)

MEETING DATE: July 6, 2021

SUBJECT: 2nd Reading, Permanent Resolution Consenting to the Vacation of Right of Way of a public street in the City of Northport for a portion of Mount Olive Road

Consent Agenda	Action Agenda	Public Hearing
First Reading	Second Reading **X**	Other
Prepared By: K. Braughton		**Approved By:** Ron Davis

Summary: The Black Warrior Solid Waste Authority (BWSWA) owns property on both sides of Mount Olive road from US Highway 82, approximately 4,314 feet north. BWSWA has requested that the City vacate the right-of-way for a portion of Mount Olive Road, (vicinity map attached). The right-of-way to be vacated is approximately 8.07 acres.

The Code of Alabama requires that the Council, after advertisement in a paper of local circulation, conduct a public hearing at a regularly scheduled meeting to consider written objections prior to taking action on the proposed vacation.

The notice of the public hearing was published in the Gazette for four (4) consecutive weeks as required and the petitioners, as well as, the adjacent property owners and various utility companies have been notified of the hearing date.

To vacate a public right-of-way, the Council must adopt a resolution of a permanent nature which requires a first and second reading. The first reading was June 21, 2021. The resolution before you tonight is for a second reading.

Alternatives: Deny the request to vacate

Recommendation: Offer the attached resolution for a second reading.

Funding Source/GL Code: N/A City Administrator Approval: GEW

Motion for Consideration: **I move to adopt the resolution consenting to the vacation of right-of-way of a public street in the City of Northport for a portion of Mount Olive Road.**

APPENDIX 1.2

ADEM FORM 439

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

1. Facility type:

- [X] **Municipal Solid Waste Landfill (MSWLF)**
- [ ] **Industrial Landfill (ILF)**
- [ ] **Construction and Demolition Landfill (C/DLF)**
- [ ] **CCR Landfill (CCRLF)**
- [ ] **CCR Surface Impoundment (CCRSI)**
- [ ] **Other (explain)**_____

2. Facility Name Black Warrior Solid Waste Disposal Facility

3. Applicant/Permittee:

Name: Black Warrior Solid Waste Disposal Authority

Address: 3301 Landfill Drive
Coker, AL 35452

Telephone: (205) 339-7330

If applicant/permittee is a Corporation, please list officers:

4. Location: (include county highway map or USGS map)

Township 21 South **Range** 11 West
Section 2 and 11 **County** Tuscaloosa

5. Land Owner:

Name: Black Warrior Solid Waste Disposal Authority

Address: 3301 Landfill Drive
Coker, AL 35452

Telephone: (205) 339-7330

(Attach copy of agreement from landowner if applicable.)

6. Contact Person:

Name	Fred Rogers	R. Daniel Wells
Position or Affiliation	Executive Director	Three Notch Group, Inc.
Address:	3301 Landfill Drive Coker, AL 35452	P.O. Box 278 Andalusia, AL 36420
Telephone:	(205) 339-7330	(334) 222-9431

7. Size of Facility: 459.64 **Acres**

Size of Disposal Area(s): 142.24 **Acres**

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

State of Alabama

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

1,500 **Tons/Day** _____ **Cubic Yards/Day**

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

Nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees limbs, stumps, dried sludge, ashes, paper and other similar type materials. Special waste approved by ADEM.

SIGNATURE (Responsible official of permit applicant):

_____ **TITLE:** _____

_____ **DATE:** _____

(please print or type name)

2 SITE EVALUATION

ADEM Administrative Code R 335-13-4-.01 lists the requirements for siting standards for new landfills. The following sections address each of the siting standards that were investigated as part of the facility evaluation.

2.1 WETLANDS ASSESSMENT

See Appendix 2.1 Wetlands Assessment Report

2.2 THREATENED AND ENDANGERED SPECIES

See Appendix 2.2 Threatened and Endangered Species Report

2.3 ARCHAEOLOGICAL SURVEY AND CULTURAL RESOURCE

See Appendix 2.3 Archaeological Survey and Cultural Resource Inventory

2.4 FLOODPLAINS

ADEM Administrative Code, Rule 335-13-4-.01(1) requires that any facility located in a floodplain shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain or result in washout of solid waste. The disposal areas will not impact the 100-year flood plain. The FEMA Flood Insurance Map is located in Appendix 2.4.

2.5 UNSTABLE AREAS

See Appendix 2.5 Hydrogeological Evaluation

2.6 AIRPORTS

ADEM Administrative Code, Rule 335-13-4-.01(1) requires that a facility not be located within 10,000 feet of any airport runway end, and that owners or operators proposing to renew existing or site new MSWLF units located within a five mile radius of any airport runway end must notify the affected airport and the Federal Aviation Administration (FAA).

Notification to the Tuscaloosa Municipal Airport and the Federal Aviation Administration is included in Appendix 2.6.

APPENDIX 2.1

WETLANDS ASSESSMENT REPORT

Map ID	Classification	Area (AC)	Length (LF)
S-1	Intermittent	0.006	158
S-2	Intermittent	0.043	542
S-3	Intermittent	0.044	974
S-4	Intermittent	0.006	143
S-5	Intermittent	0.008	192
S-6	Intermittent	0.031	687
S-6c	Culvert	---	21
S-7	Intermittent	0.003	66
S-8	Ephemeral	0.008	167
S-9	Ephemeral	0.010	143
S-10	Ephemeral	0.060	545
S-10c	Culvert	---	22
S-11	Ephemeral	0.003	32
Total Culvert Pipe: 43± LF			
Total Ephemeral Stream: 0.081± AC, 887± LF			
Total Intermittent Stream: 0.141± AC, 2762± LF			
Total Stream: 0.222± AC, 3649± LF			

Map ID	Classification	Area (AC)
WA	Wetland	0.130
WB	Wetland	0.012
WC	Wetland	0.022
WD	Wetland	0.006
WE	Wetland	0.499
WF	Wetland	3.295
WG	Wetland	0.068
WH	Wetland	0.702
WI	Wetland	0.013
WJ	Wetland	0.014
WK	Wetland	0.007
WL	Wetland	0.062
WM	Wetland	0.065
WN	Wetland	0.206
WO	Wetland	0.214
WP	Wetland	0.161
WQ	Wetland	0.844
WR	Wetland	0.383
Total Wetland: 6.703± AC		

Map ID	Classification	Area (AC)
OWA	Open Water	0.026
OWB	Open Water	0.056
Total Open Water: 0.082± AC		

This map is not a survey and represents features that were mapped with a Trimble Geo7x GPS unit set to submeter accuracy. These features are subject to verification by the USACE.

VERIFICATION DATE: _____ USACE FILE NO.: _____

Mount Olive Rd

Partlow Camp Rd

McFarland Blvd

Alabama Southern Railroad

Rose Blvd

WA S-1 WB WA WA S-1 S-10c S-10 WR WDP-5 UDP-5 WN S-9 WL OWB S-11 WD WC OWA WE WG S-3 WE WH WDP-3 UDP-3 S-4 S-5 WF WDP-4 S-2 UDP-4 WF WI UDP-2 WDP-2 S-7 S-6 S-6c WK S-6 WM S-8 WJ WO WP UDP-1 WDP-1 WQ

LEGEND

- Partlow Expansion Area (169.89± AC)
- Upland Data Point
- Wetland Data Point
- Wetland
- Open Water
- Intermittent Stream
- Ephemeral Stream
- Culvert
- Off-Site Wetland
- Off-Site Open Water
- Off-Site Stream

0 600 Feet

N

AQUATIC RESOURCES DELINEATION MAP

BLACK WARRIOR SOLID WASTE AUTHORITY - PARTLOW EXPANSION

AQUATIC RESOURCE DELINEATION

NORTHPORT, TUSCALOOSA COUNTY, TUSCALOOSA

BASEMAP: Maxar Technologies, Vivid Imagery, 4/3/2021 (0.46 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	CMS
DRAWING DATE:	6/27/2022
REVISION DATE:	N/A
TTL JOB NO.:	19-01-03033.22
APPROX. SCALE:	1 in = 600 ft

REPORT OF WETLANDS AND WATERS OF THE UNITED STATES DETERMINATION AND DELINEATION

BLACK WARRIOR SOLID WASTE FACILITY
3301 LANDFILL DRIVE
COKER, TUSCALOOSA COUNTY, ALABAMA

Submitted to:

Black Warrior Solid Waste Authority
c/o CDG Engineers & Associates
Attn: Daniel Wells
Post Office Box 278
Andalusia, Alabama 36420

Prepared by:

TTL, Inc.
3516 Greensboro Avenue
Tuscaloosa, Alabama 35401

Project No. 600112019

December 11, 2012

TTL

geotechnical · analytical · materials · environmental

SIGNATURE OF ENVIRONMENTAL PROFESSIONALS

TTL, Inc. has performed a wetland determination and delineation in general conformance with the scope and limitations of the *U. S. Army Corps of Engineers Wetland Delineation Manual, 1987 Edition*, and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2010)*. Identification of ephemeral, intermittent and perennial streams has been performed in general conformance with methodology outlined in *Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11. North Carolina Department of Environmental and Natural Resources, Division of Water Quality.*

Mary E. Wilkes
Staff Professional

12/11/2012
Date

Robert M. White
Robert M. White
Principal Natural Resources Scientist

12/11/12
Date

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 PROJECT DESCRIPTION 1
3.0 LITERATURE AND HISTORICAL RECORDS REVIEW 2
3.1 WEB SOIL SURVEY 2
3.2 NATIONAL WETLAND INVENTORY 2
3.3 HYDROLOGIC UNIT CODE 2
3.4 NORMAL WEATHER CONDITIONS 3
4.0 ON-SITE STREAM AND WETLAND DETERMINATION AND DELINEATION 3
5.0 CONCLUSIONS 4
6.0 REFERENCES 4

FIGURES

Figure 1 Site Location Map
Figure 2 Aerial Photograph
Figure 3 Soils Survey Map
Figure 4 National Wetland Inventory Map
Figure 5 Hydrologic Unit Code Map
Figure 6 Wetland and Stream Delineation Map

APPENDICES

Appendix A Site Photographs

Appendix B U.S. Corps of Engineers (USACE) Wetland Determination Data Forms

Appendix C Normal Weather Conditions Table
Palmer Drought Severity Index

1.0 INTRODUCTION

TTL, Inc. (TTL) was contracted by CDG Engineers and Associates, a consultant to the Black Warrior Solid Waste Authority (BWSWA), to perform a Wetlands and Waters of the United States Determination and Delineation on a parcel of land located within the current permitted Black Warrior Solid Waste Facility in Coker, Tuscaloosa, Alabama (Figure 1). The site is approximately 5.6 acres. TTL performed the field activities on November 13, 2012. The center of the project area is located at approximately latitude 33° 14' 24.7"N and longitude 87° 38' 58.7"W.

TTL evaluated the subject site to identify the presence of U. S. Army Corps of Engineers (USACE) regulated "Waters of the United States." Rivers, streams, lakes, ponds, and wetlands are all subsets of "Waters of the United States." The USACE has the responsibility to regulate impacts to Traditional Navigable Waters (TNW) and their adjacent tributaries and wetlands. Additionally, any surface water that demonstrates a "significant nexus" to a TNW, an adjacent tributary, or wetland is regulated under Section 404 of the Clean Water Act. A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a TNW.

2.0 PROJECT DESCRIPTION

The subject tract of land is part of the Black Warrior Solid Waste Facility and the BWSWA is performing this survey to inventory jurisdictional aquatic areas and features upon the future cells of the subject property. TTL understands BWSWA intends to apply for a major modification to their landfill permit (ADEM Permit No. 63-01) for landfill expansion. CDG is a consultant for BWSWA and has historically worked with TTL at the facility. For the initial landfill permit, a Wetlands Delineation and Endangered Species Study was performed in 1994 by Environmental Resource Analysts (report dated October 18, 1994). The report documents two intermittent tributaries on the landfill property that were not within the delineation area. One of the tributaries was considered jurisdictional as a result of the 1994 Delineation. As part of the major modification, the Alabama Department of Environmental Management (ADEM) requires a letter of concurrence from the U.S. Army Corp of Engineers (USACE). In order to obtain the USACE letter of concurrence, a wetland delineation report no more than five years old must be submitted to the USACE for jurisdictional determination. The subject site is accessed from Highway 82. The site is bounded by the landfill buffer to the east, north and south and the landfill to the west. The subject site is currently partially wooded and undeveloped with evidence of landfill dirt roadbeds and borrow pits.

The procedures followed for wetlands delineation are outlined in the *USACE Wetlands Delineation Manual, 1987 and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain, November 2010.* The technical guideline for determining the presence of wetlands requires that a positive wetland indicator be present for each of the three parameters (hydrology, soil and vegetation), with the exception of areas altered by recent human activities or natural events. The wetland delineation consisted of a field study to observe actual conditions.

TTL used the *North Carolina Division of Water Quality – Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 411, September 1, 2010 (North Carolina Method)* technical guideline to determine the ephemeral, intermittent, or perennial status of the subject streams. The Mobile District endorses the use of the North Carolina Method for differentiating stream types (*Section 4.1, Department of the Army Mobile District Corps of Engineers,*

Compensatory Stream Mitigation Standard Operating Procedures and Guidelines, Draft Edition May 2012). TTL did not observe streams within the delineation area.

TTL traversed the delineation area on foot within the project boundaries as depicted on Figures 1 and 2. Figure 1 is a portion of the 1969 (Photorevised 1978) Coker, Alabama, USGS 7.5' series Topographic Map. Figure 2 is a 2011 aerial photograph obtained by Google Earth. TTL completed the field work on November 13, 2012. TTL used the standard delineation method of traversing upland/wetland boundaries, flagged the boundaries of aquatic features, and located the features using a Trimble ProXH® Global Positioning System (GPS).

3.0 LITERATURE AND HISTORICAL RECORDS REVIEW

3.1 Web Soil Survey

A web soil survey with map unit descriptions available through the Natural Resource Conservation Service (NRCS), Web Soil Survey, illustrates the following soil types in the delineation area:

- Boswell loam, 4 to 10 percent slopes – not hydric
- Luverne-Smithdale complex, 4 to 10 percent slopes – not hydric
- Smithdale fine sandy loam, 6 to 15 percent slopes – not hydric
- Smithdale-Luverne complex, 15 to 35 percent slopes – partially hydric
- Smithdale-Luverne association, hilly – partially hydric

Hydric Rating by Map Unit data available through the NRCS Web Soil Survey indicates that the site is mapped as not hydric or partially hydric. Figure 3 depicts the NRCS-mapped soil units upon the subject site.

3.2 National Wetland Inventory

According to the National Wetlands Inventory US Fish and Wildlife Service (USFWS) Online Mapper, this delineation area contains no potential wetland areas. Figure 4 depicts the delineation area on the USFWS Map.

3.3 Hydrologic Unit Code

The United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic system (Seaber, Kapinos, Knapp, 1987).

The subject site is located within twelve-digit HUCs 031601130202, which is part of the Lower Black Warrior 8-digit Cataloging Unit (Figure 6).

3.4 Normal Weather Conditions

TTL calculates a subject site's normal weather conditions before performing site work to understand whether aquatic features in the landscape may exhibit certain characteristics related to current and near past hydrologic regime. TTL calculates data obtained from an on-line weather consultant, WeatherSource, and derives its calculation method from Tennessee Department of Environment and Conservation's guide for making hydrologic determinations (TDEC, 2011). As field work for this stream and wetland delineation was performed in November 2012, an evaluation of weather conditions was performed this period. Calculations for the subject site have determined that the weather conditions were slightly wetter than normal for the time of year that field work was performed. The Palmer Drought Severity Index provided by National Oceanic and Atmospheric Administration is accessed at http://water.weather.gov/precip and is used to cross-reference the results calculated (Appendix C). The Palmer Drought Severity Index indicates that the region of the subject site is within the range of normal annual rainfall totals during the period of field work.

4.0 ON-SITE STREAM AND WETLAND DETERMINATION AND DELINEATION

TTL used the *Corps of Engineers Wetland Delineation Manual (1987)* technical guideline for determining the presence of wetlands. This requires a positive wetland indicator be present for each of the three parameters (hydrology, soil, and vegetation), with the exception of areas altered by recent human activities or natural events. During field activities, TTL assessed the project area for the presence of hydric vegetation and used a Dutch hand-auger to evaluate the project area for the presence of hydric soils. TTL examined the soil for hydric characteristics such as low chroma color characteristics, sulfuric odor, reducing conditions and redoximorphic features. Additionally, TTL observed areas for inundated or saturated soils, water marks, drift lines, crayfish holes, buttressed trees, sediment deposits and other wetland hydrology indicators.

TTL utilized GPS equipment to locate the delineated interface between wetland and upland areas. TTL used **Wetland Determination Data Form – Atlantic and Gulf Coastal Plain Region** to record field conditions for the soil, vegetation and hydrology for wetlands and uplands located on-site. The data collection points are depicted on Figure 6. Photographs of our field observations are provided in Appendix A. Corps Data Sheets are included in Appendix B.

TTL traversed the project area on foot within the delineation boundary as depicted on Figures 1 and 2. One wetland area totaling approximately 0.46 acres was delineated and mapped within the subject property (Figure 6). The wetland area has been historically disturbed by on-going landfill activities. The wetland area is located in a former borrow area along an access road. The wetland drains to a temporary stormwater conveyance constructed for stormwater management of the landfill. The temporary conveyance did not contain hydric soils and was absent of vegetation. This temporary stormwater conveyance will be relocated as the landfill closes and constructs cells to maintain water quality.

TTL did not observe streams within the delineation area.

5.0 CONCLUSIONS

- There is one wetland area mapped upon the 5.6 acre delineation area. This area is believed to not be the under jurisdiction of the U.S. Army Corps of Engineers due to the impermanent connectivity provided by the temporary stormwater conveyances constructed for stormwater management.

- No stream channels are present on the delineation area.

6.0 REFERENCES

NC Division of Water Quality. 2010. Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, NC.

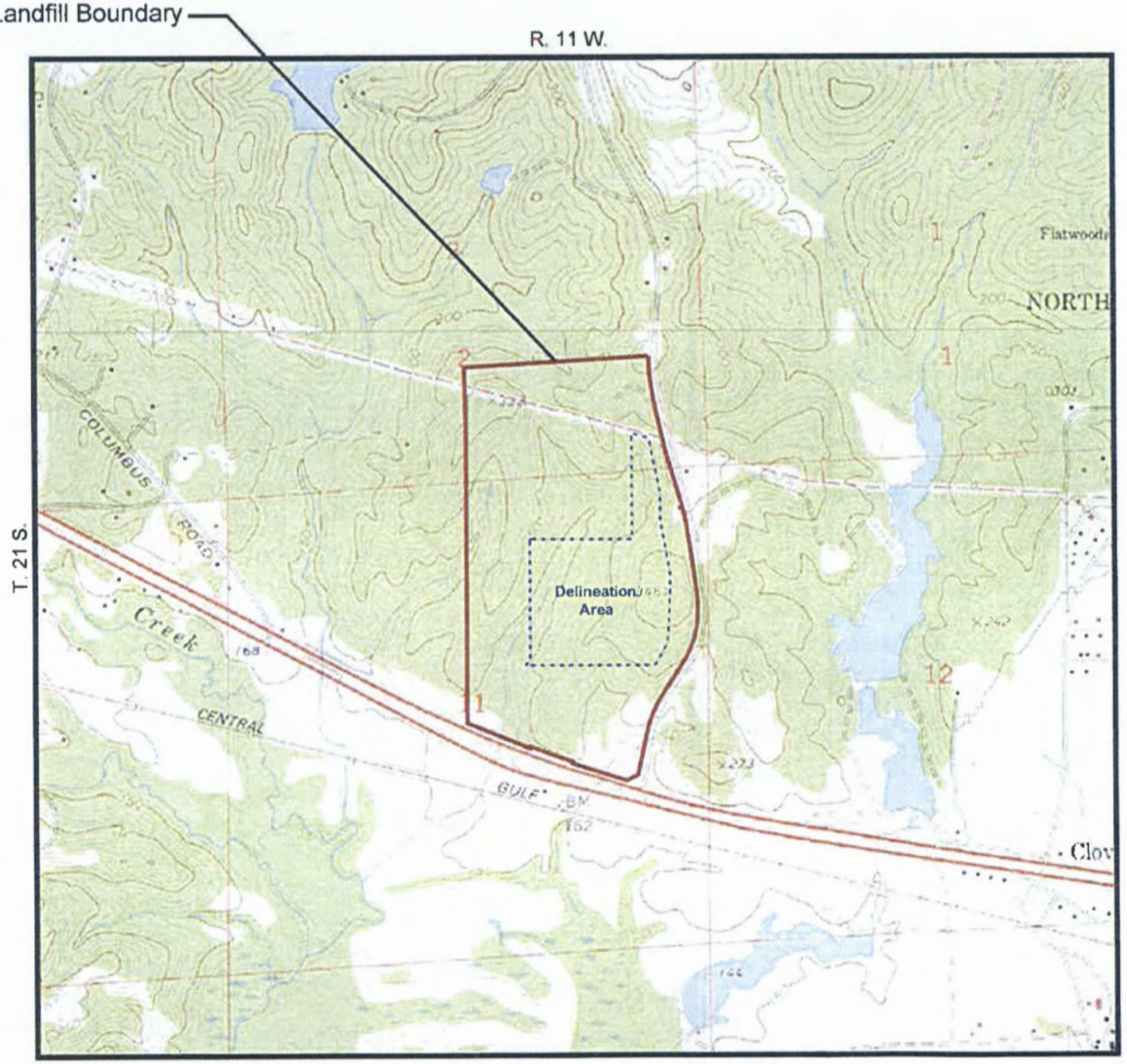
Seaber, P.R., Kapinos, F.P., and Knapp, G.L., 1987, Hydrologic Unit Maps: U.S. Geological Survey Water-Supply Paper 2294, p. 63.

Tennessee Department of Environment and Conservation (TDEC), Division of Water Pollution Control: Guidance for Making Hydrologic Determinations, Version 1.4, 2011, pp. 9-12.

U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), ed. J.S. Wakeley, R. W. Lichvar, and C.V. Noble. ERDC/EI TR-10-20. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

United States Department of Agriculture, Natural Resources Conservation Service. 2010. Field Indicators of Hydric Soils in the United States, Version 7.0. L.M. Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA, NRCS in cooperation with the National Technical Committee for Hydric Soils.

FIGURES



Source: USGS Lake Lurleen, Ala. 7.5 Minute Quadrangle Map, 1978 (Photorevised 1982)
USGS Coker, Ala. 7.5 Minute Quadrangle Map, 1969 (Photorevised 1978)

TTL
3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205 345 0816 ■ Fax 205 345 0992

TTL PROJECT NO: 600112019
PROJECT DATE: November 7, 2012

Figure 1. Site Location Map
Sec. 2 and 11, T. 21 S., R. 11 W., of the Coker, Ala. 7.5 Minute Quadrangle Map
Black Warrior Solid Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

1" = 2000'
(Approximate)

T:\Projects\2012\600112019 BWSWA Addition\Wetland & Stream Delineation\Figures\12-019 Topo Map.dwg

LEGEND

Approximate Landfill Boundary

Delineation Area

Area Not Included In Delineation

0′ 800′

TTL

3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205 345 0816 ■ Fax 205 345 0892

APPROXIMATE SCALE: 1" = 800'	TTL PROJ. NO.: 600112019
DRAWING PATH: T:\Projects\2012\600112019 BWSWA Addition\Wetland & Stream Delineation\Figures\12-019 Aerial.dwg	
DATE CREATED: 11/23/2012	DATE REVISED: 11/28/2012 — REVISION NUMBER: n/a
DRAWN BY: mjc	CHECKED BY: MEW
AERIAL SOURCE: Google Earth, October 2010	

Figure 2. Aerial Photograph

Black Warrior Sold Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

0′ 800′

Scale: 1" = 800' (Approximate)

Index of Soil Map Units within the Survey Area

11	Boswell loam, 4 to 10 percent slopes
20	Luverne-Smithdale complex, 4 to 10 percent slopes
33	Smithdale fine sandy loam, 6 to 15 percent slopes
36	Smithdale-Luverne complex, 15 to 35 percent slopes
39	Smithdale-Luverne association, hilly

Figure 3.

Soils Survey Map

Black Warrior Sold Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

Map Source:
USDA NRCS Online Soils Survey

Site Location:
Sec. 2 and 11, T. 21 S., R. 11 W., of the Coker, Ala. 7.5 Minute Quadrangle Map

TTL

3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205.345.0816 ■ Fax 205.345.0992

TTL PROJECT NO: 600112019
PROJECT DATE: November 28, 2012

0′ 800′

Scale: 1" = 800' (Approximate)

Index of Possible Wetland Types within the Survey Area

None

Figure 4.

National Wetlands Inventory Map

Black Warrior Sold Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

Map Source:
U.S. Fish and Wildlife Service
National Wetlands Inventory
Wetlands Online Mapper

Site Location:
Sec. 2 and 11, T. 21 S., R. 11 W., of the
Coker, Ala. 7.5 Minute Quadrangle Map

TTL

3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205.345.0816 ■ Fax 205.345.0992

TTL PROJECT NO: 600112019
PROJECT DATE: November 28, 2012

T:\Projects\2012\600112\2019 BWSWA Addition\Wetland & Stream Delineation\Figures\12-019 NWI Map.dwg

LEGEND

Approximate Site Location

0' 800'

TTL

3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205.345.0816 ■ Fax 205.345.0992

APPROXIMATE SCALE: 1" = 800'	TTL PROJ NO.: 600112019
DRAWING PATH: T:\Projects\2012\600112019 BWSWA Addition\Wetland & Stream Delineation\Figures\12-019 HUC Map.dwg	
DATE CREATED: 11/23/2012	DATE REVISED: n/a / REVISION NUMBER: n/a
DRAWN BY: mjc	CHECKED BY: MEW
AERIAL SOURCE: USGS National Water System Information Mapper	

Figure 5. Hydraulic Unit Code Map

Black Warrior Sold Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

LEGEND

N

Approximate Landfill Boundary

Delineation Area

Delineated Wetland Area (0.46 Acre)

Area Not Included In Delineation

DP-2 Data Point

0′ 800′

TTL

3516 Greensboro Avenue ■ Tuscaloosa, Alabama 35401
205.345.0816 ■ Fax 205.345.0892

APPROXIMATE SCALE:	TTL PROJ. NO.:
1" = 800'	600112019

DRAWING PATH:
T:\Projects\2012\600112019 BWSWA Addition\Wetland & Stream Delineation\Figures\12-019 Aerial.dwg

DATE CREATED:	DATE REVISED:	REVISION NUMBER:
11/23/2012	11/28/2012	n/a

DRAWN BY:	CHECKED BY:
mjc	MEW

AERIAL SOURCE:
Google Earth, October 2010

Figure 6. Wetland and Stream Delineation Map

Black Warrior Sold Waste Authority
ADEM Permit No. 63-01
3301 Landfill Drive
Coker, Tuscaloosa County, Alabama

APPENDICES

APPENDIX A

Site Photographs

Site Photographs

Wetland Delineation Report – TTL Project No. 600112019
Black Warrior Solid Waste Facility • Coker, Tuscaloosa County, Alabama
Photos taken November 13, 2012

Photograph 1: General view of wetland area facing south.

Photograph 2: General view of wetland area and temporary stormwater conveyance.

Site Photographs

Wetland Delineation Report – TTL Project No. 600112019
Black Warrior Solid Waste Facility • Coker, Tuscaloosa County, Alabama
Photos taken November 13, 2012

Photograph 3: View of data point DP-2 wet.

Photograph 4: View of wetland area and temproary stormwater conveyance.

Photograph 5: View of a segment of the temporary stormwater conveyance.

Appendix B

USACE Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: BWSWA (600112019) City/County: Coker, Tuscaloosa County Sampling Date: 11/13/2012

Applicant/Owner: Black Warrior Solid Waste Authority State: AL Sampling Point: DP-1 up

Investigator(s): TTL, Inc. (Eddie Zedaker & Mary E. Wilke) Section, Township, Range: Sec. 2 and 11, T 21 S, R 11 W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR or MLRA): LRR P Lat: 33d 14' 24.7" N Long: 87d 38' 58.7" W Datum: _____

Soil Map Unit Name: Luverne-Smithdale Complex NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

DP-1 is located on a former hill top. According to the landfill manager, fill has been placed around the data point to create a depressed area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

none

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-1 up

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. Liquidambar styraciflua	3.0	yes	FAC
2. Pinus elliottii	3.0	yes	FACW
3.			
4.			
5.			
6.			
7.			
50% of total cover: 3.00 20% of total cover: 1.20	6.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. sedge (at least FAC)	90.0	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. Rubus argutus	5.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 2.50 20% of total cover: 1.00	5.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

Area disturbed due to localized stockpiling in the surrounding area. Hydrology or hydric soils were not observed in the area.

SOIL

Sampling Point: DP-1 up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5 YR 4/6	45%	10 YR 7/6	35%	RM	M	loamy	
			10 YR 3/1	20	RM	M	loamy	
3-20	5 YR 4/6	100					loamy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: none

Depth (inches): na

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: BWSWA (600112019) City/County: Coker, Tuscaloosa County Sampling Date: 11/13/2012

Applicant/Owner: Black Warrior Solid Waste Authority State: AL Sampling Point: DP-2 wet

Investigator(s): TTL, Inc. (Eddie Zedaker & Mary E. Wilke) Section, Township, Range: Sec. 2 and 11, T 21 S, R 11 W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3%

Subregion (LRR or MLRA): LRR P Lat: 33d 14' 24.7" N Long: 87d 38' 58.7" W Datum: _____

Soil Map Unit Name: Luverne-Smithdale Complex NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

DP-2 is next to an access road used for landfill operations and a cut area. The area drains from north to east to culvert in a highly disturbed area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No ✓	Depth (inches): <12"

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

none

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-2 wet

Tree Stratum (Plot sizes: 10 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (10 ft radius)			
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Shrub Stratum (10 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 3.00 20% of total cover: 1.20	0.0	= Total Cover	
Herb Stratum (10 ft radius)			
1. Paspalum urvillei	70.0	yes	FAC
2. sedge (at least FAC)	20.0	yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Woody Vine Stratum (10 ft radius)			
1. Rubus argutus	5.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 2.50 20% of total cover: 1.00	5.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

Area disturbed due landfill operations.

SOIL

Sampling Point: DP-2 wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10 YR 4/1	45%	10 YR 3/1	45%	D	M	loamy	
			10 YR 6/8	10%	RM	M	loamy	redox
7-13	5 YR 4/3	60%	7.5 YR 4/1	40%	RM	M	loamy	
13-20	10 YR 3/1	90%	2.5 YR 4/6	10%	RM	M	loamy	redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: none

Depth (inches): na

Hydric Soil Present? Yes ✓ No ___

Remarks:

Appendix C

Normal Weather Conditions Tables
Palmer Drought Severity Index

Normal Weather Conditions Table
TTL Project No. 600112019

	Month	Standard Deviation	Minus One Std. Dev. (Dry)	Normal Mean (inches)	Plus One Std. Dev. (Wet)	Actual Rainfall	Condition (dry, wet, normal)	Condition Value	Month Weight Value	Product of previous two columns
1st Month Prior	October	2.93	-0.8	2.13	5.06	2.34	normal	2	3	6
2nd Month Prior	September	3.1	0.61	3.71	6.81	7.3	wet	3	2	6
3rd Month Prior	August	2.99	1.04	4.03	7.02	5.72	wet	3	1	3
									Sum =	15

Note:
If the Sum is:

6-9	prior period has been drier than normal
10-14	prior period has been normal
15-18	prior period has been wetter than normal

Condition Value:

Dry	1
Normal	2
Wet	3

NOAA National Climatic Data Center
National Oceanic And Atmospheric Administration

Palmer Drought Index - November 2011 to October 2012

NOAA/NESDIS/NCDC Climate Monitoring Group

Loop Mode: Fwd Swp

Animate Frames: << Stop >>

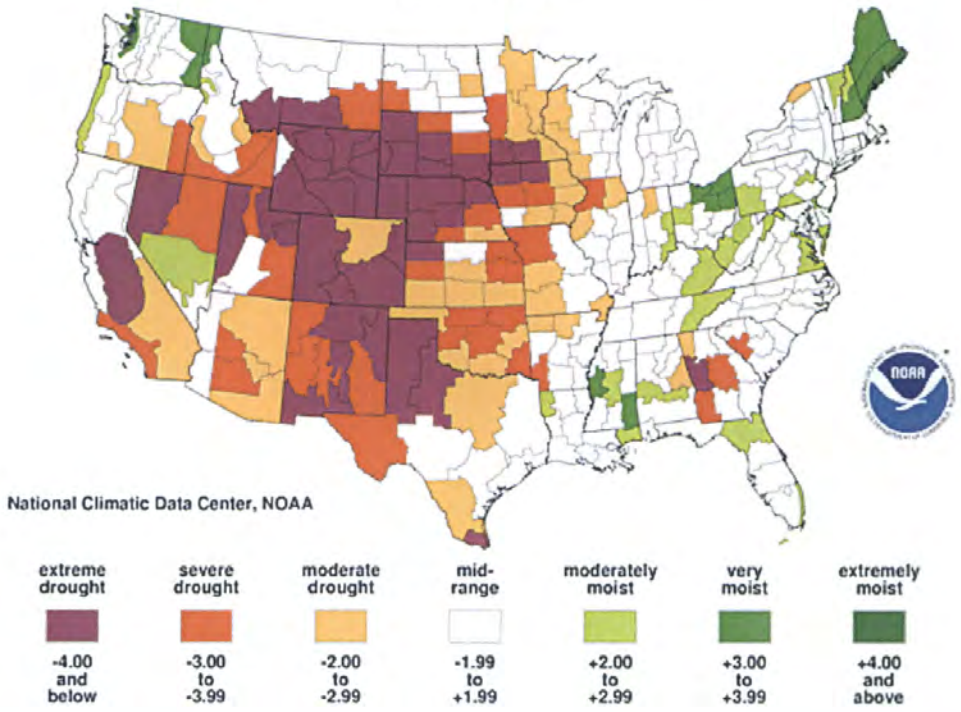
Dwell First: -First +First

Dwell Last: -Last +Last

Adjust Speed: Slow Fast

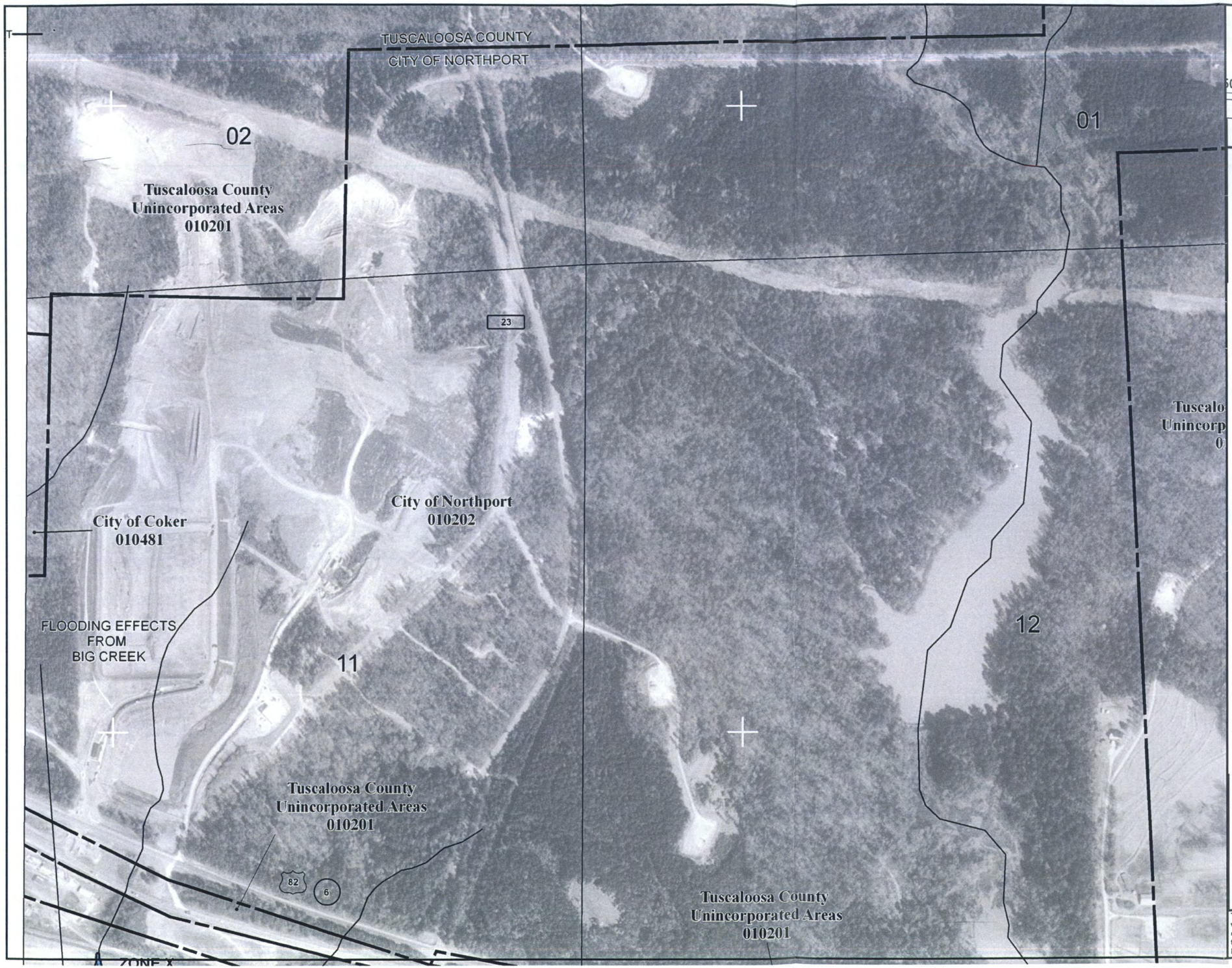
Advance One: < >

Frame No: Display Form 9



JavaScript GUI maintained by Richard Heim
NCDC's Climate Monitoring Group

http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html
Downloaded Monday, 26-Nov-2012 10:01:17 EST
Last Updated Thursday, 15-Nov-2012 10:59:36 EST by Richard.Heim@noaa.gov
Please see the NCDC Contact Page if you have questions or comments.



MAP SCALE 1" = 500'

50 0 500 1000 FEET

Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increase in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 42 76 000m E — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama State Plane coordinate system, west zone (FIPSZONE 0102), Lambert Conformal Conic projection
- DX5510 X — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

WETLANDS DELINEATION AND ENDANGERED SPECIES STUDY AT THE PROPOSED LATERAL EXPANSION OF THE COKER SANITARY LANDFILL

Prepared for:

Carter Darnell and Grubbs Engineers, Inc.
Andalusia, AL

Prepared by:

Environmental Resource Analysts
601 County Road 57
Notasulga, Alabama 36866

Joseph Freda, Ph.D.
Project Director

10/18/94
Date

1.0 INTRODUCTION

Environmental Resource Analysts (ERA) was contracted by Carter Darnell and Grubbs Engineers, Inc. to conduct a wetlands delineation and endangered species study for the proposed lateral expansion of the Coker sanitary landfill in Tuscaloosa County, Alabama. The approximate location of the study area is illustrated in Figure 1. The objectives of the study were to locate and map potential Section 404 jurisdictional wetlands. In addition, we conducted a survey for the red-cockaded woodpecker at the request of the U.S. Fish and wildlife Service.

2.0 METHODS

The wetlands delineation study was conducted April 27, 1994 according to the 1987 Army Corp Engineers wetlands delineation manual (ACE 1987). The "on site", routine determination method for areas greater than 5 acres was employed. The objective was to identify and map potential jurisdictional wetlands. Jurisdictional wetlands exhibit 3 characteristics: 1) Hydric Soil, 2) Hydrophytic Vegetation, 3) Wetland Hydrology. Soil color was determined with the use of a Munsell soil color charts (Munsell Color 1990). A Hydric soils list for Tuscaloosa County was obtained from the U.S. Soil Conservation Service (Table 1). Plants were identified by ERA personnel according to Radford et al. (1968) and Brown and Kirkman (1990). The depth of the water table was determined by digging a standard soil pit.

The regional office of the U.S. Fish and Wildlife in Daphne, AL was contacted for their determination of the potential impact on threatened or endangered species (or their critical habitat). They requested that the study site be surveyed for the red-cockaded woodpecker (Attachment B).

3.0 RESULTS

Two small intermittent tributaries were observed on the study site (Figure 2). The first tributary flowed south from the landfill and exited the study site under U.S. HWY 82. This creek was highly disturbed due to siltation from the landfill. The creek bottom and sides were blanketed with 6 to 24 inches of silt and sand. Several soil pits were dug along the side of creek and no hydric soil indicators were observed. The Tuscaloosa County soil survey (USDA 1981) mapping unit for the creek basin is Boswell soil which is not a hydric soil, but which may have inclusions of Bibb soil (hydric) along drainageways. Flooding of the creek probably occurs for short duration after heavy rains as evidenced by the scoured creek banks. Due to the siltation and flooding, no vegetation grew from the creek bank or bottom for most of its length. The floodplain next to the creek had a heavy clay soil and its color was 7.5 YR 6/6 which agrees with the soil description for

Boswell soil. The water table was not detected at a depth of 20 inches. This intermittent tributary and its adjacent banks probably would not be classified as jurisdictional wetland because of the lack of hydric soil and wetland vegetation.

The second intermittent tributary was "Y" shaped and located in the southeast corner of the study site. This area was not disturbed and the creek was not degraded by siltation. The creek banks ranged in height from 6 to 24 inches and the creek did not occupy the entire area between the banks. The area between the banks where water was not flowing had saturated soil with grey color (5Y 5/1) and heavy mottling. This soil displayed the characteristics of Bibb soil (hydric) which may be found as an inclusion in Boswell soil along drainageways. In addition, typical wetland vegetation including cane, red maple, and sweetgum were observed growing from these saturated areas. The area between the banks of this intermittent tributary is a potential jurisdictional wetland because it contained hydric soil, wetland hydrology, and wetland vegetation (Attachment A).

The study site was surveyed for red-cockaded woodpeckers on September 14, 1994. The western one half of the site was characterized by a mesic, deciduous forest dominated by oaks, hickories with an understory of dogwood. The eastern half of the site was dominated by a mixed forest of small pines (< 10 DBH) and deciduous trees with a dense understory. A small (approximately one acre) loblolly pine plantation was located in the extreme southeast corner of the study site. The trees had extremely close spacing (5-10 feet) and had DBH's ranging from 5 to 10 inches. Red-cockaded woodpeckers require old growth pine forests with little or no undergrowth. Therefore, no potential red-cockaded woodpecker nesting sites were observed. The U.S. Fish and Wildlife Service concurred with our findings and agreed that the project would have no impact on federally protected species or their critical habitat (Attachment B).

4.0 LITERATURE CITED

ACE. 1987. Corps of Engineers wetlands delineation manual. Dept. Army, U.S. Army Corps of Engineers, Washington, DC, 20314-1000.

Brown, C.L. and L.K. Kirkman. 1990. Trees of Georgia and Adjacent States. Timber Press, Portland OR. 292 pp.

Munsell Color. 1990. Munsell Soil Color Charts. Kollmorgen Corp. Baltimore, MD.

Radford, A.E., H.E. Ahles, and C. R. Bell. 1968. Manual of Vascular Flora of the Carolinas. The University of North Carolina Press. Chapel Hill, NC. 1183 pp.

USDA. 1981. Soil Survey of Tuscaloosa County, Alabama. USDA, SCS. 118 pp.

Figure 1. The approximate location of the study site within the state of Alabama.

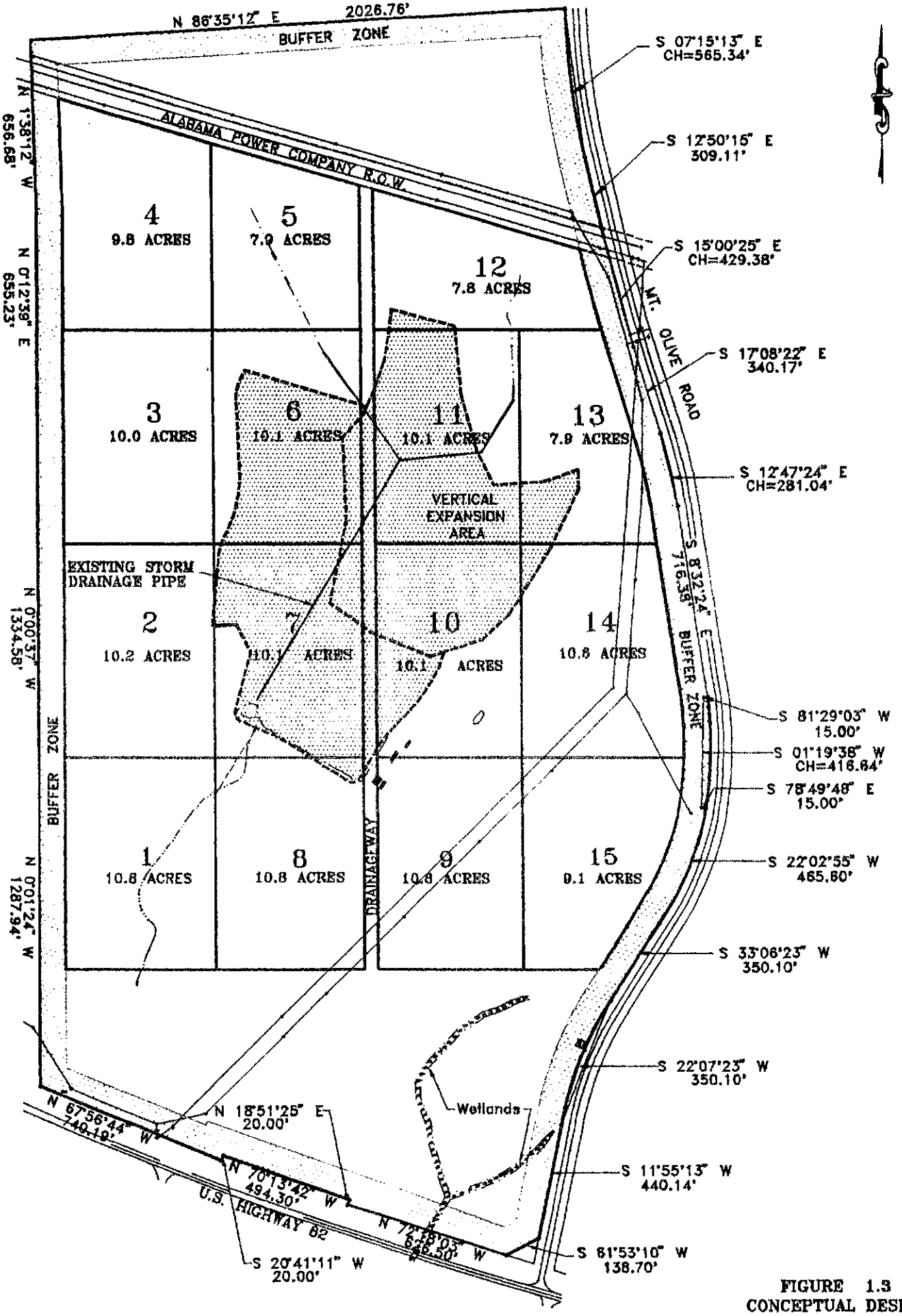


FIGURE 1.3
CONCEPTUAL DESIGN

CARTER, DARNELL & GRUBBS
ENGINEERS, INC.

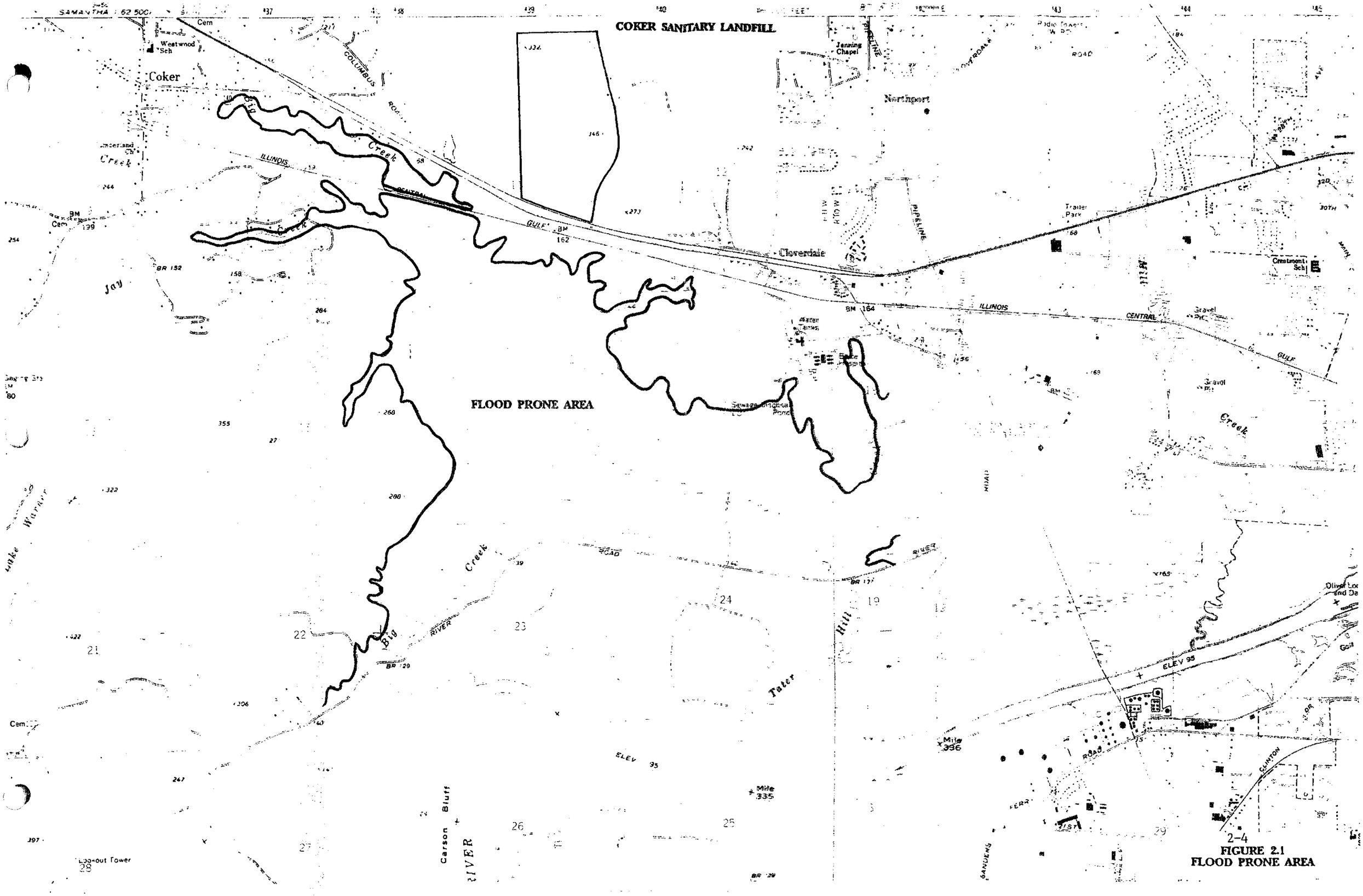


FIGURE 2.1
FLOOD PRONE AREA

COKER SANITARY LANDFILL

Coker
Westwood Sch
Cumberland Ch
Cemetery
Creek
Jay Creek
Big Creek
Columbus Road
4 Lane
Illinois Central Gulf
BM 199
BM 162
BM 164
BR 152
BR 129
BR 131
Cloverdale
Water Tanks
Sewage Disposal Pond
Bryce Hospital
Northport
Jenning Chapel
Pipeline
Gloverdale
Radio Towers (WRDI)
Trailer Park
Crestmont Sch
Gravel Pit
North Port Tuscaloosa
Municipal Airport (Van De Graff Field)
Kentuck Park
Big River
Tater Hill
Elev 95
Mile 335
Mile 336
Ferry Road
Clinton
Sanders
Carson Bluff
Lookout Tower
Ng Sta
R11W
R10W

FIGURE 2.2
AIRPORT LOCATION MAI

Figure 2. U.S. Geologic survey map (Coker Quadrangle) of the study site.

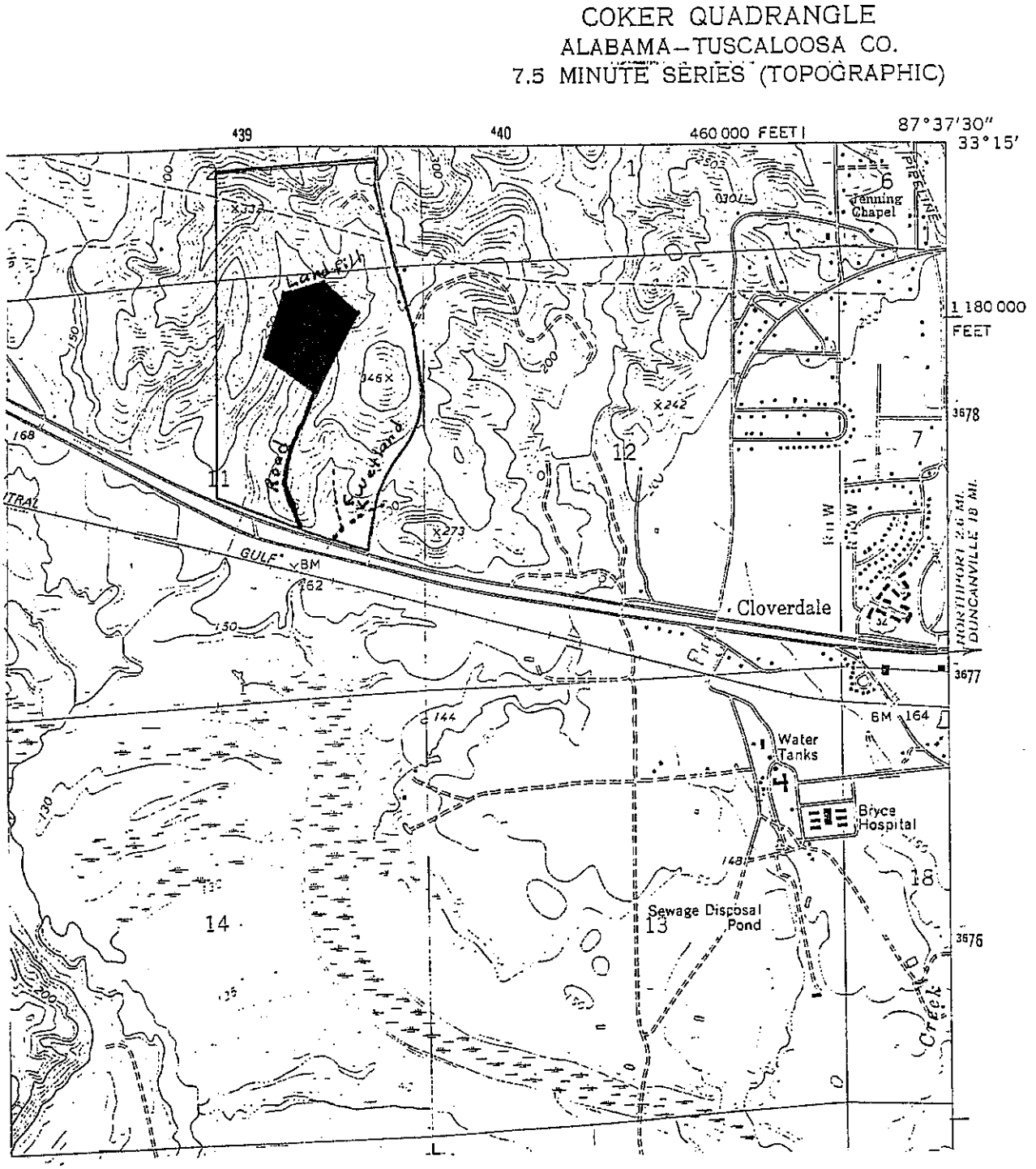


Table 1. Hydric Soil List for Tuscalossa County.

USDA-SCS
ALABAMA

TUSCALOOSA COUNTY, ALABAMA (125)

HYDRIC SOILS LIST _1/

NORTHPORT FIELD OFFICE
TECHNICAL GUIDE
SECTION II-A
NOVEMBER 1990

MAP SYMBOL	SOIL NAME	SLOPE RANGE	LCS	COMP % * ***	HYDRIC _2/ COMPONENT	LANDSCAPE POSITION OF HYDRIC PART (MULTI-TAXA UNIT)	HYDRIC _3/ CRITERIA
2	ADATON	0-2	3w	1 100	ALL		S
4	AUGUSTA	0-2	5w	1 75	*		-
4	AMY	0-2	5w	2 20	Amy part	Depressions	S
9	BIBB	0-2	5w	1 100	ALL		S

NON-HYDRIC SOILS
(WITH OR WITHOUT HYDRIC INCLUSIONS)

MAP SYMBOL	SOIL NAME	SLOPE RANGE	LCS	COMP % * ***	HYDRIC INCLUSIONS	LOCATION	HYDRIC _3/ CRITERIA OF INCLUSIONS
3	ALLEN	8-15	4e	1 65	Adaton	Drainageways	S
3	BODINE	8-15	4s	2 25	Adaton	Drainageways	S
5	BAMA	0-2	1	1 100			
6	BAMA	2-6	2e	1 100			
7	BAMA			1 50			
7	URBAN LAND			2 40			
8	BAMA			1 50			
8	URBAN LAND			2 45			
10	BODINE	15-35	7s	1 50	Adaton	Drainageways	S
10	ALLEN	15-35	6e	2 40	Adaton	Drainageways	S
11	BOSWELL	4-10	4e	1 100	Bibb	Drainageways	S
12	BRILLIANT	6-45	7s	1 100	Bibb	Drainageways	S
13	CAHABA	0-4	2e	1 100	Bibb, Amy	Depressions, Drainageways	S
14	CHOCCOLOCCO	0-2	1	1 100	Adaton	Depressions, Drainageways	S
15	DECATUR	2-8	2e	1 100			
16	DUNDEE	0-2	2w	1 100	Adaton	Depressions, Drainageways	S
17	ELLISVILLE	0-2	2w	1 100	Adaton	Depressions	S
18	FALKNER	0-2	2w	1 100	Adaton	Depressions, Drainageways	S
19	IUKA	0-2	5w	1 45	Bibb	Depressions	S
19	MANTACHIE	0-2	5w	2 30	Bibb	Depressions	S
20	LUVERNE	4-10	4e	1 60	Bibb	Drainageways	S
20	SMITHDALE	4-10	4e	2 30	Bibb	Drainageways	S
21	MONTEVALLO	15-45	7e	1 45	Bibb	Drainageways	S
21	NAUVOO	15-45	7e	2 40	Bibb	Drainageways	S
22	MONTEVALLO	10-45	7e	1 55	Bibb	Drainageways	S
22	NAUVOO	10-30	7e	2 30	Bibb	Drainageways	S
23	NAUVOO	4-10	3e	1 100	Bibb	Drainageways	S
24	PALMERDALE	6-45	7s	1 100	Bibb	Drainageways	S
25	PALMERDALE	6-45	7s	1 100	Bibb	Drainageways	S
26	PITS			1 100			
27	RUSTON	0-2	1	1 100			
28	RUSTON	2-6	2e	1 100			
29	SHATTA	0-2	2w	1 100	Adaton, Amy	Depressions, Drainageways	S

Table 1. (continued)

TUSCALOOSA COUNTY, ALABAMA (125)

NON-HYDRIC SOILS
(WITH OR WITHOUT HYDRIC INCLUSIONS)

MAP SYMBOL	SOIL NAME	SLOPE RANGE	LCS	COMP *	COMP %	HYDRIC INCLUSIONS	LOCATION	HYDRIC _3/ CRITERIA OF INCLUSIONS
30	SHATTA	2-6	2e	1	100	Adaton, Amy	Depressions, Drainageways	S
31	SHATTA			1	45	Adaton, Amy	Depressions, Drainageways	S
31	URBAN LAND			2	40			
32	SHATTA			1	45	Adaton, Amy	Depressions, Drainageways	S
32	URBAN LAND			2	40			
33	SMITHDALE	6-15	4e	1	100	Bibb	Drainageways	S
34	SMITHDALE	15-35	7e	1	100	Bibb	Drainageways	S
35	SMITHDALE	15-35	7e	1	45	Bibb	Drainageways	S
35	FLOMATON	15-35	7e	2	20	Bibb	Drainageways	S
36	SMITHDALE	15-35	7e	1	45	Bibb	Drainageways	S
36	LUVERNE	15-35	7e	2	30	Bibb	Drainageways	S
37	SMITHDALE			1	55	Bibb	Drainageways	S
37	URBAN LAND			2	40			
38	SMITHDALE	10-25	7e	1	100	Bibb	Drainageways	S
39	SMITHDALE	10-35	7e	1	50	Bibb	Drainageways	S
39	LUVERNE	10-35	7e	2	30	Bibb	Drainageways	S
40	SMITHDALE	10-35	7e	1	35	Bibb	Drainageways	S
40	PIKEVILLE	10-35	7e	2	25	Bibb	Drainageways	S
41	URBAN LAND			1	100			

_1/ All hydric soils in this county support woody vegetation under natural conditions.

_2/ An asterick (*) indicates that this soil is a non-hydric component of a multi-taxa unit.

_3/ Several criteria may be used to cause a soil to be classified as hydric. The criteria met by a particular soil mapping unit is indicated by the symbols S, P, or FF. These are defined as follows:

S -- soils are hydric due to a water table at or near the surface.

P -- soils are ponded for long duration during the growing season.

FF -- soils are frequently flooded for long duration during the growing season.

Attachment A. ACE data forms for the observed potential jurisdictional wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Coker Sanitary Landfill **Applicant/Owner:** **Investigator:** Dr. Joseph Freda	**Date:** April 28, 1994 **County:** Tuscaloosa **State:** Alabama
Do Normal Circumstances exist on this site? Yes **Is site significantly Disturbed (Atypical Situation)?** No **Is the area a potential Problem Area?** No **(If Needed, explain on reverse.)**	**Community ID:** Wetland **Transect ID:** N/A **Plot ID:** N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Liquidamber styraciflua	tree	FAC+	9.		
2. Acer rubrum	tree	OBL	10.		
3. Arundinaria gigantea	shrub	FACW	11.		
4. Lonicera japonica	herb	FAC-	12.		
5. Polystichum acrostichoides	herb	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 80%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks)
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
_X_ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: 12 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
_X_ Saturated in Upper 12 Inches
_X_ Water Marks
_X_ Drift Lines
_X_ Sediments Deposits
_X_ Drainage Patterns In Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 in.
___ Water-stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

Community ID: Wetland

SOILS

Map Unit Name
(Series and Phase): #11: Boswell
Drainage Class: Moderately well drained
Field Observations
Taxonomy (Subgroup): thermic Vertic Paleudalfs
Confirm Mapped Type? No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
10	A	5Y 5/1	5YR 5/8	25%	sandy silt

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
X Aquic Moisture Regime
___ Reducing Conditions
X Gleyed or low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? YES
Wetland Hydrology Present? YES
Hydric Soils Present? YES

Is Sampling Point Within A Wetland? YES

Remarks:

Approved by HQUSACE 3/91

Attachment B. Letter of "no impact" from U.S. Fish and Wildlife Service.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Drawer 1190
Daphne, AL 36526

July 28, 1994

Mr. Joseph Freda
Environmental Resource Analysts
601 County Road 57
Notasulga, Al 36866

Dear Mr. Freda:

This responds to your letter dated July 15, 1994, regarding the proposed expansion of the Coker Landfill in Tuscaloosa, Alabama. Our report is submitted under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

A. Fish and Wildlife Coordination Act

According to our records (U.S.G.S 1:24,000 quad sheets and the corresponding National Wetland Inventory map), the proposed site (acreage not included) contains at least 1 distinguishable palustrine forested wetland segment that is associated with Big Creek. Such wetlands have a multitude of values including providing fish and wildlife habitat and providing a natural filtering system for pollutants entering the ecosystem. These wetlands are located in the southwestern portion of the site, west of the road and running parallel to it. Your map indicates a small wetland segment in the southeast section of the property. Additionally, there is no indication on the map or in the letter regarding the size of the expansion or where it is to be located. If the landfill could eventually include the entire "boxed" in area via the expansion, then we recommend a delineation of the proposed expansion site be conducted in order to establish if any Clean Water Act permits will be necessary for this site. Consequently, we reserve our final comments until after more definitive information has been sent to us by your firm.

B. Endangered Species Act

The area in question may contain habitat for the endangered red-cockaded woodpecker, *Picoides borealis*. We recommend you have the area surveyed for this federally listed species and send us a copy of the results at your earliest convenience.

Sincerely,

Larry Goldman
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Drawer 1190
Daphne, AL 36526

October 17, 1994

Mr. Joseph Freda
Environmental Resource Analysts
601 county Road 57
Notasulga, Alabama 36866

Dear Mr. Freda:

This responds to your letter dated September 19, 1994 regarding our concerns for the potential impacts to listed species and wetlands as a result of a proposed landfill near Cloverdale, Alabama (Tuscaloosa County). Our report is submitted under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

We concur with your findings of not likely to affect the red-cockaded woodpecker. As such, no further Section 7 consultation is required for this project as described. However, if the scope of the project is altered or if construction activity is delayed for more than 6 months, we recommend you contact this office for a reassessment.

The intermittent tributary and its associated wetlands located in the southeast corner of the proposed site should have a 100 ft buffer zone be placed around it so as not to be disturbed by the landfill expansion or operations.

If you have questions, please contact Celeste South of our office (Phone: 205/441-5181).

Sincerely,

Larry E. Goldman
Field Supervisor

APPENDIX 2.2

THREATENED AND ENDANGERED SPECIES REPORT

July 8, 2022

Mr. William Pearson, Field Supervisor
Daphne Ecological Services Field Office
1208-B Main Street
Daphne, Alabama 36526

RE: ***USFWS Threatened and Endangered Species Habitat Evaluation Letter***
Black Warrior Solid Waste Authority – Partlow Expansion
Northport, Tuscaloosa County, Alabama
TTL Project No. 19-01-03033.22
USFWS Project Code: 2022-0060290

Dear Mr. Pearson:

TTL, Inc. (TTL) is assisting Black Warrior Solid Waste Authority (BWSWA) with an evaluation of the potential environmental impact associated with the proposed development of 169.89±-acre property located in Northport, Tuscaloosa County, Alabama. A topographic map and an aerial photograph of the site are enclosed for your review (see Figures 1 and 2). The survey area is identified on the Coker, Alabama U.S. Geological Survey (USGS) 7.5-minute Topographic Map (Figure 1). The center of the site is located near latitude 33.240547 and longitude –87.644452.

Site and Habitat Evaluation

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property, in Northport, Tuscaloosa County, Alabama. TTL's review of historical aerial photographs suggest the review area has historically been utilized for silviculture and institutional/recreational use. TTL conducted an Aquatic Resources Delineation and on-site habitat assessment for the review area on June 13–17 and 20–22, 2022. Select site photographs from TTL's on-site assessment are provided as an attachment.

TTL identified the following site/habitat observations:

- Forested upland habitat consisting of canopy species inclduing sweet gum *(Liquidambar stryaciflua)*, tulip poplar *(Liriodendron tulipifera)*, loblolly pine *(Pinus taeda)*, water oak *(Quercus nigra)*, black cherry *(Prunus serotina)*, mockernut hickory *(Carya tomentosa)*, hophornbeam *(Ostrya virginiana)*, winged elm *(Ulmus alata)*, and American sycamore *(Platanus occidentalis).*

- Bottomland forested habitat consisting of canopy species inclduing American sycamore *(Platanus occidentalis)*, bald cypress *(Taxodium distichum)*, red maple *(Acer rubrum)*, sweet

gum, loblolly pine *(Pinus taeda)*, American beech *(Fagus grandifolia)*, and black willow *(Salix nigra).*

- Scrub-shrub habitat consisting predominantly of herbaceous species of common rush *(Juncus effusus)*, wool grass *(Scirpus cyperinus)*, leathery rush *(Juncus coriaceus)*, grassleaf rush *(Juncus marginatus)*, and marsh seedbox *(Ludwigia palustris).*

- Maintained powerline right-of-way consisting predominantly of herbaceous species of bahia grass *(Paspalum notatum)*, gray everlasting *(Gamochaeta coarctata)*, and globe flatsedge *(Cyperus echinatus).*

- Seven (7) intermittent streams were observed to contain sandy/mud streambeds, appeared poorly to moderately oxygenated, and ranged from no to moderate flow under wetter than normal precipitation conditions for June. TTL did not observe any clam species within any of the intermittent streams located within the review area.

- Four (4) ephemeral streams were observed to contain sandy/mud streambeds, appeared poorly to moderately oxygenated, and ranged from no to low flow under wetter than normal precipitation conditions for June. TTL did not observe any clam species within any of the ephemeral stream location within the review area.

IPAC Species List

According to information maintained by the U.S. Fish & Wildlife Service (USFWS) Environmental Conservation Online System (ECOS) IPaC Species List (**Project Code: 2022-0060290**), six (6) federally-listed species may be located within the proposed BWSWA landfill expansion project area. There is no critical habitat designated for the project area. A copy of the Official Species List Letter is included as an attachment. A species list is also provided in the table below:

Group	Name	Status
Birds	**Wood Stork (*Mycteria americana*)**	**Threatened**
Clams	**Inflated Heelsplitter *(Potamilus inflatus)***	**Threatened**
	Ovate Clubshell *(Pleurobema perovatum)*	**Endangered**
Insects	**Monarch Butterfly (Danaus plexippus)**	**Candidate**
Mammals	**Indiana Bay *(Myotis sodalis)***	**Endangered**
	Northern Long-eared Bat *(Myotis septentrionalis)*	**Threatened**

Species Information

Wood Stork

The wood Sstork *(Mycteria americana)* is usually found in freshwater estuarine wetlands, primarily nesting in cypress or mangrove swamps. Wood storks have unique feeding techniques requiring higher prey concentrations. Water regimes to support these concentrations consist of periods of flooding during which prey populations increase, followed by drier periods to concentrate prey at higher

densities. Populations of wood storks can be found in the southeastern portion of the United States, moving as far north as North Carolina on the Atlantic Coast and into Alabama and eastern Mississippi along the Gulf Coast.

Wood storks are large, long-legged wading birds, about 45 inches tall, with a wingspan of 60 to 65 inches. The plumage is white, except for black primaries and secondaries, and a short black tail. The head and neck are largely unfeathered and dark gray in color. The bill is black, thick at the base, and slightly decurved. The wood stork is a highly colonial species usually nesting in large rookeries and feeding in flocks. The location of rookeries is frequently located in the upper branches of large cypress trees or in mangroves on islands and is currently restricted to Florida, Georgia, and South Carolina.

Based on TTL's on-site habitat observations on June 13–17 and 20–22, 2022, suitable habitat for the Wood Stork is not located within the review area. It is TTL's opinion that there will be no effect on the Wood Stork individuals or populations associated with the proposed project.

Inflated Heelsplitter

The inflated heelsplitter *(Potamilus inflatus)* is found in soft, stable substrates in slow to moderate currents along the protected side of bars in sloping bends of well oxygenated waterways. They may be found in water depths as deep as 20 feet. Additionally, the inflated heelsplitter requires suitable host fish species for reproductive purposes. Historically, inflated heelsplitter populations ranged from the Amite and Tangipahoa Rivers in Louisiana, the Pearl River in Mississippi, and the Tombigbee, Black Warrior, and Coosa Rivers in Alabama. The inflated heelsplitter is now limited to the Amite, Tombigbee, and Black Warrior Rivers.

Based on TTL's on-site habitat observations on June 13–17 and 20–22, 2022, suitable habitat for the inflated heelsplitter is not located within the review area. It is TTL's opinion that there will be no effect on the inflated heelsplitter individuals or populations associated with the proposed project.

Ovate Clubshell

The ovate clubshell *(Pleurobema perovatum)* is found in sand and fine gravel substrate in stretches of river with moderate current and are typically at depths of less than three (3) feet. Historically, the ovate clubshell was distributed in the Tombigbee, Black Warrior, Alabama, Cahaba, and Coosa Rivers and their associated tributaries in Mississippi, Alabama, Georgia, and Tennessee

Based on TTL's on-site habitat observations on June 13–17 and 20–22, 2022, suitable habitat for the ovate clubshell is not located within the review area. It is TTL's opinion that there will be no effect on the ovate clubshell individuals or populations associated with the proposed project.

Monarch Butterfly

Monarch butterflies (*Danaus plexippus*) are typically found in meadows, edges of agricultural fields, or flowering areas with available nectar in regions of moderate temperatures with clean water sources. Monarch butterflies in eastern and western North America exhibit long-distance migration and overwinter as adults at forested locations in Mexico and California. Reproduction is dependent on the presence of milkweed, which serves as the sole food source for larvae. Adult monarch butterflies

possess two sets of orange wings spanning three to four inches with black veins and white spots located along the edges. The body is black with white markings. Male monarch butterflies also possess black dots along the veins of their hind winds and are larger in size than females.

The caterpillars are striped with yellow, black, and white bands, have a set of antennas, and reach a length of two inches before metamorphosis.

Based on TTL's on-site habitat observations on June 13–17 and 20–22, 2022, there is potentially suitable habitat for the monarch butterfly within portions of the review area. However, the herbaceous ROW located within the project area is maintained and routinely mowed with no areas containing large flowering areas. It is TTL's opinion that the proposed project is not likely to adversely affect monarch butterfly individuals or populations.

Indiana Bat

Suitable winter habitat for the Indiana bat *(Myotis sodalis)* consists of caves or abandoned underground mine shafts that are cool, humid, and with stable temperatures of under 50º F. Summer maternity roosting habitat consists of living trees with deeply furrowed or exfoliating bark, dead trees (snags), and living trees with cavities. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

TTL completed an Indiana bat and northern long-eared bat Phase I Habitat Assessment for the review area. TTL concluded in this assessment that potentially suitable habitat for the Indiana bat and northern long-eared bat is located in the forested southwestern portion of the subject property. TTL recommended the existing structures suitable for summer roosting habitat be removed from November 1 through March 31 (of any given year) to avoid impact. If removal during this time is not feasible prior to expansion construction activities, TTL recommends an acoustic or mist netting survey for the Indiana bat and northern long-eared bat be completed between May 15 and August 15 by a USFWS and State of Alabama permitted individual to capture and handle these species. A copy of TTL's Indiana bat and northern long-eared bat Phase I Habitat Assessment is included as an attachment.

Northern Long-eared Bat

Suitable winter habitat for the northern long-eared bat *(Myotis septentrionalis)* consists of caves or abandoned underground mine shafts that are cool, humid, and with stable temperatures of under 50º F. Summer maternity roosting habitat consists of living trees with deeply furrowed or exfoliating bark, dead trees (snags), and living trees with cavities. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Northern Long-eared bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

TTL completed an Indiana bat and northern long-eared bat Phase I Habitat Assessment for the review area. TTL concluded in this assessment that potentially suitable habitat for the Indiana bat and northern long-eared bat is located in the forested southwestern portion of the subject property. TTL recommended the existing structures suitable for summer roosting habitat be removed from November 1 through March 31 (of any given year) to avoid impact. If removal during this time is not feasible prior to expansion construction activities, TTL recommends an acoustic or mist netting survey for the Indiana bat and northern long-eared bat be completed between May 15 and August 15 by a USFWS and State of Alabama permitted individual to capture and handle these species. A copy of TTL's Indiana bat and northern long-eared bat Phase I Habitat Assessment is included as an attachment.

Request for Comment & Concurrence

TTL respectfully request your concurrence from your office within 30 days of the receipt of this letter regarding the potential presence of protected species within the project area. Should you have any questions, please do not hesitate to contact either of the undersigned at (205)345-0816 or bgatlin@ttlusa.com.

Sincerely,

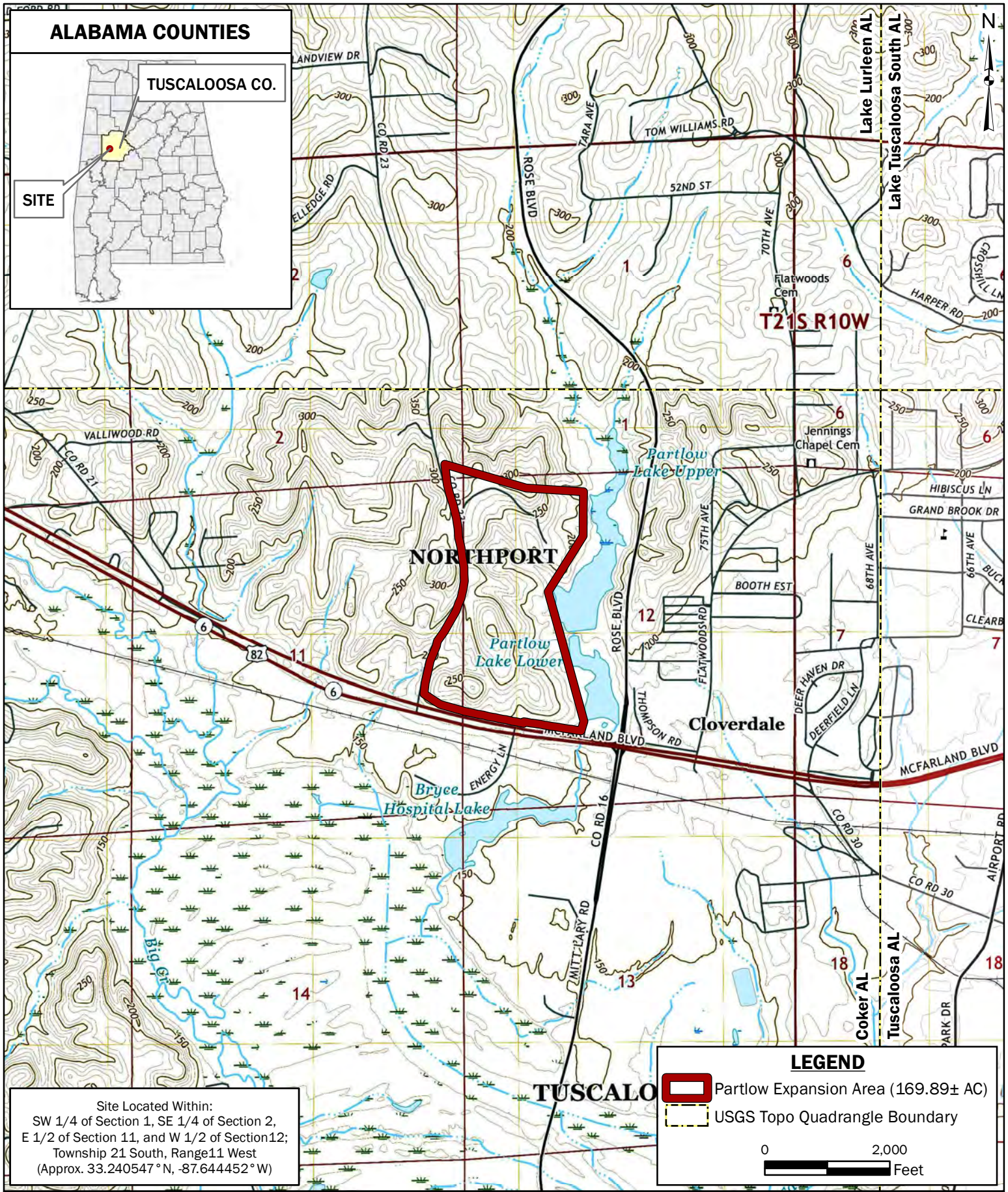
TTL, Inc.

Braci H. Gatlin
Project Professional

Christopher Terrell, PWS
Natural Resources Project Manager

Attachments: *Figure 1: Site Location & Topographic Map*
Figure 2: Site Location & Aerial Photograph Map
USFWS-IPAC Official Species List Letter
Select Site Photographs
TTL's Indiana Bat and Northern Long-eared Bat Phase I Habitat Assessment

FIGURES



TTL

FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP

BLACK WARRIOR SOLID WASTE AUTHORITY - PARTLOW EXPANSION

THREATENED & ENDANGERED SPECIES SURVEY

NORTHPORT, TUSCALOOSA COUNTY, TUSCALOOSA

BASEMAP: Coker, Alabama, USGS 7.5 Minute Quadrangle Map, 2018 (10-ft Contour Interval).

DRAWN BY:	DEK
CHECKED BY:	CMS
DRAWING DATE:	6/8/2022
REVISION DATE:	N/A
TTL JOB NO.:	19-01-03033.22
APPROX. SCALE:	1 in = 2,000 ft

TTL

FIGURE 2: PHOTOGRAPH LOCATION MAP

BLACK WARRIOR SOLID WASTE AUTHORITY - PARTLOW EXPANSION

THREATENED & ENDANGERED SPECIES SURVEY

NORTHPORT, TUSCALOOSA COUNTY, TUSCALOOSA

BASEMAP: Maxar Technologies, Vivid Imagery, 4/3/2021 (0.46 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	BHG
DRAWING DATE:	7/7/2022
REVISION DATE:	N/A
TTL JOB NO.:	19-01-03033.22
APPROX. SCALE:	1 in = 600 ft

USFWS-IPAC OFFICAL SPECIES LIST LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Alabama Ecological Services Field Office
1208 B Main Street
Daphne, AL 36526-4419
Phone: (251) 441-5181 Fax: (251) 441-6222

In Reply Refer To: July 05, 2022
Project Code: 2022-0060290
Project Name: Black Warrior Solid Waste Authority - Partlow Expansion

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Project consultation requests may be submitted by mail or email (Alabama@fws.gov). **Ensure that the Project Code in the header of this letter is clearly referenced in any request for consultation or correspondence submitted to our office.**

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. **Ensure that the Project Code in the header of this**

letter is clearly referenced with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Alabama Ecological Services Field Office
1208 B Main Street
Daphne, AL 36526-4419
(251) 441-5181

Project Summary

Project Code: 2022-0060290
Event Code: None
Project Name: Black Warrior Solid Waste Authority - Partlow Expansion
Project Type: Landfill - Solid Waste
Project Description: Proposed landfill expansion project.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@33.240872350000004,-87.64468849832741,14z

Counties: Tuscaloosa County, Alabama

Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Wood Stork *Mycteria americana* Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8477	Threatened

Clams

NAME	STATUS
Inflated Heelsplitter *Potamilus inflatus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7286	Threatened
Ovate Clubshell *Pleurobema perovatum* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5430	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Kestrel *Falco sparverius paulus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9587	Breeds Apr 1 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31

NAME	BREEDING SEASON
Henslow's Sparrow *Ammodramus henslowii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds elsewhere
Kentucky Warbler *Oporornis formosus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

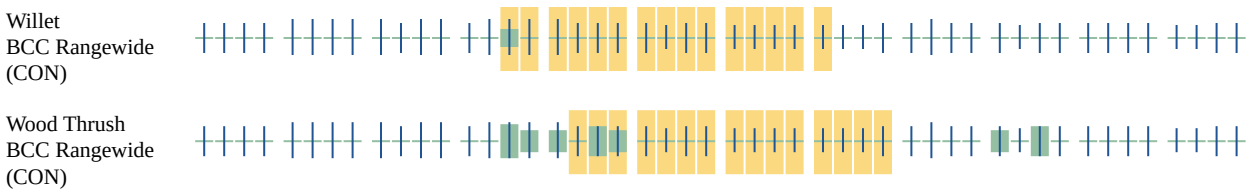
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- Riverine

FRESHWATER POND

- Palustrine

IPaC User Contact Information

Agency: TTL, Inc.
Name: Braci Gatlin
Address: 3516 Greensboro Avenue
City: Tuscaloosa
State: AL
Zip: 35401
Email bgatlin@ttlusa.com
Phone: 2053450601

SELECT SITE PHOTOGRAPHS

Site Photographs

USFWS Habitat Assessment — TTL Project No. 19-01-03033.22
Black Warrior Solid Waste Authority – Partlow Property ● 169.89-Acre Property ● Northport, Tuscaloosa County, Alabama
Photos taken June 21-22, 2022

Photograph 1: View of scrub-shrub habitat within the review area facing south.

Photograph 2: View of forested portion of the review area facing south.

Photograph 3: View of pine forest habitat within the review area facing east.

Photograph 4: View of pine forest habitat within the review area facing southwest.

Photograph 5: View of the review area facing southeast.

Photograph 6: View of the review area facing northeast.

Photograph 7: View of herbaceous habitat within the review area facing northwest.

Photograph 8: View of wetland habitat and intermittent stream within the review area facing west.

TTL'S INDIANA BAT AND NORTHERN LONG-EARED BAT

PHASE I HABITAT ASSESSMENT

INDIANA BAT & NORTHERN LONG-EARED BAT PHASE I HABITAT ASSESSMENT

PROPOSED EXPANSION PROJECT
PARTLOW EXPANSION – 169.89± ACRES
NORTHPORT, TUSCALOOSA COUNTY, ALABAMA

Submitted to:

Black Warrior Solid Waste Authority
Attn: Daniel Swartz
3301 Landfill Drive
Coker, Alabama, 35452

Prepared by:

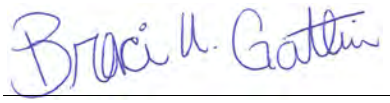
TTL, Inc.
3516 Greensboro Avenue
Tuscaloosa, Alabama 35401

Project No. 000190103033.00

July 8, 2022

SIGNATURE AND QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

TTL, Inc. has performed an Indiana bat and northern long-eared bat Phase I Habitat Assessment in general conformance with the *U.S. Fish and Wildlife Service Range-Wide Indiana Bat & Northern Long-eared Bar Survey Guidelines, March 2022.* The Phase I Habitat Assessment was conducted June 13-17 and 20-22, 2022 by TTL representatives Braci H. Gatlin (Project Professional; BS Environmental Science, University of West Alabama, 2018) and Chris Stanford (Environmental Regional Leader; BS Geology, University of North Carolina Wilmington, 2012; MS Environmental Science, Columbus State University, 2015).

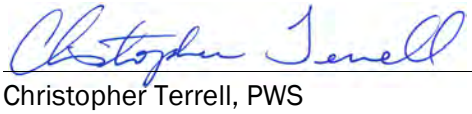


Braci H. Gatlin
Project Professional

July 8, 2022
Date

Chris Stanford
Environmental Regional Leader

July 8, 2022
Date



Christopher Terrell, PWS
Natural Resources Project Manager

July 8, 2022
Date

TABLE OF CONTENTS

SIGNATURE AND QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS ii
1.0 INTRODUCTION 1
2.0 SITE DESCRIPTION 1
3.0 HABITAT ASSESSMENT METHODOLOGY 2
3.1 Methodology 2
4.0 HABITAT ASSESSMENT FINDINGS 2
4.1 Habitat Findings 2
4.2 Plot Findings Description 5
4.3 Winter Habitat Assessment 5
4.4 Additional Site Findings 5
5.0 CONCLUSIONS 6
6.0 RELIANCE/LIMITATIONS 6

TABLES

Table 1: Potential Summer Roosting Habitat Summary 3
Table 2: Habitat Conditions 3
Table 3: Fine Level Assessment of Structural Features Found in Plots 4

FIGURES

Figure 1 Site Location and Topographic Map
Figure 2 Bat Plot & Snag Location Map

APPENDICES

Appendix A Bat Habitat Assessment Forms
Appendix B Site Photographs

1.0 INTRODUCTION

TTL, Inc. (TTL) was contracted by the Black Warrior Solid Waste Authority (BWSWA) to perform a habitat assessment to evaluate the potential environmental impacts to the Indiana bat *(Myotis sodalis)* and the northern long-eared bat *(Myotis sepentrionalis)* associated with a proposed development project in Northport, Tuscaloosa County, Alabama (Figure 1). The purpose of this habitat assessment is to determine if suitable or potentially suitable habitat for the Indiana bat or the northern long-eared bat is present within the review area. This assessment did not include a physical survey for the presence or absence of Indiana bat or northern long-eared bat.

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property. TTL's review of historical aerial photographs suggest the review area has historically been utilized for silviculture and institutional/recreational use. TTL conducted an Aquatic Resources Delineation and on-site habitat assessment for the review area on June 13–17 and 20–22, 2022.

The Endangered Species Act (ESA) of 1973 was designed to protect critically imperiled species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation." The stated purpose of the Endangered Species Act is to protect species and "the ecosystems upon which they depend." The Indiana bat was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11,1967), and is currently listed as endangered under the ESA of 1973, as amended. The northern long-eared bat was listed as threatened under the ESA on April 2, 2015. The U.S. Fish and Wildlife Service (USFWS) has developed a recommended guidance document, *Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines*, which provides survey methods and outlines additional reporting requirements for surveyors.

2.0 SITE DESCRIPTION

The review area is approximately 169.89 acres and is located within southwest ¼ of Section 1, southeast ¼ of Section 2, east ½ of Section 11 and west ½ of Section 12, Township 21 South, Range 11 West as depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Map of Coker, Alabama (Figure 1). The center of the site is located near latitude 33.240547 and longitude -87.644452.

The review area is located in western Tuscaloosa County, Alabama. TTL identified eighteen (18) wetlands, four (4) ephemeral streams, seven (7) intermittent streams, and two (2) open water features during a June 2022 aquatic resources delineation. At the time of publication of this report,

TTL is unaware of any known/occupied spring staging, summer, fall swarming, and/or winter habitat for the Indiana bat or northern long-eared bat in the general vicinity of the review area. Additionally, according to a USFWS Key to the northern long-eared bat 4(d) Rule for Non-Federal Activities, the nearest maternity roost trees for the northern long-eared bat are located within Calhoun and Cleburne County, Alabama. Furthermore, this documentation indicates the nearest known hibernacula for the northern long-eared bat is located within Bibb County, Alabama.

Driving directions to the site are as follows: from the intersection of Lurleen B Wallace Blvd N and McFarland Blvd, turn left (west) onto McFarland Blvd. Travel west for 4.3 miles and turn right (north) onto Mt. Olive Rd (CR-23). The review area is located to the east of Mt. Olive Rd (CR-23) for 0.62 miles.

3.0 HABITAT ASSESSMENT METHODOLOGY

3.1 Methodology

TTL utilized the *Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guideline, March 2022* for evaluating if potentially suitable habitat for the Indiana bat and the northern long-eared bat was present within the review area. During TTL's site reconnaissance of the project area, TTL surveyed six (6) separate plots on June 21-22, 2022 to assess and record vegetative cover within the review area. TTL identified all species within the plot and recorded the diameter at breast height (DBH) of canopy species utilizing a 10-factor wedge forestry prism to determine "in kind" individuals. TTL also recorded other habitat associated data such as the presence of snags, cavities, and trees with exfoliating bark. Bat Habitat Assessment forms for each survey plot is included as Appendix A. Select site photographs of the survey plots and identified snags are provided in Appendix B.

The locations of survey plots and identified snags were mapped with a Trimble Geo7x Global Positioning System (GPS) unit, which was set to sub-meter tolerances. Field data was post-processed using Trimble PathfinderOffice V 5.3 and exported to ESRI's ArcMap 10.7. The location of the plots and snags were manually digitized in ArcGIS using the geographic coordinates of the point locations. Figure 2 depicts the survey plot and snag locations.

4.0 HABITAT ASSESSMENT FINDINGS

4.1 Habitat Findings

TTL evaluated six (6) plot areas within the review area for potentially suitable Indiana bat or northern long-eared bat habitat. Table 1 provides a summary of the potential summer roosting habitat, Table 2 provides plot habitat descriptions, and Table 3 provides a fine level assessment of structural

features identified within the plots. Bat Habitat Assessment forms for each survey plot, including DBH for non-primary "in kind" species, are included as Appendix A.

Table 1: Potential Summer Roosting Habitat Summary

Plot ID	Primary "In Kind" Species	Average DBH of Primary Species	Description
Plot 1	No canopy species present	N/A	Scrub-shrub habitat Minimal saplings of *Liquidambar styraciflua, Salix nigra, Pinus taeda, and Quercus nigra* present
Plot 2	*Liriodendron tulipifera*	9.725"	Mixed Hardwood Canopy including species of *Liquidambar styraciflua, Pinus taeda, Quercus nigra, Prunus serotina,* and *Quercus alba*
Plot 3	Mixed Hardwood and *Pinus taeda*	14.576"	Mixed Hardwood Canopy including *Quercus alba, Liquidambar styraciflua, Acer rubrum, Quercus nigra, Ostrya virginiana*
Plot 4	*Pinus taeda*	7.685"	*Pinus taeda* forest
Plot 5	*Pinus taeda*	14.926"	Mixed Hardwood and *Pinus taeda* forest including *Liquidambar styraciflua*
Plot 6	*Pinus taeda*	4.904"	Predominantly *Pinus taeda* with mixed *Quercus nigra* and *Platanus occidentalis*

Table 2: Habitat Conditions

Plot ID	Habitat Condition	Exfoliating Bark	Snags or Cavities
Plot 1	Scrub-Shrub	None Observed	None Observed
Plot 2	Mixed Hardwood	None Observed	None Observed
Plot 3	Mixed Hardwood	*Quercus alba* 33.18" DBH Minimal to Moderate	*Quercus alba* split at 38" *Liriodendron tulipifera* 33.18" DBH located west of plot

Plot ID	Habitat Condition	Exfoliating Bark	Snags or Cavities
Plot 4	Pine Forest	None Observed	None Observed
Plot 5	Pine Forest	*Pinus taeda* snags observed to have minimal to moderate exfoliating bark Additional *Pinus taeda* observed to be mature but do not have exfoliating bark or are deeply furrowed	*Pinus taeda* 15.79" DBH *Pinus taeda* 13.40" DBH *Pinus taeda* 12.18" DBH Four *Pinus taeda* snags located east of plot average 14.625" DBH
Plot 6	Pine Forested with limited mixed hardwoods	None Observed	None Observed

Table 3: Fine Level Assessment of Structural Features Found in Plots

Plot ID	Habitat Conditions	Feature ID	Snag and Exfoliating Bark Feature Details	Comments
Plot 3	Mixed Hardwood Within wetland Open Water 200' east Intermittent stream adjacent	Snag 1	*Quercus alba* snag with split at 68" Snag portion of tree split is barkless Remainder of living portion of tree minimal to moderate exfoliating bark Snag portion below overstory	Fair Quality Limited Quantity
Plot 5	Pine Forest with limited mixed hardwoods Within wetland Intermittent stream adjacent	Snags 3, 4, 5	*Pinus taeda* snags Open canopy Additional four snags 50-100' east of plot Minimal to moderate exfoliating bark	Good Quality Fair Quantity
Snags 2, 6, 7, 8, and 9 were located outside of the survey plots. The adjacent snag quantity was included in quantity assessment but were not given a fine level structural assessment.				

4.2 Plot Findings Description

TTL evaluated six (6) plots within the review area for potentially suitable Indiana bat or northern long-eared bat habitat. Of the six (6) plots, two (2) plots (Plot 3 and Plot 5) exhibited structural features that were further assessed for potentially suitable summer roosting habitat. It is TTL's opinion Snag 1 located within Plot 3 had fair quality for bat habitat, however, it was not located in an area abundant in additional snags. Additionally, the portion of snag was broken below canopy height and therefore is not considered a potential valuable habitat for the northern long-eared bat or the Indiana bat. Plot 5 contained three (3) snags and TTL observed four (4) additional snags 50-100' east of the survey plot. The pine forest/mixed hardwood habitat exhibited an open canopy with a sufficient flyable flight corridor. It is TTL's opinion the southwestern forested portion of the review area could provide potentially suitable summer roosting habitat for the northern long-eared bat and the Indiana bat. However, the USFWS Key to the northern long-eared bat 4(d) Rule for Non-Federal Activities indicates the nearest maternity roost trees for the northern long-eared bat are located within Calhoun and Cleburne County, Alabama. This documentation also indicates the nearest known hibernacula for the northern long-eared bat is located within Bibb County, Alabama. Therefore, while is it TTL's opinion the southwestern portion of the property contains potentially suitable habitat for the Northern Long-eared Bat, it is also TTL's opinion inhabitance is unlikely.

4.3 Winter Habitat Assessment

TTL did not identify caves or abandoned underground mine shafts that are cool, humid, and contain stable temperatures of under 50 degrees F within the review area. Therefore, it is TTL's opinion there is not suitable winter habitat for the Indiana bat or northern long-eared bat within the review area.

4.4 Additional Site Findings

In addition to the six (6) plots surveyed, TTL also evaluated the remainder of the review area and surrounding land uses and land cover types. The majority of the review area consists of dense young planted *Pinus taeda* providing an unsuitable adjacent flight corridor through the property. The vacated Mt. Olive Road is located west of the review area and the BWSWA Landfill is located further west of Mt. Olive Road. Highway 82 is located immediately south of the review area and industrial operations are located further south of Highway 82. Partlow Lake and a section of undeveloped land borders the site to the east and Rose Boulevard is located further east of Partlow Lake, approximately 0.22-mile. Mature forest is located further north of the review area.

5.0 CONCLUSIONS

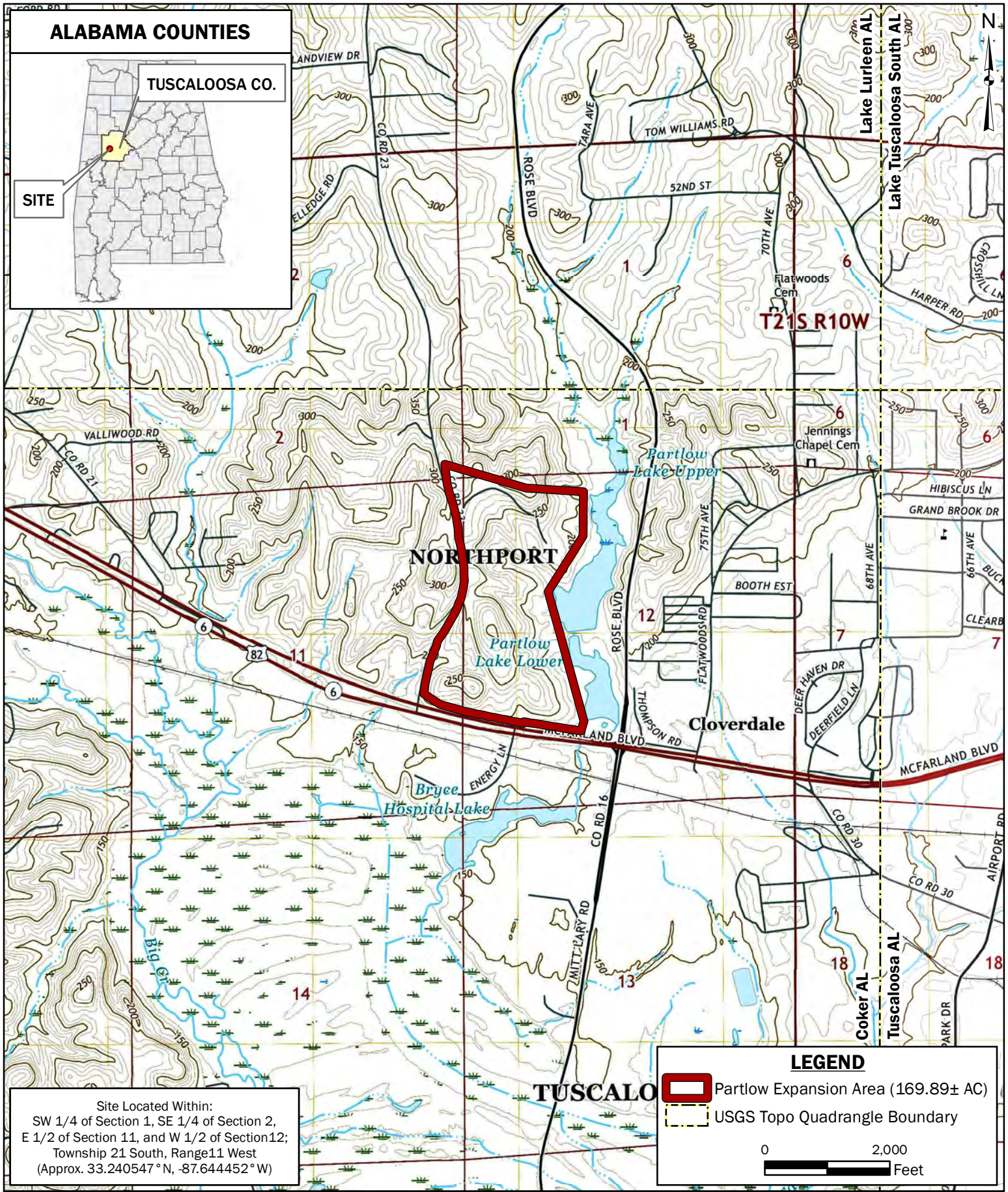
It is TTL's opinion that potentially suitable summer roosting habitat for the Indiana bat and the northern long-eared bat is located in the forested southwestern portion of the subject property. TTL recommends these existing structures be removed from November 1 through March 31 (of any given year) to avoid impacts to potentially suitable summer roosting habitat. If this is not possible at the time of expansion construction activities, TTL recommends an acoustic or mist netting survey for the Indiana bat and the northern long-eared bat be completed between May 15 and August 15 by a USFWS and State of Alabama permitted individual to capture and handle these species.

6.0 RELIANCE/LIMITATIONS

Please note that the conclusions and recommendations of this report are based solely on the field conditions observed at the site. All information (written or electronic) from TTL concerning TTL's work is for the sole use and reliance of Black Warrior Solid Waste Authority and applicable regulatory agencies. TTL intends no third party beneficiaries (express or implied) and copies of such information received by any third parties are NOT for reliance unless TTL first receives a signed Secondary Client Agreement from the third party.

FIGURES

Figure 1 Site Location and Topographic Map
Figure 2 Bat Plot & Snag Location Map



TTL

FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP

BLACK WARRIOR SOLID WASTE AUTHORITY - PARTLOW EXPANSION

THREATENED & ENDANGERED SPECIES SURVEY

NORTHPORT, TUSCALOOSA COUNTY, TUSCALOOSA

BASEMAP: Coker, Alabama, USGS 7.5 Minute Quadrangle Map, 2018 (10-ft Contour Interval).

DRAWN BY:	DEK
CHECKED BY:	CMS
DRAWING DATE:	6/8/2022
REVISION DATE:	N/A
TTL JOB NO.:	19-01-03033.22
APPROX. SCALE:	1 in = 2,000 ft

FIGURE 2: BAT PLOT & SNAG LOCATION MAP

BLACK WARRIOR SOLID WASTE AUTHORITY - PARTLOW EXPANSION

THREATENED & ENDANGERED SPECIES SURVEY

NORTHPORT, TUSCALOOSA COUNTY, TUSCALOOSA

BASEMAP: Maxar Technologies, Vivid Imagery, 4/3/2021 (0.46 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	BHG
DRAWING DATE:	7/6/2022
REVISION DATE:	N/A
TTL JOB NO.:	19-01-03033.22
APPROX. SCALE:	1 in = 600 ft

APPENDIX A

Bat Habitat Assessment Forms

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/21/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 1_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 1	None	N/A	Scrub-shrub Habitat

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/21/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Overstory	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 1	None	None	None	Scrub-Shrub; Plot within wetland

Landscape within 5-mile Radius:

Flight corridors to other forested areas?

Yes

Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)

Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/21/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/21/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 2_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 2	*Liriodendron tulipifera*	11.1"	Mixed Hardwood
	Liriodendron tulipifera	8.35"	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/21/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Primary Overstory Species	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 2	*Liriodendron tulipifera*	None	None	Mixed Hardwood; wetland adjacent; adjacent pine forested dense

Landscape within 5-mile Radius:

Flight corridors to other forested areas?

No

Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)

Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/21/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/21/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 3_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 3	*Quercus alba*	33.18"	Mixed Hardwood; Plot within wetland; Open Water 200' east; Intermittent stream adjacent
	Liquidambar stryaciflua	8.64"	
	Pinus taeda	15.04"	
	Acer rubrum	9.25"	
	Quercus nigra	15.25"	
	Ostrya virginiana	6.1"	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/21/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Primary Overstory Species	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 3	*Acer rubrum*	None	None	Mixed Hardwood
	Quercus alba	Yes - Minimal to Moderate	Yes - Split at 68"	Snag barkless and below overstory
	Pinus taedea	None	None	Mixed Hardwood
	Liriodendron tulipifera snag located west of plot	Yes - Minimal to Moderate	Yes - top broken out	Snag 22.8" DBH

Landscape within 5-mile Radius:

Flight corridors to other forested areas?

Yes

Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)

Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/21/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/22/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 4_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 4	*Pinus taeda*	15.79"	Pine Forest
	Pinus taeda	13.40"	
	Pinus taeda	12.18"	
	Pinus taeda	17.71"	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/22/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Primary Overstory Species	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 4	*Pinus taedea*	None	None	Pine Forest; ; wetland adjacent; inadequate flight corridor

Landscape within 5-mile Radius:

Flight corridors to other forested areas?

No

Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)

Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/22/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/22/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 5_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 5	*Pinus taeda*	15.79"	Pine Forest
	Pinus taeda	13.40"	
	Pinus taeda	12.18"	
	Pinus taeda	17.71"	
	Pinus taeda	11.38"	
	Pinus taeda	15.63"	
	Pinus taeda	17.99"	
	Pinus taeda	14.75"	
	Pinus taeda	16.95"	
	Pinus taeda	14.44"	
	Liquidambar styraciflua	10.20"	
	Pinus taeda	13.86"	
	Liquidambar styraciflua	7.25"	
	Pinus taeda	10.24"	
	Pinus taeda	16.78"	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/22/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Primary Overstory Species	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 5	*Pinus taeda*	Yes - snags observed to have minimal to moderate sutiable exfoliating bark	Yes	Pine Forest; Plot within wetland; intermittent stream flows west within plot; Pine mature but not deeply furrowed; multiple snags observed; Multiple Pine snags oberved in plot and four additional snags observed east of plot averaging 14.63" DBH

Landscape within 5-mile Radius:

Flight corridors to other forested areas?
Yes
Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)
Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/22/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_ **Date:** ___6/22/2022_____

Township/Section/Range: _Sect. 1,2,11, T.21.S., R.11.W.__ **Survey Point:** Plot 6_____

Latitude/Longitude: _33.240547 -87.644452_____ **Surveryor:** _TTL, Inc._____

Project Description:

The proposed undertaking includes the expansion of the existing BWSWA landfill to a property east of the vacated portion of Mt. Olive Road, identified as the Partlow Property.

Project Area:

	Total Acres	Est. Forested Acres	Est. Open Acres
Survey Area	169.89	112	58

Plot Exam - Forest Cover Data:

Plot ID	Canopy Species	Average DBH	Description
Plot 6	*Pinus taeda*	6.08"	Mixed Pine and Hardwood Forest
	Pinus taeda	5.25"	
	Quercus nigra	6.40"	
	Pinus taeda	5.61"	
	Pinus taeda	3.06"	
	Pinus taeda	6.80"	
	Pinus taeda	3.29"	
	Pinus taeda	5.90"	
	Planatus occidentalis	3.18"	
	Pinus taeda	3.24"	

BAT HABITAT ASSESSMENT

Project Name: _BWSWA Partlow Property_____ **Date:** _____6/22/2022_____

Plot Exam - Habitat Component Assessment:

Plot ID	Primary Overstory Species	Exfoliating Bark	Snags or Cavity Trees Present	Habitat Component Notes
Plot 6	*Pinus taeda*	None	None	Predominantly Pine Forest with limted mixed hardwoods; *Planatus occidentalis* observed to be young with limited unsuitable exfoliating bark; dense understory

Landscape within 5-mile Radius:

Flight corridors to other forested areas?

No

Adjacent Properties Description (e.g. forested, commerical, residential, water sources, ect.)

Vacated Mt. Olive Rd. to the west and BWSWA Landfill further west; Highway 82 south and industrial development further south. Partlow Lake and undeveloped land to the east and Rose Boulevard further east. Forested to the north.

BAT HABITAT ASSESSMENT

Project Name: ___BWSWA Partlow Property_____ Date: __6/22/2022_____

Water Resources at Review Area:			
Stream Type number and length (LF)	Ephemeral	Intermittent	Perennial
	887	2,762	None
Pools/Ponds	Number and size (AC)		Boat Accessibility?
	None - Partlow Lake adjacent to the east		No
Wetlands	Number of Wetlands	Approximate Area (AC)	
	18	6.703	

APPENDIX B

Site Photographs

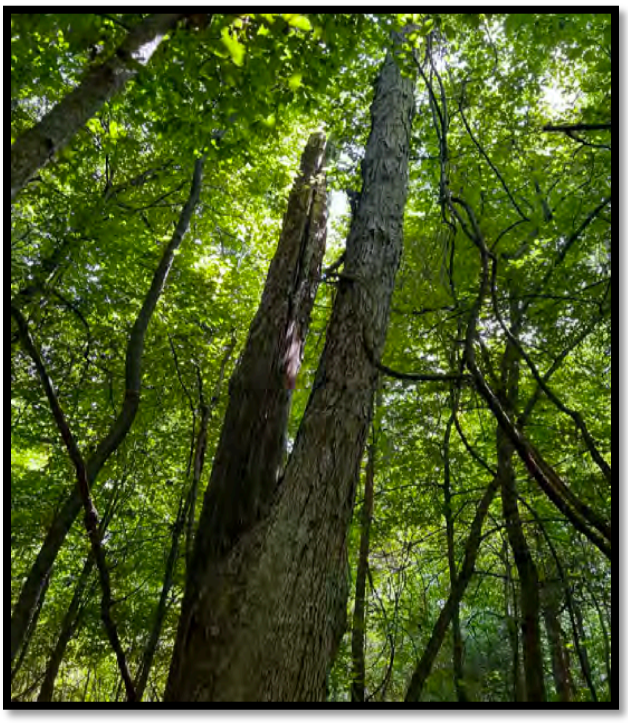
Site Photographs

Indiana Bat and Northern Long-eared Bat Phase I Habitat Assessment – TTL Project No. 19-01-03033.22
Black Warrior Solid Waste Authority – Partlow Expansion ● 169.89-Acre Property ● Northport, Tuscaloosa County, Alabama
Photos taken June 21-22, 2022

Photograph 1: View of Plot 1 within the review area facing south.

Photograph 2: View of Plot 2 within the review area facing east.

Photograph 3: View of Plot 3 within the review area facing north.



Photograph 4: View of Snag 1 within Plot 3 facing northeast.

Photograph 5: View of Plot 4 within the review area facing west.

Photograph 6: View of Plot 5 within the review area faacing south.

Photograph 7: View of snag stand within Plot 5 facing south.

Photograph 8: View of Plot 6 within the review area facing north.

Photograph 9: View of review area including Plot 5 located within pine forest facing southwest.

Photograph 10: View of the review area facing north.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Drawer 1190
Daphne, AL 36526

July 28, 1994

Mr. Joseph Freda
Environmental Resource Analysts
601 County Road 57
Notasulga, Al 36866

Dear Mr. Freda:

This responds to your letter dated July 15, 1994, regarding the proposed expansion of the Coker Landfill in Tuscaloosa, Alabama. Our report is submitted under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

A. Fish and Wildlife Coordination Act

According to our records (U.S.G.S 1:24,000 quad sheets and the corresponding National Wetland Inventory map), the proposed site (acreage not included) contains at least 1 distinguishable palustrine forested wetland segment that is associated with Big Creek. Such wetlands have a multitude of values including providing fish and wildlife habitat and providing a natural filtering system for pollutants entering the ecosystem. These wetlands are located in the southwestern portion of the site, west of the road and running parallel to it. Your map indicates a small wetland segment in the southeast section of the property. Additionally, there is no indication on the map or in the letter regarding the size of the expansion or where it is to be located. If the landfill could eventually include the entire "boxed" in area via the expansion, then we recommend a delineation of the proposed expansion site be conducted in order to establish if any Clean Water Act permits will be necessary for this site. Consequently, we reserve our final comments until after more definitive information has been sent to us by your firm.

B. Endangered Species Act

The area in question may contain habitat for the endangered red-cockaded woodpecker, *Picoides borealis*. We recommend you have the area surveyed for this federally listed species and send us a copy of the results at your earliest convenience.

Sincerely,

Larry Goldman
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Drawer 1190
Daphne, AL 36526

October 17, 1994

Mr. Joseph Freda
Environmental Resource Analysts
601 county Road 57
Notasulga, Alabama 36866

Dear Mr. Freda:

This responds to your letter dated September 19, 1994 regarding our concerns for the potential impacts to listed species and wetlands as a result of a proposed landfill near Cloverdale, Alabama (Tuscaloosa County). Our report is submitted under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

We concur with your findings of not likely to affect the red-cockaded woodpecker. As such, no further Section 7 consultation is required for this project as described. However, if the scope of the project is altered or if construction activity is delayed for more than 6 months, we recommend you contact this office for a reassessment.

The intermittent tributary and its associated wetlands located in the southeast corner of the proposed site should have a 100 ft buffer zone be placed around it so as not to be disturbed by the landfill expansion or operations.

If you have questions, please contact Celeste South of our office (Phone: 205/441-5181).

Sincerely,

Larry E. Goldman
Field Supervisor

APPENDIX 2.3

ARCHAEOLOGICAL SURVEY AND CULTURAL RESOURCE INVENTORY

A PHASE I CULTURAL RESOURCES SURVEY FOR THE BWSW PARTLOW EXPANSION PROJECT IN TUSCALOOSA COUNTY, ALABAMA

Prepared by
TerraXplorations, Inc.

Prepared for
TTL, Inc.

TerraXplorations, Inc.
3120 University Blvd E
Tuscaloosa, AL 35404
(205)799-5638
www.terraxplorations.com

JULY 2022
Draft

TTL, Inc.
3516 Greensboro Avenue
Tuscaloosa, AL 35401
(205)345-0816
www.ttlusa.com

This page intentionally left blank.

A PHASE I CULTURAL RESOURCE SURVEY FOR THE BWSW PARTLOW EXPANSION PROJECT IN IN TUSCALOOSA COUNTY, ALABAMA

BY

Rachel Smith, Sophie Fairbairn, and David Dobbs

Prepared by

TerraXplorations, Inc.
3120 UNIVERSITY BLVD E
TUSCALOOSA, ALABAMA 35404

Prepared for

TTL, Inc.
3516 Greensboro Avenue
Tuscaloosa, Alabama 35401

Principal Investigator

Paul D. Jackson

TerraX Report No. 2022.077

JULY 2022

A PHASE I CULTURAL RESOURCES SURVEY FOR THE BWSW PARTLOW EXPANSION PROJECT IN TUSCALOOSA COUNTY, ALABAMA

INTRODUCTION

TerraXplorations, Inc. of Tuscaloosa, Alabama was contracted by TTL, Inc. of Tuscaloosa, Alabama on behalf of Black Warrior Solid Waste Authority (BWSW) to conduct a cultural resource survey for the proposed BWSW Partlow expansion project in Tuscaloosa County, Alabama. The Phase I survey was performed on June 13 to June 16 and June 20 to June 24, 2022. Paul D. Jackson served as the Principal Investigator and was assisted in the field by Christopher Rivers, Cory Rice, Joshua Shiers, Michael Geonzalez, and Conner Elliot. The purpose of this study was to determine if any prehistoric or historic properties exist within the limits of the survey area and, if so, to document and assess each based on the National Register of Historic Places (NRHP) criteria.

The proposed project consists of the expansion of the Black Warrior Solid Waste landfill. The project area is located in Tuscaloosa County, Alabama, 0.81 miles (mi) (1.34 kilometers [km]) northwest of Old Bryce Hospital and 0.25 mi (0.40 km) north of Bryce Hospital Lake. The project area is bordered by the Upper Partlow Lake to the east of the project area, McFarland Boulevard to the south, and Mount Olive Road to the west. Rose Boulevard runs parallel to the east of the project area, approximately 629.35 feet (ft) (191.83 meters [m]). The project area consists of approximately 169 acres (ac) (69.39 hectares [ha]) (Figure 1). The direct Area of Potential Effect (APE) is the same as the project area, and the indirect APE includes a 0.15-mi radius totaling to 447.3 acres (181 ha). The subject property and surrounding area can be found on the 1978 (1983 edition [ed.]) Lake Lurleen, Alabama and 1969 (1973 ed.) Coker, Alabama USGS 7.5' series topographic quadrangles (Figure 2).

PROJECT AREA ENVIRONMENT

The project lies within the Fall Line Hills District within the physiographic Southeastern Plain Province. The project area is made up of Cretaceous sandy and loamy sediments (Szabo et al. 1988). Vegetation within the ecoregion consists of oak, hickory, and pine trees. The topography within the project area varies greatly throughout, with a heavy slope to the east and an average slope of 6.5%. The project area is bounded by the Black Warrior Solid Waste Authority landfill to the west, McFarland Boulevard (Highway 82 W) to the south, and the Upper Partlow Lake to the east. The project area slopes down to the McFarland Boulevard at the southern boundary and down to the Upper Partlow Lake at the eastern boundary. Elevation in the study area ranges between 168 and 322 ft (51.21 and 98.15 m) above mean sea level (AMSL) with an average elevation of 241 ft (73.46 m) AMSL. The lowest elevations occur near the center of the project area, where active landscaping takes place, and along the creek in the southwest section. Two large hills are present within the project area, one in the northern portion and one in the southern. The project area consists of mixed vegetation throughout. Pine and hardwoods are found in the northeast section of the project area. Young pines are found on the southwest section of the project area, while older pines are found in the southeast and northern sections of the project area. Blackberry brush is the common undergrowth throughout the forested areas. The western boundary of the project area along Mount Olive road is covered in grass. Power lines are located along the western and northern boundaries of the project area. Several oil rigs are present throughout the project area, and a large borrow pit is located in the northwest. Large portions of the project area have been disturbed by previous construction and industrial activities. Photographs depicting the present condition of the land within the project limits are provided (Figures 3-14).

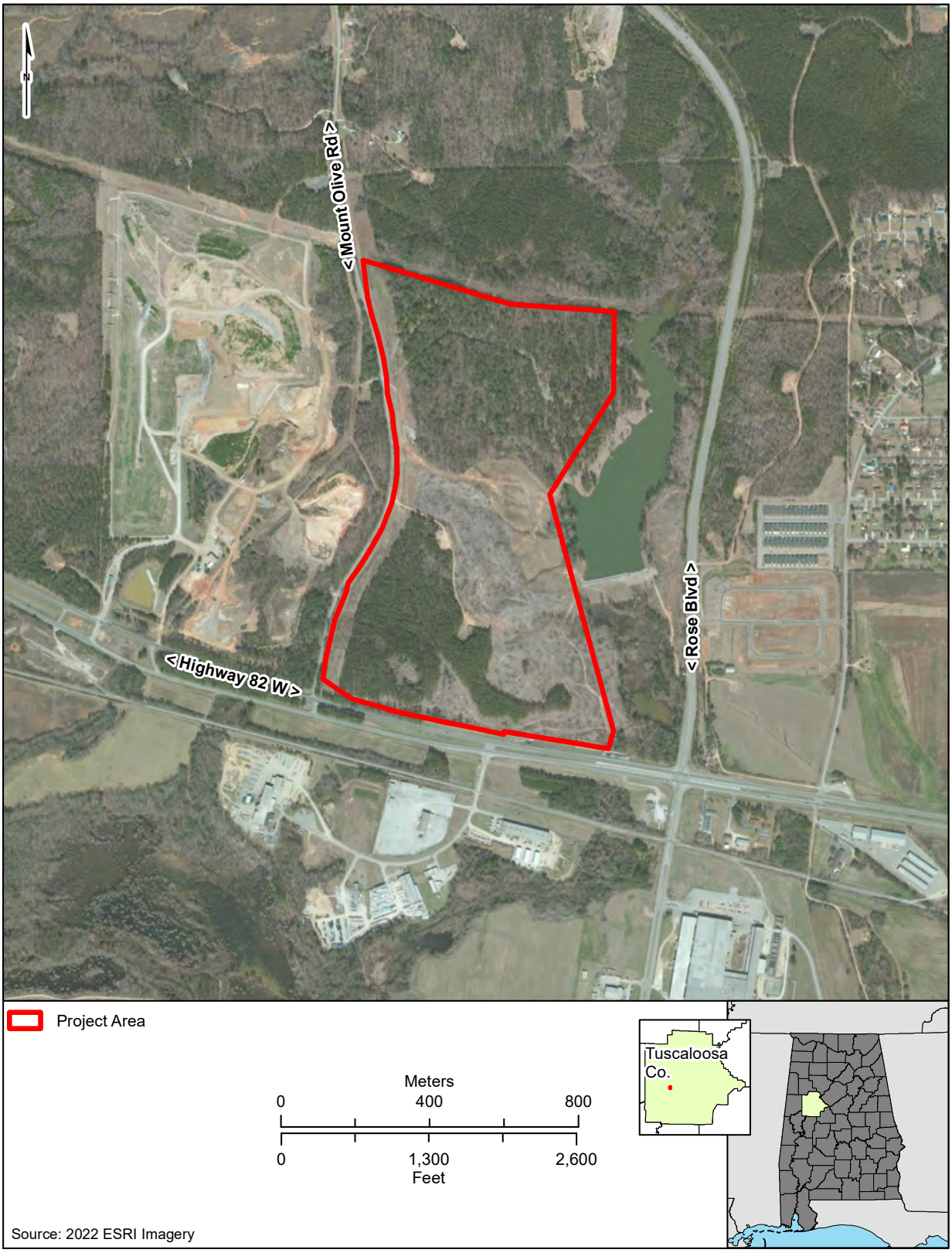


Figure 1. *Aerial image showing the project area.*

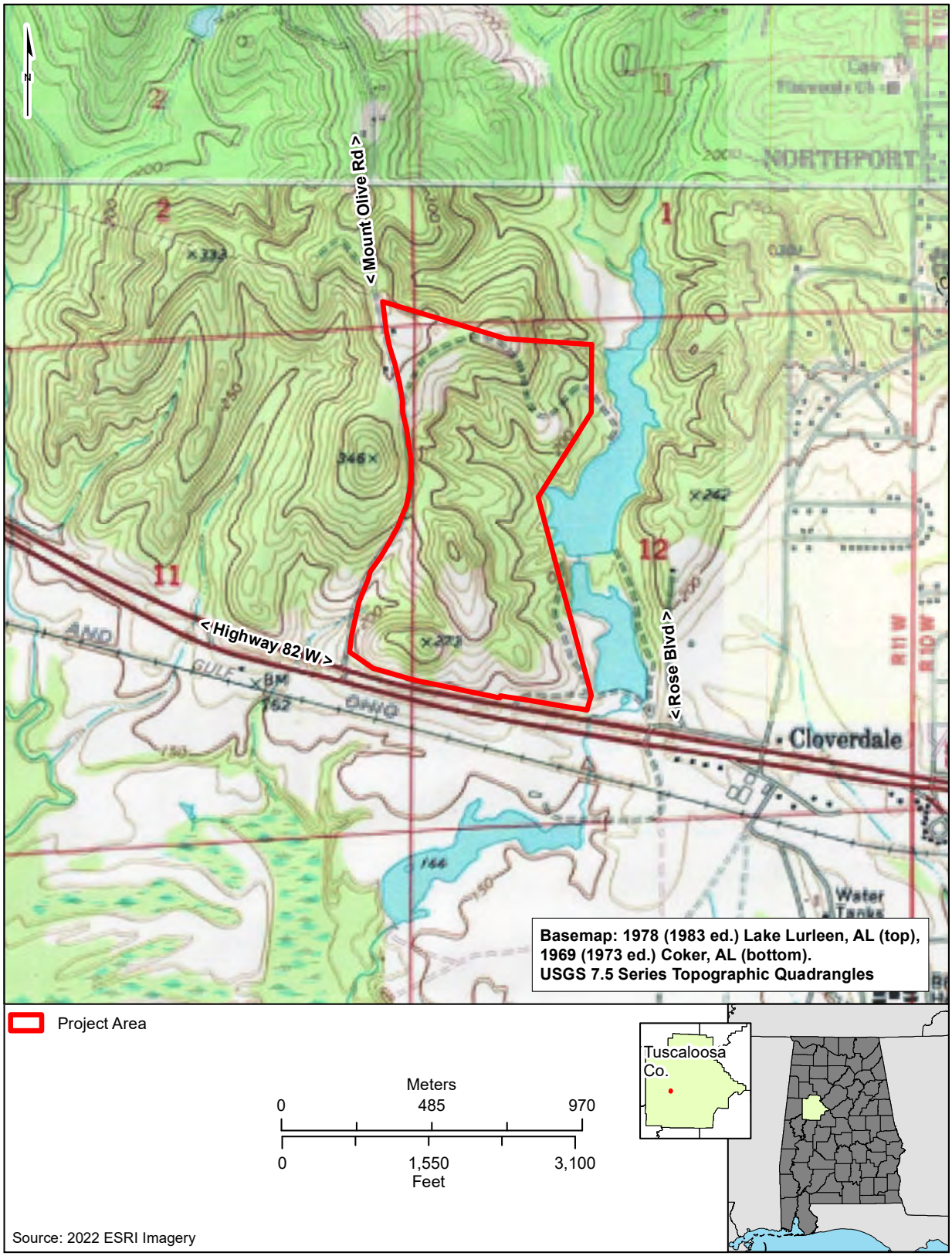


Figure 2. *Topographic map showing the project area.*

Figure 3. *View of project area from northeast portion facing west.*

Figure 4. *View of Partlow Camp road in northeast portion of project area facing northwest.*

Figure 5. *View of project area from northwest portion facing southeast.*

Figure 6. *View of pond from eastern boundary facing north.*

Figure 7. *View of project area from center portion facing southeast.*

Figure 8. *View of oil rig in center portion of project area facing southwest.*

Figure 9. *View of creek from southwest portion of project area facing northeast.*

Figure 10. *View of project area from southeast portion facing north.*

Figure 11. *View of road from center portion of project area facing southeast.*

Figure 12. *View of power lines from northwest portion of project area facing southeast.*

Figure 13. *View of borrow pit from northwest portion of project area facing west.*

Figure 14. *View of Upper Lake Partlow facing south.*

Shovel testing within the project areas typically exposed 10 centimeters (cm) of pale brown (10YR 6/3) sand followed by 25 cm of yellow (10YR 7/6) sand and 55 cm of brownish yellow (10YR 6/8) clay. A review of the United States Department of Agriculture (USDA) Web Soil Survey identified five soil types within the project area (Figure 15) (USDA 2022). Boswell loam, 4 to 10 percent slopes, comprises the largest coverage of soil types and accounts for 54.2 % of the project area. This soil type is commonly found on the side slope of ridges in the Coastal Plain Uplands. Luverne-Smithdale complex, 4 to 10 percent slopes, represents the second largest soil type accounting for 29.0% of the project area, followed by Smithdale fine sandy loam, 6 to 15 percent slopes, at 10.0%. Luverne-Smithdale complex, 4 to 10 percent slopes, is commonly found on the side slopes of ridges in the Coastal Plain Uplands and Smithdale fine sandy loam, 6 to 15 percent slopes, is commonly found on the slopes of hills. None of these three soil types are considered to be prime farmland. Table 1 provides more information on these soil types.

Table 1. Soils Within The Project Area.

Map Unit Symbol	Map Unit Name and Description	Acres in PA	Percent of PA
11	Boswell loam, 4 to 10 percent slopes	91.7	54.2%
20	Luverne-Smithdale complex, 4 to 10 percent slopes	49.1	29.0%
33	Smithdale fine sandy loam, 6 to 15 percent slopes	16.8	10.0%
36	Smithdale-Luverne complex, 15 to 35 percent slopes	3.5	2.1%
39	Smithdale-Luverne association, 12 to 35 percent slopes	7.9	4.7%
Totals for Project Area (PA)		169	100%

Literature and Document Search

Before conducting the fieldwork, TerraX performed a literature and document search in order to gather pertinent background information regarding the subject property and its surroundings. This research included inspections of the Alabama State Archaeological Site (ASASF 2022a) (Alabama Cultural Online Resource Database [ACORD] 2022b), The Alabama Register of Landmarks and Heritage (ARLH) (Alabama Historical Commission [AHC] 2022), the National Register of Historic Properties (NRHP) (National Park Service [NPS] 2022), and various historic maps and aerial images (Nationwide Environmental Title Research [NETR] 2022).

ALABAMA STATE ARCHAEOLOGICAL SITE FILE: Research of the ASASF (ACORD 2022b) identified 10 previous archaeological surveys and eight previously recorded archaeological sites within a 1-mi radius of the proposed project area (Figure 16). Of the previous surveys, one survey intersects the project area (4053873) and none of the previously recorded archaeological sites are within the project area. Survey 4053873 was a phase I cultural resource survey that discovered three precontact sites. None of these three precontact sites were located within the 1-mi search radius. For this reason, TerraX believes no previously recorded sites will be negatively impacted by the proposed project. For additional information on the previous surveys and archaeological sites, refer to Tables 2 and 3.

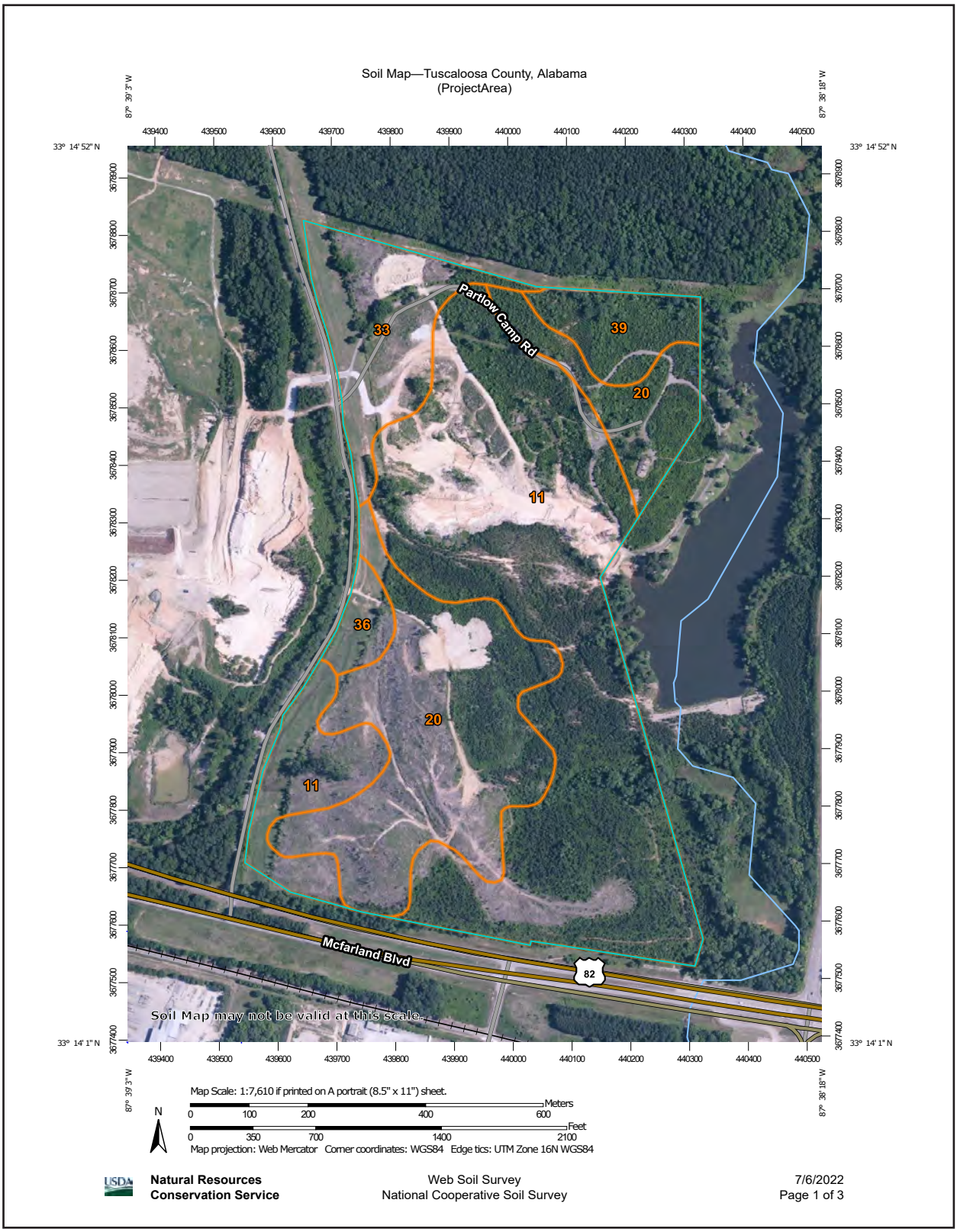


Figure 15. *Aerial image showing soil types within the project area.*

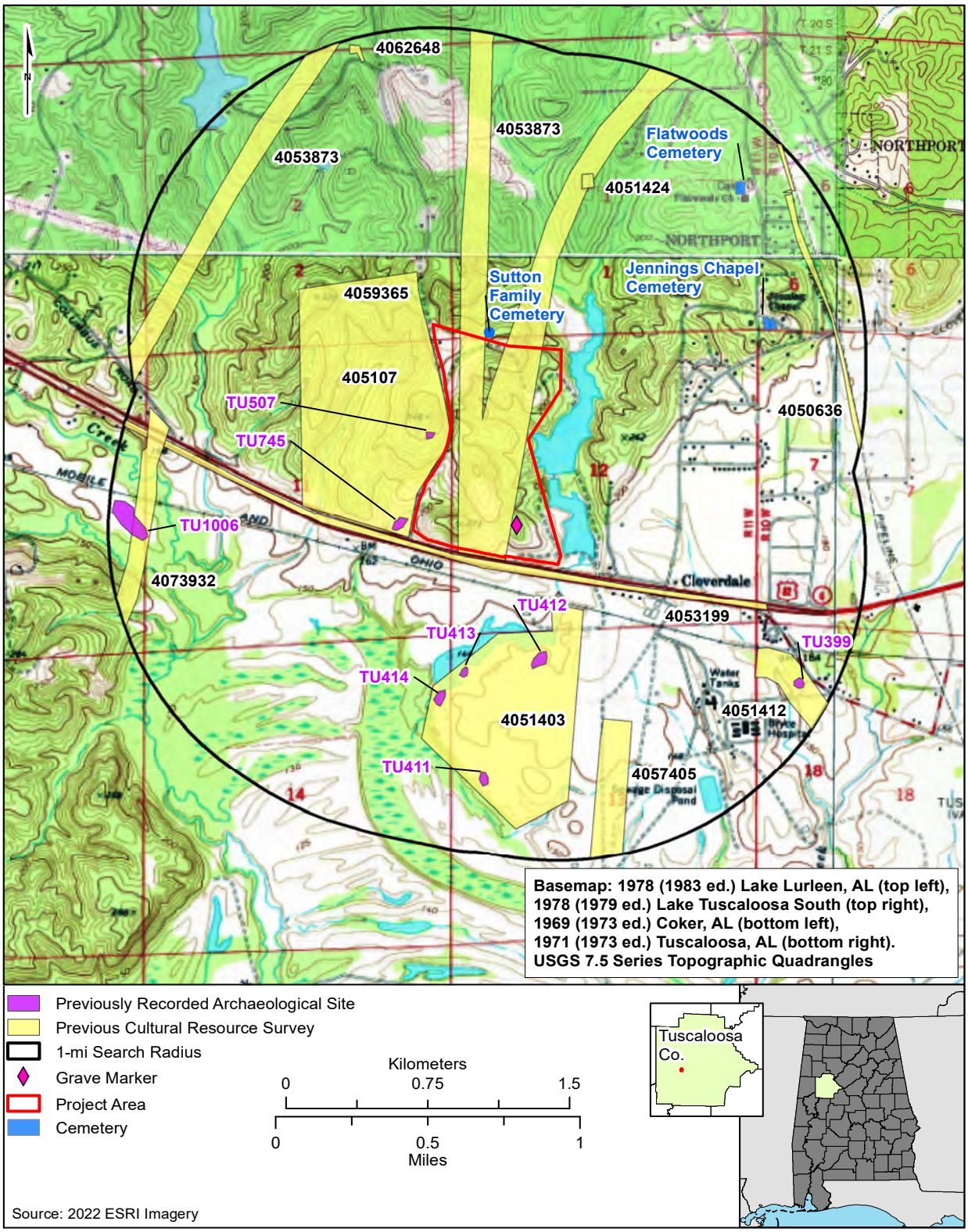


Figure 16. *Topographic map showing previously recorded archaeological sites, previously cultural resource surveys, grave marker, and cemeteries within a 1-mi radius of the project area.*

Table 2. Previously Conducted Cultural Resource Surveys within a 1-mi Radius of the Project Area.		
NADB Report Number	Report Title	Reference
4050636	*A Cultural Resource Survey for the Proposed Tuscaloosa Supply Line Natural Gas Pipeline, Northwestern Tuscaloosa County, Alabama.*	Patterson et al. 1991
4051403	*A Cultural Resource Survey of Portions of the Proposed Tuscaloosa County Industrial Park.*	Mistovich 1980
4051407	*A Cultural Resource Survey of a Proposed Landfill Study for a Waste Disposal in Tuscaloosa County, Alabama.*	Oakley 1989
4051412	*A Cultural Resources Survey of Railroad Spur Construction Areas in the Tuscaloosa County Industrial Park.*	Knight 1983
4051424	*A Cultural Resources Survey of Various Borrow Pits in Tuscaloosa, Hale, and Marengo Counties, Alabama.*	Meyer 1992
4053873	*An Archaeological Reconnaissance Level Survey of Three Proposed Highway Corridors for the Proposed Tuscaloosa Eastern Bypass in Tuscaloosa County, Alabama.*	Oakley et al. 1994
4057405	*Archaeological Survey of the Proposed Hanna Steel Rail-Line and Barge Slip Corridor Tuscaloosa County, Alabama.*	Thomson 1994
4059365	*An Archaeological Survey and Cultural Resource Inventory of the Proposed Coker Landfill, Tuscaloosa County, Alabama.*	Hendryx 1994
4062648	*Archaeological Survey Proposed Lake Eledge Telecommunications Tower Sity (AHC-00-1293) Tuscaloosa County, Alabama.*	Webb 2000
4073932	*A Cultural Resources Assessment for the Proposed County Road 2 Connectory Right-of-Way between Coker and Romulus, Tuscaloosa County, Alabama.*	Ryba and Spry 2005

Table 3. Previously Recorded Archaeological Sites within a 1-mi Radius of the Survey Area.			
Site Number	Site Type/Description/Cultural Affiliation	NRHP Status	Recorder and Date
TU399	Twentieth century domestic site	Not Eligible	University of Alabama 1983
TU411	Early twentieth century standing structure	Undetermined	University of Alabama 1980
TU412	Late Woodland lithic and cermaic scatter	Undetermined	University of Alabama 1980
TU413	Late Woodland lithic and ceramic scatter	Not Eligible	University of Alabama 1980
TU414	Late Woodland lithic and ceramic scatter	Not Eligible	University of Alabama 1980
TU507	Precontact lithic scatter	Not Eligible	University of Alabama 1989
TU745	Nineteenth and twentieth century historic ceramic scatter	Not Eligible	Panamerican Consultants 1994
TU1006	Precontact artifact scatter	Potentially Eligible	MRS Consultants 2005

ALABAMA REGISTER OF LANDMARKS AND HERITAGE: Examinations of the ARLH (AHC 2022) identified no previously recorded historic resources within the 1-mi search radius (see Figure 16).

NATIONAL REGISTER OF HISTORIC PLACES: Inspections of the NRHP (NPS 2022) identified no previously listed historic properties or districts within the 1-mi search radius (see Figure 16).

HISTORIC MAP RESEARCH: A review of historic maps and aerial photographs was conducted for evidence of previous historic structures or other historic features located within the proposed project area (NETR 2022, USGS 2022a and 2022b). The 1924 (1957 edition [ed.]) and the 1926 (1926 and 1945 eds.) Tuscaloosa, Alabama USGS 15' topographic quadrangles depict several structures located to the south, southwest, and southeast of the project area and two structures to the northeast (Figures 17, 18, and 19). Only two structures are present within the project area to the northwest. An unnamed road is also located within the project area starting in the northwest portion and continuing through to the southern boundary connecting to Columbus Road. The Mobile and Ohio Railroad is located to the south of the project area, and the town of Cloverdale is located to the southeast. The 1969 (1973 ed.) Coker, Alabama USGS 7.5' topographic quadrangle depicts one structure located in the northwest portion of the site (see Figure 2). Mount Olive Road is depicted running along the western boundary of the project area, and Camp Partlow Road is running through the northern portion. An unnamed road is present in the southeast portion of the project area. The Jennings Chapel Cemetery is not present until the 1969 (1973 ed. Coker, Alabama USGS 7.5' topographic quadrangle (see Figure 16). The Flatwoods Cemetery is first depicted on the 1978 (1979 ed.) USGS 7.5' topographic map. Since these three cemeteries are located outside the boundaries of the project area, TerraX believes that the proposed project will have no adverse impact on the cemeteries. The grave marker is located within the project area and will be discussed more in the Archaeological Survey Results section. These cemeteries and grave marker are discussed in Table 4. The aerial images from 1956 and 1966 show that the center portion of the project area has a moderate-to-dense forest. The land is cleared to the north of McFarland Boulevard and to the northeast of the project area. The area is very rural but does have some structures present to the northeast, northwest, and southeast. Mount Olive Road is present running along the western boundary of the project area and Camp Partlow Road is present in the north. The aerial image from 1974 shows that the southern portion of the project area is now covered in a moderate-to-dense forest. The area to the northwest is still mostly cleared of trees, and a structure is still present within this area. A larger structure is now located to the northeast of the project area. The structure located in the northwest portion of the project area is no longer present in the 1981 aerial image. The aerial image from 1997 shows that an access road that connects to Mount Olive Road is now present in the southern portion of the project area and the northwest portion is now covered in trees. The aerial images from 2004 to present day shows that the project area is under development with large areas being cleared of vegetation.

Table 4. Cemeteries Located Within a 1-mi Radius of the Project Area.

Name	Location	Description
Errie Giles Grave Marker	Southwest corner of project area; north of McFarland Boulevard and west of Rose Boulevard	Unrecorded grave marker; one known burial; visual inspection found no other burials or markers within the area
Flatwoods Cemetery	West of 70th Avenue and north of Flatlands Baptist Church	Flatwoods Baptist Church; has approximately 185 known graves; first known internment in 1913; currently active
Jennings Chapel Cemetery	East of 70th Avenue and north of Flatlands Road	Jennings Chapel Methodist Church; has approximately 270 known graves; first known interment in 1857; currently active
Sutton Family Cemetery	East of Mount Olive Road and north of Partlow Camp	Features eight grave markers; first known interment in 1837; not active

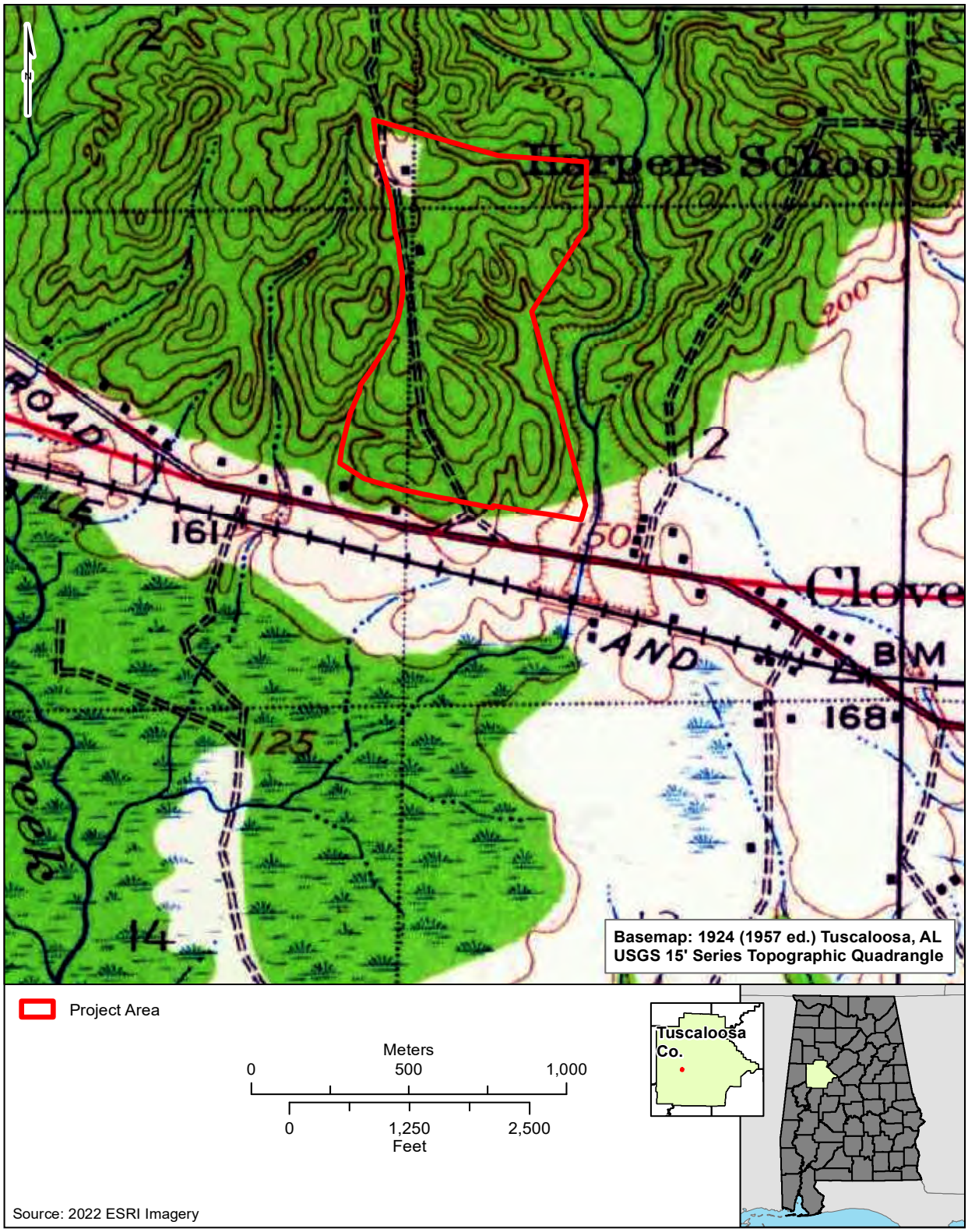


Figure 17. *The 1924 (1957 ed.) Tuscaloosa, Alabama USGS 15' topographic map showing the location of the project area.*

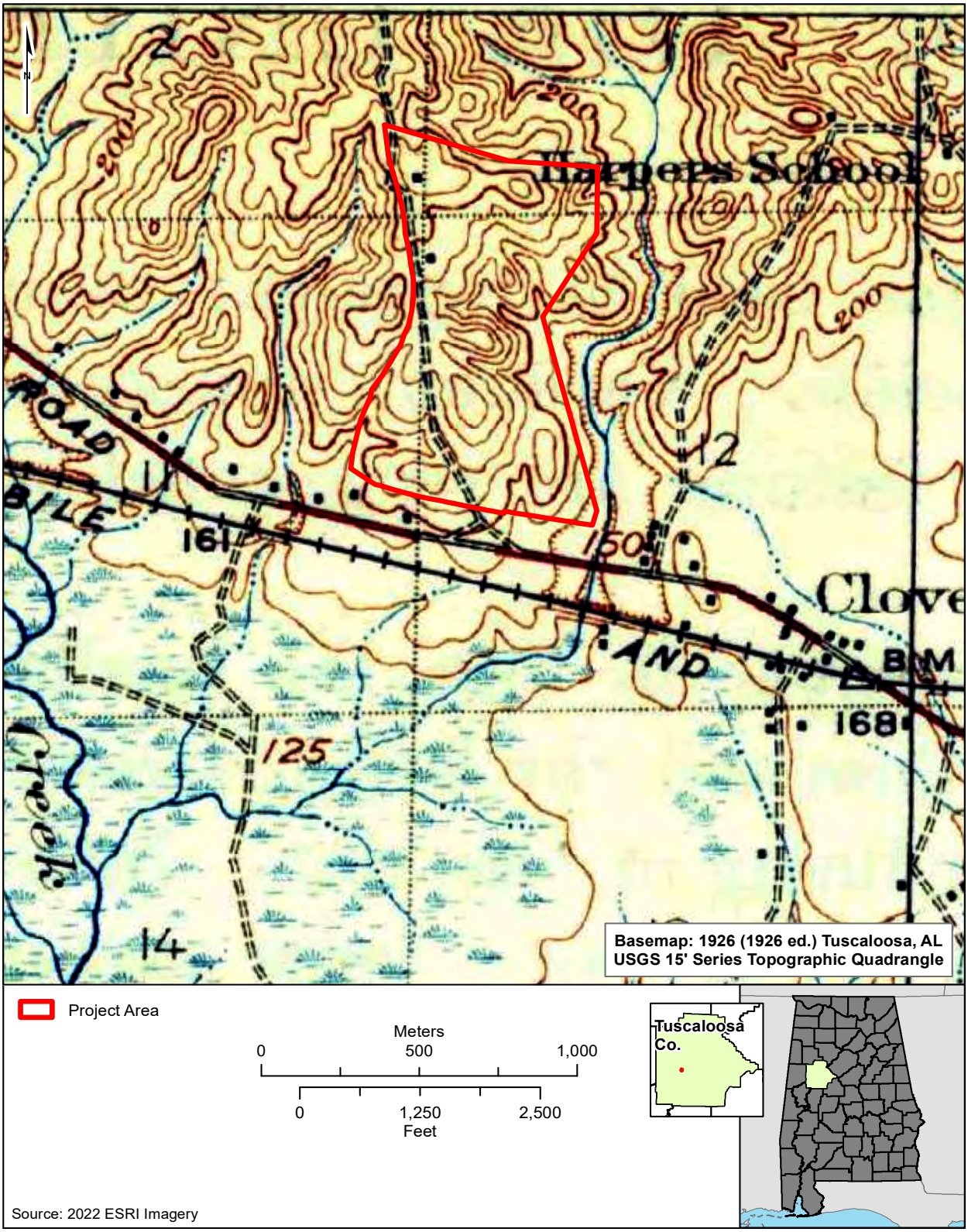


Figure 18. *The 1926 (1926 ed.) Tuscaloosa, Alabama USGS 15' topographic map showing the location of the project area.*

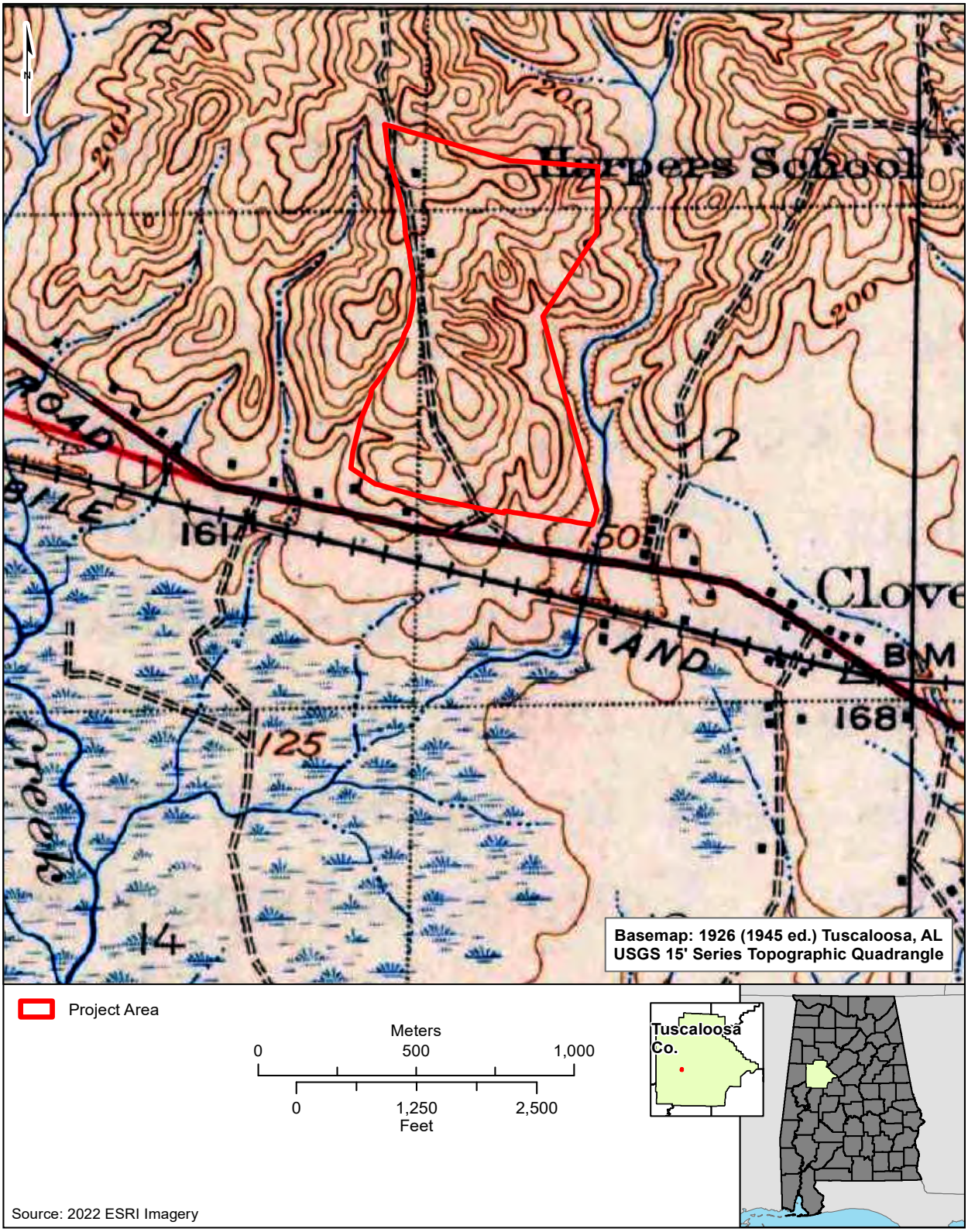


Figure 19. *The 1926 (1945 ed.) Tuscaloosa, Alabama USGS 15' topographic map showing the location of the project area.*

Field Methods

The Phase I survey was guided by procedural standards created by the Alabama Council of Professional Archaeologists in concurrence with the Alabama Historical Commission's (2006) specifications as outlined in the Policy for Archaeological Surveying and Testing in Alabama. Full land coverage requirements were achieved through visual inspections and systematic subsurface testing of the entire survey area. While conducting visual inspections, any exposed surfaces were carefully examined for cultural material.

Subsurface testing was performed within the project area along transects comprised of shovel tests spaced 30-m apart. Standard shovel tests consisted of 30-centimeter (cm)-diameter cylindrical holes excavated to the top of the sterile subsoil layer. Soils from each test were screened through 0.25-inch (0.64-cm) hardware cloth for the purpose of recovering any cultural material that may exist at that location. If cultural material had been encountered, the material would have been sorted by provenience and placed into bags labeled with the pertinent excavation information before being transported to TerraX's laboratory. Any archaeological locus identified within the project area during transecting would have been further examined in order to better define its horizontal and vertical limits. Delineations would have been conducted by establishing a datum within the area of the initial find. From the datum, close-interval shovel testing (5-to-10-m intervals) would have been conducted in a cruciform pattern in cardinal directions until at least two consecutive negative tests were encountered in each direction or until shovel tests extended beyond the boundaries of the project limits. A hand-held Garmin GPS unit would have been used to record the location, and a sketch map was drawn by compass and pace and plotted to scale. Digital photographs would have been taken for any recorded archaeological locus as well as for the survey area.

Laboratory Methods and Collection Curation

If cultural materials had been recovered during field projects, they would have been delivered to TerraX's laboratory in Tuscaloosa, Alabama for processing. Here, materials would be sorted by provenience, cleaned, and analyzed. Along with the cultural material, all project records, photographs, and maps produced while conducting the investigation are transported for curation at the Archaeological Research Center, Troy University, Troy, Alabama. A copy of the curation agreement can be found in Appendix A.

ARchaeological Survey Results

A total of 747 shovel tests, including delineation tests, were placed during the investigation. Of the total 745 tests, two tests were positive for artifacts, 745 were negative, and 44 were unable to be excavated as they fell atop various obstructions (Figure 20 and 21). These "no digs" are attributed to the disturbances noted within the project area at the time of the survey, which were attributed to slope, paved surface/gavel, and industrial development. Shovel testing within the project areas typically exposed 10 centimeters (cm) of pale brown (10YR 6/3) sand followed by 25 cm of yellow (10YR 7/6) sand overlying 55 cm of brownish yellow (10YR 6/8) clay. (Figure 22).

The Phase I survey led to the identification of two newly recorded archaeological field sites (1Tu1170 and 1Tu1171). The following section describes the two newly recorded archaeological sites. Alabama Archaeological Site Forms for these resources are provided in Appendix C. Information regarding the identification of artifacts recovered is provided in Appendix B.

Errie Giles Grave Marker: The Errie Giles Grave marker is located in the southwest corner of the project area, approximately 183 m north of McFarland Boulevard and 432 m west of Rose Boulevard (see Figure 21). The grave marker is unrecorded and is not depicted on any USGS topographic maps. Our client, TTL,

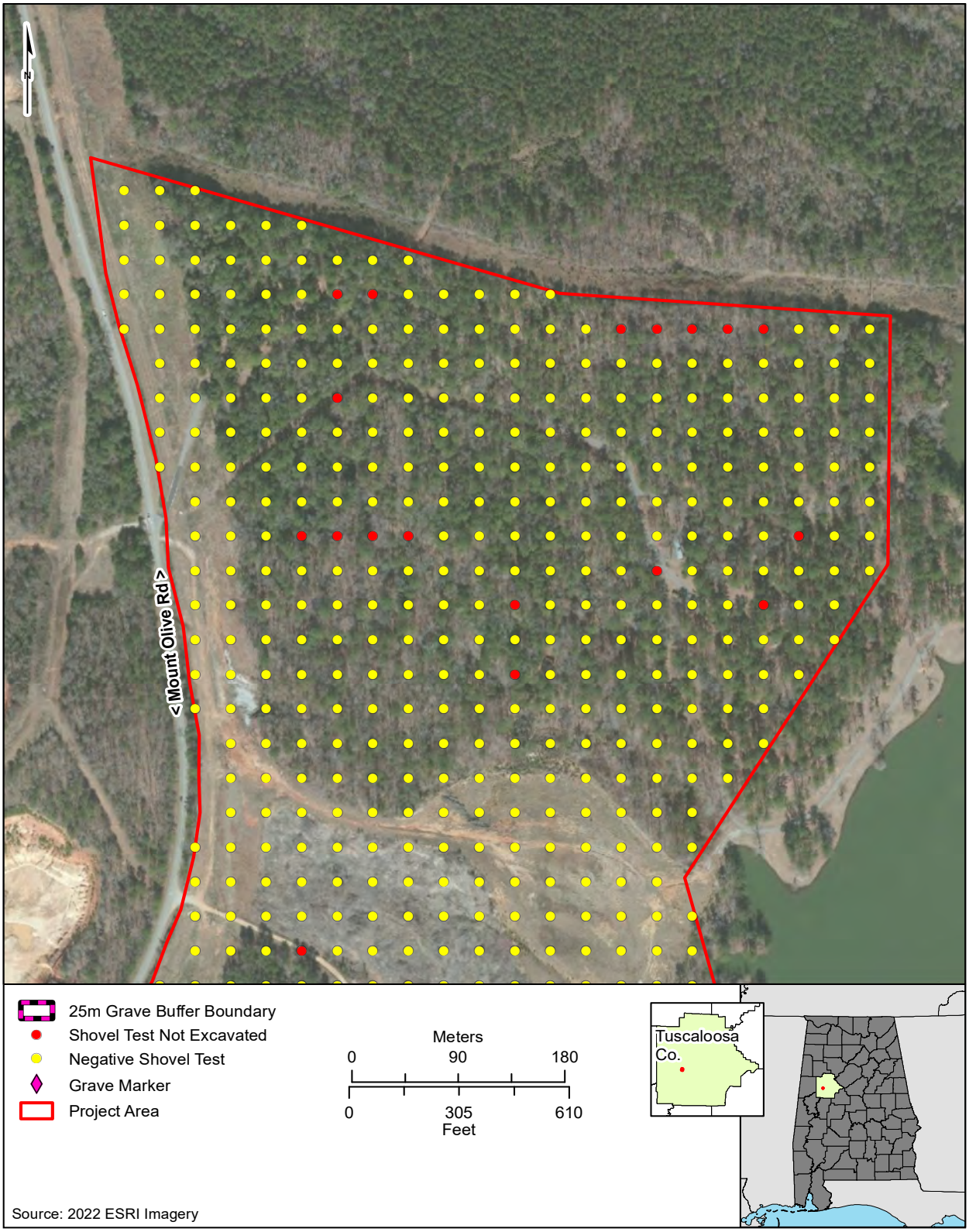


Figure 20. *Aerial map showing the results of archaeological field investigation in the northern portion of the project area.*

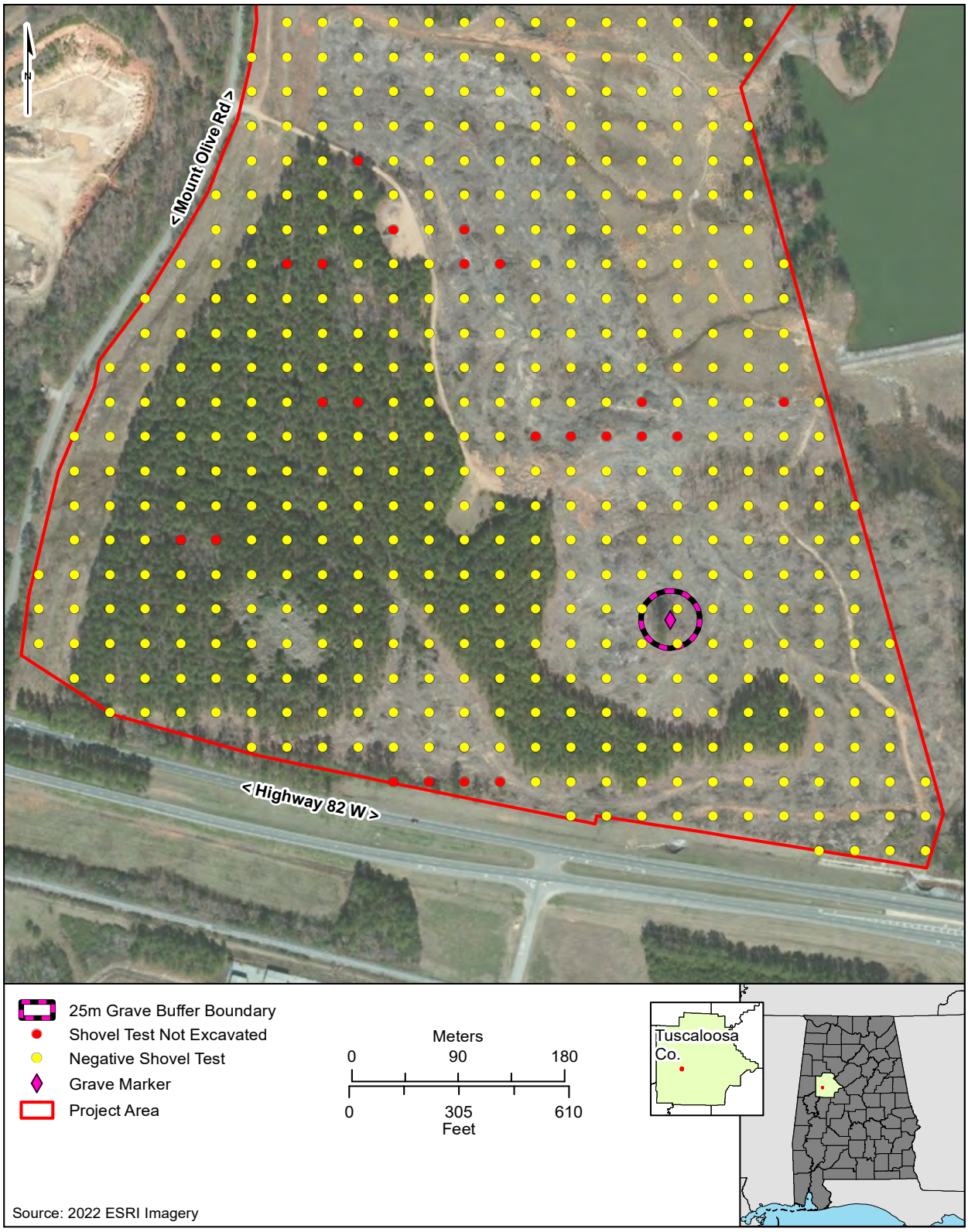


Figure 21. *Aerial map showing the results of archaeological field investigation in the southern portion of the project area.*

Figure 22. *Typical shovel test profile within the project area.*

and the construction crew alerted TerraX to the presence of the marker before fieldwork was conducted. Visual inspection of the area did not reveal any other possible burials or grave markers within the area. A rubbing was taken of the headstone (Figure 23). The rubbing appears to read: "Errie, Dad of Jack and Van Giles, Feb. 15, 1902, Aug. 26, 1923." In compliance with state cemetery law (Code of Alabama 13A-7-23.1), TerraX recommends that a 25-ft boundary be placed around the grave marker and that the area should be designated as an Environmentally Sensitive Area (ESA) to be marked with an orange barrier fence (OBF) and avoided by any project construction activities.

Archaeological Resource Descriptions

1Tu1170. Site 1Tu1170, measuring 69-x-54-m, represents a historic artifact scatter, historic features, and the remnants of a historic structure, likely associated with a razed historic structure and Partlow Camp. The site is located approximately 580 m east of Mount Olive Road, and 1046 m north of McFarland Boulevard. Site 1Tu1170 is positioned in the northeast portion of the project area. The landscape varies within the project area from gently sloping landform to slight rise. Vegetation consists of a light to moderate dense mixed pine and hardwood forest with a light to moderate dense understory consisting of vines and briars. Visibility of the site area was poor due to the understory of vine and briars, density of the forest, paved surfaces, partially collapsed structure, and leaf litter covering the site area (Figures 24-27). Noted disturbances in the site area include commercial and residential development.

Site 1Tu1170 was initially detected by surface scatter and surface features identified during visual inspection (Figures 28-31). The first feature identified is a partially collapsed structure, measuring approximately 12 x10 m. The second feature, measuring approximately 24 x 2 m, is a concrete path located to the west and

Figure 23. *Rubbing taken of Errie Giles grave marker.*

Figure 24. *View of site 1Tu1170 facing east.*

Figure 25. *View of site 1Tu1170 facing west.*

Figure 26. *View of site 1Tu1170 facing east.*

Figure 27. *View of site 1Tu1170 facing north.*

Figure 28. *View of surface debris in site 1Tu1170 facing south.*

Figure 29. *View of surface debris in site 1Tu1170 facing south.*

Figure 30. *View of paved concrete path in site 1Tu1170 facing west.*

Figure 31. *View of paritally collapsed structure in site 1Tu1170 facing east.*

southwest of the partially collapsed structure. This concrete path is likely associated with the partially collapsed structure. Additional features identified during visual inspection include cinder block, wood, and sheet metal. To investigate the subsurface and extent of the 1Tu1170 area, an additional 18 shovel tests were placed during delineation. Of the 18 delineation tests, two were positive for cultural material, 11 were negative, and four were unable to be excavated (Figure 32). Through shovel test profiles were variable throughout the site area, typical soil profiles consisted of an approximately 5-cm stratum of yellowish-brown (10 YR 5/4) sandy loam overlying a yellowish-brown (10 YR 5/4) clay excavated to a maximum depth of 30 cm. A second common soil profile consisted of roughly 10-cm stratum of gray (5YR 5/1) sand overlying a yellowish-red (5YR 5/8) clay excavated to a maximum depth of 30 cmbs. No artifacts were collected during the shovel testing effort since the cultural material consisted of cinderblocks, wood, and sheet metal.

Historic and modern aerial photographs and maps were inspected to document the presence or absence of built features in this area through time (NETR 2022, USGS 2022a and 2022b). The aerial image from 1956 shows that a structure is located within the immediate vicinity of the project area. The land surrounding the structure is cleared of trees, and an unnamed road is located to the north. The area to the north, west, and south of the project area is covered in a moderate to dense forest. Due to poor resolution, it is unclear what else is present within the immediate vicinity of the site. The structure is still present in the 1966 aerial image, and trees are now appearing in the land that was cleared around the structure. The structure is no longer present on the 1974 aerial image. Another structure is located within the site area. This structure is likely the partially collapsed structure that was identified during visual inspection. The 1981 aerial image shows that the area is now covered in a moderate to dense forest. The site area remains relatively unchanged until the 2015 aerial image, which shows a structure in the immediate vicinity. Additional structures are present to the south and southwest of the site area. The site area has been mostly cleared of its forest, and access roads leading to the structures are present. The 2019 aerial image shows that the site area is now covered in a moderate to dense forest, and the structure is still present within the immediate vicinity. No structures are present within the project area on the 1924 (1957 edition [ed.]) and the 1926 (1926 and 1945 eds.) Tuscaloosa, Alabama USGS 15' topographic quadrangles or the 1969 (1973 ed.) Coker, Alabama USGS 7.5' topographic quadrangle (see Figures 2, 17, 18, and 19).

Based on the results of the investigation, 1Tu1170 represents a mid-to-late-twentieth century historic artifact scatter, historic features, and historic structure, likely associated with a razed historic structure, Partlow Camp, and/or generalized discard. The site was identified by the presence of surface scatter and surface features. Subsurface testing did identify artifacts, but the artifacts were not collected since they were construction materials (cinderblock, wood, and sheet metal). Given the noted disturbances within the site area, and the lack of an informative cultural assemblage, the investigated portion of 1Tu1170 lacks significant data potential to address research questions about mid-to-late-twentieth century cultural practices. While the site appears to retain some integrity of location, overall, the site lacks integrity of setting, design, materials, workmanship, feeling, association, space, time, and occupation. However, since the eastern portion of the site could not be fully delineated due to constraints of the project area, the overall NRHP eligibility is considered unknown under Criterion D. TerraX recommends that any unknown portion of 1Tu1170 extending outside the project area be designated as an ESA and avoided by any ground-disturbing activities associated with project construction through the placement of an OBF.

1Tu1171. Site 1Tu1171, measuring 104 x 29 m, represents a historic artifact scatter, historic features, and the remnants of a historic structure, likely associated with a razed historic structure and Partlow Camp. The site is located approximately 370 m east of Mount Olive Road and 909 m north of McFarland Boulevard. The site is positioned in the northeast portion of the project area. The landscape varies from a gently sloping

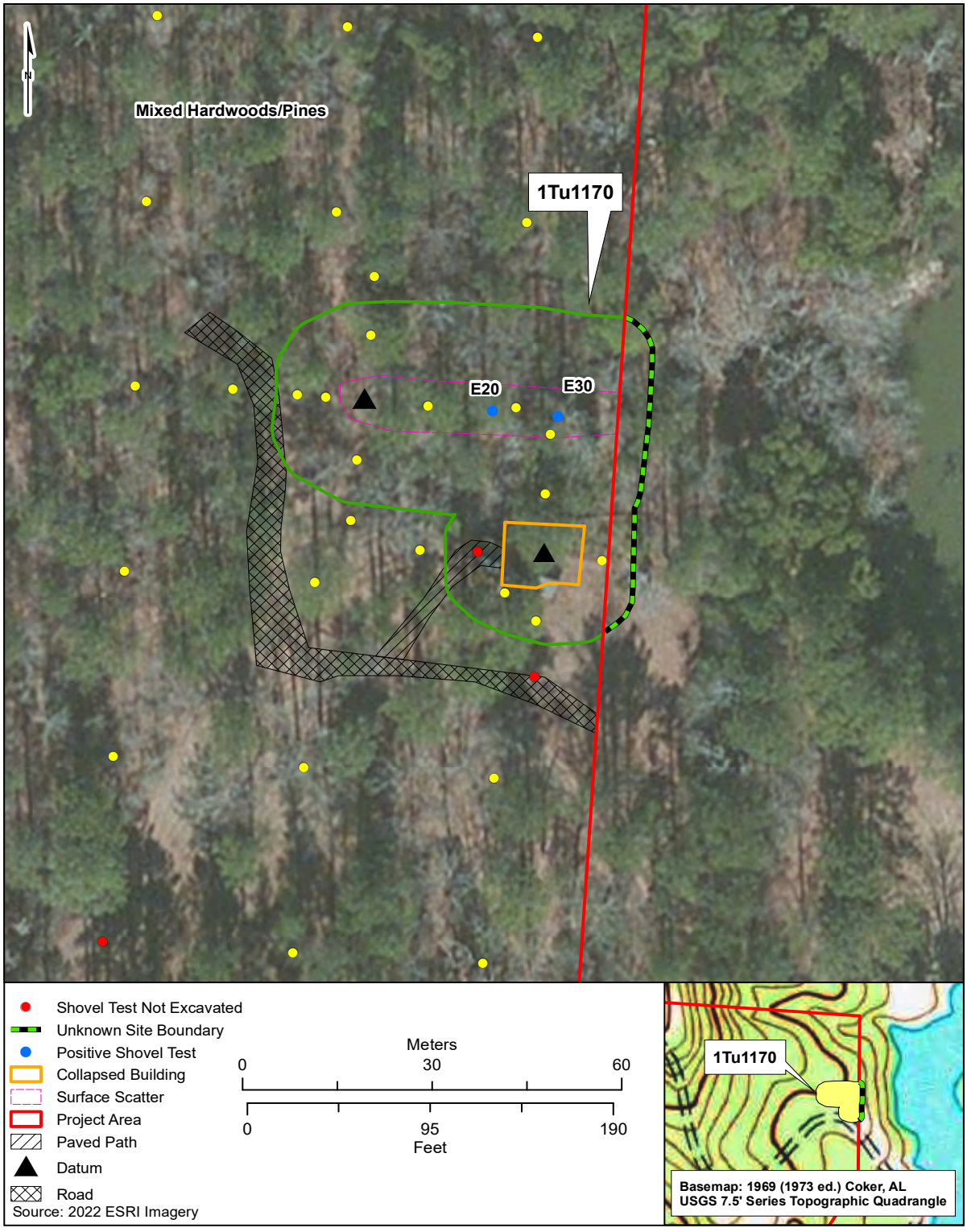


Figure 32. *Detail map of 1Tu1170.*

landform to a side slope. Vegetation within the site area consists of a moderately dense mixed pine and hardwood forest with a moderate to dense understory consisting of vines and briars. Visibility of the site area is poor due to the density of forest and understory, paved surfaces, and leaf litter covering the site area (Figures 33-37). Noted disturbances in the site area include commercial development.

Site 1Tu1171 was initially detected by surface scatter and features identified during visual inspection (Figure 38). The first feature identified is a paved path, measuring approximately 16 x 3 m. The paved path is located to the north of the house foundation. The second feature identified was a concrete house foundation, measuring approximately 10 x 15 m. Additional features found during visual inspection consisted of cinder blocks and brick. To investigate the subsurface and extent of the 1Tu1171 area, an additional 18 shovel tests were placed during delineation. Of the 18 delineation tests, 15 were negative for cultural material, and three were unable to be excavated (Figure 31). Though shovel test profiles were variable throughout the site area, typical soil profiles consisted of an approximately 30-cm stratum of very pale brown (10YR 7/4) clay. A second common soil profile consisted of roughly 30-cm stratum of light brownish-gray (10YR 6/2) sandy clay. Visual inspection of the site area recovered whole wire cut brick (n=1), an earthenware plumbing pipe fragment (n=1), and a concrete fragment (n=1). No artifacts were recovered during the shovel testing effort.

Historic and modern aerial photographs and maps were inspected to document the presence or absence of built features in this area through time (NETR 2022, USGS 2022a and 2022b). The aerial image from 1956 shows that structures are present within the immediate vicinity of the site area, but it is unclear how many are present due to poor resolution. Vegetation within the site area is a moderate to dense forest interspersed with land that are cleared from trees. The aerial image from 1966 shows the extension of the moderate to dense forest through the site area. The aerial image from 1974 shows that at least two structures are present within the site area. Additional structures could be present, but it is unclear due to poor resolution. The aerial image from 2004 shows that several structures are located within the site area and in the surrounding area. The site area is covered in a moderate to dense forest. The site area remains relatively unchanged between 2006 to 2013. Partlow Camp Road, by the 2006 aerial image had been extended and now runs through the center of the site area. The aerial image from 2015 shows that development is occurring within the site area and in the surrounding area. Several structures are present within the site area, but it is unclear how many due to poor resolution.The 2019 aerial image shows that the forest has regrown within the site area. No structures are present within the project area on the 1924 (1957 edition [ed.]) and the 1926 (1926 and 1945 eds.) Tuscaloosa, Alabama USGS 15' topographic quadrangles or the 1969 (1973 ed.) Coker, Alabama USGS 7.5' topographic quadrangle (see Figures 2, 17, 18, and 19).

Based on the results of the investigation, 1Tu1171 represents a late twentieth century historic artifact scatter, historic features, and historic structure, likely associated with a razed historic structure, Partlow Camp, and/or generalized discard. The site was identified during visual inspection by the presence of surface scatter, paved path, and a house foundation.The historic artifact assemblage was recovered on the surface during visual inspection of the site area. The assemblage consists of architectural artifacts that reflect either material from a former structure and/or redeposited discard. Given the absence of an informative artifact assemblage, the likely redeposited as well as fragmentary nature of the assemblage, and the disjointed nature of the features, 1Tu1171 lacks significant data potential to address research questions about late twentieth century cultural practices. The site lacks integrity of setting, location, design, materials, workmanship, feeling, association, space, time, and occupation. As such, TerraX recommends 1Tu1171 ineligible for NRHP inclusion under Criterion D. No further work is needed in the 1Tu1171 area.

Figure 33. *View of site 1Tu1171 facing west.*

Figure 34. *View of site 1Tu1171 facing south.*

Figure 35. *View of site 1Tu1171 facing north.*

Figure 36. *View of site 1Tu1171 facing east.*

Figure 37. *View of cinderblock wall within site 1Tu1171 facing west.*

Figure 38. *View of house foundation within site 1Tu1171 facing south.*

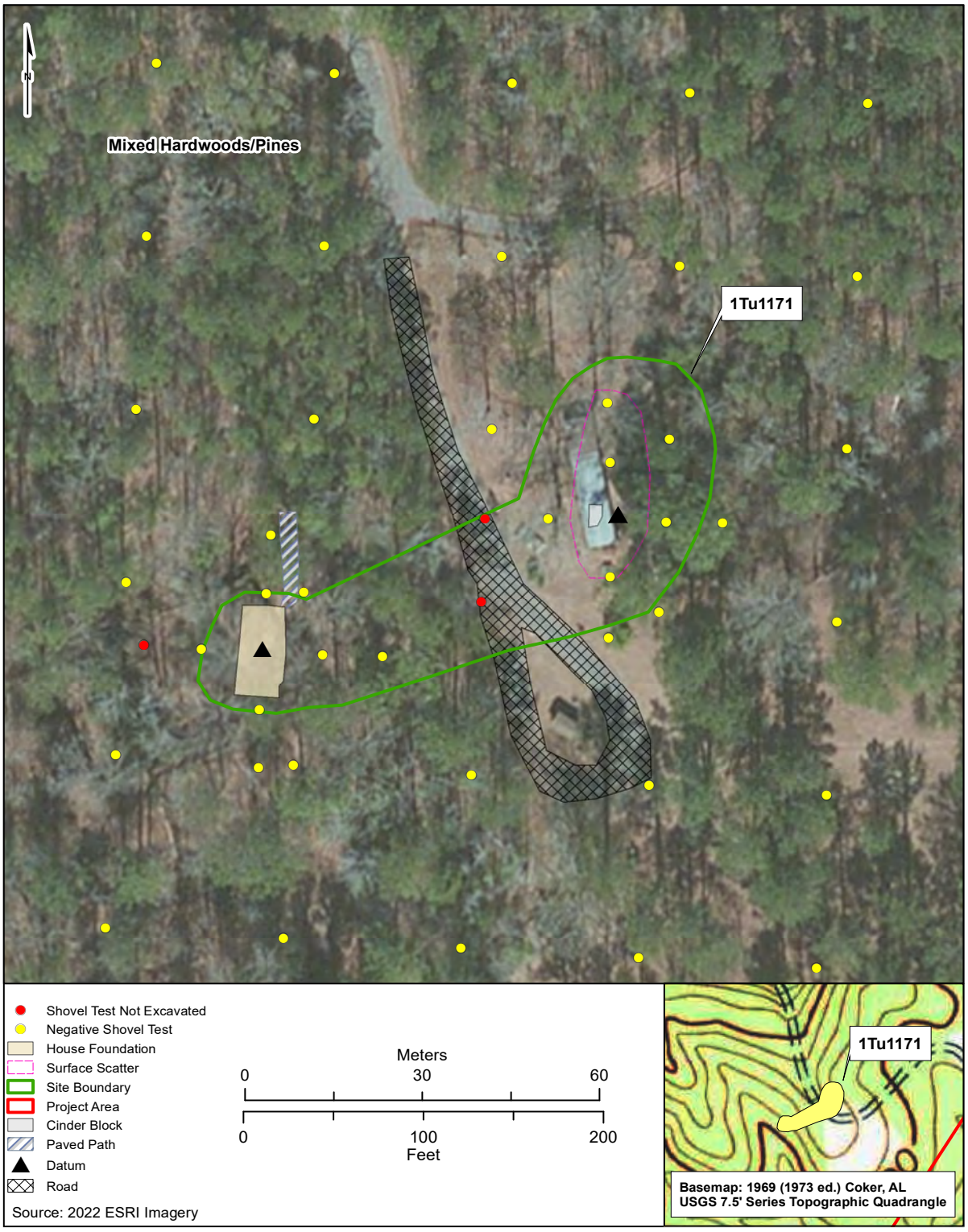


Figure 39. *Detail map of 1Tu1171.*

Architectural Survey Results

The architectural survey identified six resources within the proposed project's direct APE, and two within the proposed project's indirect APE. One of these resources has been previously recorded (The Sutton Family Cemetery [Resource 8]), and seven of these resources were newly recorded. All eight resources were recommended ineligible for listing in the NRHP. This conclusion is based upon the available information provided by the Alabama Register of Landmarks and Heritage (ARLH) and National Register of Historic Places (NRHP) databases, and topographic maps and aerials dating between 1952 and 2019. The architectural survey was completed by SOI-qualified Architectural Historian, David Dobbs MHP, and reviewed by SOI-qualified Architectural Historian Briane Shane MID.

Architectural Resources

Due to the nature of the project, the indirect APE was limited to the proposed project area and a 0.15-mile buffer around it. The proposed project area consists of a partially developed parcel of land bound by Mt. Olive Road (west), McFarland Boulevard (south) Upper Partlow Lake, wooded land, and Rose Boulevard (east), and a transmission corridor (north) in Tuscaloosa, Alabama in Tuscaloosa County. Project activity is limited to the proposed project area. Prior to commencing fieldwork, the National Register of Historic Places (NRHP), Alabama Register of Landmarks and Heritage (ARLH) databases, and various available historic maps and aerial photographs were reviewed to identify any resources aged 50 years and older within the indirect APE (National Park Service [NPS] 2022; Alabama Historical Commission [AHC] 2022; Nationwide Environmental Title Research [NETR] 2022; United States Geological Survey [USGS] 2022a, 2022b). The available aerials dated to 1952, 1956, 1966, 1974, 1975, 1981, 1997, 1999, 2004, 2006, 2009, 2011, 2013, 2015, 2017, and 2019 (USGS 2022a; NETR 2022). The available topographic maps dated to 1926, 1945, 1956, 1957, 1964, 1973, 1976, 1978, 1985, 1988, 2011, 2014, 2018, and 2020 (USGS 2022b). This search did not yield any previously recorded architectural resources listed within the NRHP; however, two previously recorded resources were identified within the ARLH database: The Sutton Family Cemetery and Resource TU_00279 (NPS 2022; AHC 2022). Upon further review, it was determined that Resource TU_00279 was incorrectly plotted and is not located within the project's APE. To verify, the reported location was investigated, and no evidence of the resource was discovered (Figure 40). During the review, seven newly identified resources were discovered (Table 5; Figure 41).

Through background research, it was determined that six of the newly identified resources (Resources 1-6) were associated with the Alabama Jaycee Partlow Camp, a special needs camp associated with the William D. Partlow (W. D Partlow) Developmental Center in Tuscaloosa, Alabama. A brief description of this facility will precede the description and evaluation of these resources below.

A pedestrian-level survey was conducted on June 24, 2022, to photograph the identified resources. As the identified resources were within the proposed project area and associated property, surveyors were able to document the resources to the extent that the natural terrain allowed. A description and NRHP recommendation follow for each property. The resources are labeled 1-8 for the purposes of this report.

Figure 40. *View of the reported location for Resource TU_00279 looking southwest, no evidence of the resource was found.*

Table 5. Historic Resources Identified within the Architectural Survey Area.

Resource ID	Resource Type	Construction Date(s)	Location	NRHP Eligibility
Resource 1	Well House	c. 1970	Within the northeast portion of the project area; located at the terminus of Partlow Camp Road	Ineligible
Resource 2	Frame Vernacular Club House	c. 1970	Within the northeast portion of the project area; located approximately 92 yards southeast of the terminus of Partlow Camp Road	Ineligible
Resource 3	Frame Vernacular Cabin	c. 1970	Within the northeast portion of the project area; located approximately 208 yards northeast of the terminus of Partlow Camp Road	Ineligible
Resource 4	Picnic Shelter	c. 1970	Located approximately 86 yards west of the northeast section of the project area, next to Upper Partlow Lake, and approximately 259 yards east of the Partlow Camp Road terminus	Ineligible
Resource 5	Frame Vernacular Cabin	c. 1970	Within the central north portion of the project area; approximately 126 yards southwest of the Partlow Camp Road terminus	Ineligible
Resource 6	Frame Vernacular Cabin	c. 1970	Within the central north portion of the project area; approximately 142 yards west of the Partlow Camp Road terminus	Ineligible
Resource 7 Errie Giles Headstone	Grave	1923	Southeast corner of the project area; approximately 200 yards north of McFarland Boulevard and approximately 472 yards west of Rose Boulevard	Ineligible
Resource 8 Sutton Family Cemetery	Cemetery	1837	Approximately 345 yards east of Mount Olive Road and approximately 98 yards north of Partlow Camp Road	Ineligible

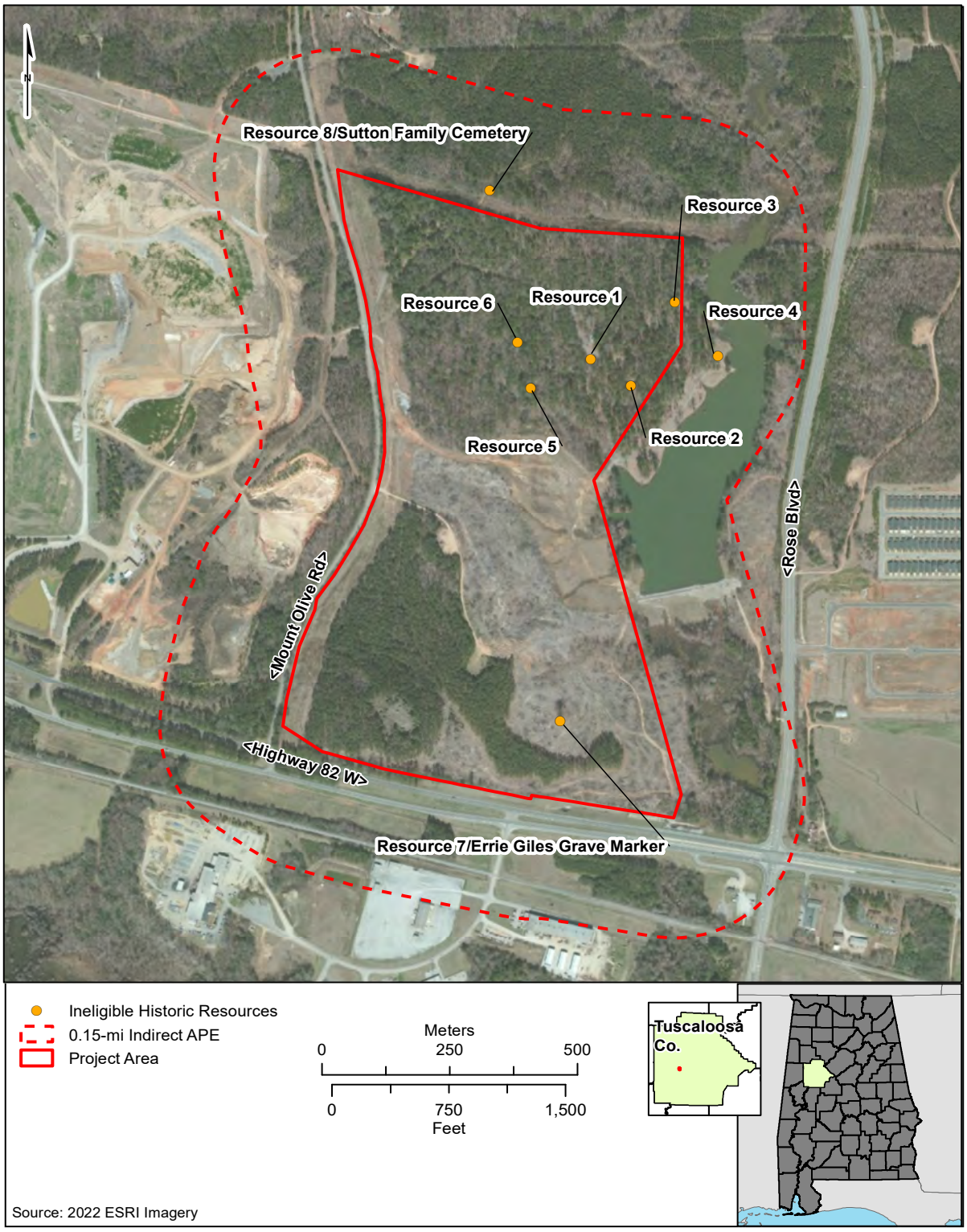


Figure 41. *Architectural resources map.*

The Alabama Jaycee Partlow Camp

The Alabama Jaycee Partlow Camp was a boys camp developed by the Alabama Junior Chamber of Commerce in association with the W.D. Partlow Development Center for the explicit use by the mentally challenged children located at the W.D. Partlow Development Center. The W.D Partlow Development Center, also known as the Partlow State School, was constructed in 1923 and was one of the few institutions in the state designed to treat the intellectually disabled. The center operated for 88 years before it was closed in 2011 due to adverse conditions and budgetary cuts (Tuscaloosanews 2011). The Alabama Junior Chamber of Commerce originated the plan to develop the camp in 1969. Members, known as the Jaycee (males) and Jaycettes (females), wanted to create a camp for the mentally challenged male children located at the Partlow State School, which would be the first of its kind in the state of Alabama (The Montgomery Advertiser 1969, 1971).

The initial plan was for the camp to be built on land owned by the State Mental Health Board and completed on May 22, 1970 (Tuscaloosanews 2022). While the land was provided, the completion date would be pushed back by a year. The camp was to consist of 75 acres of the boys' colony on the Partlow State School's property, five miles from downtown Tuscaloosa. The camp would have a 9-acre spring fed lake and provide several outdoor facilities for the children (The Montgomery Advertiser 1969). The camp facilities would include a main lodge, cabins that would shelter 8-12 children and one supervisor, a craft hut, a boat house, a swimming area, a campfire area, a fishing pier, playgrounds for organized sports and supervised free-play, nature trails, and tent camping areas. The main lodge would provide shelter for dining, cooking, recreation, a central office, and storage for the whole camp. The crafting hut provided space for handicraft activities and additional storage for the camp (Selma-Times Journal May 3, 1970). The camp was to be open year-round and operated by the staff of the Partlow State School, with additional volunteers being added during the busier months (Montgomery Advertiser 1969). The Jaycee's stated goal was to provide each mentally challenged child an opportunity for a satisfying outdoor experience in a camp environment, designed to improve a child's self-confidence and self-respect and to make them aware of the natural world. They wanted to encourage the children to learn and play together and to teach them new skills and ways of spending leisure time (The Selma-Times Journal May 3, 1970).

The Jaycee had organized a multi-phase process to complete the camp. The first phase consisted of land and materials acquisition, followed by the initial construction phase, which involved the building of the main lodge and crafting hut. This would be followed by smaller construction phases for additional facilities to serve the camp (The Montgomery Advertiser 1971; The Selma-Times Journal November 6, 1970). The Jaycee planned to break ground on the camp in the later part of May 1969 (Montgomery Advertiser 1969). The estimated expenses for the first year of the camp was $40,000, $9,000 of which the Jaycee had already raised by March of that year through local chapter sales. The Jaycee employed various forms of fundraising to help pay for the camp project, which included the sale of honey at local events called "Honey Sundays" and the sale of "flame of hope" candles at local Alabama banks (The Montgomery Advertiser 1969). As an example of how much money was being brought in through these fundraising efforts, a mason jar of honey sold at one of these Honey Sundays events cost a dollar (The Selma-Times Journal November 6, 1970). To help bring in more money, donations were heavily encouraged. To handle these public donations, the Jaycee formed the Alabama Jaycee Foundation, Inc. in order to accept and utilize tax-free donations from the public (The Montgomery Advertiser 1971). On May 3, 1970, a $53,000 contract was signed with Campbell and Associates of Tuscaloosa, building contractors for the construction of the main lodge building of Camp Partlow. While this contract was signed in May, construction on the site had already begun (The Selma-Times Journal May 3, 1970). Over 2,331 children were anticipated to go to the new Partlow camp during the first year of operation in 1970, even while construction on the additional cabins and facilities continued.

The estimated cost to complete the camp was $300,000 (The Selma-Times Journal November 6, 1970). The camp was officially dedicated in October 1970, and the land was turned over to the state for operation (The Montgomery Advertiser 1971).

It is unclear exactly when Camp Partlow ceased operation, but it appears to have been out of use for several years based on the condition of the cabins and facilities. Background research did not indicate if the camp was closed along with the W.D. Partlow Developmental Center in 2011. However, a visual inspection of the property no longer provides any indications that the camp was ever associated with the metal development center or the Jaycee's mission to provide a camping and learning environment for mentally challenged children.

Resource 1: Resource 1 is a well house located within the northeast portion of the project area, located at the terminus of Partlow Camp Road. The resource is located approximately 0.29 miles east northeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.44 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022). A review of aerial images indicates that the resource first appears between the 1966 and 1974 aerial images (NETR 2022; USGS 2022a). As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 1 is a well house located in the northeast portion of the proposed project area at the Terminus of Partlow Camp Road. The resource has a non-historic metal shed roof, is clad in non-historic sheet metal siding, and has a continuous brick foundation. The southeast elevation features a metal iron bar attached to the underside of the shed roof, most likely in order to access the interior of the resource (Figures 42 and 43).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 1 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years, and the campground no longer retains the integrity of feeling, setting, or association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 1 is not eligible under Criterion A. Cursory background research did not find that Resource 1 is associated with a significant person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 1 has undergone multiple alterations to its material makeup, which have diminished its level of integrity in the areas of materials and workmanship. These alterations include non-historic cladding and non-historic roofing material. Due to these material alterations, the resource does not represent a significant example of its resource type. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 1 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Resource 2: Resource 2 is a single-story Frame Vernacular style club house located within the northeast portion of the project area, located approximately 92 yards southeast of the terminus of Partlow Camp Road. The resource is located approximately 0.35 miles east northeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.38 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

Figure 42. *View of Resource 1 looking northwest, featuring the metal bar access.*

Figure 43. *View of Resource 1 looking southeast.*

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022). A review of aerial images indicates that the resource first appears between the 1966 and 1974 aerial images (NETR 2022; USGS 2022a). As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 2 is a single-story Framed Vernacular style club house located within the northeast portion of the project area, approximately 92 yards southeast of the terminus of Partlow Camp Road. The building has a non-historic side gable asphalt shingle roof, is clad in original vertical board siding, and has a continuous concrete block foundation. The front (west) and rear (east) elevations feature recessed entryways with non-historic metal double-entry doors with large single lights framed in the top half of the door. The building features original wood frame fixed 1/1 and single pane windows throughout. The building features multiple historic wood entry doors, and some retain associated wood screen doors. The roof features 3 historic camel hump metal vents evenly spaced along the roof's ridgeline. The building has several locations where the wood siding and roof have begun to deteriorate; in addition, the surrounding vegetation has begun to grow over and work itself into portions of the building. Some of the windows appear damaged or missing. There is a commemorative plate located at the front recessed entryway. The plate denotes the dedication of the Alabama Jaycee Partlow Camp on October 11, 1970 (Figures 44-48).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 2 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years, and the campground no longer retains the integrity of feeling, setting,

Figure 44. *View of Resource 2 looking southwest.*

Figure 45. *View of Resource 2 looking northwest.*

Figure 46. *View of Resource 2 looking northwest, featuring a remaining screen door and concrete brick stoop.*

Figure 47. *View of Resource 2 looking southeast.*

Figure 48. *The dedication plaque located at the front entranceway of Resource 2.*

or association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 2 is not eligible under Criterion A. Cursory background research did not find that Resource 2 is associated with a significant person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 2 has undergone minimal alterations to its material makeup that have diminished its level of integrity in the areas of materials and workmanship. These alterations include non-historic roofing materials and non-historic entry doors. In addition, the building has become severely overgrown with vegetation, and multiple locations show deterioration or loss of materials. While this does not inherently diminish the resource's integrity, it does illustrate that the resource's materials are threatened and the evident deterioration and loss of material components to the resource have caused a loss of material components, thus the deterioration of the resource has diminished the resource's integrity. In addition, the resource does not represent a significant example of its resource type when compared to similar vernacular camp resources. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 2 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Resource 3: Resource 3 is a Framed Vernacular cabin located within the northeast portion of the project area, located approximately 208 yards northeast of the terminus of Partlow Camp Road. The resource is located approximately 0.39 miles east of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.46 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022). A review of aerial images indicates that the resource first appears between the 1966 and 1974 aerial images (NETR 2022; USGS 2022a). As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 3 is a single-story Framed Vernacular cabin within the northeast portion of the project area, located approximately 208 yards northeast of the terminus of Partlow Camp Road. The majority of the cabin has collapsed, exposing the internal structure to the elements, and severely deteriorating the material elements of the building. Aerial images indicate that the cabin had a non-historic side gable asphalt shingle roof. Visual inspection suggests that the building was clad in historic vertical wood board siding and had a continuous concrete block foundation. Due to the severe deterioration of the resource, fenestration elements could not be identified (Figures 49-51).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 3 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years and the campground no longer retains the integrity of feeling, setting, or association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 3 is not eligible under Criterion A. Cursory background research did not find that Resource 3 is associated with a significant person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 3 has lost the majority of its materials in addition to the collapse of the building in multiple locations. Due to this severe level of deterioration, the resource's integrity of design, materials, workmanship, and feeling have been diminished. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 3 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Figure 49. *View of Resource 3 looking southeast.*

Figure 50. *View of Resource 3 looking south.*

Figure 51. *View of Resource 3 looking northwest.*

Resource 4: Resource 4 is a picnic shelter located approximately 86 yards west of the northeast section of the project area, next to the Upper Partlow Lake, and approximately 259 yards east of the Partlow Camp Road terminus. The resource is located approximately 0.39 miles east southeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.37 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022 A review of aerial images indicates that the resource first appears between the 1966 and 1974 aerial images (NETR 2022; USGS 2022a). As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 4 is a picnic shelter located approximately 86 yards west of the northeast section of the project area, next to the Upper Partlow Lake, and approximately 259 yards east of the Partlow Camp Road terminus. The shelter features a non-historic front gable metal roof, non-historic wood square post supports, and a concrete slab foundation. The northwest end of the shelter features a large brick grill and chimney (Figures 52-54).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 4 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years and the campground no longer retains the integrity of feeling, setting, or

Figure 52. *View of Resource 4 looking north.*

Figure 53. *View of Resource 4 looking northwest.*

Figure 54. *View of Resource 4 looking southeast.*

association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 4 is not eligible under Criterion A. Cursory background research did not find that Resource 4 is associated with a significant Person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 4 has undergone multiple alterations to its material makeup that have diminished its level of integrity in the areas of materials and workmanship. These alterations include non-historic supports and non-historic roofing material. Due to these material alterations, the resource does not represent a significant example of its resource type. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 4 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Resource 5: Resource 5 is a Framed Vernacular cabin located within the central northern portion of the project area, approximately 126 yards southwest of the Partlow Camp Road Terminus. The resource is located approximately 0.23 miles east southeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.45 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022). Due to the image quality of historic aerial images, Resource 5 could not be identified at its current location. As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 5 is a single-story Framed Vernacular cabin within the central northern portion of the project area, approximately 126 yards southwest of the Partlow Camp Road Terminus. The building has a non-historic asphalt shingle hip roof, is clad in historic vertical board siding, and has a continuous concrete block foundation. The cabin features non-historic single pane windows and non-historic entry doors throughout. The building is severely overgrown with the surrounding vegetation (Figures 55-58).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 5 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years, and the campground no longer retains the integrity of feeling, setting, or association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 5 is not eligible under Criterion A. Cursory background research did not find that Resource 5 is associated with a significant person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 5 has undergone multiple alterations to its material makeup that has diminished its level of integrity in the areas of materials and workmanship. These alterations include non-historic roofing material, non-historic windows, and non-historic entry doors. Due to these material alterations, the resource does not represent a significant example of its resource type. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 5 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Resource 6: Resource 6 is a single-story Framed Vernacular cabin located within the central northern portion of the project area, approximately 142 yards west of the Partlow Camp Road Terminus. The resource is located approximately 0.20 miles east southeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.50 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Tuscaloosa County Tax Assessor did not offer a date of construction for the resource (TCTA 2022). Due to the image quality of historic aerial images, Resource 5 could not be identified at its current location. As previously stated, background research into the development of the Partlow Camp indicates that a majority of the camp and its associated facilities were constructed between 1970 and 1971. Therefore, an estimated construction date of c. 1970 was given to the resource.

Resource 6 is a single-story Framed Vernacular cabin within the central northern portion of the project area, approximately 142 yards west of the Partlow Camp Road Terminus. The cabin has a non-historic asphalt shingle hip roof, is clad in non-historic vertical wood board siding, and has a continuous concrete block foundation. The building features non-historic wood framed single pane windows and non-historic entry doors. The building has some vegetation growing up around the base of the foundation, and the roof has deteriorated in areas leading to the collapse of the gutter system (Figures 59 and 60).

Evaluated under Criterion A at the local and state level in the area of Health and Medicine for its association with the Alabama Jaycee Partlow Camp, neither Resource 6 nor the surrounding environment appears to retain enough integrity to maintain its association. The camp and the W.D. Partlow Development Center have been closed for several years, and the campground no longer retains the integrity of feeling, setting, or association. In addition, the materials, workmanship, and design of the facilities have been diminished with non-historic replacements and severe overgrowth and degradation. Therefore, with only the integrity of location remaining, Resource 6 is not eligible under Criterion A. Cursory background research did not

Figure 55. *View of Resource 5 looking north.*

Figure 56. *View of Resource 5 looking northeast.*

Figure 57. *View of Resource 5 looking southeast.*

Figure 58. *View of Resource 5 looking west.*

Figure 59. *View of Resource 6 looking south.*

Figure 60. *View of Resource 6 looking southwest.*

find that Resource 6 is associated with a significant person or figure(s). Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, Resource 6 has undergone multiple alterations to its material makeup that has diminished its level of integrity in the areas of materials and workmanship. These alterations include non-historic roofing material, non-historic cladding, non-historic windows, and non-historic entry doors. Due to these material alterations, the resource does not represent a significant example of its resource type. Therefore, it is not eligible under Criterion C. It is the opinion of TerraX that Resource 6 is not eligible for inclusion in the NRHP and that the proposed project will have no effect.

Resource 7 (Errie Giles Headstone): Resource 7 is a single grave marker located in the southeast corner of the project area, approximately 200 yards north of McFarland Blvd and approximately 472 yards west of Rose Blvd. The resource is located approximately 0.57 miles southeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.29 miles southwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The grave is not registered on FindAGrave, and the landowner did not have any additional information about the grave but did indicate that they were not aware of any additional graves nearby. No other graves were observed in the vicinity. The grave marker is dated 1923.

Resource 7 is a single grave marker located in the southeast corner of the project area, approximately 200 yards north of McFarland Blvd and approximately 472 yards west of Rose Blvd. The grave is a shouldered tablet stone marker made of sandstone. The grave marker has been etched with hand tools. The marker has deteriorated slightly, so a rubbing was taken to attempt to bring out the lettering more clearly. The marker appears to say, “Errie, Dad of Jack and Van Giles, Feb. 15, 1902, Aug. 26, 1923.” The grave is surrounded by dense vegetation. No other graves were observed nearby (Figures 61 and 62: see Figure 23).

In addition to significance under Criteria A-C, cemeteries must also meet Special Considerations C or D to be eligible for listing in the NRHP (Potter and Boland 1992). Evaluated for Criterion A, the Errie Giles grave marker is not associated with a significant event. Therefore, it is not eligible under Criterion A. Evaluated for Criterion B, background research did not identify significant contributions to history by Errie Giles. Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, the single marker and its general condition makes it a poor representative of funerary architecture in the early twentieth century. Furthermore, the shouldered tablet stone marker type is commonly found. Therefore, it is not eligible under Criterion C. Given that the grave marker is not eligible under Criteria A-C, the threshold for applying Special Considerations C or D is not met. It is the opinion of TerraX that Resource 7 is not eligible for NRHP inclusion.

Resource 8 (The Sutton Family Cemetery): Resource 8 is located approximately 345 yards east of Mt. Olive Road and approximately 98 yards north of Partlow Camp Road. The resource is located approximately 0.21 miles northeast of the intersection of Mt. Olive Road and Partlow Camp Road and approximately 0.68 miles northwest of the intersection of Rose Boulevard and Daisy Lane. The setting of the resource consists of wooded lands, open fields, a landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

The Sutton Family Cemetery features eight markers. The oldest marker, Elizabeth Wilkins Sutton, is dated to 1837. The most recent marker, Martha Elizabeth Skelton Sutton, is dated to 1886 (FindAGrave 2022). The cemetery is no longer active. The Sutton Family Cemetery has been previously recorded and was listed on the Alabama Historic Cemetery Register on October 19, 2012. The cemetery is located on private

Figure 61. *View of Resource 7 looking west.*

Figure 62. *View of Resource 7 looking west, including surrounding area.*

property and is a partially maintained family cemetery. The cemetery is surrounded by a non-historic chain-link fence and seems to be organized by family groups with markers oriented east to west. Marker types include footstone and headstone markers. The cemetery does not appear to include any military markers or unique marker designs. The markers appear to be a mixture of sandstone and granite markers, and some show signs of previous damage (Figures 63-67).

In addition to significance under Criteria A-C, cemeteries must also meet Special Considerations C or D to be eligible for listing in the NRHP (Potter and Boland 1992). Evaluated for Criterion A, the Sutton Family Cemetery is not associated with a significant event. Therefore, it is not eligible under Criterion A. Evaluated for Criterion B, background research did not identify significant contributions to history by any members of the Sutton Family. Therefore, it is not eligible under Criterion B. Evaluated for Criterion C, the foot and headstone markers and their general condition, with elements of previous damage, makes them a poor representative of funerary architecture in the mid-to-late-nineteenth century. Furthermore, the foot and headstone marker types are commonly found. Therefore, it is not eligible under Criterion C. Given that the Sutton Family Cemetery is not eligible under Criteria A-C, the threshold for applying Special Considerations C or D is not met. It is the opinion of TerraX that Resource 8, The Sutton Family Cemetery is not eligible for NRHP inclusion.

Figure 63. *View of Resource 8 looking east.*

Figure 64. *View of Resource 8 looking east, featuring Elizabeth and Abnar Sutton's marker.*

Figure 65. *View of Resource 8 looking east, featuring Martha and William Sutton's marker.*

Figure 66. *View of Resource 8 looking east, featuring the marker stone for Joseph, Permella, Lucy, and Swan Sutton.*

Figure 67. *View of Resource 8 looking southwest.*

Conclusions and Recommendations

TerraX, under contract with TTL, Inc. on behalf of Black Warrior Solid Waste Authority (BWSW), conducted a cultural resource survey for the proposed expansion of the Black Warrior Solid Waste landfill in Tuscaloosa County, Alabama, in compliance with federal and state regulations. The Phase I survey was performed on June 13 to June 16 and June 20 to June 24, 2022, and the architecutural survey was performed on June 24, 2022. Paul D. Jackson served as the Principal Investigator and was assisted by Christopher Rivers, Cory Rice, Joshua Shiers, Michael Geonzalez, and Conner Elliot.

The archaeological investigation discovered two new archaeological sites (1Tu1170 and 1Tu1171). The investigated portion of 1Tu1170 lacked signifcant data potential to address archaeological research questions. However, 1Tu1170 was not fully delineated due to constraints of the project area and is therefore recommended as unknown for NRHP eligibility under Criterion D. TerraX recommends that any unknown portion of this site extending outside the project area be designated as an ESA and avoided by any ground-disturbing activities associated with project construction through the placement of OBF. 1Tu1171 lacked significant data potential to address archaeological research questions and was recommended as ineligible for the NRHP under Criterion D. Before field work was conducted, TerraX was alerted by TTL and the construction to the presence of a grave marker within the project area. Visual inspection of the area did not identify any other possible burials or grave markers. In compliance with state cemetery law (Code of Alabama 13A-7-23.1), TerraX recommends that a 25 ft boundary be placed around the grave marker, and the area should be designated as an ESA to be marked with an OBF and avoided by any construction activities. There is always the possibility of undetected cultural resources such as graves or other cultural features not discovered through standard survey methods. All work should be halted in the unlikely event that burials or cultural features are revealed during the proposed project. The Alabama Historical Commission should be alerted of the discovery. The architectural survey identifed eight resources within the project's indirect APE. All eight resources were recommended as ineligible for the NRHP. As such, TerraX recommends that the future undertaking be allowed to proceed regarding cultural resource concerns.

References

Alabama Historical Commission (AHC)

2006 Alabama Historical Commission Policy for Archaeological Survey and Testing in Alabama. Alabama Historical Commission. Alabama State Historic Preservation Office (ALSHPO), Montgomery, Alabama.

2022 Alabama Register of Landmarks and Heritage (ARLH). Electronic document, http://ahc.alabama.gov/alabamaregister.aspx, accessed May 27, 2022.

Alabama Maps

2022a Historical Atlas of Alabama, Vol. II, Cemeteries by County. Electronic document, http://alabamamaps.ua.edu/cemetary/cemetary.html, accessed July 2022.

2022b Historical Atlas of Alabama, Vol. II, Cemeteries by County. Electronic document, http://alabamamaps.ua.edu/cemetary/Tuscaloosa.pdf, accessed July 2022.

FindAGrave

2022 Sutton Family Cemetery. Electronic document, http://www.findagrave.com/cemetery/2326010/sutton-family-cemetery, accessed May 27, 2022.

Hendryx, Gregory S.

1994 *An Archaeological Survey and Cultural Resource Inventory of the Proposed Coker Landfill, Tuscaloosa County, Alabama.* Prepared for Carter, Darnell & Grubbs Engineers, Inc. Andalusia, Alabama. Prepared by Panamerican Consultants, Inc. Tuscaloosa, Alabama.

Knight Jr., Vernon James

1983 *A Cultural Resource Survey of Railroad Spur Construction Areas in the Tuscaloosa County Industrial Park.* Prepared for Tuscaloosa County Industrial Park Tuscaloosa, Alabama. Prepared by the Office of Archaeological Research at The University of Alabama, Moundville, Alabama.

Meyer, Jeffery M.

1992 *A Cultural Resource Survey of Various Borrow Pits in Tuscaloosa, Hale, and Marengo Counties, Alabama.* Prepared for S.T. Bunn Construction Company Tuscaloosa, Alabama. Prepared by the Division of Archaeology at The University of Alabama, Moundville, Alabama.

Mistovich, Tim

1980 *A Cultural Resource Survey of Portions of the Proposed Tuscaloosa County Industrial Park.* Prepared for Tuscaloosa County Industrial Development Authority Tuscaloosa, Alabama. Prepared by the Office of Archaeological Research at The University of Alabama, Moundville, Alabama.

National Park Service (NPS)

2022 National Register of Historic Places. Electronic document, http://www.nps.gov/nr/research/, accessed May 27, 2022.

Nationwide Environmental Title Research (NETR)
2022 Aerial photographs. Electronic document, https://www.historicaerials.com/viewer, Web accessed May 27, 2022.

Oakley, Brand
1989 *A Cultural Resource Survey of a Proposed Landfill Study for a Waste Disposal in Tuscaloosa County, Alabama.* Prepared for Hankins, Harrison, and Cabiness, Inc, Tuscaloosa, Alabama. Prepared by the Division of Archaeology at The University of Alabama, Moundville, Alabama.

Oakley, Warren C., Daniel G. Tillman, Marina S. Klaric, Terry L. Ernsberger, and Larry R. Dunn, Jr.
1994 *An Archaeological Reconnaissance Level Survey of Three Proposed Highway Corridors for the Proposed Tuscaloosa Eastern Bypass in Tuscaloosa County, Alabama.* Prepared for Volkert & Associates, Inc. Mobile, Alabama. Prepared by the Division of Archaeology at The University of Alabama, Moundville, Alabama.

Patterson, Paul, Scott Shaw, John Newman, and Greg Norton
1991 *A Cultural Resource Survey for the Proposed Tuscaloosa Supply Line Natural Gas Pipeline, Northwestern Tuscaloosa County, Alabama.* Prepared for Southern Natural Gas Company Birmingham, Alabama. Prepared by the Division of Archaeology at The University of Alabama, Moundville, Alabama.

Potter, Elisabeth Walton, and Beth M. Boland
1992 National Register Bulletin 41: Guidelines for Evaluating and Registering Cemeteries and Burial Places. Electronic document, https://www.nps.gov/subjects/nationalregister/upload/NRB41-Complete.pdf, accessed May 27, 2022.

Ryba, Beth A. and Marla J. Spry
1991 *A Cultural Resources Assessment for the Proposed County Road 2 Connector Right-of-Way between Coker and Romulus, Tuscaloosa County, Alabama.* Prepared for Burk-Kleinpeter, Inc. Tuscaloosa, Alabama. Prepared by MRS Consultants, LLC. Tuscaloosa, Alabama.

Szabo, E.W., Osborne, W.E., Copeland, C.W. Jr. and Neathery, T.L.
1988 Geologic map of Alabama: Geological Survey of Alabama, Special Map 2020. Electronic document, http://ngmdb.usgs.gov/ngm-bin/pdp/zui_viewer.pl?id=7327, accessed June 2022.

The Montgomery Advertiser
1969 *Jaycees Seek Aid to Build Camp for Mentally Retarded*, March 20, 1969, Page 2, Montgomery, Alabama. Electronic document, https://www.newspapers.com/image/256063907/?terms=Alabama%20Jaycee%20Partlow%20Camp&match=1, accessed July 5, 2022.

1971 *They're Older-But They're Still Going Strong!*, October 19, 1971, Pages 69-70, Montgomery, Alabama. Electronic document, https://www.newspapers.com/image/256366572/?terms=Alabama%20Jaycee%20Partlow%20Camp&match=1, accessed July 5, 2022.

The Selma Times-Journal
1970 *Contract Signed for Lodge at Camp Partlow*, May 3, 1970, Page 37, Selma, Alabama. Electronic document, https://www.newspapers.com/image/571411654/?terms=Alabama%20Jaycee%20Partlow%20Camp&match=1, accessed July 5, 2022.

1970 *Honey Provides Sweet Way for Partlow Camp*, November 6, 1970, Page 2, Selma, Alabama. Electronic document, https://www.newspapers.com/image/570756223/?terms=Alabama%20Jaycee%20Partlow%20Camp&match=1, accessed July 5, 2022.

Thomson, Jefferson M.
1994 *Archaeological Survey of the Proposed Hanna Steel Rail-Line and Barge Slip Corridor Tuscaloosa County, Alabama.* Prepared for Almon Associates, Inc. Tuscaloosa, Alabama. Prepared by Panamerican Consultants, Inc. Tuscaloosa, Alabama.

Tuscaloosanews.com
2011 *Partlow Center Closes After 88 Years.* Electronic Document, https://www.tuscaloosanews.com/story/news/2011/12/29/partlow-center-closes-after-88-years/28399354007/, accessed July 5, 2022

2020 *Looking Back: This week in West Alabama History: May 11, 2020*. Electronic Document, https://www.tuscaloosanews.com/story/lifestyle/columns/2020/05/11/looking-back-this-week-in-west-alabama-history-may-11-2020/1189201007/, accessed July 5, 2022.

Tuscaloosa County Tax Assessor (TCTA)
2022 Property Search GIS Database, Electronic document, http://www.alabamagis.com/Tuscaloosa/, accessed June 7, 2022.

United States Department of Agriculture (USDA)
2022 Web Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture. Electronic document, http://websoilsurvey.nrcs.usda.gov/ Web Accessed June 2022.

United States Geological Survey (USGS)
2022a EarthExplorer. Electronic document, https://earthexplorer.usgs.gov/, accessed May 27, 2022.

2022b topoView. Electronic document, https://ngmdb.usgs.gov/topoview/viewer, accessed May 27, 2022.

University of Alabama (UA)
2022a Alabama State Archaeological Site File (ASASF). Database information compiled by The University of Alabama. Electronic document, http://oar.museums.ua.eud/services/alabama, accessed June 2022.

2022b Alabama Cultural Online Resource Database (ACORD). Database information compiled by The University of Alabama. Electronic document, http://appserver.oas.ua.edu/assf/Login.jsp, accessed June 2022.

Webb, Robert S.
2000 A*rchaeological Survey Proposed Lake Eledge Telecommunications Tower Sity (AHC-00-1293) Tuscaloosa County, Alabama.* Prepared for Terracon Norcross, Georgia. Prepared by R.S. Webb & Associates Holly Springs, Georgia.

APPENDIX A:
CURATION AGREEMENT

Troy, Alabama
36082

334-670-3000

TROY
UNIVERSITY

FROM: Stephen Carmody

TO: Paul Jackson
Terra Xplorations
3523 18th Ave NE
Tuscaloosa, Alabama 35406
DATE: November 16, 2021

SUBJECT: Letter of Acceptance of Archaeological Collections

This memo serves as our [Troy University Archaeological Research Center] acceptance and long-term curation of archaeological collections from TerraXplorations.

We appreciate this opportunity to be of assistance and look forward to working with you in the future.

Sincerely,

Stephen Carmody
Troy University Archaeological Center
120 MSCX
Troy, Alabama 36082
Lab Phone: (334) 808-6771
Office Phone: (334) 808-6850

APPENDIX B:
Artifact Inventory List

Artifact Inventory List

Site #	*Location*	*Artifact Description*	*Count*	*Weight/g*	*Access #*
1TU1171					
	Surface				
	Bag # 1				
		whole wire cut brick	1	2540.12	2022.077.1
		earthenware plumbing pipe fragment	1	272.15	2022.077.2
		concrete fragment	1	201.8	2022.077.3
		Location Total	3		
		Site Total	3		
		Total	3		

APPENDIX C:
Alabama State Site Cards

Site: TU1170 Retrieve Site

Site Name: TTL1,2

Location and Size

Easting: 440303 Northing: 3678371 Elevation: 201

Township: 21S Range: 11W Section: 12

SW 1/4 of NE 1/4 of NW 1/4

Major Axis: 69 Minor Axis: 54 Max Depth: 30

Location and Size

Preservation State: CONSTRUCTION

Immediate Destruction Pending: Y Looting/Vandalism: N % Destroyed: 40

National Register Status: UNDE

Archaeological Information

Level of Investigation: INTENSIVE

Excavation Status: SURFACE & SHOVEL

Topographic Association: UPLAND SLOPE

Physiographic District: FALL

Physiographic Section: COASTAL

Nearest Water Source: LAKE

Direction To: E Distance To: 100 At Confluence: ?

Drainage Basin: ----------

Ground Cover: UNIMPROVED

Soil Type: LUVERNE-SMITHDALE

Soil Texture Class: SANDY LOAM AND CLAY

County Soil Survey: null

Degree of Disturbance: ENTIRE

Characteristics

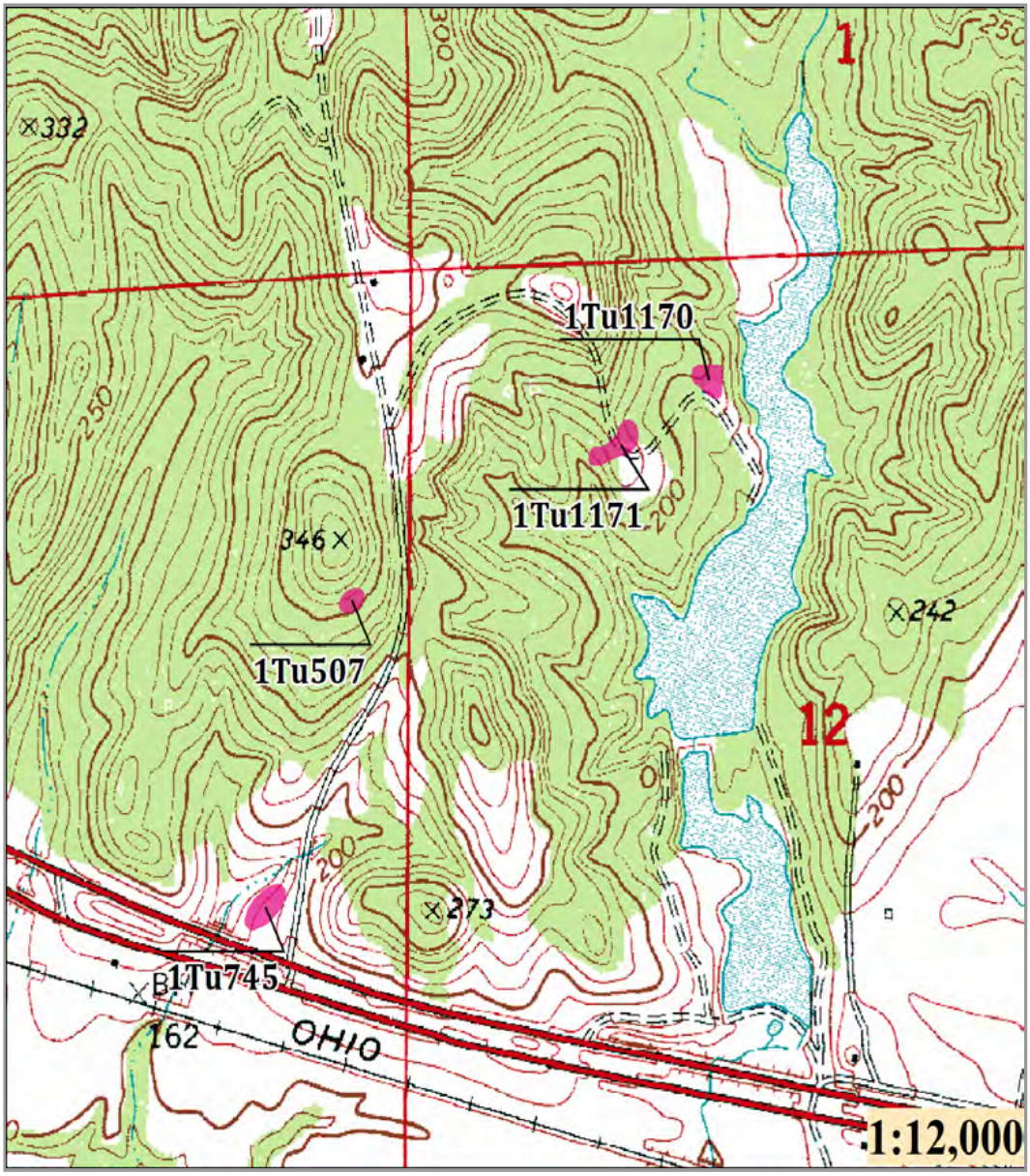
☐ Human Remains	☐ Stone Mound(s)
☑ Features	☐ Weir
☐ Petroglyph/Pictrograph	☐ Quarry
☐ Rockshelter	☐ Standing Historic Structure
☐ Cave	☐ Historic Structure Site
☑ Artifact Scatter	☐ Historic Cemetery
☐ Midden	☐ Still
☐ Shell Midden	☐ Mill
☐ Single Earthen Mound	☐ Engineering
☐ Multiple Earthen Mound	☐ Other

Components

MID TO LATE 20TH CENTURY NONABORIGINAL

Comments

THE SITE WAS IDENTIFIED BY THE PRESENCE OF SURFACE SCATTER, CINDERBLOCK, WOOD, SHEET METAL, AS WELL AS A PARTIALLY COLLAPSED STRUCTURE AND A PAVED CONCRETE PATH. HOWEVER, THE ARRANGEMENT OF THESE FEATURES ON THE LANDSCAPE DOES NOT OFFER INSIGHT INTO THE HISTORIC ACTIVITIES PERFORMED IN THIS AREA AND/OR THE HISTORIC STRUCTURE ONCE PRESENT IN THIS LOCATION. SUBSURFACE TESTING DID IDENTIFY ARTIFACTS, BUT THE ARTIFACTS WERE NOT COLLECTED DUE TO BEING CONSTRUCTION MATERIALS. GIVEN THE NOTED DISTURBANCES WITHIN THE AREA, THE DISJOINTED NATURE OF THE FEATURES, AND THE LIKELY REDEPOSITED NATURE OF THE ARTIFACTS, THE INVESTIGATED PORTION OF THIS SITE LACKS SIGNIFICANT DATA POTENTIAL TO ADDRESS RESEARCH QUESTIONS ABOUT MID-TO-LATE TWENTIETH CENTURY CULTURAL PRACTICES. THE SITE LACKS INTEGRITY OF SETTING, LOCATION, DESIGN, MATERIALS, WORKMANSHIP, FEELING, ASSOCIATION, SPACE, TIME, AND OCCUPATION. HOWEVER, SINCE THE EASTERN PORTION OF THE SITE COULD NOT BE FULLY DELINEATED DUE TO THE CONSTRAINTS OF THE PROJECT AREA, THE OVERALL NRHP ELIGIBILITY IS CONSIDERED UNKNOWN UNDER CRITERION D. TERRAX RECOMMENDS THAT ANY UNKNOWN PORTION OF THIS SITE EXTENDING OUTSIDE THE PROJECT AREA BE DESIGNATED AS AN ENVIRONMENTALLY SENSITIVE AREA AND AVOIDED BY AN GROUND-DISTURBING ACTIVITIES ASSOCIATED WITH PROJECT CONSTRUCTION THROUGH THE PLACEMENT OF ORANGE BARRIER FENCING.



USGS 7.5' Topographic Map: COKER

Record Type: ☑ Clear ☐ Master ☐ Synonym

Form Status: ☐ Final ☐ Verified ☑ New

Form Completion: ☐ Final ☐ Map Search ☐ Literature Search

Sponsor Type:	PRI	Sponsored By:	TTL
Recorder Type:	PRI	Recorded By:	TerraXplorations
Date Submitted:	2022-07-14	Date Revised:	2022-07-18

Site: TU1171 Retrieve Site

Site Name: TTL3,4

Location and Size

Easting:	440141	Northing:	3678269	Elevation:	224	
Township:	21S	Range:	11W	Section:	12	
	SE	1/4 of	NW	1/4 of	NW	1/4
Major Axis:	104	Minor Axis:	29	Max Depth:	30	

Location and Size

Preservation State: CONSTRUCTION

Immediate Destruction Pending: Y Looting/Vandalism: N % Destroyed: 40

National Register Status: NO?

Archaeological Information

Level of Investigation: INTENSIVE

Excavation Status: SURFACE & SHOVEL

Topographic Association: FLOOD PLAIN

Physiographic District: FALL

Physiographic Section: COASTAL

Nearest Water Source: LAKE

Direction To: E Distance To: 241 At Confluence: ?

Drainage Basin: ----------

Ground Cover: UNIMPROVED

Soil Type: BOSWELLOAM/SMITHDALE

Soil Texture Class: CLAY

County Soil Survey: null

Degree of Disturbance: ENTIRE

Characteristics

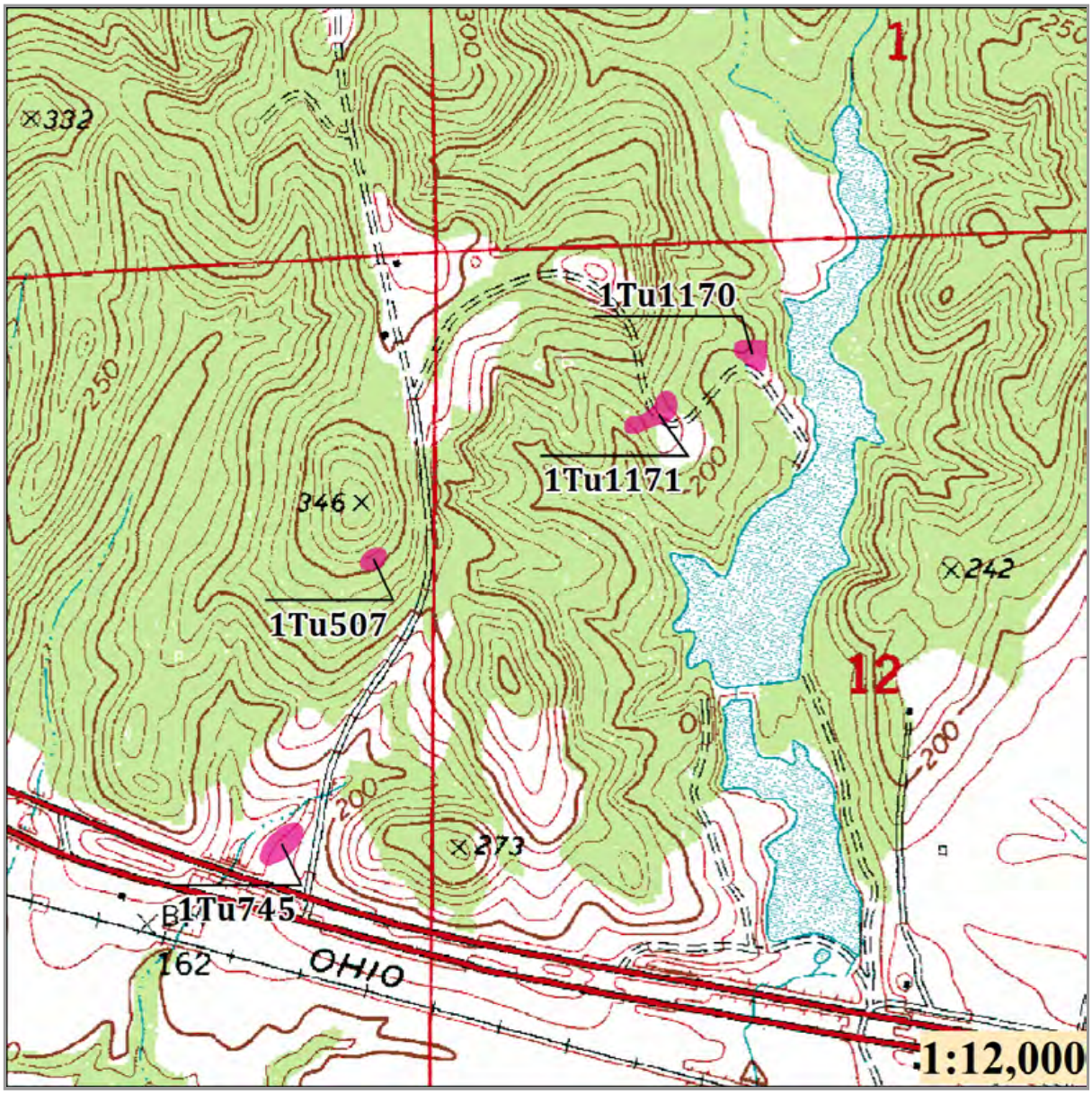
☐ Human Remains	☐ Stone Mound(s)
☑ Features	☐ Weir
☐ Petroglyph/Pictrograph	☐ Quarry
☐ Rockshelter	☐ Standing Historic Structure
☐ Cave	☑ Historic Structure Site
☑ Artifact Scatter	☐ Historic Cemetery
☐ Midden	☐ Still
☐ Shell Midden	☐ Mill
☐ Single Earthen Mound	☐ Engineering
☐ Multiple Earthen Mound	☐ Other

Components

MID TO LATE 20TH CENTURY NONABORIGINAL

Comments

THE HISTORIC ARTIFACT ASSEMBLAGE WAS RECOVERED ON THE SURFACE DURING VISUAL INSPECTION OF THE SITE AREA WHICH INCLUDED A WHOLE WIRE CUT BRICK, AN EARTHENWARE PLUMBING PIPE FRAGMENT, AND A CONCRETE FRAGMENT. INVESTIGATORS ALSO NOTED PRESENCE OF A PAVED PATH AND A HOUSE FOUNDATION. THE ARRANGEMENT OF FEATURES DOES NOT OFFER INSIGHT INTO THE HISTORIC ACTIVITIES PERFORMED IN THE AREA AND/OR THE HISTORIC STRUCTURES ONCE PRESENT. THE ASSEMBLAGE CONSISTS OF ARCHITECTURAL ARTIFACTS, WHICH REFLECT EITHER MATERIAL FROM A FORMER STRUCTURE AND/OR REDEPOSITED DISCARD. GIVEN THE ABSENCE OF AN INFORMATIVE ARTIFACT ASSEMBLAGE, AND THE LIKELY REDEPOSITED AS WELL AS FRAGMENTARY NATURE OF THE ASSEMBLAGE, THIS SITE LACKS SIGNIFICANT DATA POTENTIAL TO ADDRESS RESEARCH QUESTIONS ABOUT LATE TWENTIETH CENTURY CULTURAL PRACTICES. THE SITE LACKS INTEGRITY OF SETTING, LOCATION, DESIGN, MATERIALS, WORKMANSHIP, FEELING, ASSOCIATION, SPACE, TIME, AND OCCUPATION. AS SUCH, TERRAX RECOMMENDS THIS SITE INELIGIBLE FOR NRHP INCLUSION UNDER CRITERION D. NO FURTHER WORK IS NEEDED IN THIS SITE AREA.



USGS 7.5' Topographic Map: COKER

Record Type: ☑ Clear ☐ Master ☐ Synonym

Form Status: ☐ Final ☐ Verified ☑ New

Form Completion: ☐ Final ☐ Map Search ☐ Literature Search

Sponsor Type: PRI | Sponsored By: TTL

Recorder Type: PRI | Recorded By: TerraXplorations

Date Submitted: 2022-07-14 | Date Revised: 2022-07-18

APPENDIX D:
HISTORIC BUILDING SURVEY FORMS

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00001	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Aerial Image, Historic News Papers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Fair	Remaining historic fabric: (High, Medium, Low)	Low

No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)	Sheet Metal Siding	Roof finish material(s):	Metal
Main roof configuration:	Shed	Foundation material:	Brick
Porch type:			
Window type and materials:			
Describe alterations:	non-historic cladding and non-historic roofing material		
Number and type of all outbuildings: (if significant, fill out separate survey form)			
Exterior Architectural Description:	non-historic metal shed roof, is clad in non-historic sheet metal siding, and has a continuous brick foundation. The southeast elevation features a metal iron bar attached to the underside of the shed roof, most likely in order to access the interior of the resource		
Description of Setting:	The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.		
Historical Notes:			

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined
Justification of Eligibility/Ineligibility:	The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00002	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Aerial Image, Historic Newspapers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Fair	Remaining historic fabric: (High, Medium, Low)	Medium

No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)	Vertical Board siding	Roof finish material(s):	Asphalt Shingle
Main roof configuration:	Gable	Foundation material:	Concrete Block
Porch type:	Recessed Entry Porch		
Window type and materials:	Wood Frame fixed 1/1 and single pane		
Describe alterations:	non-historic roofing materials and non-historic entry doors		

Number and type of all outbuildings:
(if significant, fill out separate survey form)

Exterior Architectural Description: non-historic side gable asphalt shingle roof, is clad in original vertical board siding, and has a continuous concrete block foundation. The front (west) and rear (east) elevations feature recessed entryways with non-historic metal double-entry doors with large single lights framed in the top half of the door. The building features original wood frame fixed 1/1 and single pane windows throughout. The building features multiple historic wood entry doors, some retain associated wood screen doors. The roof features 3 historic camel hump metal vents evenly spaced along the roof's ridgeline. The building has several locations where the wood siding and roof has begun to deteriorate, in addition the surrounding vegetation has begun to grow over and work itself into portions of the building. Some of the windows appear damaged or missing.

Description of Setting: The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

Historical Notes:

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined

Justification of Eligibility/Ineligibility: The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00003	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Aerial Image, Historic Newspapers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Ruinous	Remaining historic fabric: (High, Medium, Low)	Low

No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)	Vertical Woodboar Siding	Roof finish material(s):	Asphalt Shingle
Main roof configuration:	Gable	Foundation material:	Concrete Block
Porch type:			
Window type and materials:			
Describe alterations:			

Number and type of all outbuildings:
(if significant, fill out separate survey form)

Exterior Architectural Description: The majority of the cabin has collapsed, exposing the internal structure to the elements, and severely deteriorating the material elements of the building. Aerial images indicate that the cabin had a non-historic side gable asphalt shingle roof.

Visual inspection suggests that the building was clad in historic vertical wood board siding and had a continuous concrete block foundation. Due to the severe deterioration of the resource, fenestration elements could not be identified

Description of Setting: The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.

Historical Notes:

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined

Justification of Eligibility/Ineligibility: The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00004	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Aerial Image, Historic Newspapers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Good	Remaining historic fabric: (High, Medium, Low)	Medium
No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)		Roof finish material(s):	Metal
Main roof configuration:	Gable	Foundation material:	Concrete Slab
Porch type:			
Window type and materials:			
Describe alterations:	non-historic supports and non-historic roofing material.		
Number and type of all outbuildings: (if significant, fill out separate survey form)			
Exterior Architectural Description:	Picnic Shelter located approximately 86 yards west of the northeast section of the project area, next to the Upper Partlow Lake, and approximately 259 yards east of the Partlow Camp Road terminus. The shelter features a non-historic front gable metal roof, non-historic wood square post supports, and a concrete slab foundation. The northwest end of the shelter features a large brick grill and chimney		
Description of Setting:	The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.		
Historical Notes:			

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined
Justification of Eligibility/Ineligibility:	The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00005	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Visual Inspection, Historic Newspapers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Fair	Remaining historic fabric: (High, Medium, Low)	Medium

No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)	Vertical Woodboard Siding	Roof finish material(s):	Asphalt Shingle
Main roof configuration:	Hip	Foundation material:	Concrete Block
Porch type:			
Window type and materials:	Woodframe Single Pane		
Describe alterations:	non-historic roofing material, non-historic windows, and non-historic entry doors		
Number and type of all outbuildings: (if significant, fill out separate survey form)			
Exterior Architectural Description:	The building has a non-historic asphalt shingle hip roof, is clad in historic vertical board siding, and has a continuous concrete block foundation. The cabin features non-historic single pane windows and non-historic entry doors throughout. The building is severely overgrown with the surrounding vegetation		
Description of Setting:	The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.		
Historical Notes:			

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined
Justification of Eligibility/Ineligibility:	The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

ALABAMA HISTORICAL COMMISSION
The State Historic Preservation Office

468 S. Perry Street
Montgomery, Alabama 36130-0900
Voice: (334)242-3184
Fax: (334)262-1083
www.ahc.alabama.gov

HISTORIC BUILDING SURVEY FORM

1. Location/Ownership

AHC Survey Number:	TU00006	Form completed by:	David Dobbs, Architectural Historian	Date:	6/29/2022
Property Name:	Alabama Jaycee Partlow Camp				
Location/Street Address:	11331 Partlow Camp Road				
City/Zip:	Coker, 35452			County:	Tuscaloosa
USGS Quad:	Coker, AL			Township/Range/Section:	78N 40E S12
Current Owner's Name & Contact Info (if known):	Black Warrior Solid Waste, 3301 Landfill Drive, Coker AL 35452				

2. Physical Description

Construction date:	c. 1970	Source:	Visual Inspection, Historic Newspapers
Alteration date:		Source:	
Architect/Builder:		Contractor:	
Physical condition: (Excellent, Good, Fair, Poor, Ruinous)	Good	Remaining historic fabric: (High, Medium, Low)	Medium
No. of stories:	One		
Historic use of property:	Recreation		
Current use of property:	Recreation		
Architectural style category:	No Style	Architectural style sub-category:	
Basic typology:		Basic shape:	Rectangular
Basic floor plan:	Unknown	Historic Construction material(s):	
Current exterior wall material(s)	Vertical Woodboard Siding	Roof finish material(s):	Asphalt Shingle
Main roof configuration:	Hip	Foundation material:	Concrete Block
Porch type:			
Window type and materials:	Wood Frame Single Pane		
Describe alterations:	non-historic roofing material, non-historic cladding, non-historic windows, and non-historic entry doors.		
Number and type of all outbuildings: (if significant, fill out separate survey form)			
Exterior Architectural Description:	The cabin has a non-historic asphalt shingle hip roof, is clad in non-historic vertical wood board siding, and has a continuous concrete block foundation. The building features non-historic wood framed single pane windows and non-historic entry doors. The building has some vegetation growing up around the base of the foundation and the roof has deteriorated in points leading to the collapse of the gutter system		
Description of Setting:	The setting of the resource consists of wooded lands, open fields, landfill, Upper Lake Partlow, and a mixture of historic and non-historic residential and industrial properties.		
Historical Notes:			

3. Eligibility

Appears Eligible for Alabama Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
Appears Eligible for National Register:	☐ Yes ☑ No ☐ would contribute to a district ☐ Undetermined
AR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
NR Criteria:	☐ A ☐ B ☐ C ☐ D ☐ Undetermined
Level of Significance:	☐ Local ☐ State ☐ National ☐ Undetermined
Justification of Eligibility/Ineligibility:	The resource is ineligible for listing in the NRHP, either individually or as a contributing resource within a potential or existing historic district, due to a lack of historic significance and architectural distinction.

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

FRANK W. WHITE
EXECUTIVE DIRECTOR

TEL: 334-242-3184
FAX: 334-240-3477

August 16, 2012

Sarah Sightler
CDG Engineers
P.O. Box 278
Andalusia, Alabama 36420

Re: AHC 12-1353
Cultural Resource Assessment
Black Warrior Landfill (Coker Landfill)
Tuscaloosa County, Alabama

Dear Ms. Sightler:

Upon review of the cultural resource assessment submitted by your office, we have determined that project activities will have no adverse effect on cultural resources eligible for or listed on the National Register of Historic Places. Therefore, we concur with the proposed project activities. However, should artifacts or archaeological features be encountered during project activities, work shall cease and our office shall be consulted immediately.

We appreciate your efforts on this project. Should you have any questions, please contact Greg Rhinehart at (334) 230-2662. Please have the AHC tracking number referenced above available and include it with any correspondence.

Truly yours,

Elizabeth Ann Brown

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/GCR/gcr

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 South Perry Street
MONTGOMERY, ALABAMA 36130-0900

F. LAWERENCE OAKS
EXECUTIVE DIRECTOR

TELEPHONE NUMBER
242-3184

August 21, 1995

RECEIVED AUG 2 5 1995

David Welch
Carter, Darnell, and Grubbs, Inc.
P.O. Box 278
Andalusia, Alabama 36420

Re: AHC 95-1572
Cultural Resource Assessment
Coker Landfill
Tuscaloosa County, Alabama

Dear Mr. Welch:

Upon review of the cultural resource assessment conducted by Panamerican Consultants, the Alabama Historical Commission has determined the following. We agree with the reports findings that the project activities will not affect any cultural resources listed on or eligible for the National Register of Historic Places. Therefore, our office can concur with the proposed project.

We appreciate your efforts in helping us preserve Alabama's cultural heritage. If we may be of further service or if you have any questions or comments, please contact Greg Rhinehart of our office.

Sincerely,

F. Lawerence Oaks
State Historic Preservation Officer

FLO/GCR/gtj

AN ARCHAEOLOGICAL SURVEY AND CULTURAL RESOURCE INVENTORY OF THE PROPOSED COKER LANDFILL, TUSCALOOSA COUNTY, ALABAMA

by
Gregory S. Hendryx

Performed for:

Carter, Darnell & Grubbs Engineers, Inc.
P.O. Box 278
Andalusia, Alabama 36420

Performed by:

Panamerican Consultants, Inc.
924 26th Avenue East
Tuscaloosa, Alabama 35441

Tim S. Mistovich
Principal Investigator

October 18, 1994

An Archaeological Survey and Cultural Resource Inventory of the Proposed Coker Sanitary Landfill Tuscaloosa County, Alabama

Introduction

On October 11 and 17, 1994, an archaeological survey team from Panamerican Consultants, Inc. (PCI) conducted a cultural resource assessment of a 200-acre tract of land to be impacted by the proposed Coker landfill. The project area's southern end is marked by U.S. Highway 82, and the eastern end is marked by Mt. Olive Road. The western boundary is marked by existing landfill activity. The area extends approximately one-half mile east-west, and just under a mile north-south. It is located in the Northeastern ¼ of Section 11, Township 21 South, Range 11 West, as well as the Southeastern ¼ of Section 2, Township 21 South, Range 11 West, as shown on the USGS 7.5' 1969 (photorevised 1978) Coker topographic quadrangle (Figure 1).

Environmental Setting

The survey area is located in the Fall Line Hills district of the Highland Rim physiographic region of Alabama. Elevation of the project area ranges from approximately 150 feet (ft) to 340 ft above mean sea level (AMSL). The southern and eastern boundaries of the survey area are characterized by thick underbrush, mature hardwoods, and pines. Toward the center of the area, elevation increases and pines are the predominant vegetation. In the higher elevations, generally toward the eastern sector, clear-cutting and erosion have disturbed the area. In fact, shovel tests revealed light-colored soil situated under darker topsoil, indicating that the soil had been turned over. In the southeastern sector of the survey area numerous roadcuts have been created, which are now characterized by extensive erosion.

In the drainage area, Boswell loam is the predominant soil; this is a moderately well drained soil. The higher elevations are characterized by three varieties of soils, all belonging to the Smithdale-Luverne series. Luverne-Smithdale complex, 4 to 10 percent slopes, is a well drained soil found on low lying hills and knolls in the southern part of the county. Smithdale-Luverne complex, 15 to 35 percent slopes, are well drained soils located on side slopes and narrow ridgetops of the Coastal Plain uplands. Smithdale-Luverne association, hilly, is a well drained soil found on dissected uplands of the Coastal Plain.

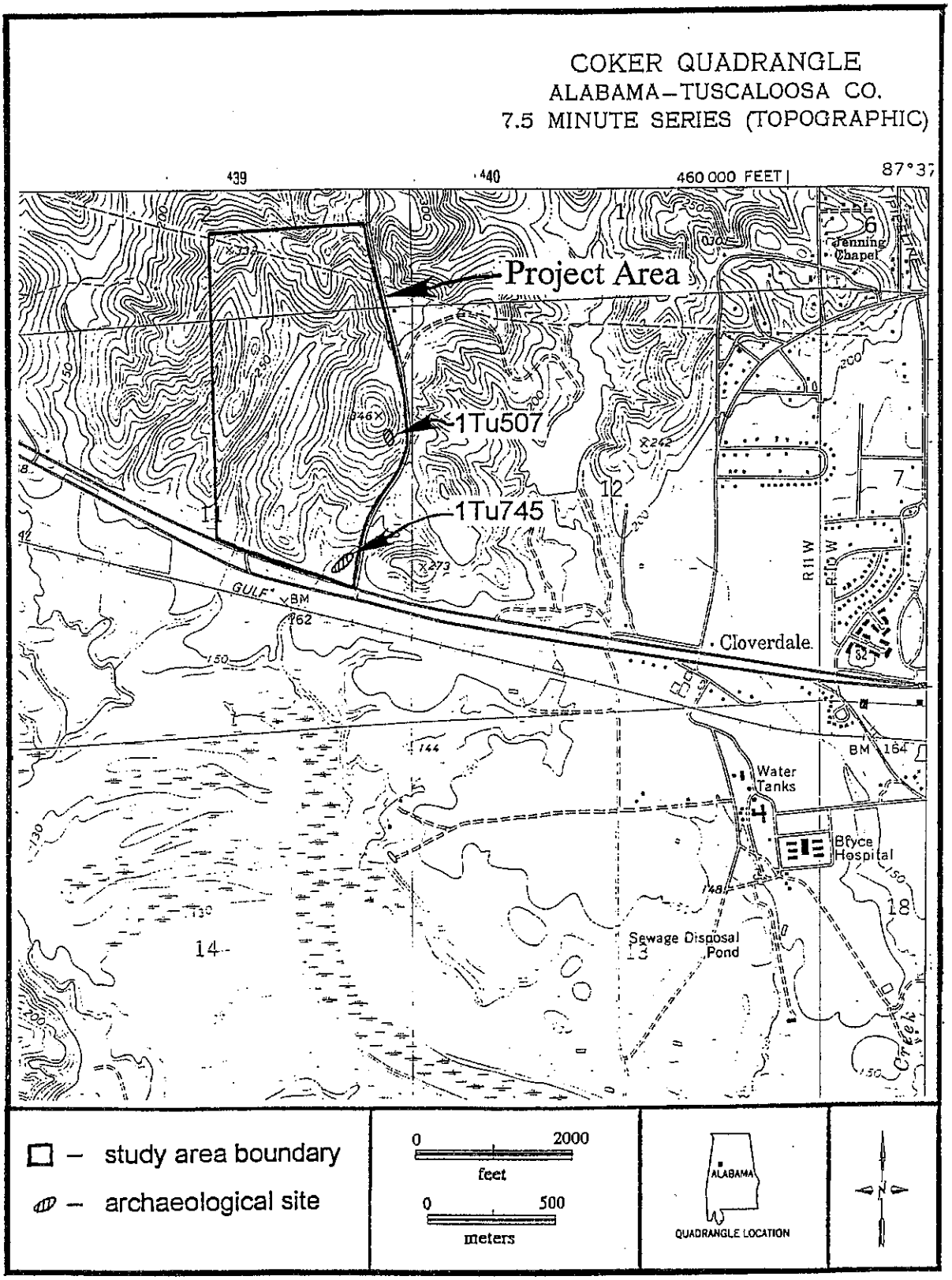


Figure 1. Location of project area, including Sites 1Tu507 and 1Tu745 (USGS 7.5' Coker quadrangle, photorevised 1978).

Literature and Document Search

Prior to the fieldwork portion of the survey, a background literature search was conducted. This included queries to the Alabama State Archaeological Site File (ASASF), as well as the National Register of Historic Places (NRHP) and the Alabama Tapestry. The ASASF showed previously recorded Site 1Tu507 in the eastern sector of the survey area; this site was determined to be a middle Archaic extractive camp. Artifacts recovered from this site include a Crawford Creek projectile point, two non-diagnostic projectile points, a nutting stone, and a flake.

Field Methods

On October 11 and 17, 1994 a two-person archaeological team from PCI performed a physical survey of the proposed landfill area. Pedestrian reconnaissance was the primary method employed in the survey; however, shovel tests were conducted to test the soil color as well as to look for cultural materials. The decision to conduct shovel tests, as opposed to visual inspections of the surface, was left to the discretion of the field supervisor. Shovel tests were not conducted in areas that were sparsely vegetated, in road cuts, where clear-cutting had exposed large areas where cultural materials could be readily observed, or where erosion had depleted the topsoil. Descriptions of the survey area are included in the Survey Results section of this report.

Laboratory Methods and Collection Curation

Materials recovered during surveys are transported to the laboratory at PCI in Tuscaloosa, Alabama. The materials are then cleaned, sorted and analyzed according to standard laboratory procedures. All cultural material, project records, and other pertinent documents generated by the surveys are then curated with the Alabama Division of Archaeology in Moundville.

Survey Results

Cultural resource survey of the proposed Coker landfill area resulted in the recovery of one historic cluster, one historic isolated find, and one prehistoric isolated find. The extensive destruction of the land from roadcuts, clear-cutting, and erosion has distorted the archaeological record, by disturbing stratification and rearranging the context of cultural materials. Soil stratification was revealed by conducting shovel tests. From the surface to 15 cm below surface a dark brown (7.5YR3/2) humus layer was observed, underlain by 15 cm of strong brown (7.5YR4/6) sandy topsoil, followed by a yellowish red (5YR4/6) sandy clay subsoil.

Survey Interpretation and Evaluation

Cultural resource survey was conducted at the proposed Coker landfill, on the USGS Coker topographic quadrangles (Figure 1). Although one site, 1Tu745 was located within the survey area and a preexisting site, 1Tu507 is also situated within the survey area, the extensive damage to the land has destroyed the depositional integrity of these sites. It is the opinion of PCI that Sites 1Tu507 and 1Tu745 are both ineligible for inclusion in the NRHP, and that neither site warrants further consideration.

Conclusions and Recommendations

Intensive survey of the land comprising the Coker landfill in central Tuscaloosa County encountered one site, 1Tu745; this site is a historic scatter, comprised of nineteenth and twentieth century ceramics. Additionally, one aboriginal biface and one reduction flake were recovered in the same area. Based on the extensive destruction of the land, it is these investigators' opinion that the landfill activity proposed for the Coker landfill will not adversely impact any potentially significant cultural resources. No further cultural resource considerations are recommended for the tracts comprising the Coker landfill.

Gregory S. Hendryx
Archaeological Assistant

Tim Mistovich
Principal Investigator

ALABAMA STATE SITE FILE

SITE NUMBER: 1 10 Ø 1 – T u – Ø 7 4 5

SITE IDENTIFICATION

TEMPORARY SITE NUMBER: TS #1

11 12 Ø 1

SITE NAME: 13 40

SITE FLAG: 41 [ ]
Ø - Main entry with no synonyms
M - Main entry with synonyms
S - Synonym to main entry

DELETE FLAG: 42 [ ] D - Delete this entry

SITE LOCATION AND SIZE

UTM COORDINATES (Center of Site)

ZONE: 43 44 1 6 EASTING: 45 Ø 4 3 9 4 4 0 51 NORTHING: 52 3 6 7 7 5 6 0 58

TOWNSHIP: 59 2 1 61 S RANGE: 62 1 1 64 W SECTION: 65 Ø 1 1 67 68 N W 69 ¼ of 70 N E 71 ¼ of 72 S E 73 ¼

11 12 Ø 2 QUADRANGLE SHEET: 13 C O K E R 40

SERIES: 41 7 5 42 DATE: 43 1 9 6 9 46 ELEVATION: 47 0 1 7 0 50 ft. AMSL

SITE SIZE — MAJOR AXIS: 51 0 1 5 0 54 m MINOR AXIS: 55 0 0 3 0 58 m

MAXIMUM DEPTH: 59 0 0 0 61 cm

PRESERVATION INFORMATION

PRESERVATION STATE: 62 0 3 63

01-Unmodified
02-Erosion
03-Severe erosion
04-Inundated
05-Intermittent flooding
06-Cultivation
07-Construction
08-Borrow pit
09-Deposition (buried)
10-Pothunting
99-Other (specify) _____

PRESERVATION PROSPECT: 64 X
X-Immediate destruction pending

PERCENT DESTROYED: 65 0 9 9 67 %

NATIONAL REGISTER STATUS: 68 Ø 4 69
01-Considered eligible
02-Considered ineligible
03-Registered
04-Ineligible

DESCRIPTION/COMMENTS/REFERENCES

This site is a moderate sized historic scatter. Numerous pieces of whiteware, pearlware, and stoneware were retreived. Additionally, one prehistoric biface and one reduction flake were recovered.

ARCHEOLOGICAL INFORMATION

11 12 [Ø 3]

LEVEL OF INVESTIGATION:

13 14 [Ø 4]

01-Volunteered report
02-Reconnaissance survey
03-Sample survey (specify) _____
04-Intensive (100%) survey

EXCAVATION STATUS:

15 16 [Ø 2]

01-No collection
02-Surface collection
03-Surface collection & test units
04-Extensive testing program
05-Excavation program
06-Total excavation

TOPOGRAPHICAL ASSOCIATION:

17 18 [0 2]

01-Upland crest
02-Upland slope
03-Upland base
04-T-0 (floodplain)
05-T-1 terrace
06-T-2 terrace
07-T-3 terrace
08-T-4 terrace
09-T-5 terrace
10-Island
99-Other (specify) _____

PHYSIOGRAPHIC DISTRICT:

19 20 [2 6]

01-Ashland Plateau
02-Opelika Plateau
03-Big Canoe Valley
04-Cahaba Ridges
05-Cahaba Valley
06-Coosa Ridges
07-Coosa Valley
08-Weisner Ridges
09-Blount Mountain
10-Jackson Co. Mountains
11-Little Mountain
12-Lookout Mountain
13-Moulton Valley
14-Murphree Valley
15-Sand Mountain
16-Sequatchie Valley
17-Warrior Basin
18-Wills Valley
19-Tennessee Valley proper
20-Outer Nashville Basin
21-Black Prairie
22-Buhrstone Hills
23-Chunnennuggee Hills
24-Dougherty Plain
25-Eastern Red Hills
26-Fall Line Hills
27-Flatwoods
28-Lime Hills
29-Southern Pine Hills
30-Western Red Hills
31-Coastal Strip
32-Mobile Delta

NEAREST WATER SOURCE:

21 22 [1 0]

01-Sink
02-Well
03-Spring
04-Swamp
05-Lake
06-Oxbow lake
07-First order stream
08-Second order stream
09-Third order stream
10-Fourth order stream
11-Major tributary
12-River
13-Estuary
14-Ocean

23 [ ]

X-Confluence

DIRECTION TO WATER:

24 25 [S W]

DISTANCE TO WATER:

26 28 [0 5 0] m

DRAINAGE BASIN:

29 30 [0 3]

01-Alabama
02-Apalachicola
03-Black Warrior
04-Blackwater
05-Buttahatchee
06-Cahaba
07-Chattahoochee
08-Choctawhatchee
09-Conecuh
10-Coosa
11-Escambia
12-Escatawpa
13-Mobile
14-Pea
15-Perdido
16-Sipsey
17-Tallapoosa
18-Tennessee
19-Tombigbee
20-Yellow
21-Coastal estuary or bay
99-Other (specify) _____

GROUND COVER:

31 32 [0 9]

01-Grassland
02-Cultivation
03-Secondary growth
04-Unimproved forest
05-Improved forest/orchard
06-Intermittent flooding
07-Inundated
08-Urban, residential, industrial, recreational
09-Roadway
10-Open and eroded
99-Other (specify) _____

SOIL TEXTURE CLASS:

33 34 [1 6]

01-Coarse sand
02-Sand
03-Fine sand
04-Very fine sand
05-Loamy coarse sand
06-Loamy sand
07-Loamy fine sand
08-Loamy very fine sand
09-Coarse sandy loam
10-Sandy loam
11-Fine sandy loam
12-Very fine sandy loam
13-Loam
14-Silt loam
15-Silt
16-Sandy clay loam
17-Clay loam
18-Silty clay loam
19-Sandy clay
20-Silty clay
21-Clay
22-Rockland

2 3–7 35 [ ]

NATURE OF DEPOSIT:

11 12
0	4

0	1

01-Entire site disturbed
02-Single component, upper portion disturbed
03-Single component, deep disturbance
04-Single component, undisturbed throughout
05-Multicomponent, upper portion disturbed
06-Multicomponent, deep disturbance
07-Multicomponent, undisturbed throughout

15 [ ] X-Midden present

16 [ ] X-Features present

SITE CLASSIFICATION(S):

ROCKSHELTER	17	
CAVE	18	
LITHIC SCATTER	19	
EXTRACTIVE CAMP	20	
CAMPSITE	21	
BASECAMP	22	
VILLAGE	23	
SHELL MIDDEN	24	
SINGLE EARTHEN MOUND	25	
MULTIPLE EARTHEN MOUNDS	26	
PETROGLYPH/PICTOGRAPH	27	
STONE MOUND(S)	28	
HISTORIC NON-ABORIGINAL	29	X
HISTORIC STRUCTURE, STANDING	30	
HISTORIC CEMETERY	31	
ISOLATED FIND(S)	32	
OTHER (Specify)	33	

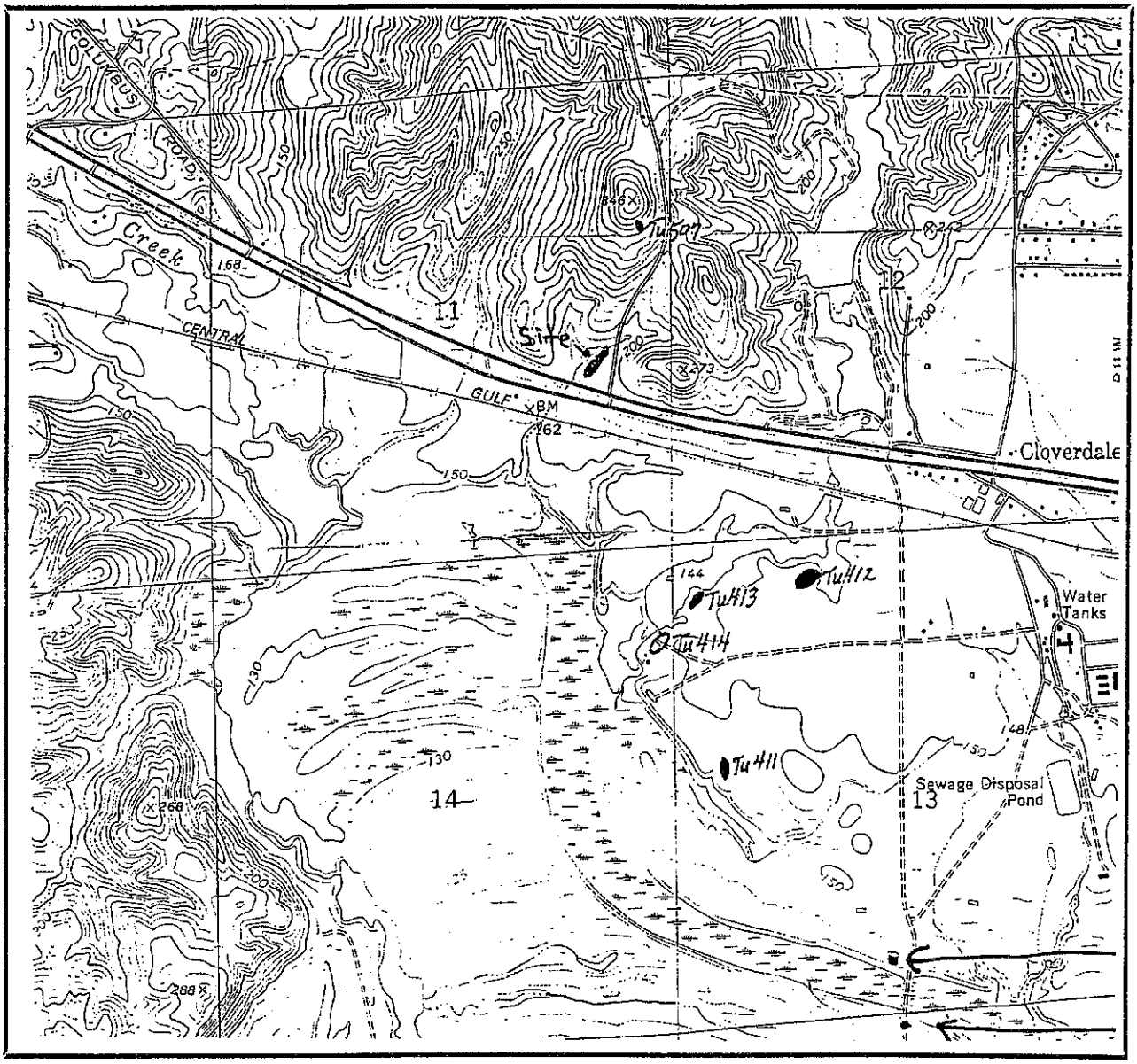
CULTURAL AFFILIATION(S):

PHASES, CULTURES, HORIZONS, IF KNOWN

CULTURE—		
PALEO	34	
EARLY	35	
MIDDLE	36	
LATE	37	
ARCHAIC	38	
EARLY	39	
MIDDLE	40	
LATE	41	
GULF FORMATIONAL	42	
EARLY	43	
MIDDLE	44	
LATE	45	
WOODLAND	46	
EARLY	47	
MIDDLE	48	
LATE	49	
MISSISSIPPIAN	50	
EARLY	51	
MIDDLE	52	
LATE	53	
PROTOHISTORIC	54	
HISTORIC ABORIGINAL	55	
UNKNOWN ABORIGINAL	56	
EUROPEAN-AMERICAN	57	
16th CENTURY	58	
17th CENTURY	59	
18th CENTURY	60	
19th CENTURY	61	X
20th CENTURY	62	X

SPECIFIC DATE RANGE 63 66 67 70

MAP OF SITE



MAP SOURCE: COKER 7.5' USGS TOPOGRAPHICAL QUADRANGLE

SITE REPORT AUTHOR IDENTIFICATION

REPORT DATE: 10-17-94

AUTHOR — NAME: GREGORY S. HENDRYX

ADDRESS: PANAMERICAN CONSULTANTS, INC.

924 26TH AVENUE EAST

CITY: TUSCALOOSA

STATE: AL ZIP: 35404

APPENDIX 2.4

FLOOD INSURANCE MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16. The **horizontal datum was** NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Coordinate System used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Tuscaloosa County E-911.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

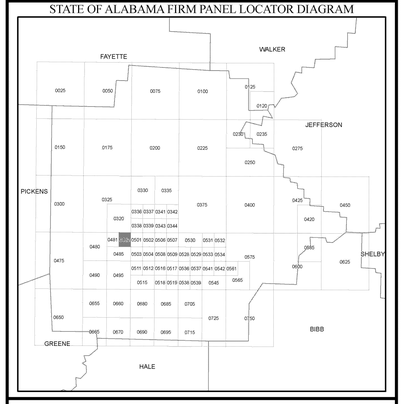
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

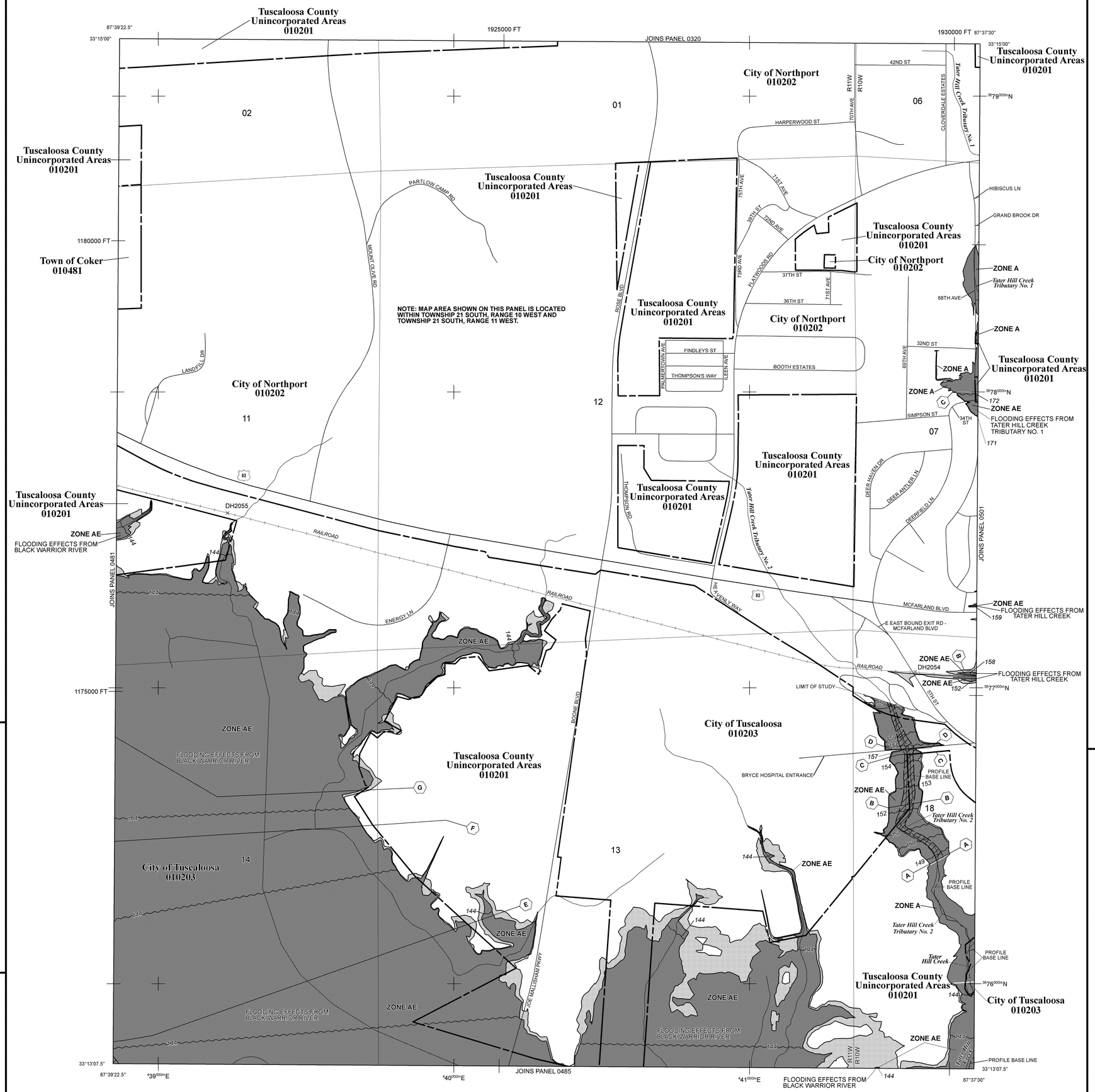
For Information and **questions about this map**, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange** at 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

STATE OF ALABAMA FIRM PANEL LOCATOR DIAGRAM



In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain its digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4275000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 6000000 FT — 5000-foot grid ticks: Alabama State Plane coordinate system, West Zone (FIPSZONE = 102), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 28, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 16, 2014 – to update corporate limits, to add Special Flood Hazard Areas, to add Base Flood Elevations, to change Special Flood Hazard Areas, to update roads and road names, to change zone designation, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0482G

FIRM

FLOOD INSURANCE RATE MAP

TUSCALOOSA COUNTY, ALABAMA AND INCORPORATED AREAS

PANEL 482 OF 750

(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COKER, TOWN OF	010481	0482	G
NORTHPORT, CITY OF	010202	0482	G
TUSCALOOSA COUNTY	010201	0482	G
TUSCALOOSA, CITY OF	010203	0482	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
JANUARY 16, 2014

MAP NUMBER
01125C0482G

State of Alabama
Federal Emergency Management Agency

APPENDIX 2.5

HYDROGEOLOGIC EVALUATION

HYDROGEOLOGICAL EVALUATION

Coker Sanitary Landfill
Area A Expansion
ADEM Permit No. 63-01

Submitted to:
Black Warrior Solid Waste Authority
Mr. Ken Thrasher
Coker, Alabama

Prepared by:

ITTL, Inc.

3516 Greensboro Avenue
Tuscaloosa, Alabama 35401

Project No. 000190103033.00

May 27, 2021 (Finalized August 16, 2023)

TABLE OF CONTENTS

1.0 INTRODUCTION AND GENERAL INFORMATION 3
1.1 Active Landfill 3
1.2 Area A Expansion and Historical Land Use 3
2.0 SITE EVALUATION OF AREA A EXPANSION 4
2.1 Floodplains 4
2.2 Airports 4
3.0 FIELD INVESTIGATORY PROCEEDURES 4
3.1 Reconnaissance of Area A Expansion to Establish Drilling Locations 4
3.2 Exploratory Drilling and Piezometer Installation 5
3.2.1 Shallow Piezometers 5
3.2.2 Deep Piezometers 6
3.3 Soil Laboratory Testing 6
3.4 Slug and Bail Tests 7
3.5 Groundwater-Level Measurements 8
4.0 REGIONAL GEOLOGY AND STRATIGRAPHY 10
4.1 Geologic Structure 11
4.2 Seismic Risk 11
5.0 SITE-SPECIFIC GEOLOGY 12
6.0 HYDROGEOLOGY 14
6.1 Regional Hydrogeology 14
6.2 Site-Specific Hydrogeology 15
7.0 WATER WELL INVENTIORY 15
8.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS 16
9.0 REFERENCES 17

TABLES

Table 1. Summary of Piezometer Construction Details
Table 2. Summary of Slug and Bail Test Results
Table 3. Summary of Site-Wide Water-Level Measurements
Table 4. Summary of Seasonal-High Groundwater Levels
Table 5. Summary of Seismic Events in Alabama
Table 6. Summary of Confining Clay Elevation Data
Table 7. Summary of Water Supply Well Inventory

FIGURES

Figure 1. Site Location and Topographic Map
Figure 2. Site Location and Aerial Photograph
Figure 3. Approximate Extent of Waste in the Pre-Subtitle D Landfill
Figure 4. FEMA Flood Hazard Zone Map
Figure 5. Airport Location Map
Figure 6. Locations of Borings/Piezometers Drilled and Installed for Hydrogeological Investigation of Area A Expansion
Figure 7. Structure Contour Map of the Top of Confining Clay
Figure 8. Isopach Map of Confining Clay
Figure 9. Lines of Cross-Sections Map (A-A' to H-H')
Figure 10. Hydrogeologic Cross-Section A – A'
Figure 11. Hydrogeologic Cross-Section B – B'
Figure 12. Hydrogeologic Cross-Section C – C'
Figure 13. Hydrogeologic Cross-Section D – D'
Figure 14. Hydrogeologic Cross-Section E – E'
Figure 15. Hydrogeologic Cross-Section F – F'
Figure 16. Hydrogeologic Cross-Section G – G'
Figure 17. Hydrogeologic Cross-Section H – H'
Figure 18. Seasonal-High Groundwater for the Uppermost Saturated Zone
Figure 19. Potentiometric Surface and Directions of Groundwater Flow in the First -Saturated Zone
Figure 20. Potentiometric Surface and Directions of Groundwater Flow in the Lower-Saturated Zone
Figure 21. Regional Geologic Map
Figure 22. Generalized Stratigraphic Section
Figure 23. Coalbed Methane Well Location Map
Figure 24A. USGS Seismic Hazard Map
Figure 24B. Historical Earthquakes of Alabama Map
Figure 25. Map of Local Geology
Figure 26. Generalized Cross-Section Showing Lithofacies
Figure 27. Water Well Inventory Map

APPENDICES

APPENDIX A: Selected Site Photographs
APPENDIX B: Soil Boring and Piezometer/Monitoring Well Construction Logs
B-I Area A Expansion Boring Logs (2012 – 2020)
B-II Active Landfill Boring Logs (1988 – 1997)
APPENDIX C: Soil Sample Laboratory Test Results for Hydraulic Conductivity
APPENDIX D: Hydraulic Conductivity Values Derived from Slug & Bail Tests using AQTESOLV Software
APPENDIX E: Resumes of Environmental Professionals

1.0 INTRODUCTION AND GENERAL INFORMATION

This report is a hydrogeological evaluation for a proposed expansion (Area A) of the Black Warrior Solid Waste Facility (Active Landfill), Alabama Department of Environmental Management (ADEM) Permit No. 63-01. Figure 1 provides a location and topographic map for the Active Landfill (226.48 acres) and the Area A Expansion (233.16 acres). Total acreage for the Active Landfill and the Area A Expansion is 459.64 acres. The properties are located along U.S. Highway 82 west of the City of Northport, Alabama in Tuscaloosa County and within Sections 11 and 12 of Township 21 South, Range 11 West. The site properties are bound to the east by Rose Boulevard and to the south by U.S. Highway 82. For this report, TTL, Inc. (TTL) has combined the hydrogeological information formerly collected for permitting the Active Landfill (CDG and TTL, 1995 Revised) with information more recently (2012 to 2021) compiled from the Area A Expansion property. CDG Engineers and Associates, Inc. (CDG), the civil design engineer/consultant and TTL, the geotechnical and environmental consultant, worked as a team to provide services for our mutual client, Black Warrior Solid Waste Authority (Authority) and develop documents for this major modification permit application (Area A Expansion) to the Active A Landfill permit.

1.1 Active Landfill

The Active Landfill, comprised of 226.48 acres, began operation in 1977 as the Tuscaloosa Solid Waste Disposal Authority and operated for approximately 17 years as a pre-Subtitle D facility. Figure 3 depicts the approximate extent of waste placement prior to Subtitle D. The landfill was originally permitted on April 11, 1977 under permit no. 63-01R which expired on April 30, 1994. On August 29, 1994, the Authority submitted to ADEM an application for lateral expansion of the facility and requested a permit to transfer from Tuscaloosa Solid Waste Disposal Authority to the Black Warrior Solid Waste Authority (the Authority). Approval for vertical expansion was granted by ADEM on July 14, 1994 and the facility was approved to operate under vertical expansion until October 9, 1995. In 1994 (Revised 1995) TTL completed a hydrogeological evaluation of the Active Landfill. The report of hydrogeological evaluation was published as Section 3 of Volume I of a Site Analysis Report prepared by TTL and CDG. The Active Landfill design consists of 16 cells varying in size from 2.4 to 15.6 acres. As of the date of this report, a total of 10 cells have either been filled or are in the process of being filled (Figure 3).

Subtitle D, with its emphasis on landfill containment, was proposed by the U.S. Environmental Protection Agency (EPA) in August 1988 and became effective in October 1991, although various implementation deadline extensions ran through 1997. The rules established minimum landfill criteria for: location, operation, design (including liner and leachate collection system installation), groundwater monitoring, closure and post-closure care, and financial assurance. With the implementation of Subtitle D, the Authority initiated a plan to excavate the waste historically placed in the unlined facility and reinter the excavated waste in the lined Subtitle D facility. From 2000 to 2010, an estimated volume of 2.3 million cubic yards of waste were removed and reinterred in the lined facility as part of this effort.

1.2 Area A Expansion and Historical Land Use

The Area A Expansion is comprised of 233.16 acres. This section of the report provides a brief summary of the Area A historical land use. Partlow opened in 1923 and closed in 2011. Partlow State School and Hospital (Partlow) was established in 1919 as the Alabama Home for Mental Deficients.

The Authority acquired the Partlow property in 2012 and the property was subsequently clear cut in 2015. The proposed expansion (Area A) will result in the eventual merger of the Active Landfill to the

west of abandoned Mt. Olive Road with Area A, the property to the east of abandoned Mt. Olive Road (see Figure 2). The realignment of Mt. Olive Road was completed in 2021 resulting in the closure of Mt. Olive Road from a point just north of the site properties, south to U.S. Highway 82. The Authority has estimated, based on the current average annual rate of waste disposal at the Active Landfill, that construction of the Area A Expansion will not occur until approximately 2031 (10 years).

2.0 SITE EVALUATION OF AREA A EXPANSION

2.1 Floodplains

ADEM Administrative Code R. 335-13-4-.01 (1) requires that any facility located in a floodplain shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste. Figure 4 shows the location of the 100-hundred floodplain as taken from the U.S. Department of the Interior Flood Prone Area Maps. The proposed Area A Expansion lies outside the 100-year flood prone area and therefore will not affect the floodplain. All nearby mapped flood hazard zones occur south of Area A and U.S. Highway 82.

2.2 Airports

The ADEM Administrative Code R. 335-13-4-.01 (5) and Title 40 Code of Federal Registrations, Part 258.10 require that a municipal solid waste landfill (MSWLF) unit not be sited within10,000 feet of any airport runway end, and that owners or operators proposing to renew existing or new MSWLF units located within a five-mile radius of any airport runway end must notify the effected airport and the Federal Aviation Administration (FAA). Figure 5 shows the Tuscaloosa Municipal Airport (Van de Graff Field) in relation to the Active Landfill and the Area A Expansion.

The Active Landfill is located just beyond the minimum 10,000-foot distance from the end of the nearest airport runway at the Tuscaloosa Municipal Airport. The Area A Expansion, however, is 7,250 feet from the end of the nearest runway to the closest point of the Area A Expansion property. Concurrence is included in the permit application package.

This report does not address additional site evaluation items consisting of wetlands, endangered species, and archaeological survey and cultural resources inventory.

3.0 FIELD INVESTIGATORY PROCEEDURES

3.1 Reconnaissance of Area A Expansion to Establish Drilling Locations

Due to the size of the proposed project area as well as in an attempt to fill data gaps, drilling activities were conducted in several phases. Drilling in and near Expansion Area A was subdivided into four separate phases (Phase I, Phase II, Phase III, and Phase IV). Prior to initiating field services, TTL utilized a topographic map of the site and surrounding area to determine an appropriate location of each of the proposed soil borings/piezometers. The proposed borings/piezometers were placed in consideration of the Site's topography and on-site structures. TTL utilized the topographic map to establish the approximate geographic coordinates for each of the proposed borings. TTL utilized a Trimble Global Position System (GPS) to field located each of the proposed borings/piezometers. The proposed locations were flagged with wooden stakes prior to each phase of drilling. The Authority assisted TTL in gaining access to wooden areas that required clearing and/or grading.

3.2 Exploratory Drilling and Piezometer Installation

3.2.1 Shallow Piezometers

The field activities associated with the installation of shallow piezometers (Phase I) were initiated in 2012 along the south end of Area A and generally advanced northward to the area just beyond the on-site powerline (Figure 2). In total, twenty-two (22) shallow piezometers (PZ-01S, through PZ-04S, PZ-08S through PZ-13S, PZ-16S through PZ-19S, PZ22S, PZ-30S, PZ-32S through PZ-35S, and PZ-39S and PZ-40S) were installed between June and October 2012 and eight (8) piezometers (PZ-41S through PZ-47S and PZ-46SS) were installed in December 2012. The shallow piezometers installed in 2012 ranged in depth from 5 feet below land surface (BLS) in PZ-47S to 94 feet BLS in PZ-17S. Select shallow piezometers included installation of a deeper partner piezometer. A total of twenty (20) well clusters were installed throughout the expansion area equating to one well cluster per every 17.4 acres. Due to the relatively distance between these initially installed well clusters, TTL installed a subsequent series of piezometers (Phase II) throughout the Area A property. Piezometers PZ-48S through PZ-51S were installed in January 2013. These additional shallow piezometers, installed in January 2013, ranged in depth from 10.5 feet BLS in piezometer PZ-48S to 114 feet BLS in piezometer PZ-51S.

Following their installation in 2012, a reconnaissance of the piezometers was conducted approximately six years later in the fall of 2019. This reconnaissance determined that four shallow piezometers (PZ-29S, PZ-44S, PZ-45, and PZ-47S) were either damaged or noted to have subsurface obstructions. TTL determined that the damage to the piezometers was significant as to necessitate replacement. In December 2019, TTL returned to the Area A property to replace all four of the damaged shallow piezometers (Phase III). The soil borings for the installation of each piezometer were advanced in the area immediately surrounding the damaged piezometer and designations were revised to include an “R” for those piezometers that were replaced. Due to the close proximity of the replacement well in relation to the original piezometer, soil samples were not collected and described by on-site personnel. However, the replacement well for shallow piezometer PZ-47S (replacement well designated as PZ-47SR) was relocated from its original position due to access issues. Since the replacement well was not installed in the area immediately surrounding the original piezometer, TTL collected and described soil samples and prepared a new log for the replacement piezometer (PZ-47SR). In total, TTL replaced four shallow piezometers (PZ-29SR, PZ-44SR, PZ-45SR, and PZ-47SR) in December of 2019. Following the installation of the replacement piezometers, the original damaged piezometers were abandoned in-place in general accordance with ADEM guidelines.

In May and September 2020, TTL determined that additional shallow piezometers were required in order to adequately evaluate the potentiometric surface from the Active Landfill across Mt. Olive Road to the Area A Expansion (Phase IV). Services associated with Phase IV of the installation consisted of installing only shallow piezometers in areas between the east side of the Active Landfill and the west edge of Mt. Olive Road as well as the area immediately south of the Active Landfill. In total, 30 shallow piezometers (PZ-52S through PZ-82S) were installed during the Phase IV drilling effort. The Phase IV shallow piezometers were installed to depths ranging from 11.5 feet in PZ-75S to 125.5 feet BLS in PZ-65S.

Upon completion of all four phases of drilling, a total of 70 shallow piezometers were installed as part of this evaluation. Each of the shallow piezometers were set and screened just above the underlying confining unit (dark gray clay) in order to determine the seasonal potentiometric variability within the first-saturated zone. The locations of piezometers are shown on Figure 6 and construction information is summarized on Table 1. Selected site photographs from drilling activities are provided in Appendix A. In addition, copies of the soil boring and piezometer construction logs are included as Appendix B (BI and BII) for reference. Appendix B, BI contains borings logs generated from the shallow and deep

piezometers drilled and installed from 2012, 2013, and 2020, as described above. Appendix B, BII provides historical boring logs generated from the drilling and installation of piezometers and monitoring wells within the vicinity of the Active Landfill as part of previous hydrogeologic investigations conducted from 1988 to 1997.

3.2.2 Deep Piezometers

The field activities associated with the installation of deep piezometers (Phase I) occurred concurrent with the Phase I shallow piezometer installation initiated in 2012 along the south end of Area A and generally advanced northward to the area just beyond the on-site powerline. In total, thirty-nine (39) deep piezometers (PZ-01D through PZ-16D, PZ-18D through PZ-40D) were installed between June and October 2012. The deep piezometers installed in 2012 ranged in depth from 19 feet BLS in piezometers PZ-05D, PZ-06D, and PZ-36D to 149 feet BLS in PZ-35D. Select deep piezometers included installation of a shallow partner piezometer.

During a 2019 site reconnaissance, six piezometers (PZ-18D, PZ-24D, PZ-27D, PZ-32D, PZ-33D, and PZ-39D) were determined to be damaged. TTL determined that the damage to the piezometers was sufficient as to necessitated replacement. In December 2019, TTL returned to the subject Site to replace all six of the damaged deep piezometers (Phase II). The soil borings for the installation of each piezometer were advanced in the area immediately surrounding the damaged piezometer and designations were revised to include an "R" for those piezometers that were replaced. However, the replacement well for piezometer PZ-24D (replacement well designated as PZ-24DR) was relocated from its original position due to access issues. Since the replacement well was not installed in the area immediately surrounding the original piezometer, TTL collected and logged the soil samples encountered during the advancement of PZ-24DR. In total, TTL replaced six piezometers (PZ-18DR, PZ-24DR, PZ-27DR, PZ-32DR, PZ-33DR, and PZ-39DR) in December of 2019. Following installation of the deep replacement piezometers, the original damaged piezometers were abandoned in-place in general accordance with ADEM guidelines.

A total of thirty-nine (39) deep piezometers were installed as part of this evaluation. No additional deep piezometers were installed as part of Phase III or Phase IV of the piezometer installation process. Each of the deep piezometers were advanced through the underlying confining dark gray clay and screened immediately below the base of the confining unit. Installation of the deep piezometers enabled TTL to evaluate the characteristics and thickness of the confining clay unit. In addition, the deep piezometers are utilized to determine the seasonal potentiometric variability within the underlying confined portion of the aquifer. In summary, a total of 109 shallow/deep piezometers were drilled and installed between the years of 2012 and 2020. The locations of the piezometers installed for this hydrogeologic investigation for the Area A Expansion are shown on Figure 6 and are summarized in Table 1. Selected site photographs from drilling activities are provided in Appendix A. In addition, copies of the soil boring and piezometer construction logs are provided for reference in Appendix B.

3.3 Soil Laboratory Testing

In August of 2012, TTL utilized Shelby tubes to collected an undisturbed soil sample from the soil borings advanced for the installation of piezometers PZ-09D and PZ-22D. The two undisturbed soil samples were collected from the underlying confining unit (stiff dark gray clay) that separates the shallow zone from the deep zone. One undisturbed soil sample was collected from a depth of 103.0 to 104.0 feet BLS in soil boring PZ-09D and the second sample was collected at a depth of 57.0 to 58.0 feet BLS from soil boring PZ-22D. The undisturbed soil samples were transported to TTL's soil testing laboratory located in Tuscaloosa, Alabama for testing and analysis. Soil laboratory test results indicate hydraulic conductivity "K" values for the underlying confining unit (stiff dark gray clay) of 9.4 x 10^{-8} cm/sec and 2.7 x 10^{-8} cm/sec for PZ-09D and PZ-22D, respectively. Soil laboratory permeability

test results are provided in Appendix C for reference. In addition, a structure contour map and an associated Isopach for the underlying confining clay unit is provided as Figures 7 and 8, respectively.

3.4 Slug and Bail Tests

On April 13, 2021, TTL performed slug and bail tests on selected piezometers screened within the shallow zone of the uppermost zone of saturation. The results of the tests were used to estimate the hydraulic conductivities of the water-bearing materials of the uppermost zone of saturation. The nine (9) shallow piezometers selected for the slug and bail tests are listed in the table below, along with construction details and water-level information.

Piezometer ID	Total Depth (ft. BLS)	Screened Interval (ft. BLS)	Depth to Water (ft. BTOC)	Water Column Height (ft.)
PZ-02S	19.0	7.5 - 17.5	7.20	15.36
PZ-04S	16.0	5.5 - 15.5	8.36	12.02
PZ-17S	94.0	72.5 - 92.5	85.04	10.86
PZ-30S	23.0	12.5 - 22.5	12.66	12.92
PZ-35S	84.0	73.5 - 83.5	79.41	6.89
PZ-47SR	23.0	2.5 - 5.0	15.39	11.66
PZ-56S	93.0	9.5 - 24.5	87.55	6.33
PZ-82S	17.5	7.0 - 17.0	10.40	10.10
PZ-97-15	53.0	43.0 - 53.0	49.15	5.25

Spatially, these piezometers are positioned east of the Active Landfill and roughly distributed evenly throughout the extent of the Area A Expansion (with exception of PZ-97-15 located immediately west of Mt. Olive Road). Total depths of the piezometers range from 16.0 feet BLS in PZ-04S to 94.0 feet BLS in PZ-17S. Each piezometer is screened across the base of the silty and/or clayey, fine-grained sand that overlies the medium to dark gray confining clay.

Aquifer testing equipment and software from In-Situ, Inc. in Fort Collins, Colorado was utilized to conduct the tests. Utilizing a SLG thermoplastic mandrel (slug), an instantaneous change in groundwater level was measured during deployment and/or removal from within the well casing. The rate at which water levels recovered following displacement was continuously recorded using a Level-Troll 700 pressure transducer.

Test data from the transducer was downloaded and compiled using Win-Situ software. The displacement versus time data was input into various solution methods for slug test analyses (for an unconfined aquifer) utilizing AQTESOLV PRO 4.0 software. Solutions included the straight-line method of Bouwer-Rice (1976) and Butler (1988) visual curve matching (with exception of the Hvorslev Method [1951] utilized at the PZ-30S location). The Bouwer and Rice solution is useful for determining hydraulic conductivity (K) of an unconfined aquifer from an overdamped slug test. Analysis involves matching a straight line to water-level displacement data collected over time. This method automatically matches the curve to the displacement data. The Butler (1998) solution is an additional sub-method that is often used when matching a straight line to a specific range of data within recommended normalized head ranges to overcome ambiguity associated with data curvature. This method proved effective at those locations where additional transducer noise was inevitable (deep well casings, minimal water column lengths, contact with slug, etc.).

The resulting horizontal hydraulic conductivity values derived from the slug and bail test analyses performed on the nine (9) shallow piezometers ranged from 3.30 x 10^{-6} cm/s at the PZ-82S location to 1.51 x 10^{-3} cm/s at the PZ-30S location. The average hydraulic conductivity from all nine tests was determined at 2.52 x 10^{-4} cm/s. A summary of the hydraulic conductivity values are provided in Table 2. Reports generated from the AQTESOLV software are provided in Appendix D.

It is evident that the resulting values are representative of the hydraulic properties of the materials occurring in the shallow subsurface across Area A. Values of this magnitude are classified as semi-pervious with moderate permeability and described as being comprised of fine to very-fine sand, silty sand, and/or clayey sand. In addition, conductivity values from this analysis correlated favorably to the slug and bail and laboratory test values generated from the evaluation performed for the Active Landfill as part of the testing conducted in 1994. Based on the results of the slug and bail tests performed on piezometers in 1994, the hydraulic conductivities of these water-bearing clayey sands within the vicinity of Cell 1 ranged from 1.0 x 10^{-3} cm/s to 7.1 x 10^{-4} cm/s, whereas values retrieved from the Shelby tubes and analyzed in the laboratory ranged between 3.7 x 10^{-4} cm/s and 2.0 x 10^{-5} cm/s. In conclusion, results of the analysis correspond to the descriptions of the sediments shown on the boring logs and depicted in cross-sections A-A' to H-H' (see Section 5.0 of this report).

3.5 Groundwater-Level Measurements

Following the completion of drilling and installation of the 122 total shallow and deep piezometers (70 shallow/39 deep) in 2013, subsequent efforts to collect site-wide seasonal-high groundwater level data commenced soon after. In 2013, a series of six consecutive water-level measurements (two each during the months of February, March and April) were collected from each of the deep and shallow piezometers within a 24-hour time period. Each measurement event was performed during a single day, every two weeks (or 14 days) for a total monitoring period duration of 12 weeks. These Spring season measurements started the first week in February and continued through the end of April. In addition to the 2013 event, seasonal-high groundwater measurements were also conducted during the Spring of 2020 and 2021. With exception of 2020, both of the 2013 and 2021 events included site-wide measurements to include an additional 14 piezometers/monitoring wells located west of Mt. Olive Road, within the vicinity of the Active Landfill (97-15, 97-2, 97-3, 97-7, 97-8, and monitoring wells MW-01 through MW-09). The table below summarizes the dates of each water-level measurement by year.

Year	#	Date of Measurement
2013	1	2/4/2013
	2	2/19/2013
	3	3/6/2013
	4	3/21/2013
	5	4/8/2013
	6	4/24/2013
2020	7	2/4/2020
	8	2/18/2020
	9	3/3/2020
	10	3/16/2020
	11	4/1/2020
	12	4/15/2020
2021	13	2/10/2021
	14	2/24/2021
	15	3/10/2021
	16	3/24/2021
	17	4/7/2021
	18	4/21/2021

A total of 18 groundwater-level measurements were collected at each piezometer/monitoring well location during the three years of monitoring. Depth to water-level measurements were then converted to a groundwater elevation above mean sea level (AMSL). The maximum water-level elevation recorded during the three years of seasonal-high measurements at each piezometer/monitoring well location was selected for generating the seasonal-high potentiometric surface. For the purposes of this investigation, the seasonal-high groundwater surface was generated from only the 70 shallow piezometers to represent maximum groundwater elevations within the uppermost saturated zone (shallow zone). A complete record of the site-wide water-levels are summarized in Table 3. The maximum groundwater elevations selected for each shallow piezometer/monitoring well location for the seasonal-high groundwater contour map is provided in Table 4.

Utilizing Golden's Surfer Pro software, the maximum elevations were used to generate a groundwater contour map. Spatially, the extents of our data corresponded to the confines of TTL's piezometers/monitoring wells (including Area A and the Active Landfill). The contours were generated by the software using kriging interpolation to produce the best linear unbiased prediction of intermediate values where groundwater data was absent. A substantial portion of this interpolation included the area of the Active Landfill within the current waste cell boundaries.

In 1994, the area of the Active Landfill underwent a similar hydrogeological investigation for permitting. As part of that investigation, piezometers were drilled and installed within the footprint of the Active Landfill. A seasonal-high groundwater contour map was generated and submitted for the 5-foot separation requirement for cell design. In order to depict a site-wide groundwater contour map, TTL incorporated the data from the Active Landfill (1994 seasonal-high groundwater contours) with that from the Area A seasonal-high groundwater contours to produce a site-wide contour map.

In addition to integrating the 1994 and 2021 groundwater contour data, the contours underwent a geoprocessing operation in ArcGIS software to account for the influence of land surface topography. Utilizing the raster calculator in the spatial analyst toolbox, a new surface was generated using the 2-foot Light Detection and Ranging (LiDAR) surface elevation compared to the groundwater surface elevations from the seasonal high data set. This process was executed to prevent groundwater elevations from breaching the land surface during contour interpolation. Finally, some minor hand-drawn adjustments were made to the contours by a TTL hydrogeologist.

The water-bearing sands of limited horizontal extent were observed in areas of topographic highs in the north-central portion of Area A. These sands locally contained perched groundwater that is not hydraulically connected to the uppermost saturated zone that constitutes the shallow zone. Several such perched zones were reportedly identified in previous investigations occurring at correspondingly similar elevations in the northern and west-central portion of the Active Landfill area. Data generated from the drilling/installation of piezometers in the north-central portions of Area A, suggest the perched zones overlies the first-saturated zone at elevations ranging from 260 to 290 feet AMSL, approximately 40 to 50 feet above the first-saturated zone. The relationships of the perched zones to the first-saturated zone can be seen in cross-sections located in the northern portions of Area A. (Figures 10 through 17). A map showing the lines of section is provided in Figure 9. While processing the seasonal-high water-level data, it became evident that three (3) of the shallow piezometers located in Area A and the Active Landfill were drilled and screened within this perched zone (PZ-46SS, PZ-97-2, and PZ-97-7). Additionally, this perched zone was observed during the installation of the piezometers in 2020 via saturation of returned soil samples that were positioned well above the groundwater surface of the first-saturated zone. To accommodate this variance, the groundwater data from these three piezometers was excluded in generating the seasonal-high contour map.

Figure 18 illustrates the potentiometric surface for the seasonal-high groundwater. The maximum water-level elevation recorded during the three years of seasonal-high measurements at each piezometer/monitoring well location, regardless of the date of the water level was recorded, was selected for generating the seasonal-high potentiometric surface. The groundwater surface generally trends with the land surface topography throughout most of the review area and closely parallels the topography at lower elevations where drainage patterns are present. Groundwater flow emanates from the north and north-central portion of the site and moves downgradient to the southwest and southeast. In the eastern portions of Area A, groundwater flows downgradient towards Lake Partlow. Annual groundwater level fluctuations in the shallow zone vary between piezometer location. Approximate degrees of fluctuation were recorded to be less than one-foot at most locations to upwards of three to four feet in others. Fluctuations in water-levels are most likely attributed to recharge conditions (proximity to drainage areas, precipitation influence, spatial location, etc.). An additional potentiometric surface map of the first-saturated zone was generated from groundwater level data measured on April 21, 2021 for Area A (Figure 19). This map illustrates water-level data measured under normal, static conditions. With exception of a decrease in groundwater elevations, both maps share similar hydrogeologic relationships (e.g., similar gradient, flow direction). The potentiometric surface and directions of groundwater flow in the uppermost saturated zone (shallow zone) is depicted in on Figure 19.

The potentiometric surface and directions of groundwater flow in the deep zone was generated from a single-day water-level measurement event on April 21, 2021 and is depicted on Figure 20. Contrary to the shallow zone, the groundwater surface does not closely conform with the changes in land surface topography. The deep zone exhibits a shallower gradient with groundwater generally flowing in a south to southeast direction. Annual fluctuations in water-levels within the deep zone change only slightly, exhibiting an approximate one-foot maximum change on average. Groundwater levels collected from the 38 deep piezometers within Area A is provided in the site-wide water level summary (Table 3).

4.0 REGIONAL GEOLOGY AND STRATIGRAPHY

The Area A Expansion site is about four miles southwest of the contact between the unconsolidated Cretaceous-age deposits of the Coastal Plain Physiographic Province and rocks of the Pottsville Formation (Figure 21). The site is in west-central Alabama and is on an unconsolidated, basal, terrigenous unit of the Cretaceous Series of deposits known as the Tuscaloosa Group. In western and central Alabama, the Tuscaloosa Group is divided into the Gordo Formation and the Coker Formation (Drennen, 1953a; Smith and King, 1983). The Gordo Formation comprises an interbedded series of gravel, sand, and clay beds (Conant and others, 1945) and the underlying Coker Formation comprises highly cross-bedded and lenticular beds of sand and ferruginous clay (Monroe and others, 1946). The Coker Formation is subdivided further into an upper, unnamed member and a lower Eoline Member. The upper unnamed member comprises variegated and mottled massive ferruginous clay that, locally, is sandy. The lower Eoline Member comprises massive cross-stratified and ripple marked sands and laminated clays with some partings of glauconitic sand (Drennen, 1953a; 1953b).

In Tuscaloosa County, the Tuscaloosa Group commonly is overlain by Holocene and Pleistocene alluvial and terrace deposits. The Tuscaloosa Group unconformably overlies the rocks of the Paleozoic Pottsville Formation. The top of the Pottsville Formation, which is deeply eroded, slopes about 30 to 35 feet per mile toward the southwest in Tuscaloosa County (Paulson, Miller, and Drennen, 1962). Drennen (1953a) reported that the Gordo Formation is as much as 400 feet thick and the Coker Formation can be, locally, as much as 350 feet thick in Tuscaloosa County and vicinity. The Pottsville Formation is at least 2,500 feet thick in Tuscaloosa County. A generalized columnar section that shows

the relationships of the Pottsville Formation, the Coker and Gordo Formations of the Tuscaloosa Group, and the Holocene/Pleistocene deposits is shown in Figure 22.

In Tuscaloosa County, the Tuscaloosa Group comprises a transgressive-regressive sequence of open-shelf sands and estuary muds. The sands and muds are overlain by and interfinger with tidal delta, tidal channel, and shelf muds and sands. This sequence is capped by marine sands, marsh muds, and fluvial sands and clays. The geometry of the Tuscaloosa Group in Tuscaloosa County is complex because of the laterally discontinuous nature of the lithologic units and because there are numerous minor and major erosional unconformities (Hummell, 1994). This complex geometry and laterally discontinuous nature of the lithologic units of the Tuscaloosa Group can be observed in each of the eight hydrogeologic cross-sections prepared for this report. Cross-section locations A-A' through H-H' are shown on Figure 9. The eight hydrogeologic cross sections are shown on Figures 10 through 17.

4.1 Geologic Structure

Review of a map of the top of the Pottsville Formation in Alabama that was prepared by Kidd (1976) indicated no fault-like offsets in the Pottsville Formation at or near the landfill site. Likewise, review of a map of the top of the Pottsville Formation prepared by Paulson, Miller, and Drennen (1962) indicated no fault-like offsets in the Pottsville Formation at or near the landfill site.

Pashin (1991) reported that cross-sections from Mississippi that were prepared by Thomas (1988) showed that normal faults in the Pottsville Formation terminate at the unconformable contact of the Pottsville Formation with the overlying Cretaceous strata. Pashin mapped a topographic lineament that coincides with the Active Landfill site. None of his other lineaments were near the site. The topographic lineament mapped by Pashin has a northeast-southwest orientation and roughly dissects the northern half of the Active Landfill site.

Figure 23 provides locations of 29 active and four plugged and abandoned coalbed methane wells as recorded by the Alabama Geological Survey (AGS) that are located within a one-mile radius of the Active Landfill and proposed Area A Expansion. Review of the elevations of the top of the Pottsville derived from logs of coalbed methane wells indicated that there might be a fault affecting the top of the Pottsville Formation. A coalbed methane well in the quarter section west of the western boundary of the Active Landfill site had casing set at an elevation of about 300 feet BMSL (below mean sea level). Coalbed methane wells within or near the eastern boundary of the Active Landfill site had depth elevations roughly between 85 and 115 feet BMSL. Allowing a variation of 50 feet for the actual land surface elevations at the wells provides for a difference in elevation of about 200 feet between the areas.

4.2 Seismic Risk

The site lies in the extreme southwest section of an elongate area that is oriented northeast-southwest and known as the Southern Appalachian Seismic Zone. The greatest number of recorded earthquake epicenters in this zone is in an area that extends from northeast Alabama northeastward to a point near northeast Tennessee where Tennessee borders the extreme western tip of Virginia. The earthquake data listed in Table 5 provides a list of earthquakes that were originally used in preparing the Seismic Risk Studies in the United States (Algermissen, 1969) which have been recompiled and updated through 1977. The data has been reexamined and intensities assigned where none had been assigned before, on the basis of available data. Other intensity values were updated from new and additional data sources that were not available at the time of original compilation. Some epicenters were relocated on the basis of new information. The data shown in Table 5 are estimates of the most accurate epicenter, magnitude, and intensity of each earthquake, on the basis of historical and current information.

This hydrogeologic evaluation was performed to address the expansion of an existing facility. Figures 24 A and 24 B were developed by the U.S. Geological Survey (USGS) and show seismic hazards and historical earthquakes of record for the state of Alabama, respectively. Figure 24 A indicates that the site is located in a seismic hazard zone with a peak ground acceleration (PGA) of 16-18 which is roughly equivalent to a low-to-moderate intensity event. Figure 24 B illustrates earthquake epicenters in Alabama and the associating relative magnitudes. As shown on Figure 24 B, a total of 29 earthquake epicenters have been recorded historically within a 50-mile radius of the site. The nearest recorded epicenter was located approximately 8 miles to the east-southeast of the site and had a magnitude in the range of 3.0 to 3.9.

5.0 SITE-SPECIFIC GEOLOGY

Utilizing logs prepared from the soil sample descriptions generated by TTL geologists from soil borings drilled to construct piezometers and monitoring wells, TTL prepared a total of eight (8) hydrogeologic cross-sections. Cross-section locations are shown in the Lines of Section Map provided in Figure 9. These include three sections oriented north-south and five sections oriented west-east. Production of the cross-sections included an assessment of the logs from 78 boring locations. Historical boring logs from piezometers drilled and installed within the vicinity of the Active Landfill were referenced from the 1994 investigation to integrate the interpreted lithologies west of Mt. Olive Road. Cross-Sections A-A' though H-H' (Figure 10 through Figure 17) contained numerous soil boring logs as outlined below.

Cross Section A-A'	Orientation N-S	15 Borings
Cross Section B-B'	Orientation N-S	11 Borings
Cross Section C-C'	Orientation N-S	10 Borings
Cross Section D-D'	Orientation E-W	15 Borings
Cross Section E-E'	Orientation E-W	10 Borings
Cross Section F-F'	Orientation E-W	9 Borings
Cross Section G-G'	Orientation E-W	11 Borings
Cross Section H-H'	Orientation E-W	8 Borings

A number of borings where cross sections intersected were duplicated. A total of 78 soil borings are represented on the eight cross sections.

The principal geological units penetrated at the Area A Expansion comprise estuarine clays and muds that are overlain by open-shelf sands. Tidal delta and/or shelf muds interfinger with estuary deposits and shelf sands at Area A. These estuarine, tidal deltas, and shelf deposits are in the upper unnamed member of the Coker Formation. The open-shelf sands are massive, laterally continuous and have their maximum thicknesses along the eastern, northern, and western boundaries of Area A. It is evident that the increase in thickness of these sands correlate with an increase in land surface elevation. Additionally, the open-shelf sands become thin and pinch out to the south where surface elevations decrease significantly. Although there may be some Holocene-Pleistocene alluvial and terrace deposits on the hilltops at higher elevations of Area A, these sediments can be so similar to some of the Tuscaloosa Group sediments that they cannot be distinguished at the site (Hummel, 1994). Alluvial deposits are exposed in the southernmost part of Area A. A geologic map illustrating the local formations present at Area A is provided in Figure 25.

Review of the electrical log and associated "header" information for a coalbed methane well that is in the northern part of the Active Landfill site indicates that the top of the Pottsville Formation is about 100 feet BMSL at the site. The land surface at the well is about 330 AMSL. Based on this information, the maximum thickness of the Coker Formation at the site is about 400 feet.

In reference to the previous hydrogeologic investigation conducted in the early 90's, the author sub-divided the subsurface lithology in three separates 'lithofacies' based on parameters such as grain-size composition, depositional environment, and mineralogy. The previous investigation did not advance borings through the confining layer to the lower sands of the lower saturated zone. For the purposes of this report, the lithologic subdivisions described below also include three separate lithofacies for Area A. Lithofacies two and three as described in the previous report were combined and described as one-single group. A generalized geologic cross-section of the three lithofacies is it pertains to Area A is provided in Figure 26.

The lowermost of these facies is a fairly clean, fine-grained, water-bearing sand that is defined as the second-saturated zone, or deep zone. Dissimilar to the other lithofacies that overlie it, these sands contain relatively few lenses of fine-grained material (silts or clays). A total of 39 piezometers that were drilled and installed within Area A and were screened in this deeper water-bearing zone.

The second lithofacies immediately overlies the deep zone (second-saturated zone) and is described as a dark gray, stiff, unstructured clay likely deposited in an estuarine environment. This lithofacies exhibits very low horizontal and vertical permeabilities. This dark gray clay is present beneath the entire site and serves as a confining layer beneath the first-saturated zone. This confining layer separates the first-saturated zone (shallow zone) from the underlying second-saturated zone (deep zone). As seen in cross-sections A-A' through H-H', the water level in the deep zone generally does not rise above the base of the confining clay layer. On average, an approximate 5- to 20-foot unsaturated zone separates the base of the clay from the potentiometric surface of the deep zone. The top of the confining clay was penetrated in a total of 71 borehole locations throughout the Area A Expansion during installation of PZ-01S/D to PZ-82S (2012 - 2020). Of the 109 borings advanced in Area A, 71 encountered this confining unit. Of the 71 borings where the confining clay was observed, 25 of them penetrated the entire thickness of the confining clay. The locations of these borings and associated elevations and thicknesses are summarized in Table 6.

The data summarized in Table 6 was utilized to generate a structure contour map on the top of the confining clay and an isopach (total thickness) map of the confining clay layer (Figure 7 and Figure 8, respectively). The lateral continuity of the very stiff confining clay throughout the landfill site (Active Landfill and Area A) can be seen in each geological cross-section (A-A' through H-H'). In reference to the data compiled in Table 6, the top of this dark gray, low permeability confining clay is present throughout the site within an approximate elevation range of 180 feet AMSL to 230 feet AMSL and an average elevation of 207 feet AMSL. This clay unit generally follows the land surface elevation as it dips south to southwest at the site with decreasing land surface elevation. Elevations of the top of clay in the northern and southern portions of Area A range from 233 feet AMSL to 185 feet AMSL, respectively. The top of the very stiff clay is less than about 10 feet BLS or it is exposed at the lowermost elevations in the southern part of the site. In contrast, the top of the stiff clay is approximately 80 feet BLS in the northern portions of the site. The 25 deep piezometers located east of Mt. Olive Road were the only borings advanced to penetrate the confining clay unit, therefore, the extent of the isopach map is limited to Area A. Thicknesses of the confining clay varies across the site; however, it is evident that deposit thickens in the southern portions of the site. Thicknesses of the dark gray confining clay range from 10 feet in the topographic high areas of the north to 65 feet in the low-lying southwest portion of Area A. The confining clay thins to the east towards Lake Partlow, where it is exposed near the surface, as confirmed by surface mapping at an approximate elevation range of 180 feet AMSL.

The top of the stiff unstructured clay was tagged in numerous boreholes located in Area A during the drilling performed by TTL in the early 1990s as well as 2012 to 2020. Review of the geological cross-sections and the map of the top of the very stiff unstructured clay (Figure 7) indicated that there is no faulting of the unconsolidated deposits at the Active Landfill site. The very stiff unstructured clay

beneath the landfill does not have significant offsets or evidences of post- depositional structural movement.

As noted in Section 3.3 (Soil Laboratory Testing), the stiff confining clay exhibits a very low permeability. Three Shelby tube samples of this very stiff clay were collected and tested by TTL in 1992. The permeabilities from triaxial-permeability tests of these three samples indicate hydraulic conductivity "K" values for the dark gray clay of 9.4 x 10^{-8} cm/sec and 2.7 x 10^{-8} cm/sec for PZ-09D and PZ-22D, respectively. These permeabilities are significantly low, suggesting this clay unit acts as an aquitard to any downward migration of groundwater from the shallow zone to the deep zone.

The classification of the third lithofacies in this report varies from the third lithofacies description provided in the previous 1994 hydrogeologic investigation report. The third lithofacies immediately overlies the very stiff clay. The third lithofacies is a micaceous, silty, clayey sand with relatively stiff clay that contains laminae and lenses of fine- to very fine-grained quartz sand. The majority of this zone is a heterogenous mix of interbedded sand, silt, and clay that constitutes the first-saturated zone near the base. The contact between the dark gray confining clay and the basal portion of the overlying third lithofacies is characterized as a gradational contact. From the top down, the basal portion of the third lithofacies grades from a light to medium gray silty, lean clay with thin sandy lenses (one to five inches thick) to the dark gray stiff clay (top of the second lithofacies). This interface zone has been described at some boring locations as containing fragments of charcoal and/or relatively thin zones of iron-oxide-stained sediments with ironstone fragments. The third lithofacies caps the hills at the site and comprises micaceous, silty and/or clayey, very fine- to fine-grained sands. The interbedding/intercalating configurations of the third lithofacies resulted from transgressive-regressive depositional processes. The relatively lean clay lenses were deposited in tidal deltaic and/or estuarine environments. The sands were deposited in tidal delta and/or shoal/shelf environments.

The thickness of the third lithofacies ranges across the site. In topographically low areas near the southern portion of Area A, average thicknesses are thin to non-existent. At the PZ-01S location, at elevations near 200 feet AMSL, shallow groundwater was observed under what appeared to be artesian conditions. In topographically high areas near the central to north central and northwestern portions of Area A, the massive clayey sands are upwards of 90 feet thick. As discussed in Section 3.5 (Groundwater-level Measurements), elevations near 280 feet AMSL contain a perched zone of limited extent that was observed during drilling operations. Piezometer location PZ-46SS (super shallow) is screened within this water-bearing zone. Average thicknesses of the third lithofacies ranges from approximately 30 to 40 feet.

6.0 HYDROGEOLOGY

6.1 Regional Hydrogeology

The Pottsville Formation and the Coker Formation can be tapped as supplies for groundwater in the vicinity of the Active Landfill and Area A Expansion (site). The Pottsville Formation underlies 200 to 400 feet of the Coker Formation in the vicinity of the site. The Pottsville Formation generally yields only small quantities of water to wells; these quantities usually are adequate only for domestic and stock supplies. The water in the Pottsville Formation, which occurs in joints, fractures, and along bedding planes, commonly is objectionable to consumers because of elevated concentrations of iron that can stain clothes and appliances and can cause the water to have a metallic taste.

The Coker Formation is a principal aquifer in west Alabama. Sand and gravel beds in the Coker Formation are very productive aquifers in Tuscaloosa County. Wells in the Coker Formation can be shallow, dug wells or drilled wells that are several hundred feet deep. For example, there are two public-supply wells at Coker, Alabama. These wells, which are about two miles west of the landfill site, are screened between 150 and 180 feet BLS and produce 130 and 170 gallons per minute of water. The water from the wells is treated to reduce the concentrations of iron.

6.2 Site-Specific Hydrogeology

The first or uppermost saturated zone overlies the dark gray stiff, unstructured clay that is laterally continuous and thick beneath the site. There also are localized perched zones of water that occur in the sands that cap hills in the northern part of the site. Between the top of the Pottsville Formation and the base of the very stiff unstructured clay are 200 to 300 feet of gravels, sands, and clays of the Coker Formation as well as sands, silts and clays that occur above the dark gray confining that are also part of the Coker Formation which constitute the uppermost aquifer.

A total of three (3) saturated zones are present within the boundaries of Area A. In the northwestern and north-central portions of the site, at an approximate elevation of 280 feet AMSL, a perched zone was observed within the clayey sandy upper zones of lithofacies three. One shallow piezometer (PZ-46 SS) was drilled and screened within this water-bearing zone. Additionally, this perched zone was observed via saturated soil samples returned during drilling operations. The saturated soil samples were observed throughout Area A at similar elevations near 280 feet AMSL. This zone is likely supported by the silty, lean clayey lenses that represent interbedding of lithofacies three.

The top of the potentiometric surface of the shallow zone is positioned near the base of lithofacies three that is confined at the base by the stiff, low permeability, dark gray clay. Elevations of this groundwater surface range from 190 feet to 240 feet AMSL across the site. The gradient and flow direction of the shallow zone generally trends with the varying land surface topography. In the eastern portions of Area, A, groundwater flows east to streams and tributaries that recharge Lake Partlow. In the north and western portions of the site, groundwater flows south, southeast and southwest to areas that are significantly lower in elevation. Just north of Highway 82, at elevations of approximately 190 feet AMSL near PZ-01S/D, the surface of the first-saturated zone was observed under artesian conditions. Water-levels at this piezometer were measured at depths above land surface throughout the year. It is likely that the first-saturated zone discharges in the southern portion of Area A in the form of seeps or springs.

Water-level measurements from the potentiometric surface of the second-saturated zone suggest no hydraulic connection to the first-saturated zone. The water-bearing sands of this zone are confined above by the dark gray, low permeability clay. Water-levels in the deep zone generally do not rise above the base of the confining clay. The gradient and flow direction of the deep zone trends from north to south, but with a constant and lower gradient that is not directly related to the surface topography.

7.0 WATER WELL INVENTIORY

An inventory was conducted by TTL to identify water-supply wells and springs located within a one-mile radius of the Active Landfill property as part of the Hydrogeological Investigation reported in October 1994. At that time, TTL concluded that at least 90 percent of the landowners within one mile of the Active Landfill property were contacted during the inventory. Based on the inventory reported in 1994, there were 26 domestic water wells and commercial water wells, and two springs within one mile of the Active Landfill property. During this current evaluation, TTL expanded the original water-well

inventory to the east to include a one-mile radius from the Area A property boundary. TTL reviewed the records of the Geological Survey of Alabama (GSA) as well as conducting a vehicular drive-by survey on April 13, 2021. TTL identified 37 water supply wells (in addition to the initial 26 wells) within the one-mile review area. The number of idented water wells was based on a windshield survey and a formal door-to-door water well survey was not conducted as part of this evaluation. Therefore, TTL was unable to verify the intended usage, well status, or construction characteristics of the observed water supply wells. The locations of the observed water supply wells are shown on Figure 27. In addition, the parcel identification and mailing address of the associated property owners is provided in Table 7 for reference. Selected site photographs taken during the water well inventory are provided in Appendix A. for reference.

8.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

The primary author of this report is listed below. Together, the professionals have in excess of 46 years of experience in their profession as geologists. Mr. Tanner was involved in every aspect of the project. Résumé of the environmental professional for this project is provided in Appendix E.

J. Mark Tanner, P.E.
Senior Principal Geologist
Alabama License No. 247

9.0 REFERENCES

Algermissen S.T., 1969, Seismic risk studies in the United States; Fourth World Conference on Earthquake Engineering, 14 Jan 1969, 21 p.

Bouwer and Rice, 1976, A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells: U.S. Water Conservation Laboratory, v. 12, no. 3, p. 423-428.

Drennen, C. W., 1961, Geologic map of Tuscaloosa County, Alabama: Alabama Geological Survey Special Map 16, Tuscaloosa, Alabama.

Conant, L. C., Eargle, D. H., Monroe, W. H., Morris, H. H., 1945, Geologic map of Tuscaloosa and Cottondale Quadrangles, Alabama, showing areal geology and structure of Upper Cretaceous Formations: U.S. Geol. Survey Oil and Gas Invest. Map No. 37.

DeJamette, S.S., and Crownover, J. E., 1987, Geohydrology and susceptibility of major aquifers to surface contamination in Alabama; area 6: U. S. Geological Survey Water-Resources Investigations Report 97-4113.

Drennen, C. W., 1953a, Reclassification of outcropping Tuscaloosa Group in Alabama: Amer. Assoc. Petrol. Geol. Bull., v. 37, p. 522-538.

Drennen, C. W., 1953b, Stratigraphy and structure of outcropping pre-Selma Coastal Plain beds of Fayette and Lamar Counties, Alabama: U.S. Geol. Survey Circ. 27.

Geraghty & Miller, Inc., 1989, AQTESOLV: Geraghty & Miller Modeling Group, Reston, VA.

Hummel, R. L., 1994, Sedimentology and depositional systems of the Tuscaloosa Group, west-central Alabama: Unpublished Ph. D., dissertation, Florida State University, Tallahassee.

Hunter, J. A. and Moser, P. H., 1990, Ground-water availability in Tuscaloosa County, Alabama: Alabama Geological Survey, Special Map 219, Tuscaloosa, Alabama.

Kidd, J. T., 1976, Configuration of the top of the Pottsville Formation in west-central Alabama: Alabama Geological Survey, Map 1, Tuscaloosa, Alabama.

Mercer, J. W., and Waddell, R. K, 1993, Contaminant transport in groundwater in Mainment, D. R., Handbook of hydrology: McGraw-Hill, Inc., New York.

Miller, J. D., Jr., 1958, Ground water in the vicinity of Bryce State Hospital, Tuscaloosa County, Alabama: Alabama Geological Survey, Information Series 12, Tuscaloosa, Alabama.

Miller, J. D., Jr., and Causey, L. V., 1958, Geology and ground-water resources of Tuscaloosa County, Alabama: Alabama Geological Survey, Information Series 14, Tuscaloosa, Alabama.

Monroe, W. H., Conant, L. C., Eargle, D. H., 1946, Pre-Selma Upper Cretaceous stratigraphy of western Alabama: Amer. Assoc. Petrol. Geol. Bull., v. 30, p. 187-212.

Osborne, W. E., Szabo, M. W., Copeland, C. W., and Neathery, T. L., 1989, Geologic map of Alabama: Alabama Geological Survey, Special Map 220, Tuscaloosa, Alabama.

Pashin, J.C., 1991, Regional analysis of the Black Creek-Cobb coalbed-methane target interval, Black Warrior Basin, Alabama: Alabama Geological Survey Bull. 145.

Paulson, Q. F., Miller, J. D., Jr., and Drennen, C. W., 1962, Ground-water resources and geology of Tuscaloosa County, Alabama: Alabama Geological Survey, County Report 6, Tuscaloosa, Alabama.

Raymond, D. E., Osborne, W. E., Copeland, C. W., and Neathery, T. L., 1988, Alabama stratigraphy: Alabama Geological Survey, Circular 140, Tuscaloosa, Alabama.

Smith, L. W., and King. D. T., Jr., 1983, The Tuscaloosa Formation: fluvial facies and their relationships to the basement topography and changes in paleoslope in Carrington, T. J., ed., Current studies of Cretaceous formations in eastern Alabama and Columbus, Georgia: Guidebook 20th Annual Field Trip, Alabama Geological Society, p. 11-16.

Szabo, M. W., Osborne, W. E., Copeland, C. W., 1988, Geologic map of Alabama: Alabama Geological Survey Special Map 220, 5 sheets.

Thomas, W. A., 1988, The Black Warrior Basin, *in* Sloss, L. L., ed., Sedimentary cover—North American craton: Geol. Soc. Amer, The Geology of North America, v. D-2, p. 471-492.

TTL, Inc., 1981, Installation of monitoring wells; compacted bales waste landfill; Letter report.

TTL, Inc., 1988, Geological evaluation for the Coker sanitary landfill; City of Tuscaloosa, Alabama.

TTL, Inc., 1992a, Ground-water evaluation--phases I and II; Coker sanitary landfill; Tuscaloosa County, Alabama: August 24, 1992.

TTL, Inc., 1992b, Status report; geotechnical evaluation; Coker sanitary landfill: November 16, 1992 letter report.

TTL, Inc., 1992, Ground-water evaluation--phases I and II; Coker sanitary landfill; Tuscaloosa County, Alabama.

TABLES

Table 1. Summary of Piezometer Construction Details
Table 2. Summary of Slug and Bail Test Results
Table 3. Summary of Site-Wide Water-Level Measurements
Table 4. Summary of Seasonal-High Groundwater Levels
Table 5. Summary of Seismic Events in Alabama
Table 6. Summary of Confining Clay Elevation Data
Table 7. Summary of Water Supply Well Inventory

Table 1. Summary of Piezometer Construction Details; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Land Surface Elevation (ft. amsl)	Date Drilled	Total Well Depth (ft. bgs)	Casing Type	Screen Type	Screened Interval (ft. bgs)	Length of Screen (ft.)	Filter Pack Material	Drilling/Sampling Method
PZ-01 D	1923414.68	1177155.08	204.32	8/6/2012	69.0	2" PVC	0.010-in. slotted PVC	47.5 - 67.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-01 S	1923421.71	1177153.81	204.32	8/7/2012	24.0	2" PVC	0.010-in. slotted PVC	8.5 - 23.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-02 D	1924009.42	1177105.89	204.20	6/27/2012	64.0	2" PVC	0.010-in. slotted PVC	47.5 - 62.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-02 S	1924005.01	1177099.46	203.84	6/27/2012	19.0	2" PVC	0.010-in. slotted PVC	7.5 - 17.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-03 D	1924643.70	1177190.27	211.79	8/7/2012	64.0	2" PVC	0.010-in. slotted PVC	42.5 - 62.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-03 S	1924639.56	1177189.09	211.46	12/11/2012	14.0	2" PVC	0.010-in. slotted PVC	3.5 - 13.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-04 D	1925150.59	1177409.85	193.71	6/26/2012	39.0	2" PVC	0.010-in. slotted PVC	23.5 - 38.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-04 S	1925145.09	1177406.93	194.40	6/26/2012	16.0	2" PVC	0.010-in. slotted PVC	5.5 - 15.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-05 D	1925481.66	1177584.83	164.99	6/26/2012	19.0	2" PVC	0.010-in. slotted PVC	2.5 - 17.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-06 D	1925186.82	1177795.38	170.52	6/26/2012	19.0	2" PVC	0.010-in. slotted PVC	2.5 - 17.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-07 D	1924754.44	1177713.12	209.78	6/27/2012	59.0	2" PVC	0.010-in. slotted PVC	42.5 - 57.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-07 S	1924750.45	1177706.50	210.49	12/11/2012	8.5	2" PVC	0.010-in. slotted PVC	3.5 - 8.5	5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-08 D	1924330.24	1177455.75	240.94	10/1/2012	94.0	2" PVC	0.010-in. slotted PVC	67.5 - 92.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-08 S	1924335.41	1177461.80	240.94	10/2/2012	39.0	2" PVC	0.010-in. slotted PVC	27.5 - 37.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-09 D	1923731.15	1177408.39	264.30	8/1/2012	124.0	2" PVC	0.010-in. slotted PVC	99.5 - 119.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-09 S	1923724.77	1177412.86	264.12	8/2/2012	64.0	2" PVC	0.010-in. slotted PVC	42.6 - 62.6	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-10 D	1923365.98	1177506.23	252.11	8/3/2012	139.0	2" PVC	0.010-in. slotted PVC	117.5 - 137.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-10 S	1923372.68	1177506.45	252.11	8/6/2012	54.0	2" PVC	0.010-in. slotted PVC	37.5 - 52.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-11 D	1923543.91	1177851.36	206.54	7/26/2012	59.0	2" PVC	0.010-in. slotted PVC	29.5 - 54.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-11 S	1923542.98	1177845.22	206.54	6/29/2012	19.0	2" PVC	0.010-in. slotted PVC	3.5 - 18.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-12 D	1923817.58	1177861.10	233.85	7/31/2012	84.0	2" PVC	0.010-in. slotted PVC	61.5 - 81.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-12 S	1923823.58	1177859.72	233.85	8/1/2012	29.0	2" PVC	0.010-in. slotted PVC	12.5 - 27.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-13 D	1924162.12	1177826.35	269.46	6/28/2012	114.0	2" PVC	0.010-in. slotted PVC	88.5 - 113.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-13 S	1924155.80	1177816.89	269.19	6/29/2012	59.0	2" PVC	0.010-in. slotted PVC	43.5 - 58.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-14 D	1925096.55	1178125.81	198.37	6/25/2012	44.0	2" PVC	0.010-in. slotted PVC	26.5 - 41.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-15 D	1924854.50	1178412.75	193.06	6/25/2012	39.0	2" PVC	0.010-in. slotted PVC	23.5 - 38.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-16 D	1924544.99	1178252.43	222.88	8/8/2012	69.0	2" PVC	0.010-in. slotted PVC	43.5 - 68.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-16 S	1924549.58	1178254.00	222.56	8/8/2012	24.0	2" PVC	0.010-in. slotted PVC	8.5 - 23.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-17 S	1924055.90	1178359.45	306.56	7/25/2012	94.0	2" PVC	0.010-in. slotted PVC	72.5 - 92.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-18 D	1923584.64	1178232.68	234.51	7/30/2012	79.0	2" PVC	0.010-in. slotted PVC	57.5 - 77.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-18 DR	1923584.64	1178232.68	234.51	12/12/2019	79.0	2" PVC	0.010-in. slotted PVC	57.5 - 77.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-18 S	1923582.89	1178237.24	234.51	7/31/2012	24.0	2" PVC	0.010-in. slotted PVC	13.5 - 23.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-19 D	1924028.50	1178780.11	276.32	7/24/2012	124.0	2" PVC	0.010-in. slotted PVC	97.5 - 122.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-19 S	1924019.45	1178782.47	276.17	7/25/2012	64.0	2" PVC	0.010-in. slotted PVC	42.5 - 62.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-20 D	1924480.85	1178685.47	218.40	8/8/2012	69.0	2" PVC	0.010-in. slotted PVC	43.5 - 68.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-20 S	1924480.27	1178674.13	218.60	12/11/2012	24.0	2" PVC	0.010-in. slotted PVC	12.0 - 22.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-21 D	1924841.72	1178936.15	190.49	6/25/2012	34.0	2" PVC	0.010-in. slotted PVC	18.5 - 33.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-22 D	1924218.31	1179059.11	239.99	8/9/2012	84.0	2" PVC	0.010-in. slotted PVC	61.5 - 81.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-22 S	1924212.60	1179061.99	240.23	8/10/2012	39.0	2" PVC	0.010-in. slotted PVC	18.5 - 38.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-23 D	1924272.32	1179505.65	205.19	10/25/2012	49.0	2" PVC	0.010-in. slotted PVC	23.5 - 48.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-23 S	1924265.21	1179502.01	205.83	12/12/2012	14.0	2" PVC	0.010-in. slotted PVC	4.0 - 14.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-24 D	1924731.55	1179335.85	184.34	10/8/2012	25.0	2" PVC	0.010-in. slotted PVC	9.5 - 24.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-24 DR	1924599.11	1179235.57	202.56	12/12/2019	42.0	2" PVC	0.010-in. slotted PVC	32.0 - 42.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-25 D	1925243.26	1179252.87	194.77	10/4/2012	39.0	2" PVC	0.010-in. slotted PVC	22.5 - 37.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-26 D	1925495.59	1179613.50	183.94	10/8/2012	24.0	2" PVC	0.010-in. slotted PVC	8.5 - 23.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-27 D	1925085.36	1179680.09	216.77	10/5/2012	59.0	2" PVC	0.010-in. slotted PVC	42.5 - 57.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-27 DR	1925085.36	1179680.09	216.77	12/12/2019	59.0	2" PVC	0.010-in. slotted PVC	42.5 - 57.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-28 D	1925380.09	1179953.85	196.98	10/8/2012	39.0	2" PVC	0.010-in. slotted PVC	21.5 - 36.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-29 D	1924731.93	1179979.78	216.39	10/10/2012	54.0	2" PVC	0.010-in. slotted PVC	33.5 - 53.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-29 S	1924725.07	1179981.09	220.58	12/11/2012	11.9	2" PVC	0.010-in. slotted PVC	4.5 - 9.5	5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-29 SR	1924725.07	1179981.09	220.58	12/12/2019	11.9	2" PVC	0.010-in. slotted PVC	4.5 - 9.5	5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-30 D	1924055.77	1179974.47	234.93	10/24/2012	74.0	2" PVC	0.010-in. slotted PVC	48.5 - 73.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-30 S	1924050.69	1179968.83	234.93	10/24/2012	23.0	2" PVC	0.010-in. slotted PVC	12.5 - 22.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-31 D	1925435.43	1180465.05	201.93	10/10/2012	39.0	2" PVC	0.010-in. slotted PVC	23.5 - 38.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-32 D	1924933.00	1180380.69	253.79	10/22/2012	94.0	2" PVC	0.010-in. slotted PVC	62.5 - 92.5	30	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-32 DR	1924933.00	1180380.69	253.79	12/12/2019	94.0	2" PVC	0.010-in. slotted PVC	62.5 - 92.5	30	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-32 S	1924934.03	1180388.34	253.79	10/24/2012	33.0	2" PVC	0.010-in. slotted PVC	22.5 - 32.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-33 D	1924274.62	1180417.85	267.11	10/11/2012	109.0	2" PVC	0.010-in. slotted PVC	82.5 - 107.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-33 D	1924274.62	1180417.85	267.11	12/12/2019	109.0	2" PVC	0.010-in. slotted PVC	82.5 - 107.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-33 S	1924275.26	1180417.72	267.67	10/12/2012	39.0	2" PVC	0.010-in. slotted PVC	33.5 - 48.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-34 D	1923798.17	1180477.38	285.65	10/15/2012	124.0	2" PVC	0.010-in. slotted PVC	97.5 - 122.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-34 S	1923798.69	1180478.00	285.88	10/16/2012	79.0	2" PVC	0.010-in. slotted PVC	63.0 - 78.0	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-35 D	1924493.37	1180673.93	313.73	10/18/2012	149.0	2" PVC	0.010-in. slotted PVC	117.5 - 147.5	30	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-35 S	1924487.50	1180679.41	313.73	10/19/2012	84.0	2" PVC	0.010-in. slotted PVC	73.5 - 83.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-36 D	1925806.32	1180974.55	177.17	10/11/2012	19.0	2" PVC	0.010-in. slotted PVC	3.5 - 18.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-37 D	1925278.36	1181039.05	194.79	10/11/2012	34.0	2" PVC	0.010-in. slotted PVC	19.5 - 33.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-38 D	1924647.54	1181081.82	279.29	10/2/2012	119.0	2" PVC	0.010-in. slotted PVC	90.5 - 115.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-38 S	1924651.72	1181086.91	279.29	10/3/2012	49.0	2" PVC	0.010-in. slotted PVC	38.5 - 48.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-39 D	1924089.56	1181034.52	256.78	10/16/2012	94.0	2" PVC	0.010-in. slotted PVC	67.5 - 92.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-39 S	1924091.28	1181026.89	256.78	10/17/2012	34.0	2" PVC	0.010-in. slotted PVC	23.5 - 33.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-39 DR	1924091.28	1181026.89	256.78	12/12/2019	34.0	2" PVC	0.010-in. slotted PVC	23.5 - 33.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-40 D	1923537.27	1181232.20	279.46	10/25/2012	120.0	2" PVC	0.010-in. slotted PVC	88.5 - 118.5	30	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-40 S	1923530.13	1181232.77	280.39	10/29/2012	64.0	2" PVC	0.010-in. slotted PVC	42.5 - 62.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-41 S	1923151.52	1177760.40	198.28	12/13/2012	9.0	2" PVC	0.010-in. slotted PVC	4.0 - 9.0	5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-42 S	1923278.90	1178143.77	206.46	12/13/2012	24.0	2" PVC	0.010-in. slotted PVC	3.5 - 23.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-43 S	1923738.00	1179035.25	256.46	12/13/2012	39.0	2" PVC	0.010-in. slotted PVC	28.5 - 38.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-44 S	1923920.31	1179529.87	241.41	12/12/2012	36.5	2" PVC	0.010-in. slotted PVC	21.5 - 36.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-44 SR	1923920.31	1179529.87	241.41	12/12/2019	36.5	2" PVC	0.010-in. slotted PVC	21.5 - 36.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-45 S	1924516.44	1179711.11	226.38	12/11/2012	20.0	2" PVC	0.010-in. slotted PVC	9.5 - 19.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-45 SR	1924516.44	1179711.11	226.38	12/12/2019	20.0	2" PVC	0.010-in. slotted PVC	9.5 - 19.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-46 S	1923633.59	1179941.95	284.94	12/14/2012	79.0	2" PVC	0.010-in. slotted PVC	53.5 - 78.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-46 SS	1923633.70	1179935.93	284.67	12/15/2012	20.0	2" PVC	0.010-in. slotted PVC	9.5 - 19.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-47 S	1924519.97	1179426.57	185.02	12/17/2012	5.0	2" PVC	0.010-in. slotted PVC	2.5 - 5.0	2.5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-47 SR	1924592.47	1179236.31	202.78	12/12/2019	23.0	2" PVC	0.010-in. slotted PVC	13.0 - 23.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-48 S	1922783.25	1177483.94	184.34	1/24/2013	10.5	2" PVC	0.010-in. slotted PVC	5.5 - 10.5	5	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-49 S	1923462.70	1178968.74	278.79	1/24/2013	69.0	2" PVC	0.010-in. slotted PVC	57.5 - 67.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-50 S	1923345.42	1179988.48	297.49	1/22/2013	94.0	2" PVC	0.010-in. slotted PVC	73.5 - 93.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-51 S	1923023.12	1181576.21	336.38	1/23/2013	114.0	2" PVC	0.010-in. slotted PVC	94 - 114	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/5' Continuous Sampler
PZ-52 S	1923914.24	1178126.63	270.07	5/11/2020	55.0	2" PVC	0.010-in. slotted PVC	34.5 - 54.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-53 S	1923784.23	1178431.40	256.53	5/12/2020	45.0	2" PVC	0.010-in. slotted PVC	24.5 - 44.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-54 S	1923535.43	1180284.15	298.58	5/4/2020	75.0	2" PVC	0.010-in. slotted PVC	54.5 - 74.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-55 S	1923712.20	1178772.92	255.64	5/5/2020	36.0	2" PVC	0.010-in. slotted PVC	15.5 - 35.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-56 S	1923445.78	1179416.48	310.81	5/13/2020	93.0	2" PVC	0.010-in. slotted PVC	72.5 - 92.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-57 S	1923243.26	1179694.00	310.00	5/12/2020	100.0	2" PVC	0.010-in. slotted PVC	79.5 - 99.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-58 S	1923894.18	1180240.39	272.63	5/6/2020	50.0	2" PVC	0.010-in. slotted PVC	29.5 - 39.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-59 S	1923429.98	1180771.84	314.25	5/6/2020	85.0	2" PVC	0.010-in. slotted PVC	64.5 - 84.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-60 S	1923787.23	1180820.54	311.00	5/7/2020	80.0	2" PVC	0.010-in. slotted PVC	59.5 - 79.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-61 S	1922865.21	1180787.19	251.98	9/9/2020	25.5	2" PVC	0.010-in. slotted PVC	13.5 - 23.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-62 S	1923267.39	1180197.25	299.57	9/9/2020	90.5	2" PVC	0.010-in. slotted PVC	69.5 - 89.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-63 S	1923030.09	1179981.24	267.15	9/9/2020	56.0	2" PVC	0.010-in. slotted PVC	28.5 - 53.5	25	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-64 S	1922815.46	1179769.38	235.12	9/9/2020	27.5	2" PVC	0.010-in. slotted PVC	6.5 - 26.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-65 S	1923365.74	1179373.99	329.32	9/11/2020	125.5	2" PVC	0.010-in. slotted PVC	90.0 - 125.0	35	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-66 S	1923151.65	1178963.76	263.27	9/10/2020	55.5	2" PVC	0.010-in. slotted PVC	33.5 - 53.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-67 S	1922703.72	1178956.67	247.47	9/15/2020	26.0	2" PVC	0.010-in. slotted PVC	10.5 - 25.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-68 S	1922863.85	1178758.04	248.64	9/10/2020	51.0	2" PVC	0.010-in. slotted PVC	29.5 - 49.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-69 S	1923055.67	1178326.78	239.50	9/11/2020	37.0	2" PVC	0.010-in. slotted PVC	25.5 - 35.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-70 S	1922858.01	1178113.06	221.24	9/10/2020	22.5	2" PVC	0.010-in. slotted PVC	6.5 - 21.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-71 S	1922414.84	1178537.54	239.46	9/11/2020	33.0	2" PVC	0.010-in. slotted PVC	15.5 - 30.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-72 S	1922457.49	1178753.97	246.99	9/15/2020	36.0	2" PVC	0.010-in. slotted PVC	14.5 - 34.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-73 S	1922019.95	1178831.14	233.02	9/9/2020	30.5	2" PVC	0.010-in. slotted PVC	20.5 - 30.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-74 S	1922318.26	1178432.56	236.67	9/15/2020	41.0	2" PVC	0.010-in. slotted PVC	20.5 - 40.5	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-75 S	1922416.23	1177966.38	179.92	9/8/2020	11.5	2" PVC	0.010-in. slotted PVC	3.0 - 10.0	7	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-76 S	1922025.37	1178353.97	224.25	9/8/2020	26.0	2" PVC	0.010-in. slotted PVC	13.5 - 23.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-77 S	1922327.47	1177739.34	192.55	9/8/2020	30.5	2" PVC	0.010-in. slotted PVC	9.0 - 29.0	20	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-78 S	1921739.04	1178155.69	212.49	9/8/2020	18.5	2" PVC	0.010-in. slotted PVC	6.5 - 16.5	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-79 S	1921173.99	1177964.97	172.76	9/10/2020	25.0	2" PVC	0.010-in. slotted PVC	7.5 - 22.5	15	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-80 S	1922617.03	1177626.97	178.67	9/8/2020	19.5	2" PVC	0.010-in. slotted PVC	8.0 - 18.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-81 S	1922264.34	1177488.00	187.87	9/9/2020	13.5	2" PVC	0.010-in. slotted PVC	5.0 - 13.0	8	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling
PZ-82 S	1922854.13	1177876.03	192.74	9/8/2020	17.5	2" PVC	0.010-in. slotted PVC	7.0 - 17.0	10	20-40 Graded Sand	4¼" Hollow Stem Auger w/2' SPT Sampling

ft. amsl = feet above mean sea level

ft bgs = feet below ground surface

Table 2. Summary of AQTESOLV Hydraulic Conductivities from Slug/Bail Testing; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Well Diameter (in.)	TOC Elevation (ft. amsl)	Total Well Depth (ft.)	Screened Interval (ft. bls)	Lengthed of Screened Interval (ft.)	Mathematical Solution Method	Hydraulic Conductivity (cm/s)
PZ-02 S	2.0	207.93	18.0	8.0 - 18.0	10.0	Bouwer and Rice (1976)	7.00×10^{-5}
PZ-04 S	2.0	198.70	16.0	6.0 - 16.0	10.0	Bouwer and Rice (1976) & Butler (1998)	3.94×10^{-4}
PZ-17 S	2.0	308.41	93.0	73.0 - 93.0	20.0	Bouwer and Rice (1976)	1.89×10^{-6}
PZ-30 S	2.0	237.85	23.0	13.0 - 23.0	10.0	Bouwer and Rice (1976) & Butler (1998)	1.51×10^{-4}
PZ-35 S	2.0	315.87	84.0	74.0 - 84.0	10.0	Bouwer and Rice (1976) & Butler (1998)	1.81×10^{-4}
PZ-47 SR	2.0	205.93	23.0	13.0 - 23.0	10.0	Bouwer and Rice (1976) & Butler (1998)	4.04×10^{-5}
PZ-56 S	2.0	315.56	94.0	74.0 - 94.0	20.0	Bouwer and Rice (1976)	1.26×10^{-5}
PZ-82 S	2.0	195.56	17.0	7.0 - 17.0	10.0	Bouwer and Rice (1976)	3.30×10^{-6}
PZ 97-15	2.0	286.07	53.0	43.0 - 53.0	10.0	Bouwer and Rice (1976) & Butler (1998)	5.92×10^{-5}

in. = inches

ft. amsl = feet above mean sea level

ft. bls = feet below land surface

cm/s = centimeters per second

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
Shallow Aquifer Piezometers									
PZ-01 S	206.08	204.32	24.0	1.76	JP	2/4/2013	1.33	---	artsesian conditions
					ECP	2/19/2013	0.95	---	artsesian conditions
					ECP	3/6/2013	1.56	---	artsesian conditions
					ECP	3/21/2013	1.66	---	artsesian conditions
					ECP	4/8/2013	1.24	---	artsesian conditions
					ECP	4/24/2013	1.41	---	artsesian conditions
					MM	2/4/2020	0.49	---	artsesian conditions
					ZBL	2/18/2020	---	---	artsesian conditions
					ZBL	3/3/2020	---	---	artsesian conditions
					JKT	3/16/2020	---	---	artsesian conditions
					ZBL	4/1/2020	---	---	artsesian conditions
					ZBL	4/15/2020	---	---	artsesian conditions
					JKT	2/10/2021	1.69	---	artsesian conditions
					JKT	2/24/2021	0.97	---	artsesian conditions
					ACP	3/10/2021	1.73	---	artsesian conditions
					JKT	3/24/2021	1.08	---	artsesian conditions
					JKT	4/7/2021	1.01	---	artsesian conditions
					JKT	4/21/2021	1.38	---	artsesian conditions
PZ-02 S	207.93	203.84	18.0	4.09	JP	2/4/2013	7.26	200.67	
					ECP	2/19/2013	6.80	201.13	
					ECP	3/6/2013	7.55	200.38	
					ECP	3/21/2013	7.76	200.17	
					ECP	4/8/2013	7.64	200.29	
					ECP	4/24/2013	7.68	200.25	
					MM	2/4/2020	7.61	200.32	
					ZBL	2/18/2020	6.31	201.62	
					ZBL	3/3/2020	6.24	201.69	
					JKT	3/16/2020	6.84	201.09	
					ZBL	4/1/2020	6.82	201.11	
					ZBL	4/15/2020	6.51	201.42	
					JKT	2/10/2021	8.01	199.92	
					JKT	2/24/2021	7.11	200.82	
					AMM	3/10/2021	8.11	199.82	
					JKT	3/24/2021	7.23	200.70	
					JKT	4/7/2021	7.29	200.64	
					JKT	4/21/2021	8.14	199.79	
PZ-03 S	214.51	211.46	13.5	3.05	JP	2/4/2013	11.34	203.17	
					ECP	2/19/2013	10.70	203.81	
					ECP	3/6/2013	12.63	201.88	
					ECP	3/21/2013	12.96	201.55	
					ECP	4/8/2013	12.34	202.17	
					ECP	4/24/2013	12.96	201.55	
					MM	2/4/2020	13.37	201.14	
					ZBL	2/18/2020	13.22	201.29	
					ZBL	3/3/2020	9.91	204.60	
					JKT	3/16/2020	11.72	202.79	
					ZBL	4/1/2020	13.04	201.47	
					ZBL	4/15/2020	9.51	205.00	
					JKT	2/10/2021	13.55	200.96	
					JKT	2/24/2021	12.94	201.57	
					AMM	3/10/2021	15.05	199.46	
					JKT	3/24/2021	13.13	201.38	
					JKT	4/7/2021	13.01	201.50	
					JKT	4/21/2021	13.48	201.03	
PZ-04 S	198.70	194.40	16.0	4.30	JP	2/4/2013	6.11	192.59	
					ECP	2/19/2013	5.65	193.05	
					ECP	3/6/2013	6.31	192.39	
					ECP	3/21/2013	6.45	192.25	
					ECP	4/8/2013	6.36	192.34	
					ECP	4/24/2013	6.62	192.08	
					MM	2/4/2020	8.40	190.30	
					ZBL	2/18/2020	6.85	191.85	
					ZBL	3/3/2020	6.44	192.26	
					JKT	3/16/2020	7.54	191.16	
					JKT	4/1/2020	8.05	190.65	
					ZBL	4/15/2020	7.69	191.01	
					JKT	2/10/2021	12.45	186.25	
					JKT	2/24/2021	8.61	190.09	
					ACP	3/10/2021	10.56	188.14	
					JKT	3/24/2021	8.89	189.81	
					JKT	4/7/2021	8.81	189.89	
					JKT	4/21/2021	10.40	188.30	
PZ-07 S	213.62	210.49	8.5	3.13	JP	2/4/2013	8.12	205.50	
					ECP	2/19/2013	8.09	205.53	
					ECP	3/6/2013	8.58	205.04	
					ECP	3/21/2013	8.75	204.87	
					ECP	4/8/2013	8.64	204.98	
					ECP	4/24/2013	8.73	204.89	
					MM	2/4/2020	8.77	204.85	
					ZBL	2/18/2020	8.34	205.28	
					ZBL	3/3/2020	7.32	206.30	
					JKT	3/16/2020	8.09	205.53	
					JKT	4/1/2020	8.94	204.68	
					ZBL	4/15/2020	8.15	205.47	
					JKT	2/10/2021	9.37	204.25	
					JKT	2/24/2021	9.00	204.62	
					ACP	3/10/2021	9.52	204.10	
					JKT	3/24/2021	9.11	204.51	
					JKT	4/7/2021	9.14	204.48	
					JKT	4/21/2021	9.42	204.20	
PZ-08 S	243.01	240.94	38.0	2.07	JP	2/4/2013	26.89	216.12	
					ECP	2/19/2013	26.62	216.39	
					ECP	3/6/2013	26.70	216.31	
					ECP	3/21/2013	26.58	216.43	
					ECP	4/8/2013	26.46	216.55	
					ECP	4/24/2013	26.40	216.61	
					MM	2/4/2020	25.87	217.14	
					ZBL	2/18/2020	25.11	217.90	
					ZBL	3/3/2020	25.12	217.89	
					JKT	3/16/2020	25.19	217.82	
					ZBL	4/1/2020	25.16	217.85	
					ZBL	4/15/2020	25.12	217.89	
					JKT	2/10/2021	26.43	216.58	
					JKT	2/24/2021	25.83	217.18	
					AMM	3/10/2021	26.36	216.65	
					JKT	3/24/2021	25.95	217.06	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					JKT	4/7/2021	25.77	217.24	
					JKT	4/21/2021	26.30	216.71	
PZ-09 S	267.72	264.12	63.0	3.61	JP	2/4/2013	56.97	210.75	
					ECP	2/19/2013	56.70	211.02	
					ECP	3/6/2013	56.49	211.23	
					ECP	3/21/2013	55.91	211.81	
					ECP	4/8/2013	55.82	211.90	
					ECP	4/24/2013	55.81	211.91	
					MM	2/4/2020	47.38	220.34	
					ZBL	2/18/2020	46.58	221.14	
					ZBL	3/3/2020	45.72	222.00	
					JKT	3/16/2020	45.04	222.68	
					ZBL	4/1/2020	44.70	223.02	
					ZBL	4/15/2020	44.84	222.88	
					JKT	2/10/2021	51.90	215.82	
					JKT	2/24/2021	51.44	216.28	
					AMM	3/10/2021	51.79	215.93	
					JKT	3/24/2021	51.31	216.41	
					JKT	4/7/2021	50.67	217.05	
					JKT	4/21/2021	50.62	217.10	
PZ-10 S	253.98	252.11	53.0	1.87	JP	2/4/2013	47.55	206.43	
					ECP	2/19/2013	47.44	206.54	
					ECP	3/6/2013	42.29	211.69	
					ECP	3/21/2013	47.05	206.93	
					ECP	4/8/2013	46.81	207.17	
					ECP	4/24/2013	46.76	207.22	
					MM	2/4/2020	38.44	215.54	
					ZBL	2/18/2020	37.35	216.63	
					ZBL	3/3/2020	36.52	217.46	
					JKT	3/16/2020	36.08	217.90	
					ZBL	4/1/2020	36.43	217.55	
					ZBL	4/15/2020	36.77	217.21	
					JKT	2/10/2021	45.30	208.68	
					JKT	2/24/2021	44.86	209.12	
					ACP	3/10/2021	45.01	208.97	
					JKT	3/24/2021	44.65	209.33	
					JKT	4/7/2021	44.00	209.98	
					JKT	4/21/2021	43.18	210.80	
PZ-11 S	210.13	206.54	19.0	3.59	JP	2/4/2013	4.50	205.63	
					ECP	2/19/2013	4.53	205.60	
					ECP	3/6/2013	4.58	205.55	
					ECP	3/21/2013	4.90	205.23	
					ECP	4/8/2013	4.79	205.34	
					ECP	4/24/2013	4.86	205.27	
					MM	2/4/2020	4.98	205.15	
					ZBL	2/18/2020	4.44	205.69	
					ZBL	3/3/2020	4.38	205.75	
					JKT	3/16/2020	4.55	205.58	
					ZBL	4/1/2020	4.72	205.41	
					ZBL	4/15/2020	4.71	205.42	
					JKT	2/10/2021	5.31	204.82	
					JKT	2/24/2021	4.94	205.19	
					AMM	3/10/2021	5.32	204.81	
					JKT	3/24/2021	5.02	205.11	
					JKT	4/7/2021	5.02	205.11	
					JKT	4/21/2021	5.24	204.89	
PZ-12 S	237.39	233.85	28.0	3.54	JP	2/4/2013	17.01	220.38	
					ECP	2/19/2013	16.58	220.81	
					ECP	3/6/2013	16.60	220.79	
					ECP	3/21/2013	16.67	220.72	
					ECP	4/8/2013	16.61	220.78	
					ECP	4/24/2013	16.63	220.76	
					MM	2/4/2020	16.20	221.19	
					ZBL	2/18/2020	15.66	221.73	
					ZBL	3/3/2020	15.30	222.09	
					JKT	3/16/2020	15.50	221.89	
					ZBL	4/1/2020	15.61	221.78	
					ZBL	4/15/2020	15.33	222.06	
					JKT	2/10/2021	16.85	220.54	
					JKT	2/24/2021	16.18	221.21	
					AMM	3/10/2021	16.68	220.71	
					JKT	3/24/2021	16.13	221.26	
					JKT	4/7/2021	16.04	221.35	
					JKT	4/21/2021	16.40	220.99	
PZ-13 S	273.87	269.19	59.0	4.69	JP	2/4/2013	53.48	220.39	
					ECP	2/19/2013	53.26	220.61	
					ECP	3/6/2013	53.01	220.86	
					ECP	3/21/2013	52.65	221.22	
					ECP	4/8/2013	52.56	221.31	
					ECP	4/24/2013	52.58	221.29	
					MM	2/4/2020	49.42	224.45	
					ZBL	2/18/2020	49.05	224.82	
					ZBL	3/3/2020	48.88	224.99	
					JKT	3/16/2020	48.62	225.25	
					ZBL	4/1/2020	48.18	225.69	
					ZBL	4/15/2020	47.95	225.92	
					JKT	2/10/2021	50.42	223.45	
					JKT	2/24/2021	50.39	223.48	
					AMM	3/10/2021	50.46	223.41	
					JKT	3/24/2021	50.43	223.44	
					JKT	4/7/2021	50.22	223.65	
					JKT	4/21/2021	50.29	223.58	
PZ-16 S	226.11	222.56	24.0	3.55	JP	2/4/2013	10.40	215.71	
					ECP	2/19/2013	10.30	215.81	
					ECP	3/6/2013	10.25	215.86	
					ECP	3/21/2013	10.32	215.79	
					ECP	4/8/2013	10.31	215.80	
					ECP	4/24/2013	10.34	215.77	
					MM	2/4/2020	10.55	215.56	
					ZBL	2/18/2020	10.33	215.78	
					ZBL	3/3/2020	9.16	216.95	
					JKT	3/16/2020	9.31	216.80	
					JKT	4/1/2020	9.72	216.39	
					JKT	4/15/2020	9.39	216.72	
					JKT	2/10/2021	11.05	215.06	
					JKT	2/24/2021	10.78	215.33	
					ACP	3/10/2021	11.10	215.01	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					JKT	3/24/2021	10.91	215.20	
					JKT	4/7/2021	10.80	215.31	
					JKT	4/21/2021	10.97	215.14	
PZ-17 S	308.41	306.56	93.0	1.86	JP	2/4/2013	87.32	221.09	
					ECP	2/19/2013	87.67	220.74	
					ECP	3/6/2013	86.97	221.44	
					ECP	3/21/2013	86.56	221.85	
					ECP	4/8/2013	86.48	221.93	
					ECP	4/24/2013	86.39	222.02	
					MM	2/4/2020	84.42	223.99	
					ZBL	2/18/2020	84.03	224.38	
					ZBL	3/3/2020	83.50	224.91	
					JKT	3/16/2020	82.99	225.42	
					ZBL	4/1/2020	82.54	225.87	
					ZBL	4/15/2020	82.49	225.92	
					JKT	2/10/2021	85.37	223.04	
					JKT	2/24/2021	85.37	223.04	
					AMM	3/10/2021	86.65	221.76	
					JKT	3/24/2021	85.36	223.05	
					JKT	4/7/2021	85.23	223.18	
					JKT	4/21/2021	85.18	223.23	
PZ-18 S	238.24	234.51	24.0	3.73	JP	2/4/2013	17.59	220.65	
					ECP	2/19/2013	17.34	220.90	
					ECP	3/6/2013	17.05	221.19	
					ECP	3/21/2013	16.94	221.30	
					ECP	4/8/2013	16.70	221.54	
					ECP	4/24/2013	16.57	221.67	
					MM	2/4/2020	14.21	224.03	
					ZBL	2/18/2020	13.36	224.88	
					ZBL	3/3/2020	12.84	225.40	
					JKT	3/16/2020	12.81	225.43	
					ZBL	4/1/2020	12.83	225.41	
					ZBL	4/15/2020	12.79	225.45	
					JKT	2/10/2021	15.82	222.42	
					JKT	2/24/2021	15.30	222.94	
					AMM	3/10/2021	---	---	Not Measured
					JKT	3/24/2021	15.30	222.94	
					JKT	4/7/2021	14.91	223.33	
					JKT	4/21/2021	14.99	223.25	
PZ-19 S	278.96	276.17	63.0	2.79	JP	2/4/2013	53.48	225.48	
					ECP	2/19/2013	53.37	225.59	
					ECP	3/6/2013	53.17	225.79	
					ECP	3/21/2013	53.12	225.84	
					ECP	4/8/2013	53.10	225.86	
					ECP	4/24/2013	53.15	225.81	
					MM	2/4/2020	53.25	225.71	
					ZBL	2/18/2020	52.02	226.94	
					ZBL	3/3/2020	51.82	227.14	
					JKT	3/16/2020	51.54	227.42	
					ZBL	4/1/2020	51.88	227.08	
					ZBL	4/15/2020	51.61	227.35	
					JKT	2/10/2021	54.45	224.51	
					JKT	2/24/2021	54.29	224.67	
					AMM	3/10/2021	55.68	223.28	
					JKT	3/24/2021	54.30	224.66	
					JKT	4/7/2021	54.05	224.91	
					JKT	4/21/2021	54.19	224.77	
PZ- 20 S	221.69	218.60	24.0	3.09	JP	2/4/2013	15.65	206.04	
					ECP	2/19/2013	15.73	205.96	
					ECP	3/6/2013	15.80	205.89	
					ECP	3/21/2013	16.45	205.24	
					ECP	4/8/2013	16.93	204.76	
					ECP	4/24/2013	17.26	204.43	
					MM	2/4/2020	18.22	203.47	
					ZBL	2/18/2020	15.14	206.55	
					ZBL	3/3/2020	15.76	205.93	
					JKT	3/16/2020	15.84	205.85	
					ZBL	4/1/2020	17.35	204.34	
					ZBL	4/15/2020	17.26	204.43	
					JKT	2/10/2021	20.24	201.45	
					JKT	2/24/2021	19.38	202.31	
					ACP	3/10/2021	19.65	202.04	
					JKT	3/24/2021	19.24	202.45	
					JKT	4/7/2021	18.34	203.35	
					JKT	4/21/2021	18.75	202.94	
PZ-22 S	242.40	240.23	39.0	2.17	JP	2/4/2013	24.62	217.78	
					ECP	2/19/2013	24.24	218.16	
					JP	3/6/2013	24.04	218.36	
					ECP	3/21/2013	24.24	218.16	
					ECP	4/8/2013	24.37	218.03	
					ECP	4/24/2013	24.55	217.85	
					MM	2/4/2020	24.62	217.78	
					ZBL	2/18/2020	24.03	218.37	
					JKT	3/3/2020	21.51	220.89	
					JKT	3/16/2020	21.24	221.16	
					JKT	4/1/2020	22.10	220.30	
					JKT	4/15/2020	22.34	220.06	
					JKT	2/10/2021	25.75	216.65	
					JKT	2/24/2021	25.30	217.10	
					ACP	3/10/2021	25.52	216.88	
					JKT	3/24/2021	25.34	217.06	
					JKT	4/7/2021	25.04	217.36	
					JKT	4/21/2021	25.03	217.37	
PZ- 23 S	208.67	205.83	14.0	2.84	JP	2/4/2013	8.67	200.00	
					JP	2/19/2013	8.66	200.01	
					JP	3/6/2013	8.96	199.71	
					ECP	3/21/2013	9.58	199.09	
					ECP	4/8/2013	9.47	199.20	
					ECP	4/24/2013	9.53	199.14	
	211.42	205.70		5.72	MM	2/4/2020	13.21	198.21	Repaired 12-11-19
					ZBL	2/18/2020	10.04	201.38	
					JKT	3/3/2020	11.41	200.01	
					JKT	3/16/2020	11.47	199.95	
					JKT	4/1/2020	12.86	198.56	
					JKT	4/15/2020	12.50	198.92	
					JKT	2/10/2021	14.23	197.19	
					JKT	2/24/2021	11.96	199.46	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ACP	3/10/2021	12.43	198.99	
					JKT	3/24/2021	12.42	199.00	
					JKT	4/7/2021	11.40	200.02	
					JKT	4/21/2021	11.37	200.05	
PZ-29 SR	217.03	214.08	12.0	2.95	MM	2/4/2020	4.20	212.83	Drilled 12-19-2019
					ZBL	2/18/2020	3.39	213.64	
					JKT	3/3/2020	3.45	213.58	
					JKT	3/16/2020	3.67	213.36	
					JKT	4/1/2020	3.83	213.20	
					JKT	4/15/2020	3.33	213.70	
					JKT	2/10/2021	4.67	212.36	
					JKT	2/24/2021	3.75	213.28	
					AMM	3/10/2021	4.84	212.19	
					JKT	3/24/2021	3.82	213.21	
					JKT	4/7/2021	3.95	213.08	
					JKT	4/21/2021	4.66	212.37	
PZ-30 S	237.85	234.93	23.0	2.92	JP	2/4/2013	15.82	222.03	
					ECP	2/19/2013	21.82	216.03	
					ECP	3/6/2013	15.44	222.41	
					ECP	3/21/2013	15.21	222.64	
					ECP	4/8/2013	15.01	222.84	
					ECP	4/24/2013	14.90	222.95	
					MM	2/4/2020	14.30	223.55	
					ZBL	2/18/2020	13.03	224.82	
					JKT	3/3/2020	12.85	225.00	
					JKT	3/16/2020	12.55	225.30	
					JKT	4/1/2020	12.60	225.25	
					JKT	4/15/2020	11.90	225.95	
					JKT	2/10/2021	13.38	224.47	
					JKT	2/24/2021	13.00	224.85	
					ACP	3/10/2021	13.42	224.43	
					JKT	3/24/2021	13.04	224.81	
					JKT	4/7/2021	12.63	225.22	
					JKT	4/21/2021	12.66	225.19	
PZ-32 S	256.97	253.79	33.0	3.18	JP	2/4/2013	23.68	233.29	
					ECP	2/19/2013	23.51	233.46	
					ECP	3/6/2013	23.14	233.83	
					ECP	3/21/2013	22.80	234.17	
					ECP	4/8/2013	22.54	234.43	
					ECP	4/24/2013	22.44	234.53	
					MM	2/4/2020	22.11	234.86	
					ZBL	2/18/2020	21.26	235.71	
					JKT	3/3/2020	20.76	236.21	
					JKT	3/16/2020	20.48	236.49	
					JKT	4/1/2020	20.74	236.23	
					JKT	4/15/2020	20.63	236.34	
					ACP	2/10/2021	22.73	234.24	
					JKT	2/24/2021	22.54	234.43	
					AMM	3/10/2021	22.73	234.24	
					JKT	3/24/2021	22.61	234.36	
					JKT	4/7/2021	22.34	234.63	
					JKT	4/21/2021	22.43	234.54	
PZ-33 S	269.96	267.11	49.0	2.85	JP	2/4/2013	34.83	235.13	
					ECP	2/19/2013	34.84	235.12	
					ECP	3/6/2013	33.81	236.15	
					JP	3/21/2013	33.20	236.76	
					ECP	4/8/2013	32.76	237.20	
					ECP	4/24/2013	32.48	237.48	
					MM	2/4/2020	32.01	237.95	
					ZBL	2/18/2020	31.84	238.12	
					JKT	3/3/2020	29.78	240.18	
					JKT	3/16/2020	29.20	240.76	
					JKT	4/1/2020	29.62	240.34	
					JKT	4/15/2020	29.42	240.54	
					JKT	2/10/2021	33.38	236.58	
					JKT	2/24/2021	33.32	236.64	
					ACP	3/10/2021	33.51	236.45	
					JKT	3/24/2021	33.46	236.50	
					JKT	4/7/2021	33.07	236.89	
					JKT	4/21/2021	33.00	236.96	
PZ-34 S	289.13	285.88	78.5	3.25	JP	2/4/2013	57.05	232.08	
					ECP	2/19/2013	57.07	232.06	
					ECP	3/6/2013	57.14	231.99	
					JP	3/21/2013	56.78	232.35	
					ECP	4/8/2013	56.54	232.59	
					ECP	4/24/2013	56.41	232.72	
					MM	2/4/2020	54.54	234.59	
					ZBL	2/18/2020	54.16	234.97	
					JKT	3/3/2020	53.98	235.15	
					JKT	3/16/2020	53.78	235.35	
					JKT	4/1/2020	53.59	235.54	
					JKT	4/15/2020	53.26	235.87	
					JKT	2/10/2021	53.62	235.51	
					JKT	2/24/2021	53.59	235.54	
					AMM	3/10/2021	53.68	235.45	
					JKT	3/24/2021	53.79	235.34	
					JKT	4/7/2021	53.74	235.39	
					JKT	4/21/2021	54.02	235.11	
PZ-35 S	315.87	313.73	84.0	2.14	JP	2/4/2013	81.04	234.83	
					ECP	2/19/2013	81.00	234.87	
					ECP	3/6/2013	80.83	235.04	
					ECP	3/21/2013	80.47	235.40	
					ECP	4/8/2013	80.14	235.73	
					ECP	4/24/2013	79.77	236.10	
					MM	2/4/2020	79.02	236.85	
					ZBL	2/18/2020	78.63	237.24	
					JKT	3/3/2020	78.16	237.71	
					JKT	3/16/2020	77.56	238.31	
					JKT	4/1/2020	77.11	238.76	
					JKT	4/15/2020	76.72	239.15	
					JKT	2/10/2021	78.91	236.96	
					JKT	2/24/2021	79.03	236.84	
					AMM	3/10/2021	79.17	236.70	
					JKT	3/24/2021	79.32	236.55	
					JKT	4/7/2021	79.26	236.61	
					JKT	4/21/2021	79.37	236.50	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
PZ-38 S	282.71	279.29	49.0	3.42	JP	2/4/2013	47.46	235.25	
					ECP	2/19/2013	47.37	235.34	
					ECP	3/6/2013	47.15	235.56	
					ECP	3/21/2013	46.79	235.92	
					ECP	4/8/2013	46.27	236.44	
					ECP	4/24/2013	45.82	236.89	
	280.07			0.78	MM	2/4/2020	43.40	236.67	TOC re-surveyed
					ZBL	2/18/2020	43.02	237.05	
					JKT	3/3/2020	42.46	237.61	
					JKT	3/16/2020	41.60	238.47	
					JKT	4/1/2020	40.81	239.26	
					JKT	4/15/2020	40.33	239.74	
					JKT	2/10/2021	43.40	236.67	
					JKT	2/24/2021	43.49	236.58	
					AMM	3/10/2021	43.61	236.46	
					JKT	3/24/2021	43.72	236.35	
					JKT	4/7/2021	43.66	236.41	
					JKT	4/21/2021	43.75	236.32	
PZ-39 S	260.48	256.78	34.0	3.70	JP	2/4/2013	24.88	235.60	
					ECP	2/19/2013	24.76	235.72	
					ECP	3/6/2013	24.47	236.01	
					ECP	3/21/2013	24.21	236.27	
					ECP	4/8/2013	23.96	236.52	
					ECP	4/24/2013	23.81	236.67	
					MM	2/4/2020	23.57	236.91	
					ZBL	2/18/2020	22.48	238.00	
					JKT	3/3/2020	21.83	238.65	
					JKT	3/16/2020	21.46	239.02	
					JKT	4/1/2020	21.78	238.70	
					JKT	4/15/2020	21.89	238.59	
					JKT	2/10/2021	23.74	236.74	
					JKT	2/24/2021	23.70	236.78	
					AMM	3/10/2021	23.81	236.67	
					JKT	3/24/2021	23.77	236.71	
					JKT	4/7/2021	23.59	236.89	
					JKT	4/21/2021	23.66	236.82	
PZ-40 S	283.20	280.39	64.0	2.81	JP	2/4/2013	46.07	237.13	
					ECP	2/19/2013	46.01	237.19	
					JP	3/6/2013	45.86	237.34	
					JP	3/21/2013	45.54	237.66	
					ECP	4/8/2013	45.42	237.78	
					ECP	4/24/2013	45.41	237.79	
					MM	2/4/2020	44.59	238.61	
					ZBL	2/18/2020	44.19	239.01	
					ZBL	3/3/2020	43.55	239.65	
					JKT	3/16/2020	43.39	239.81	
					ZBL	4/1/2020	43.45	239.75	
					JKT	4/15/2020	43.50	239.70	
					ACP	2/10/2021	44.60	238.60	
					JKT	2/24/2021	44.53	238.67	
					AMM	3/10/2021	44.61	238.59	
					ACP	3/24/2021	44.52	238.68	
					JKT	4/7/2021	44.30	238.90	
					AMM	4/21/2021	44.42	238.78	
PZ- 41 S	201.12	198.28	9.0	2.84	JP	2/4/2013	3.16	197.96	
					ECP	2/19/2013	2.98	198.14	
					ECP	3/6/2013	3.26	197.86	
					ECP	3/21/2013	3.42	197.70	
					ECP	4/8/2013	3.33	197.79	
					ECP	4/24/2013	3.36	197.76	
					JKT	2/4/2020	---	---	Not measured
					ZBL	2/18/2020	2.53	198.59	
					ZBL	3/3/2020	2.44	198.68	
					JKT	3/16/2020	2.58	198.54	
					ZBL	4/1/2020	2.73	198.39	
					JKT	4/15/2020	2.76	198.36	
					JKT	2/10/2021	3.03	198.09	
					JKT	2/24/2021	2.76	198.36	
					AMM	3/10/2021	4.93	196.19	
					JKT	3/24/2021	2.82	198.30	
					JKT	4/7/2021	2.81	198.31	
					JKT	4/21/2021	3.05	198.07	
PZ-42 S	209.26	206.46	24.0	2.80	JP	2/4/2013	6.03	203.23	
					ECP	2/19/2013	5.71	203.55	
					ECP	3/6/2013	6.32	202.94	
					ECP	3/21/2013	6.45	202.81	
					ECP	4/8/2013	6.28	202.98	
					ECP	4/24/2013	6.31	202.95	
					MM	2/4/2020	6.53	202.73	
					ZBL	2/18/2020	5.68	203.58	
					JKT	3/3/2020	6.57	202.69	
					JKT	3/16/2020	6.07	203.19	
					ZBL	4/1/2020	6.09	203.17	
					JKT	4/15/2020	5.76	203.50	
					JKT	2/10/2021	6.40	202.86	
					JKT	2/24/2021	5.98	203.28	
					AMM	3/10/2021	8.47	200.79	
					JKT	3/24/2021	6.06	203.20	
					JKT	4/7/2021	6.12	203.14	
					JKT	4/21/2021	6.45	202.81	
PZ-43 S	259.33	256.46	39.0	2.87	JP	2/4/2013	31.34	227.99	
					JP	2/19/2013	31.20	228.13	
					JP	3/6/2013	30.84	228.49	
					JP	3/21/2013	30.70	228.63	
					ECP	4/8/2013	30.72	228.61	
					ECP	4/24/2013	30.76	228.57	
					MM	2/4/2020	30.69	228.64	
					ZBL	2/18/2020	30.53	228.80	
					JKT	3/3/2020	29.37	229.96	
					JKT	3/16/2020	28.93	230.40	
					ZBL	4/1/2020	28.87	230.46	
					JKT	4/15/2020	28.70	230.63	
					JKT	2/10/2021	31.80	227.53	
					JKT	2/24/2021	31.54	227.79	
					ACP	3/10/2021	31.56	227.77	
					ACP	3/24/2021	31.54	227.79	
					JKT	4/7/2021	31.20	228.13	
					JKT	4/21/2021	31.08	228.25	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
PZ-44 SR	259.15	257.45	42.5	1.70	MM	2/4/2020	34.36	224.79	Drilled 12-19-2019
					ZBL	2/18/2020	33.44	225.71	
					JKT	3/3/2020	33.01	226.14	
					JKT	3/16/2020	32.76	226.39	
					ZBL	4/1/2020	32.58	226.57	
					JKT	4/15/2020	32.37	226.78	
					JKT	2/10/2021	33.55	225.60	
					JKT	2/24/2021	32.94	226.21	
					ACP	3/10/2021	33.42	225.73	
					JKT	3/24/2021	33.22	225.93	
					JKT	4/7/2021	32.93	226.22	
					JKT	4/21/2021	32.89	226.26	
PZ-45 SR	227.62	224.92	20.0	2.70	MM	2/4/2020	18.19	209.43	Drilled 12-19-2019
					ZBL	2/18/2020	14.38	213.24	
					JKT	3/3/2020	16.20	211.42	
					JKT	3/16/2020	16.65	210.97	
					JKT	4/1/2020	17.96	209.66	
					JKT	4/15/2020	16.29	211.33	
					JKT	2/10/2021	18.88	208.74	
					JKT	2/24/2021	17.46	210.16	
					ACP	3/10/2021	18.60	209.02	
					JKT	3/24/2021	17.78	209.84	
					JKT	4/7/2021	17.39	210.23	
					JKT	4/21/2021	18.27	209.35	
PZ-46 S	287.86	284.94	79.0	2.92	JP	2/4/2013	60.68	227.18	
					JP	2/19/2013	60.72	227.14	
					JP	3/6/2013	60.63	227.23	
					JP	3/21/2013	60.18	227.68	
					ECP	4/8/2013	59.88	227.98	
					ECP	4/24/2013	59.66	228.20	
					MM	2/4/2020	57.96	229.90	
					ZBL	2/18/2020	57.59	230.27	
					ZBL	3/3/2020	57.17	230.69	
					JKT	3/16/2020	56.81	231.05	
					ZBL	4/1/2020	56.50	231.36	
					JKT	4/15/2020	56.14	231.72	
					JKT	2/10/2021	57.22	230.64	
					JKT	2/24/2021	57.13	230.73	
					AMM	3/10/2021	57.23	230.63	
					ACP	3/24/2021	57.22	230.64	
					JKT	4/7/2021	56.98	230.88	
					AMM	4/21/2021	57.12	230.74	
PZ-46 SS	287.74	284.67	20.0	3.07	JP	2/4/2013	13.55	274.19	
					JP	2/19/2013	13.38	274.36	
					JP	3/6/2013	13.80	273.94	
					JP	3/21/2013	14.39	273.35	
					ECP	4/8/2013	14.70	273.04	
					ECP	4/24/2013	14.97	272.77	
					MM	2/4/2020	15.82	271.92	
					ZBL	2/18/2020	13.08	274.66	
					ZBL	3/3/2020	12.98	274.76	
					JKT	3/16/2020	12.93	274.81	
					JKT	4/1/2020	14.65	273.09	
					ZBL	4/15/2020	14.97	272.77	
					JKT	2/10/2021	17.20	270.54	
					JKT	2/24/2021	16.20	271.54	
					AMM	3/10/2021	16.91	270.83	
					ACP	3/24/2021	16.41	271.33	
					JKT	4/7/2021	15.36	272.38	
					AMM	4/21/2021	16.18	271.56	
PZ-47 SR	205.93	202.78	23.0	3.15	MM	2/4/2020	17.95	187.98	Drilled 12-11-2019
					ZBL	2/18/2020	16.22	189.71	
					JKT	3/3/2020	13.58	192.35	
					JKT	3/16/2020	15.99	189.94	
					JKT	4/1/2020	16.31	189.62	
					JKT	4/15/2020	15.62	190.31	
					JKT	2/10/2021	16.79	189.14	
					JKT	2/24/2021	14.86	191.07	
					ACP	3/10/2021	17.14	188.79	
					JKT	3/24/2021	16.33	189.60	
					JKT	4/7/2021	16.66	189.27	
					JKT	4/21/2021	17.98	187.95	
PZ-48 S	187.04	184.34	10.5	2.70	JP	2/4/2013	3.60	183.44	
					JP	2/19/2013	3.90	183.14	
					JP	3/6/2013	4.40	182.64	
					JP	3/21/2013	5.36	181.68	
					ECP	4/8/2013	5.25	181.79	
					ECP	4/24/2013	5.31	181.73	
					MM	2/4/2020	5.23	181.81	
					ZBL	2/18/2020	3.55	183.49	
					JKT	3/3/2020	3.51	183.53	
					JKT	3/16/2020	4.58	182.46	
					ZBL	4/1/2020	5.05	181.99	
					JKT	4/15/2020	4.03	183.01	
					JKT	2/10/2021	12.68	174.36	
					JKT	2/24/2021	10.09	176.95	
					ACP	3/10/2021	8.93	178.11	
					JKT	3/24/2021	7.41	179.63	
					JKT	4/7/2021	5.27	181.77	
					JKT	4/21/2021	6.52	180.52	
PZ-49 S	281.04	278.79	68.0	2.25	JP	2/4/2013	55.67	225.37	
					JP	2/19/2013	55.46	225.58	
					JP	3/6/2013	55.18	225.86	
					JP	3/21/2013	54.89	226.15	
					ECP	4/8/2013	54.56	226.48	
					ECP	4/24/2013	54.37	226.67	
					MM	2/4/2020	53.52	227.52	
					ZBL	2/18/2020	53.16	227.88	
					ZBL	3/3/2020	52.29	228.75	
					JKT	3/16/2020	51.52	229.52	
					ZBL	4/1/2020	50.80	230.24	
					JKT	4/15/2020	50.43	230.61	
					ACP	2/10/2021	53.82	227.22	
					AMM	2/24/2021	54.01	227.03	
					ACP	3/10/2021	54.03	227.01	
					ACP	3/24/2021	54.09	226.95	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					AMM	4/7/2021	53.97	227.07	
					AMM	4/21/2021	53.93	227.11	
PZ-50 S	299.23	297.49	94.0	1.74	JP	2/4/2013	71.29	227.94	
					JP	2/19/2013	71.28	227.95	
					JP	3/6/2013	71.20	228.03	
					JP	3/21/2013	70.87	228.36	
					ECP	4/8/2013	70.57	228.66	
					ECP	4/24/2013	70.42	228.81	
					MM	2/4/2020	68.09	231.14	
					ZBL	2/18/2020	67.81	231.42	
					ZBL	3/3/2020	67.51	231.72	
					JKT	3/16/2020	67.27	231.96	
					ZBL	4/1/2020	67.03	232.20	
					JKT	4/15/2020	66.71	232.52	
					ACP	2/10/2021	67.26	231.97	
					AMM	2/24/2021	67.37	231.86	
					ACP	3/10/2021	67.39	231.84	
					ACP	3/24/2021	67.38	231.85	
					AMM	4/7/2021	67.11	232.12	
					AMM	4/21/2021	67.47	231.76	
PZ-51 S	337.93	336.38	114.0	1.55	JP	2/4/2013	100.91	237.02	
					JP	2/19/2013	100.93	237.00	
					JP	3/6/2013	100.98	236.95	
					JP	3/21/2013	100.66	237.27	
					ECP	4/8/2013	100.53	237.40	
					ECP	4/24/2013	100.42	237.51	
					MM	2/4/2020	99.56	238.37	
					ZBL	2/18/2020	99.50	238.43	
					ZBL	3/3/2020	99.19	238.74	
					JKT	3/16/2020	99.12	238.81	
					ZBL	4/1/2020	99.15	238.78	
					JKT	4/15/2020	99.00	238.93	
	336.66	---			ACP	2/10/2021	99.55	237.11	TOC re-surveyed (new cul-de-sac)
					JKT	2/24/2021	98.13	238.53	
					ACP	3/10/2021	98.34	238.32	
					ACP	3/24/2021	98.20	238.46	
					JKT	4/7/2021	98.01	238.65	
					JKT	4/21/2021	98.34	238.32	
PZ-52 S	274.85	270.07	55.0	4.78	ACP	2/10/2021	51.35	223.50	
					JKT	2/24/2021	51.22	223.63	
					AMM	3/10/2021	51.21	223.64	
					JKT	3/24/2021	51.09	223.76	
					JKT	4/7/2021	50.76	224.09	
					JKT	4/21/2021	50.56	224.29	
PZ-53 S	261.06	256.53	45.0	4.53	ACP	2/10/2021	44.72	216.34	
					JKT	2/24/2021	36.95	224.11	
					AMM	3/10/2021	37.96	223.10	
					JKT	3/24/2021	36.85	224.21	
					JKT	4/7/2021	36.46	224.60	
					JKT	4/21/2021	36.36	224.70	
PZ-54 S	302.00	298.58	75.0	3.42	ACP	2/10/2021	68.31	233.69	
					JKT	2/24/2021	68.35	233.65	
					AMM	3/10/2021	69.68	232.32	
					ACP	3/24/2021	68.36	233.64	
					JKT	4/7/2021	68.30	233.70	
					AMM	4/21/2021	68.56	233.44	
PZ-55 S	259.44	255.64	36.0	3.80	JKT	2/10/2021	32.66	226.78	
					JKT	2/24/2021	32.57	226.87	
					AMM	3/10/2021	33.79	225.65	
					ACP	3/24/2021	32.53	226.91	
					JKT	4/7/2021	32.15	227.29	
					JKT	4/21/2021	32.07	227.37	
PZ-56 S	315.56	310.81	93.0	4.75	ACP	2/10/2021	87.56	228.00	
					AMM	2/24/2021	86.55	229.01	
					ACP	3/10/2021	87.62	227.94	
					ACP	3/24/2021	87.64	227.92	
					AMM	4/7/2021	87.58	227.98	
					AMM	4/21/2021	87.75	227.81	
PZ-57 S	314.56	310.00	100.0	4.56	ACP	2/10/2021	83.91	230.65	
					AMM	2/24/2021	83.93	230.63	
					ACP	3/10/2021	84.04	230.52	
					ACP	3/24/2021	83.93	230.63	
					AMM	4/7/2021	85.25	229.31	
					AMM	4/21/2021	84.19	230.37	
PZ-58 S	277.25	272.63	50.0	4.62	JKT	2/10/2021	43.73	233.52	
					JKT	2/24/2021	43.74	233.51	
					ACP	3/10/2021	43.88	233.37	
					JKT	3/24/2021	43.90	233.35	
					JKT	4/7/2021	43.73	233.52	
					JKT	4/21/2021	43.72	233.53	
PZ-59 S	318.12	314.25	85.0	3.87	ACP	2/10/2021	68.52	249.60	
					JKT	2/24/2021	68.56	249.56	
					AMM	3/10/2021	68.58	249.54	
					ACP	3/24/2021	68.66	249.46	
					JKT	4/7/2021	68.59	249.53	
					JKT	4/21/2021	68.91	249.21	
PZ-60 S	315.77	311.00	80.0	4.77	JKT	2/10/2021	74.77	241.00	
					JKT	2/24/2021	75.29	240.48	
					AMM	3/10/2021	73.35	242.42	
					ACP	3/24/2021	75.03	240.74	
					JKT	4/7/2021	74.96	240.81	
					JKT	4/21/2021	75.00	240.77	
PZ-61 S	253.07	251.98	25.5	1.09	ACP	2/10/2021	11.84	241.23	
					AMM	2/24/2021	9.38	243.69	
					ACP	3/10/2021	9.89	243.18	
					ACP	3/24/2021	7.65	245.42	
					AMM	4/7/2021	7.67	245.40	
					AMM	4/21/2021	7.09	245.98	
PZ-62 S	302.97	299.57	90.5	3.40	ACP	2/10/2021	68.78	234.19	
					AMM	2/24/2021	68.71	234.26	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ACP	3/10/2021	68.81	234.16	
					ACP	3/24/2021	68.70	234.27	
					AMM	4/7/2021	68.42	234.55	
					AMM	4/21/2021	68.69	234.28	
PZ-63 S	273.35	267.15	56.0	6.20	ACP	2/10/2021	35.88	237.47	
					AMM	2/24/2021	35.86	237.49	twist off TOC blank riser before measurement
					ACP	3/10/2021	35.90	237.45	
					ACP	3/24/2021	35.76	237.59	
					AMM	4/7/2021	36.98	236.37	
					AMM	4/21/2021	35.84	237.51	
PZ-64 S	238.06	235.12	27.5	2.94	ACP	2/10/2021	7.89	230.17	
					AMM	2/24/2021	7.67	230.39	
					ACP	3/10/2021	7.92	230.14	
					ACP	3/24/2021	7.62	230.44	
					AMM	4/7/2021	11.38	226.68	
					AMM	4/21/2021	7.74	230.32	
PZ-65 S	332.27	329.32	125.5	2.95	ACP	2/10/2021	103.36	228.91	
					AMM	2/24/2021	103.53	228.74	
					ACP	3/10/2021	103.61	228.66	
					ACP	3/24/2021	103.68	228.59	
					AMM	4/7/2021	103.52	228.75	
					AMM	4/21/2021	103.84	228.43	
PZ-66 S	264.95	263.27	55.5	1.68	ACP	2/10/2021	40.43	224.52	
					AMM	2/24/2021	40.67	224.28	
					ACP	3/10/2021	40.68	224.27	
					ACP	3/24/2021	40.65	224.30	
					AMM	4/7/2021	41.81	223.14	
					AMM	4/21/2021	40.11	224.84	
PZ-67 S	250.68	247.47	26.0	3.21	ACP	2/10/2021	25.61	225.07	
					AMM	2/24/2021	25.82	224.86	
					ACP	3/10/2021	25.41	225.27	
					ACP	3/24/2021	25.35	225.33	
					AMM	4/7/2021	26.51	224.17	
					AMM	4/21/2021	24.67	226.01	
PZ-68 S	252.59	248.64	51.0	3.94	ACP	2/10/2021	37.18	215.41	
					AMM	2/24/2021	37.37	215.22	
					ACP	3/10/2021	37.29	215.30	
					ACP	3/24/2021	37.23	215.36	
					AMM	4/7/2021	38.32	214.27	
					AMM	4/21/2021	36.57	216.02	
PZ-69 S	242.41	239.50	37.0	2.91	ACP	2/10/2021	32.47	209.94	
					AMM	2/24/2021	32.41	210.00	
					ACP	3/10/2021	32.47	209.94	
					ACP	3/24/2021	32.32	210.09	
					AMM	4/7/2021	31.95	210.46	
					AMM	4/21/2021	31.84	210.57	
PZ-70 S	224.05	221.24	22.5	2.81	ACP	2/10/2021	22.48	201.57	
					AMM	2/24/2021	22.02	202.03	
					ACP	3/10/2021	22.44	201.61	
					ACP	3/24/2021	22.16	201.89	
					AMM	4/7/2021	21.93	202.12	
					AMM	4/21/2021	22.13	201.92	
PZ-71 S	243.87	239.46	33.0	4.41	ACP	2/10/2021	26.73	217.14	
					AMM	2/24/2021	26.62	217.25	
					ACP	3/10/2021	26.36	217.51	
					ACP	3/24/2021	26.16	217.71	
					AMM	4/7/2021	26.62	217.25	
					AMM	4/21/2021	25.47	218.40	
PZ-72 S	250.28	246.99	36.0	3.29	ACP	2/10/2021	26.11	224.17	
					AMM	2/24/2021	26.28	224.00	
					ACP	3/10/2021	26.39	223.89	
					ACP	3/24/2021	26.42	223.86	
					AMM	4/7/2021	26.36	223.92	
					AMM	4/21/2021	26.26	224.02	
PZ-73 S	237.73	233.02	30.5	4.72	ACP	2/10/2021	29.05	208.68	
					AMM	2/24/2021	22.74	214.99	Confirmed Error in Measurement
					ACP	3/10/2021	29.17	208.56	
					ACP	3/24/2021	28.73	209.00	
					AMM	4/7/2021	28.71	209.02	
					AMM	4/21/2021	29.23	208.50	
PZ-74 S	238.60	236.67	41.0	1.92	ACP	2/10/2021	31.42	207.18	
					AMM	2/24/2021	31.11	207.49	
					ACP	3/10/2021	30.98	207.62	
					ACP	3/24/2021	30.55	208.05	
					AMM	4/7/2021	31.38	207.22	
					AMM	4/21/2021	30.10	208.50	
PZ-75 S	181.98	179.92	11.5	2.06	ACP	2/10/2021	5.64	176.34	
					AMM	2/24/2021	5.49	176.49	
					ACP	3/10/2021	5.73	176.25	
					ACP	3/24/2021	5.59	176.39	
					AMM	4/7/2021	6.64	175.34	
					AMM	4/21/2021	5.43	176.55	
PZ-76 S	225.52	224.25	26.0	1.27	ACP	2/10/2021	20.41	205.11	
					AMM	2/24/2021	20.29	205.23	
					ACP	3/10/2021	20.22	205.30	
					ACP	3/24/2021	20.13	205.39	
					AMM	4/7/2021	19.91	205.61	
					AMM	4/21/2021	19.83	205.69	
PZ-77 S	195.52	192.55	30.5	2.97	ACP	2/10/2021	14.27	181.25	
					AMM	2/24/2021	11.96	183.56	
					ACP	3/10/2021	13.05	182.47	
					ACP	3/24/2021	11.86	183.66	
					AMM	4/7/2021	12.26	183.26	
					AMM	4/21/2021	11.94	183.58	
PZ-78 S	215.99	212.49	18.5	3.50	ACP	2/10/2021	17.10	198.89	
					AMM	2/24/2021	16.98	199.01	
					ACP	3/10/2021	17.10	198.89	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ACP	3/24/2021	16.85	199.14	
					AMM	4/7/2021	18.14	197.85	
					AMM	4/21/2021	17.93	198.06	
PZ-79 S	174.97	172.76	25.0	2.22	ACP	2/10/2021	13.85	161.12	
					AMM	2/24/2021	11.09	163.88	
					ACP	3/10/2021	9.36	165.61	
					ACP	3/24/2021	8.08	166.89	
					AMM	4/7/2021	7.83	167.14	
					AMM	4/21/2021	9.00	165.97	
PZ-80 S	181.22	178.67	19.5	2.55	ACP	2/10/2021	13.56	167.66	
					AMM	2/24/2021	13.43	167.79	
					ACP	3/10/2021	13.62	167.60	
					ACP	3/24/2021	13.38	167.84	
					AMM	4/7/2021	14.61	166.61	
					AMM	4/21/2021	13.54	167.68	
PZ-81 S	189.65	187.87	13.5	1.78	ACP	2/10/2021	5.92	183.73	
					AMM	2/24/2021	3.80	185.85	
					ACP	3/10/2021	4.31	185.34	
					ACP	3/24/2021	2.98	186.67	
					AMM	4/7/2021	3.98	185.67	
					AMM	4/21/2021	3.38	186.27	
PZ-82 S	195.56	192.74	17.5	2.82	ACP	2/10/2021	10.47	185.09	
					AMM	2/24/2021	10.27	185.29	
					ACP	3/10/2021	10.59	184.97	
					ACP	3/24/2021	10.27	185.29	
					AMM	4/7/2021	10.47	185.09	
					AMM	4/21/2021	10.92	184.64	
Deep Aquifer Piezometers									
PZ-01 D	206.43	204.32	68.0	2.11	JP	2/4/2013	48.23	158.20	
					ECP	2/19/2013	48.33	158.10	
					ECP	3/6/2013	48.40	158.03	
					ECP	3/21/2013	48.20	158.23	
					ECP	4/8/2013	48.12	158.31	
					ECP	4/24/2013	48.23	158.20	
	206.32			2.00	MM	2/4/2020	48.10	158.22	Cut to make TOC even
					ZBL	2/18/2020	47.72	158.60	
					ZBL	3/3/2020	47.59	158.73	
					JKT	3/16/2020	47.88	158.44	
					ZBL	4/1/2020	47.88	158.44	
					ZBL	4/15/2020	48.03	158.29	
					JKT	2/10/2021	48.73	157.59	
					JKT	2/24/2021	48.41	157.91	
					ACP	3/10/2021	48.60	157.72	
					JKT	3/24/2021	48.22	158.10	
					JKT	4/7/2021	48.09	158.23	
					JKT	4/21/2021	48.51	157.81	
PZ-02 D	208.13	204.20	63.0	3.93	JP	2/4/2013	48.35	159.78	
					ECP	2/19/2013	48.66	159.47	
					ECP	3/6/2013	48.85	159.28	
					ECP	3/21/2013	48.63	159.50	
					ECP	4/8/2013	48.53	159.60	
					ECP	4/24/2013	48.66	159.47	
					MM	2/4/2020	48.75	159.38	
					ZBL	2/18/2020	48.42	159.71	
					ZBL	3/3/2020	48.25	159.88	
					JKT	3/16/2020	48.54	159.59	
					ZBL	4/1/2020	48.57	159.56	
					ZBL	4/15/2020	48.61	159.52	
					JKT	2/10/2021	49.30	158.83	
					JKT	2/24/2021	49.03	159.10	
					AMM	3/10/2021	49.17	158.96	
					JKT	3/24/2021	48.89	159.24	
					JKT	4/7/2021	48.78	159.35	
					JKT	4/21/2021	49.18	158.95	
PZ-03 D	214.52	211.79	63.0	2.73	JP	2/4/2013	54.73	159.79	
					ECP	2/19/2013	54.77	159.75	
					ECP	3/6/2013	54.95	159.57	
					ECP	3/21/2013	54.77	159.75	
					ECP	4/8/2013	54.67	159.85	
					ECP	4/24/2013	54.74	159.78	
					MM	2/4/2020	54.96	159.56	
					ZBL	2/18/2020	54.57	159.95	
					ZBL	3/3/2020	54.47	160.05	
					JKT	3/16/2020	54.68	159.84	
					ZBL	4/1/2020	54.75	159.77	
					ZBL	4/15/2020	54.74	159.78	
					JKT	2/10/2021	55.40	159.12	
					JKT	2/24/2021	55.14	159.38	
					AMM	3/10/2021	55.22	159.30	
					JKT	3/24/2021	55.07	159.45	
					JKT	4/7/2021	54.94	159.58	
					JKT	4/21/2021	55.31	159.21	
PZ-04 D	197.27	193.71	39.0	3.56	JP	2/4/2013	38.03	159.24	
					ECP	2/19/2013	37.96	159.31	
					ECP	3/6/2013	38.00	159.27	
					ECP	3/21/2013	38.04	159.23	
					ECP	4/8/2013	37.93	159.34	
					ECP	4/24/2013	37.99	159.28	
					MM	2/4/2020	38.18	159.09	
					ZBL	2/18/2020	37.86	159.41	
					ZBL	3/3/2020	37.85	159.42	
					JKT	3/16/2020	37.93	159.34	
					ZBL	4/1/2020	38.08	159.19	
					ZBL	4/15/2020	37.85	159.42	
					JKT	2/10/2021	38.63	158.64	
					JKT	2/24/2021	38.38	158.89	
					ACP	3/10/2021	38.44	158.83	
					JKT	3/24/2021	38.33	158.94	
					JKT	4/7/2021	38.26	159.01	
					JKT	4/21/2021	38.55	158.72	
PZ-05 D	167.81	164.99	18.0	2.81	JP	2/4/2013	8.64	159.17	
					ECP	2/19/2013	8.44	159.37	
					ECP	3/6/2013	8.85	158.96	
					ECP	3/21/2013	8.79	159.02	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ECP	4/8/2013	8.67	159.14	
					ECP	4/24/2013	8.75	159.06	
					MM	2/4/2020	8.85	158.96	
					ZBL	2/18/2020	8.44	159.37	
					ZBL	3/3/2020	7.88	159.93	
					JKT	3/16/2020	8.70	159.11	
					ZBL	4/1/2020	8.81	159.00	
					ZBL	4/15/2020	8.56	159.25	
					JKT	2/10/2021	9.13	158.68	
					JKT	2/24/2021	8.95	158.86	
					ACP	3/10/2021	9.08	158.73	
					JKT	3/24/2021	8.92	158.89	
					JKT	4/7/2021	8.89	158.92	
					JKT	4/21/2021	9.19	158.62	
PZ-06 D	173.66	170.52	18.0	3.14	JP	2/4/2013	12.53	161.13	
					ECP	2/19/2013	12.46	161.20	
					ECP	3/6/2013	12.71	160.95	
					ECP	3/21/2013	12.57	161.09	
					ECP	4/8/2013	12.46	161.20	
					ECP	4/24/2013	12.50	161.16	
					MM	2/4/2020	12.77	160.89	
					ZBL	2/18/2020	12.36	161.30	
					ZBL	3/3/2020	12.16	161.50	
					JKT	3/16/2020	12.58	161.08	
					ZBL	4/1/2020	12.70	160.96	
					ZBL	4/15/2020	12.60	161.06	
					JKT	2/10/2021	13.33	160.33	
					JKT	2/24/2021	13.05	160.61	
					ACP	3/10/2021	13.11	160.55	
					JKT	3/24/2021	12.98	160.68	
					JKT	4/7/2021	12.86	160.80	
					JKT	4/21/2021	13.25	160.41	
PZ-07 D	213.60	209.78	58.0	3.82	JP	2/4/2013	52.31	161.29	
					ECP	2/19/2013	52.35	161.25	
					ECP	3/6/2013	52.53	161.07	
					ECP	3/21/2013	52.34	161.26	
					ECP	4/8/2013	52.24	161.36	
					ECP	4/24/2013	52.18	161.42	
					MM	2/4/2020	52.43	161.17	
					ZBL	2/18/2020	52.04	161.56	
					ZBL	3/3/2020	52.00	161.60	
					JKT	3/16/2020	52.27	161.33	
					JKT	4/1/2020	52.34	161.26	
					ZBL	4/15/2020	52.33	161.27	
					JKT	2/10/2021	52.99	160.61	
					JKT	2/24/2021	52.72	160.88	
					ACP	3/10/2021	52.78	160.82	
					JKT	3/24/2021	52.62	160.98	
					JKT	4/7/2021	52.50	161.10	
					JKT	4/21/2021	52.89	160.71	
PZ-08 D	242.86	240.94	93.0	1.91	JP	2/4/2013	81.83	161.03	
					ECP	2/19/2013	81.87	160.99	
					ECP	3/6/2013	81.24	161.62	
					ECP	3/21/2013	81.78	161.08	
					ECP	4/8/2013	81.73	161.13	
					ECP	4/24/2013	81.78	161.08	
					MM	2/4/2020	81.94	160.92	
					ZBL	2/18/2020	81.71	161.15	
					ZBL	3/3/2020	81.59	161.27	
					JKT	3/16/2020	81.76	161.10	
					ZBL	4/1/2020	81.69	161.17	
					ZBL	4/15/2020	81.81	161.05	
					JKT	2/10/2021	82.47	160.39	
					JKT	2/24/2021	82.23	160.63	
					AMM	3/10/2021	82.29	160.57	
					JKT	3/24/2021	82.11	160.75	
					JKT	4/7/2021	81.96	160.90	
					JKT	4/21/2021	82.36	160.50	
PZ-09 D	267.58	264.30	120.0	3.28	JP	2/4/2013	102.45	165.13	
					ECP	2/19/2013	106.90	160.68	
					ECP	3/6/2013	107.04	160.54	
					ECP	3/21/2013	106.91	160.67	
					ECP	4/8/2013	106.80	160.78	
					ECP	4/24/2013	106.85	160.73	
					MM	2/4/2020	104.82	162.76	
					ZBL	2/18/2020	104.39	163.19	
					ZBL	3/3/2020	106.31	161.27	
					JKT	3/16/2020	106.81	160.77	
					ZBL	4/1/2020	106.79	160.79	
					ZBL	4/15/2020	106.90	160.68	
					JKT	2/10/2021	107.56	160.02	
					JKT	2/24/2021	107.27	160.31	
					AMM	3/10/2021	107.51	160.07	
					JKT	3/24/2021	107.09	160.49	
					JKT	4/7/2021	107.02	160.56	
					JKT	4/21/2021	107.29	160.29	
PZ-10 D	253.95	252.11	138.0	1.84	JP	2/4/2013	93.74	160.21	
					ECP	2/19/2013	93.66	160.29	
					ECP	3/6/2013	93.67	160.28	
					ECP	3/21/2013	93.63	160.32	
					ECP	4/8/2013	93.53	160.42	
					ECP	4/24/2013	93.57	160.38	
					MM	2/4/2020	93.79	160.16	
					ZBL	2/18/2020	93.33	160.62	
					ZBL	3/3/2020	93.18	160.77	
					JKT	3/16/2020	93.47	160.48	
					ZBL	4/1/2020	93.32	160.63	
					ZBL	4/15/2020	93.49	160.46	
					JKT	2/10/2021	94.21	159.74	
					JKT	2/24/2021	93.90	160.05	
					ACP	3/10/2021	94.23	159.72	
					JKT	3/24/2021	93.72	160.23	
					JKT	4/7/2021	93.62	160.33	
					JKT	4/21/2021	93.84	160.11	
PZ-11 D	209.98	206.54	55.0	3.44	JP	2/4/2013	46.91	163.07	
					ECP	2/19/2013	46.94	163.04	
					ECP	3/6/2013	47.00	162.98	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ECP	3/21/2013	46.78	163.20	
					ECP	4/8/2013	46.69	163.29	
					ECP	4/24/2013	46.74	163.24	
					MM	2/4/2020	46.40	163.58	
					ZBL	2/18/2020	46.30	163.68	
					ZBL	3/3/2020	46.41	163.57	
					JKT	3/16/2020	46.73	163.25	
					ZBL	4/1/2020	46.65	163.33	
					ZBL	4/15/2020	46.85	163.13	
					JKT	2/10/2021	47.46	162.52	
					JKT	2/24/2021	47.20	162.78	
					AMM	3/10/2021	47.36	162.62	
					JKT	3/24/2021	47.00	162.98	
					JKT	4/7/2021	46.90	163.08	
					JKT	4/21/2021	47.31	162.67	
PZ- 12 D	236.70	233.85	82.0	2.86	JP	2/4/2013	73.85	162.85	
					ECP	2/19/2013	73.91	162.79	
					ECP	3/6/2013	74.05	162.65	
					ECP	3/21/2013	73.75	162.95	
					ECP	4/8/2013	73.69	163.01	
					ECP	4/24/2013	73.74	162.96	
					MM	2/4/2020	73.83	162.87	
					ZBL	2/18/2020	73.63	163.07	
					ZBL	3/3/2020	73.39	163.31	
					JKT	3/16/2020	73.69	163.01	
					ZBL	4/1/2020	73.59	163.11	
					ZBL	4/15/2020	73.80	162.90	
					JKT	2/10/2021	74.43	162.27	
					JKT	2/24/2021	74.17	162.53	
					AMM	3/10/2021	74.27	162.43	
					JKT	3/24/2021	73.99	162.71	
					JKT	4/7/2021	73.88	162.82	
					JKT	4/21/2021	74.31	162.39	
PZ-13 D	273.50	269.46	114.0	4.04	JP	2/4/2013	111.27	162.23	
					ECP	2/19/2013	111.32	162.18	
					ECP	3/6/2013	111.38	162.12	
					ECP	3/21/2013	111.21	162.29	
					ECP	4/8/2013	111.12	162.38	
					ECP	4/24/2013	111.20	162.30	
					MM	2/4/2020	111.25	162.25	
					ZBL	2/18/2020	111.09	162.41	
					ZBL	3/3/2020	110.77	162.73	
					JKT	3/16/2020	111.06	162.44	
					JKT	4/1/2020	111.03	162.47	
					ZBL	4/15/2020	111.13	162.37	
					JKT	2/10/2021	111.77	161.73	
					JKT	2/24/2021	111.51	161.99	
					AMM	3/10/2021	111.69	161.81	
					JKT	3/24/2021	111.38	162.12	
					JKT	4/7/2021	111.26	162.24	
					JKT	4/21/2021	111.64	161.86	
PZ-14 D	201.53	198.37	42.0	3.16	JP	2/4/2013	38.95	162.58	
					ECP	2/19/2013	38.96	162.57	
					ECP	3/6/2013	39.10	162.43	
					ECP	3/21/2013	38.95	162.58	
					ECP	4/8/2013	38.83	162.70	
					ECP	4/24/2013	38.89	162.64	
					MM	2/4/2020	39.10	162.43	
					ZBL	2/18/2020	39.04	162.49	
					ZBL	3/3/2020	38.60	162.93	
					JKT	3/16/2020	38.85	162.68	
					JKT	4/1/2020	38.93	162.60	
					ZBL	4/15/2020	38.98	162.55	
					JKT	2/10/2021	39.65	161.88	
					JKT	2/24/2021	39.41	162.12	
					ACP	3/10/2021	39.45	162.08	
					JKT	3/24/2021	39.32	162.21	
					JKT	4/7/2021	39.19	162.34	
					JKT	4/21/2021	39.56	161.97	
PZ-15 D	196.71	193.06	39.0	3.65	JP	2/4/2013	32.57	164.14	
					ECP	2/19/2013	32.60	164.11	
					ECP	3/6/2013	32.72	163.99	
					ECP	3/21/2013	32.52	164.19	
					ECP	4/8/2013	32.41	164.30	
					ECP	4/24/2013	32.43	164.28	
					MM	2/4/2020	32.69	164.02	
					ZBL	2/18/2020	32.32	164.39	
					ZBL	3/3/2020	32.23	164.48	
					JKT	3/16/2020	32.40	164.31	
					JKT	4/1/2020	32.43	164.28	
					ZBL	4/15/2020	32.55	164.16	
					JKT	2/10/2021	33.25	163.46	
					JKT	2/24/2021	33.01	163.70	
					ACP	3/10/2021	33.08	163.63	
					JKT	3/24/2021	32.90	163.81	
					JKT	4/7/2021	32.73	163.98	
					JKT	4/21/2021	33.09	163.62	
PZ-16 D	224.79	222.88	69.0	1.91	JP	2/4/2013	61.35	163.44	
					ECP	2/19/2013	61.37	163.42	
					ECP	3/6/2013	61.49	163.30	
					ECP	3/21/2013	61.27	163.52	
					ECP	4/8/2013	61.18	163.61	
					ECP	4/24/2013	61.20	163.59	
					MM	2/4/2020	61.35	163.44	
					ZBL	2/18/2020	61.27	163.52	
					ZBL	3/3/2020	60.95	163.84	
					JKT	3/16/2020	61.12	163.67	
					JKT	4/1/2020	61.13	163.66	
					JKT	4/15/2020	61.22	163.57	
					JKT	2/10/2021	61.92	162.87	
					JKT	2/24/2021	61.65	163.14	
					ACP	3/10/2021	61.73	163.06	
					JKT	3/24/2021	61.51	163.28	
					JKT	4/7/2021	61.50	163.29	
					JKT	4/21/2021	61.72	163.07	
PZ-18 DR	237.77	234.47	76.0	3.30	MM	2/4/2020	73.57	164.20	Drilled 12-17-19
					ZBL	2/18/2020	73.32	164.45	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					ZBL	3/3/2020	72.99	164.78	
					JKT	3/16/2020	73.42	164.35	
					ZBL	4/1/2020	73.20	164.57	
					ZBL	4/15/2020	73.50	164.27	
					JKT	2/10/2021	73.97	163.80	
					JKT	2/24/2021	73.69	164.08	
					AMM	3/10/2021	---	---	Not Measured
					JKT	3/24/2021	73.44	164.33	
					JKT	4/7/2021	73.35	164.42	
					JKT	4/21/2021	73.85	163.92	
PZ-19 D	278.77	276.32	123.0	2.45	JP	2/4/2013	113.65	165.12	
					ECP	2/19/2013	113.60	165.17	
					ECP	3/6/2013	113.64	165.13	
					ECP	3/21/2013	113.46	165.31	
					ECP	4/8/2013	113.37	165.40	
					ECP	4/24/2013	113.40	165.37	
					MM	2/4/2020	113.55	165.22	
					ZBL	2/18/2020	113.37	165.40	
					ZBL	3/3/2020	113.03	165.74	
					JKT	3/16/2020	113.33	165.44	
					ZBL	4/1/2020	113.24	165.53	
					ZBL	4/15/2020	113.41	165.36	
					JKT	2/10/2021	114.03	164.74	
					JKT	2/24/2021	113.77	165.00	
					AMM	3/10/2021	113.99	164.78	
					JKT	3/24/2021	113.52	165.25	
					JKT	4/7/2021	113.47	165.30	
					JKT	4/21/2021	113.74	165.03	
PZ-20 D	220.91	218.40	69.0	2.51	JP	2/4/2013	55.86	165.05	
					ECP	2/19/2013	55.86	165.05	
					ECP	3/6/2013	55.99	164.92	
					ECP	3/21/2013	55.74	165.17	
					ECP	4/8/2013	55.65	165.26	
					ECP	4/24/2013	55.66	165.25	
					MM	2/4/2020	55.79	165.12	
					ZBL	2/18/2020	55.49	165.42	
					ZBL	3/3/2020	55.34	165.57	
					JKT	3/16/2020	55.57	165.34	
					JKT	4/1/2020	55.50	165.41	
					JKT	4/15/2020	55.69	165.22	
					JKT	2/10/2021	56.37	164.54	
					JKT	2/24/2021	56.14	164.77	
					ACP	3/10/2021	56.20	164.71	
					JKT	3/24/2021	55.99	164.92	
					JKT	4/7/2021	55.84	165.07	
					JKT	4/21/2021	56.22	164.69	
PZ-21 D	193.98	190.49	34.0	3.49	JP	2/4/2013	27.72	166.26	
					JP	2/19/2013	27.69	166.29	
					JP	3/6/2013	27.71	166.27	
					ECP	3/21/2013	27.57	166.41	
					ECP	4/8/2013	27.47	166.51	
					ECP	4/24/2013	27.51	166.47	
					MM	2/4/2020	27.74	166.24	
					ZBL	2/18/2020	27.35	166.63	
					JKT	3/3/2020	27.18	166.80	
					JKT	3/16/2020	27.31	166.67	
					ZBL	4/1/2020	27.34	166.64	
					ZBL	4/15/2020	27.48	166.50	
					JKT	2/10/2021	28.34	165.64	
					JKT	2/24/2021	28.10	165.88	
					ACP	3/10/2021	28.20	165.78	
					JKT	3/24/2021	27.92	166.06	
					JKT	4/7/2021	27.81	166.17	
					JKT	4/21/2021	28.04	165.94	
PZ-22 D	242.71	239.99	82.0	2.72	ECP	2/4/2013	76.33	166.38	
					ECP	2/19/2013	76.31	166.40	
					JP	3/6/2013	76.38	166.33	
					ECP	3/21/2013	76.18	166.53	
					ECP	4/8/2013	76.87	165.84	
					ECP	4/24/2013	76.87	165.84	
					MM	2/4/2020	76.27	166.44	
					ZBL	2/18/2020	76.14	166.57	
					JKT	3/3/2020	75.68	167.03	
					JKT	3/16/2020	76.03	166.68	
					JKT	4/1/2020	75.87	166.84	
					JKT	4/15/2020	76.13	166.58	
					JKT	2/10/2021	76.76	165.95	
					JKT	2/24/2021	76.54	166.17	
					ACP	3/10/2021	76.74	165.97	
					JKT	3/24/2021	76.32	166.39	
					JKT	4/7/2021	76.25	166.46	
					JKT	4/21/2021	76.50	166.21	
PZ-23 D	208.35	205.19	49.0	3.16	JP	2/4/2013	40.57	167.78	
					JP	2/19/2013	40.56	167.79	
					JP	3/6/2013	40.61	167.74	
					JP	3/21/2013	40.30	168.05	
					ECP	4/8/2013	40.19	168.16	
					ECP	4/24/2013	40.28	168.07	
	207.27	203.27		4.00	MM	2/4/2020	39.36	167.91	Repaired 12-12-19
					ZBL	2/18/2020	38.08	169.19	
					JKT	3/3/2020	38.81	168.46	
					JKT	3/16/2020	38.94	168.33	
					JKT	4/1/2020	38.93	168.34	
					JKT	4/15/2020	39.14	168.13	
					JKT	2/10/2021	44.82	162.45	
					JKT	2/24/2021	44.56	162.71	
					ACP	3/10/2021	39.50	167.77	
					JKT	3/24/2021	44.46	162.81	
					JKT	4/7/2021	44.33	162.94	
					JKT	4/21/2021	44.50	162.77	
PZ-24 DR	205.36	202.56	42.0	2.80	MM	2/4/2020	36.18	169.18	Drilled 12-11-19
					ZBL	2/18/2020	35.77	169.59	
					JKT	3/3/2020	34.90	170.46	
					JKT	3/16/2020	34.85	170.51	
					JKT	4/1/2020	35.32	170.04	
					JKT	4/15/2020	35.07	170.29	
					JKT	2/10/2021	35.09	170.27	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					JKT	2/24/2021	34.96	170.40	
					ACP	3/10/2021	34.95	170.41	
					JKT	3/24/2021	34.91	170.45	
					JKT	4/7/2021	34.73	170.63	
					JKT	4/21/2021	35.35	170.01	
PZ-25 D	196.61	194.77	38.0	1.84	JP	2/4/2013	28.13	168.48	
					JP	2/19/2013	28.06	168.55	
					JP	3/6/2013	28.00	168.61	
					JP	3/21/2013	27.89	168.72	
					ECP	4/8/2013	27.80	168.81	
					ECP	4/24/2013	27.84	168.77	
					MM	2/4/2020	28.17	168.44	
					ZBL	2/18/2020	27.41	169.20	
					JKT	3/3/2020	27.28	169.33	
					JKT	3/16/2020	27.30	169.31	
					JKT	4/1/2020	27.57	169.04	
					JKT	4/15/2020	27.68	168.93	
					JKT	2/10/2021	28.87	167.74	
					JKT	2/24/2021	28.59	168.02	
					AMM	3/10/2021	28.76	167.85	
					JKT	4/7/2021	28.25	168.36	
					JKT	4/21/2021	28.45	168.16	
PZ-26 D	187.15	183.94	24.0	3.21	JP	2/4/2013	16.67	170.48	
					JP	2/19/2013	16.57	170.58	
					JP	3/6/2013	16.60	170.55	
					JP	3/21/2013	16.45	170.70	
					ECP	4/8/2013	16.34	170.81	
					ECP	4/24/2013	16.41	170.74	
					MM	2/4/2020	14.73	172.42	
					ZBL	2/18/2020	13.86	173.29	
					JKT	3/3/2020	13.63	173.52	
					JKT	3/16/2020	13.78	173.37	
					JKT	4/1/2020	14.09	173.06	
					JKT	4/15/2020	14.06	173.09	
					JKT	2/10/2021	15.54	171.61	
					JKT	2/24/2021	15.13	172.02	
					AMM	3/10/2021	15.31	171.84	
					JKT	3/24/2021	14.99	172.16	
					JKT	4/7/2021	14.70	172.45	
					JKT	4/21/2021	15.04	172.11	
PZ-27 DR	214.49	213.09	59.5	1.40	MM	2/4/2020	44.37	170.12	Drilled 12-18-19
					ZBL	2/18/2020	43.74	170.75	
					JKT	3/3/2020	43.43	171.06	
					JKT	3/16/2020	43.43	171.06	
					JKT	4/1/2020	43.65	170.84	
					JKT	4/15/2020	43.85	170.64	
					JKT	2/10/2021	45.03	169.46	
					JKT	2/24/2021	44.76	169.73	
					AMM	3/10/2021	46.13	168.36	
					JKT	3/24/2021	44.65	169.84	
					JKT	4/7/2021	44.41	170.08	
					JKT	4/21/2021	44.69	169.80	
PZ-28 D	199.73	196.98	37.0	2.75	JP	2/4/2013	28.97	170.76	
					JP	2/19/2013	28.94	170.79	
					JP	3/6/2013	28.96	170.77	
					JP	3/21/2013	28.78	170.95	
					ECP	4/8/2013	28.70	171.03	
					ECP	4/24/2013	28.70	171.03	
					MM	2/4/2020	28.80	170.93	
					ZBL	2/18/2020	---	---	Not Measured
					JKT	3/3/2020	28.01	171.72	
					JKT	3/16/2020	28.07	171.66	
					JKT	4/1/2020	28.25	171.48	
					JKT	4/15/2020	28.34	171.39	
					JKT	2/10/2021	29.42	170.31	
					JKT	2/24/2021	29.10	170.63	
					AMM	3/10/2021	29.24	170.49	
					JKT	3/24/2021	28.99	170.74	
					JKT	4/7/2021	28.78	170.95	
					JKT	4/21/2021	29.06	170.67	
PZ-29 D	217.58	216.39	54.0	1.20	JP	2/4/2013	47.25	170.33	
					JP	2/19/2013	47.23	170.35	
					ECP	3/6/2013	47.24	170.34	
					JP	3/21/2013	47.02	170.56	
					ECP	4/8/2013	46.96	170.62	
					ECP	4/24/2013	46.83	170.75	
	217.12			0.73	MM	2/4/2020	46.88	170.24	TOC re-surveyed
					ZBL	2/18/2020	46.50	170.62	
					JKT	3/3/2020	46.24	170.88	
					JKT	3/16/2020	46.23	170.89	
					JKT	4/1/2020	46.30	170.82	
					JKT	4/15/2020	46.51	170.61	
					JKT	2/10/2021	47.35	169.77	
					JKT	2/24/2021	47.10	170.02	
					AMM	3/10/2021	47.18	169.94	
					JKT	3/24/2021	46.96	170.16	
					JKT	4/7/2021	46.82	170.30	
					JKT	4/21/2021	47.08	170.04	
PZ-31 D	205.16	201.93	39.0	3.23	JP	2/4/2013	32.51	172.65	
					JP	2/19/2013	32.45	172.71	
					ECP	3/6/2013	32.50	172.66	
					ECP	3/21/2013	32.39	172.77	
					ECP	4/8/2013	32.30	172.86	
					ECP	4/24/2013	32.28	172.88	
					MM	2/4/2020	32.31	172.85	
					ZBL	2/18/2020	---	---	Not Measured
					JKT	3/3/2020	31.61	173.55	
					JKT	3/16/2020	31.69	173.47	
					JKT	4/1/2020	31.91	173.25	
					JKT	4/15/2020	31.82	173.34	
					JKT	2/10/2021	32.80	172.36	
					JKT	2/24/2021	32.48	172.68	
					AMM	3/10/2021	32.71	172.45	
					JKT	3/24/2021	32.37	172.79	
					JKT	4/7/2021	32.20	172.96	
					JKT	4/21/2021	32.46	172.70	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
PZ-32 DR	254.84	252.54	93.0	2.30	MM	2/4/2020	83.19	171.65	Drilled 12-18-19
					ZBL	2/18/2020	82.74	172.10	
					JKT	3/3/2020	82.48	172.36	
					JKT	3/16/2020	82.71	172.13	
					JKT	4/1/2020	82.75	172.09	
					JKT	4/15/2020	82.93	171.91	
					ACP	2/10/2021	83.66	171.18	
					JKT	2/24/2021	83.37	171.47	
					AMM	3/10/2021	83.54	171.30	
					JKT	3/24/2021	83.23	171.61	
					JKT	4/7/2021	83.06	171.78	
					JKT	4/21/2021	83.43	171.41	
PZ-33 DR	269.15	268.25	110.0	0.90	MM	2/4/2020	97.75	171.40	Drilled 12-13-19
					ZBL	2/18/2020	97.45	171.70	
					JKT	3/3/2020	97.11	172.04	
					JKT	3/16/2020	97.37	171.78	
					JKT	4/1/2020	97.34	171.81	
					JKT	4/15/2020	97.34	171.81	
					JKT	2/10/2021	97.97	171.18	
					JKT	2/24/2021	97.67	171.48	
					ACP	3/10/2021	97.85	171.30	
					JKT	3/24/2021	97.50	171.65	
					JKT	4/7/2021	97.34	171.81	
					JKT	4/21/2021	97.73	171.42	
PZ-34 D	288.82	285.65	123.0	3.17	ECP	2/4/2013	117.60	171.22	
					ECP	2/19/2013	117.58	171.24	
					ECP	3/6/2013	117.31	171.51	
					JP	3/21/2013	117.41	171.41	
					ECP	4/8/2013	117.31	171.51	
					ECP	4/24/2013	117.20	171.62	
					MM	2/4/2020	117.34	171.48	
					ZBL	2/18/2020	116.98	171.84	
					JKT	3/3/2020	116.73	172.09	
					JKT	3/16/2020	116.98	171.84	
					JKT	4/1/2020	116.91	171.91	
					ZBL	4/15/2020	117.14	171.68	
					JKT	2/10/2021	117.65	171.17	
					JKT	2/24/2021	117.36	171.46	
					AMM	3/10/2021	117.60	171.22	
					JKT	3/24/2021	117.15	171.67	
					JKT	4/7/2021	117.06	171.76	
					JKT	4/21/2021	117.40	171.42	
PZ-35 D	315.46	313.73	148.0	1.73	ECP	2/4/2013	143.23	172.23	
					ECP	2/19/2013	143.08	172.38	
					ECP	3/6/2013	143.14	172.32	
					ECP	3/21/2013	142.93	172.53	
					ECP	4/8/2013	142.82	172.64	
					ECP	4/24/2013	141.30	174.16	
					MM	2/4/2020	142.89	172.57	
					ZBL	2/18/2020	142.02	173.44	
					JKT	3/3/2020	142.33	173.13	
					JKT	3/16/2020	142.45	173.01	
					JKT	4/1/2020	142.42	173.04	
					ZBL	4/15/2020	142.67	172.79	
					JKT	2/10/2021	143.22	172.24	
					JKT	2/24/2021	142.97	172.49	
					AMM	3/10/2021	143.18	172.28	
					JKT	3/24/2021	142.76	172.70	
					JKT	4/7/2021	142.67	172.79	
					JKT	4/21/2021	142.92	172.54	
PZ-36 D	180.24	177.17	19.0	3.08	ECP	2/4/2013	6.10	174.14	
					ECP	2/19/2013	5.83	174.41	
					ECP	3/6/2013	6.15	174.09	
					ECP	3/21/2013	6.11	174.13	
					ECP	4/8/2013	5.98	174.26	
					ECP	4/24/2013	5.97	174.27	
					MM	2/4/2020	6.22	174.02	
					ZBL	2/18/2020	5.49	174.75	
					JKT	3/3/2020	4.80	175.44	
					JKT	3/16/2020	5.70	174.54	
					JKT	4/1/2020	5.81	174.43	
					JKT	4/15/2020	5.58	174.66	
					JKT	2/10/2021	6.25	173.99	
					JKT	2/24/2021	5.98	174.26	
					AMM	3/10/2021	7.51	172.73	
					JKT	3/24/2021	5.96	174.28	
					JKT	4/7/2021	5.98	174.26	
					JKT	4/21/2021	6.18	174.06	
PZ-37 D	197.80	194.79	34.0	3.01	ECP	2/4/2013	22.87	174.93	
					ECP	2/19/2013	22.87	174.93	
					ECP	3/6/2013	22.98	174.82	
					ECP	3/21/2013	22.81	174.99	
					ECP	4/8/2013	22.66	175.14	
					ECP	4/24/2013	22.70	175.10	
					MM	2/4/2020	22.67	175.13	
					ZBL	2/18/2020	22.02	175.78	
					JKT	3/3/2020	21.86	175.94	
					JKT	3/16/2020	22.07	175.73	
					JKT	4/1/2020	22.31	175.49	
					JKT	4/15/2020	22.09	175.71	
					JKT	2/10/2021	23.02	174.78	
					JKT	2/24/2021	22.67	175.13	
					AMM	3/10/2021	22.94	174.86	
					JKT	3/24/2021	22.61	175.19	
					JKT	4/7/2021	22.43	175.37	
					JKT	4/21/2021	22.75	175.05	
PZ-38 D	283.66	279.29	116.0	4.36	ECP	2/4/2013	109.62	174.04	
					ECP	2/19/2013	109.54	174.12	
					ECP	3/6/2013	109.47	174.19	
					ECP	3/21/2013	109.31	174.35	
					ECP	4/8/2013	109.22	174.44	
					ECP	4/24/2013	109.18	174.48	
					MM	2/4/2020	109.22	174.44	
					ZBL	2/18/2020	108.77	174.89	
					JKT	3/3/2020	108.72	174.94	
					JKT	3/16/2020	108.70	174.96	

Table 3. Summary of Water Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00.

Well ID	TOC Elevation (ft. AMSL)[1]	Surface Elevation (ft. AMSL)	Total Well Depth (ft. BLS)[2]	Height of Stick-Up (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BTOC)[3]	Groundwater Elevation (ft. AMSL)	Notes/Comments
					JKT	4/1/2020	108.82	174.84	
					JKT	4/15/2020	108.77	174.89	
					JKT	2/10/2021	109.34	174.32	
					JKT	2/24/2021	109.19	174.47	
					AMM	3/10/2021	109.19	174.47	
					JKT	3/24/2021	109.13	174.53	
					JKT	4/7/2021	108.99	174.67	
					JKT	4/21/2021	109.06	174.60	
PZ-39 DR	258.79	257.19	93.0	1.60	MM	2/4/2020	85.18	173.61	Drilled 12-16-19
					ZBL	2/18/2020	84.86	173.93	
					JKT	3/3/2020	84.16	174.63	
					JKT	3/16/2020	85.10	173.69	
					JKT	4/1/2020	84.88	173.91	
					JKT	4/15/2020	85.04	173.75	
					JKT	2/10/2021	85.58	173.21	
					JKT	2/24/2021	85.43	173.36	
					AMM	3/10/2021	85.66	173.13	
					JKT	3/24/2021	84.97	173.82	
					JKT	4/7/2021	84.88	173.91	
					JKT	4/21/2021	85.45	173.34	
PZ-40 D	282.76	279.46	120.0	3.30	JP	2/4/2013	108.39	174.37	
					ECP	2/19/2013	108.11	174.65	
					JP	3/6/2013	108.50	174.26	
					JP	3/21/2013	108.07	174.69	
					ECP	4/8/2013	107.92	174.84	
					ECP	4/24/2013	107.98	174.78	
					MM	2/4/2020	108.08	174.68	
					ZBL	2/18/2020	107.88	174.88	
					ZBL	3/3/2020	107.46	175.30	
					JKT	3/16/2020	107.84	174.92	
					ZBL	4/1/2020	107.67	175.09	
					JKT	4/15/2020	107.88	174.88	
					ACP	2/10/2021	108.33	174.43	
					JKT	2/24/2021	108.19	174.57	
					AMM	3/10/2021	109.72	173.04	
					ACP	3/24/2021	107.91	174.85	
					JKT	4/7/2021	107.80	174.96	
					AMM	4/21/2021	108.17	174.59	

[1] AMSL = above mean sea level
[2] BLS = below land surface
[3] BTOC = below top of casing
[4] ALS = above land surface

Well ID	TOC Elevation (ft. AMSL)[1]	Land Surface Elevation (ft. AMSL)	Total Well Depth (ft. BTOC)[2]	Casing Height (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BMP)[3]	Groundwater Elevation (ft. AMSL)	Comments
Existing Landfill Wells									
PZ-94-15	288.29	286.42	(?)	1.87	JP	2/4/2013	52.89	233.53	
					JP	2/19/2013	52.86	233.56	
					JP	3/6/2013	52.86	233.56	
					JP	3/21/2013	52.50	233.92	
					ECP	4/8/2013	52.40	234.02	
					ECP	4/24/2013	52.39	234.03	DESTROYED/NOT CURRENTLY MONITORED
PZ-94-24	278.11	275.00	32.5	3.11	JP	2/4/2013	22.68	255.43	
					JP	2/19/2013	22.63	255.48	
					JP	3/6/2013	22.78	255.33	
					JP	3/21/2013	22.79	255.32	
					ECP	4/8/2013	22.65	255.46	
					ECP	4/24/2013	22.61	255.50	DESTROYED/NOT CURRENTLY MONITORED
PZ-94-25	349.94	346.20	72.0	3.74	JP	2/4/2013	65.81	284.13	
					JP	2/19/2013	65.28	284.66	
					JP	3/6/2013	64.45	285.49	
					JP	3/21/2013	63.47	286.47	
					ECP	4/8/2013	63.36	286.58	
					ECP	4/24/2013	63.33	286.61	DESTROYED/NOT CURRENTLY MONITORED
PZ 94-35	310.04	308.30	75.0	1.74	JP	2/4/2013	70.79	239.25	
					JP	2/19/2013	70.78	239.26	
					JP	3/6/2013	70.87	239.17	
					JP	3/21/2013	70.56	239.48	
					ECP	4/8/2013	70.44	239.60	
					ECP	4/24/2013	70.45	239.59	DESTROYED/NOT CURRENTLY MONITORED
PZ 97-1	313.38	308.97	69.0	4.41	JP	2/4/2013	64.74	248.64	
					JP	2/19/2013	64.88	248.50	
					JP	3/6/2013	65.12	248.26	
					JP	3/21/2013	64.83	248.55	
					ECP	4/8/2013	64.72	248.66	
					ECP	4/24/2013	64.78	248.60	DESTROYED/NOT CURRENTLY MONITORED
PZ-97-15	286.07	283.67	53.0	2.40	JP	2/4/2013	52.67	233.40	
					JP	2/19/2013	52.47	233.60	
					JP	3/6/2013	52.28	233.79	
					JP	3/21/2013	52.04	234.03	
					ECP	4/8/2013	51.92	234.15	
					ECP	4/24/2013	51.94	234.13	
					ACP	2/10/2021	49.69	236.38	
					AMM	2/24/2021	49.48	236.59	
					ACP	3/10/2021	49.65	236.42	
					ACP	3/24/2021	48.10	237.97	
					JKT	4/7/2021	49.38	236.69	
					AMM	4/21/2021	49.42	236.65	
PZ 97-2	316.66	312.62	49.0	4.04	JP	2/4/2013	52.09	264.57	
					JP	2/19/2013	52.10	264.56	
					JP	3/6/2013	52.11	264.55	
					JP	3/21/2013	52.12	264.54	
					ECP	4/8/2013	52.10	264.56	
					ECP	4/24/2013	52.12	264.54	
	315.68	312.62			ACP	2/10/2021	48.27	264.35	TOC re-surveyed (damaged by machinery)
					AMM	2/24/2021	50.96	261.66	
					ACP	3/10/2021	50.94	261.68	
					ACP	3/24/2021	50.93	261.69	
					AMM	4/7/2021	50.91	261.71	
					AMM	4/21/2021	50.96	261.66	
PZ 97-3	317.59	313.14	95.0	4.45	JP	2/4/2013	97.38	220.21	
					JP	2/19/2013	93.43	224.16	
					JP	3/6/2013	93.24	224.35	
					JP	3/21/2013	93.02	224.57	
					ECP	4/8/2013	92.91	224.68	
					ECP	4/24/2013	92.89	224.70	
					ACP	2/10/2021	89.30	228.29	
					AMM	2/24/2021	89.61	227.98	
					ACP	3/10/2021	89.65	227.94	
					ACP	3/24/2021	89.77	227.82	
					AMM	4/7/2021	91.12	226.47	
					AMM	4/21/2021	89.85	227.74	
PZ 97-7	280.94	278.40	22.5	2.54	JP	2/4/2013	9.94	271.00	
					JP	2/19/2013	9.56	271.38	
					JP	3/6/2013	9.29	271.65	
					JP	3/21/2013	8.94	272.00	
					ECP	4/8/2013	8.82	272.12	
					ECP	4/24/2013	8.84	272.10	
					ACP	2/10/2021	12.28	268.66	
					AMM	2/24/2021	10.81	270.13	
					ACP	3/10/2021	11.07	269.87	
					ACP	3/24/2021	10.70	270.24	
					AMM	4/7/2021	10.45	270.49	
					AMM	4/21/2021	10.66	270.28	
PZ 97-8	282.16	279.43	48.0	2.73	JP	2/4/2013	48.97	233.19	
					JP	2/19/2013	48.82	233.34	
					JP	3/6/2013	48.65	233.51	
					JP	3/21/2013	48.37	233.79	
					ECP	4/8/2013	48.25	233.91	
					ECP	4/24/2013	48.24	233.92	
					ACP	2/10/2021	45.87	236.29	
					AMM	2/24/2021	45.82	236.34	
					ACP	3/10/2021	45.85	236.31	
					ACP	3/24/2021	45.77	236.39	
					AMM	4/7/2021	45.58	236.58	
					AMM	4/21/2021	45.62	236.54	

Continued on Next Page

Well ID	TOC Elevation (ft. AMSL)[1]	Land Surface Elevation (ft. AMSL)	Total Well Depth (ft. BTOC)[2]	Casing Height (ft. ALS)[4]	Measured by (Initials)	Measurement Date	Depth to Water (ft BMP)[3]	Groundwater Elevation (ft. AMSL)	Comments
MW-1	280.92	278.20	37.1	2.72	ACP	2/10/2021	26.46	254.46	
					AMM	2/24/2021	26.14	254.78	
					ACP	3/10/2021	26.61	254.31	
					ACP	3/24/2021	26.12	254.80	
					AMM	4/7/2021	25.90	255.02	
					AMM	4/21/2021	26.43	254.49	
MW-2	297.44	296.50	76.9	0.94	JP	2/4/2013	63.84	233.60	
					JP	2/19/2013	63.81	233.63	
					JP	3/6/2013	63.79	233.65	
					JP	3/21/2013	63.45	233.99	
					ECP	4/8/2013	63.38	234.06	
					ECP	4/24/2013	63.41	234.03	
					ACP	2/10/2021	61.64	235.80	
					AMM	2/24/2021	61.64	235.80	
					ACP	3/10/2021	61.60	235.84	
					ACP	3/24/2021	61.51	235.93	
					JKT	4/7/2021	61.21	236.23	
					AMM	4/21/2021	61.62	235.82	
MW-3R	272.25	269.65	84.0	2.60	ACP	2/10/2021	67.47	204.78	
					AMM	2/24/2021	67.67	204.58	
					ACP	3/10/2021	67.94	204.31	
					ACP	3/24/2021	67.57	204.68	
					AMM	4/7/2021	67.82	204.43	
					AMM	4/21/2021	68.21	204.04	
MW-4	196.88	194.40	18.0	2.48	ACP	2/10/2021	9.24	187.64	
					AMM	2/24/2021	8.78	188.10	
					ACP	3/10/2021	9.35	187.53	
					ACP	3/24/2021	8.72	188.16	
					AMM	4/7/2021	8.91	187.97	
					AMM	4/21/2021	9.26	187.62	
MW-5	225.02	222.00	57.1	3.02	ACP	2/10/2021	29.49	195.53	
					AMM	2/24/2021	28.70	196.32	
					ACP	3/10/2021	29.31	195.71	
					ACP	3/24/2021	28.59	196.43	
					AMM	4/7/2021	28.02	197.00	
					AMM	4/21/2021	27.94	197.08	
MW-6	191.62	188.80	26.0	2.82	ACP	2/10/2021	17.62	174.00	
					AMM	2/24/2021	16.81	174.81	
					ACP	3/10/2021	16.93	174.69	
					ACP	3/24/2021	16.41	175.21	
					AMM	4/7/2021	16.92	174.70	
					AMM	4/21/2021	15.62	176.00	
MW-7	199.56	196.70	37.0	2.86	ACP	2/10/2021	26.72	172.84	
					AMM	2/24/2021	26.29	173.27	
					ACP	3/10/2021	26.69	172.87	
					ACP	3/24/2021	26.55	173.01	
					AMM	4/7/2021	26.20	173.36	
					AMM	4/21/2021	26.51	173.05	
MW-8	217.84	215.40	29.6	2.44	JP	2/4/2013	14.51	203.33	
					JP	2/19/2013	14.32	203.52	
					JP	3/6/2013	14.21	203.63	
					JP	3/21/2013	13.86	203.98	
					ECP	4/8/2013	13.75	204.09	
					ECP	4/24/2013	13.77	204.07	
					ACP	2/10/2021	13.32	204.52	
					AMM	2/24/2021	13.31	204.53	
					ACP	3/10/2021	13.39	204.45	
					MM	3/24/2021	13.29	204.55	
					AMM	4/7/2021	13.14	204.70	
					AMM	4/21/2021	13.04	204.80	
MW-9	270.14	267.82	61.7	2.32	JP	2/4/2013	53.88	216.26	
					JP	2/19/2013	53.03	217.11	
					JP	3/6/2013	52.56	217.58	
					JP	3/21/2013	52.00	218.14	
					ECP	4/8/2013	51.90	218.24	
					ECP	4/24/2013	51.94	218.20	
					ACP	2/10/2021	53.61	216.53	
					AMM	2/24/2021	52.58	217.56	
					ACP	3/10/2021	52.64	217.50	
					MM	3/24/2021	52.64	217.50	
					AMM	4/7/2021	53.97	216.17	
					AMM	4/21/2021	52.25	217.89	

[1] MSL = mean sea level

[2] BLS = below land surface

[3] BTOC = below top of casing

[4] ALS = above land surface

Table 4**.** Seasonal-High Groundwater Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Seasonal-High Groundwater Elevation (ft. amsl)
PZ-01 S	1923421.710	1177153.810	205.59
PZ-02 S	1924005.010	1177099.460	201.69
PZ-03 S	1924639.560	1177189.090	205.00
PZ-04 S	1925145.090	1177406.930	193.05
PZ-07 S	1924750.450	1177706.500	206.30
PZ-08 S	1924335.410	1177461.800	217.90
PZ-09 S	1923724.770	1177412.860	223.02
PZ-10 S	1923372.680	1177506.450	217.90
PZ-11 S	1923542.980	1177845.220	205.75
PZ-12 S	1923823.580	1177859.720	222.09
PZ-13 S	1924155.800	1177816.890	225.92
PZ-16 S	1924549.580	1178254.000	216.95
PZ-17 S	1924055.900	1178359.450	225.92
PZ-18 S	1923582.890	1178237.240	225.45
PZ-19 S	1924019.450	1178782.470	227.42
PZ- 20 S	1924480.270	1178674.130	206.55
PZ-22 S	1924212.600	1179061.990	221.16
PZ-23 S	1924265.210	1179502.010	201.38
PZ-29 SR	1924725.070	1179981.090	213.70
PZ-30 S	1924050.690	1179968.830	225.95
PZ-32 S	1924934.030	1180388.340	236.49
PZ-33 S	1924275.260	1180417.720	240.76
PZ-34 S	1923798.690	1180478.000	235.87
PZ-35 S	1924487.500	1180679.410	239.15
PZ-38 S	1924651.720	1181086.910	239.74
PZ-39 S	1924091.280	1181026.890	239.02
PZ-40 S	1923530.130	1181232.770	239.81
PZ- 41 S	1923151.520	1177760.400	198.68
PZ-42 S	1923278.900	1178143.770	203.58
PZ-43 S	1923738.000	1179035.250	230.63
PZ-44 SR	1923920.310	1179529.870	226.78
PZ-45 SR	1924516.440	1179711.110	213.24
PZ-46 S	1923633.590	1179941.950	231.72
PZ-46 SS	1923633.700	1179935.930	*274.81
PZ-47 SR	1924519.970	1179426.570	192.35
PZ-48 S	1922783.250	1177483.940	183.53
PZ-49 S	1923462.700	1178968.740	230.61
PZ-50 S	1923345.420	1179988.480	232.52
PZ-51 S	1923023.120	1181576.210	238.93
PZ-52 S	1923914.240	1178126.630	224.29

Table 4**.** Seasonal-High Groundwater Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Seasonal-High Groundwater Elevation (ft. amsl)
PZ-53 S	1923784.230	1178431.400	224.70
PZ-54 S	1923535.430	1180284.150	233.70
PZ-55 S	1923712.200	1178772.920	227.37
PZ-56 S	1923445.780	1179416.480	229.01
PZ-57 S	1923243.260	1179694.000	230.65
PZ-58 S	1923894.180	1180240.390	233.53
PZ-59 S	1923429.980	1180771.840	249.60
PZ-60 S	1923787.230	1180820.540	242.42
PZ-61 S	1922865.210	1180787.190	245.98
PZ-62 S	1923267.390	1180197.250	234.55
PZ-63 S	1923030.090	1179981.240	237.59
PZ-64 S	1922815.460	1179769.380	230.44
PZ-65 S	1923365.740	1179373.990	228.91
PZ-66 S	1923151.650	1178963.760	224.84
PZ-67 S	1922703.720	1178956.670	226.01
PZ-68 S	1922863.850	1178758.040	216.02
PZ-69 S	1923055.670	1178326.780	210.57
PZ-70 S	1922858.010	1178113.060	202.12
PZ-71 S	1922414.840	1178537.540	218.40
PZ-72 S	1922457.490	1178753.970	224.17
PZ-73 S	1922019.950	1178831.140	214.99
PZ-74 S	1922318.260	1178432.560	208.50
PZ-75 S	1922416.230	1177966.380	176.55
PZ-76 S	1922025.370	1178353.970	205.69
PZ-77 S	1922327.470	1177739.340	183.66
PZ-78 S	1921739.040	1178155.690	199.14
PZ-79 S	1921173.990	1177964.970	167.14
PZ-80 S	1922617.030	1177626.970	167.84
PZ-81 S	1922264.340	1177488.000	186.67
PZ-82 S	1922854.130	1177876.030	185.29
PZ-97-15	1923117.92	1180634.36	237.97
PZ 97-2	1923396.340	1179203.710	*264.57
PZ 97-3	1923407.100	1179209.340	228.29
PZ 97-7	1923226.820	1180551.480	*272.12
PZ 97-8	1923226.820	1180551.480	236.58
MW-1	1922237.976	1181683.753	255.02
MW-2	1923125.120	1180989.359	236.23
MW-3R	1921014.021	1180812.648	204.78
MW-4	1921047.264	1179859.448	188.16
MW-5	1921030.504	1178893.757	197.08

Table 4**.** Seasonal-High Groundwater Level Measurements; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Seasonal-High Groundwater Elevation (ft. amsl)
MW-6	1921286.028	1178510.123	176.00
MW-7	1921539.525	1178369.113	173.36
MW-8	1922700.416	1178665.305	204.80
MW-9	1923289.078	1178521.445	218.24

* = represents perched zone above shallow aquifer not used to generate the seasonal-high groundwater map

ft. amsl = feet above mean sea level

Table 5**.** Summary of Seismic Events in Alabama; Area A Expansion Hydrogeological Investigation; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

State	Date of Occurrence	Magnitude	Class	Data Source	Longitude	Latitude
Alabama	11/7/2004	4.3	4.0 - 4.9	NA	-87.93000515	32.65000607
Alabama	1/8/1978	3	3.0 - 3.9	NA	-88.25000525	32.78000608
Alabama	5/21/2002	3.1	3.0 - 3.9	NA	-88.10000521	32.80000609
Alabama	4/21/2009	3.3	3.0 - 3.9	NA	-87.10000493	32.83000614
Alabama	2/19/2015	3	3.0 - 3.9	USGS	-87.99710518	32.90830612
Alabama	6/6/2015	3	3.0 - 3.9	USGS	-88.00400519	32.93680613
Alabama	11/20/2014	3.8	3.0 - 3.9	USGS	-88.03170519	32.94110613
Alabama	2/19/2015	3	3.0 - 3.9	USGS	-88.03070520	32.94970613
Alabama	12/17/2014	3.4	3.0 - 3.9	USGS	-88.01980519	32.95040613
Alabama	6/30/2015	3.8	3.0 - 3.9	USGS	-88.03010520	32.95940613
Alabama	3/12/2015	3.1	3.0 - 3.9	USGS	-88.05500520	32.97180613
Alabama	2/27/2015	3.2	3.0 - 3.9	USGS	-88.04120520	33.00930614
Alabama	4/21/2009	3.8	3.0 - 3.9	NA	-87.14400495	33.01100617
Alabama	3/14/1971	3.2	3.0 - 3.9	NA	-87.91100517	33.13200617
Alabama	9/11/1992	3	3.0 - 3.9	NA	-87.50000506	33.17000619
Alabama	5/28/1995	3.4	3.0 - 3.9	NA	-87.82000515	33.19000619
Alabama	8/19/2004	3.6	3.0 - 3.9	NA	-86.96800491	33.20300622
Alabama	5/7/1986	4.5	4.0 - 4.9	NA	-87.36000502	33.23000621
Alabama	5/9/2004	3.3	3.0 - 3.9	NA	-86.96000491	33.23100623
Alabama	6/28/2008	3.1	3.0 - 3.9	NA	-87.40000504	33.28000622
Alabama	1/18/1999	4	4.0 - 4.9	NA	-87.25000500	33.40000625
Alabama	11/28/1999	3.8	3.0 - 3.9	NA	-87.25000500	33.42000626
Alabama	2/15/1995	3.3	3.0 - 3.9	NA	-87.66000512	33.47000625
Alabama	12/12/1997	4	4.0 - 4.9	NA	-87.31000502	33.47000626
Alabama	11/7/1975	3.4	3.0 - 3.9	NA	-87.36000504	33.55000628
Alabama	8/13/1989	3.4	3.0 - 3.9	NA	-87.09000497	33.63000631
Alabama	2/28/1989	3.5	3.0 - 3.9	NA	-87.09000497	33.64000631
Alabama	6/24/1975	4.2	4.0 - 4.9	NA	-87.84000518	33.72000630
Alabama	9/2/1990	3.2	3.0 - 3.9	NA	-87.92000521	33.75000630
Alabama	6/23/1990	3.2	3.0 - 3.9	NA	-87.97000522	33.76000630
Alabama	5/4/2007	3	3.0 - 3.9	NA	-87.29900504	33.79700633
Alabama	5/28/2000	3	3.0 - 3.9	NA	-87.82000518	33.81000632
Alabama	4/22/2016	3	3.0 - 3.9	USGS	-87.20000000	33.30000000
Alabama	4/29/2016	3	3.0 - 3.9	USGS	-87.20000000	33.30000000
Alabama	4/29/2016	3	3.0 - 3.9	USGS	-87.20002246	33.29974892
Alabama	4/22/2016	3	3.0 - 3.9	USGS	-87.19989371	33.30000000

Table 6. Summary of Confining Clay Elevation Data from Borings; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Land Surface Elevation (ft. amsl)	Depth to Confining Layer (ft. bgs)	Top Elevation of Confining Layer (ft. amsl)	Thickness of Confining Layer (ft.)	Bottom Elevation of Confining Layer (ft. amsl)
PZ-01D	1923421.71	1177153.81	204.32	19.0	185.32	40.0	145.32
PZ-02S	1924005.01	1177099.46	204.20	19.0	185.20	10.0	175.20
PZ-03D	1924639.56	1177189.09	211.46	14.0	197.46	20.0	177.46
PZ-04S	1925145.09	1177406.93	193.71	9.0	184.71	8.0	176.71
PZ-07D	1924750.45	1177706.50	210.49	7.5	202.99	21.0	181.99
PZ-09D	1923724.77	1177412.86	264.12	59.0	205.12	55.0	150.12
PZ-10D	1923372.68	1177506.45	252.11	54.0	198.11	65.0	133.11
PZ-11S	1923542.98	1177845.22	206.54	14.0	192.54	---	---
PZ-12D	1923823.58	1177859.72	233.85	29.0	204.85	30.0	174.85
PZ-13D	1924155.80	1177816.89	269.46	64.0	205.46	25.0	180.46
PZ-14D	1925096.55	1178125.81	198.37	14.0	184.37	5.0	179.37
PZ-15D	1924854.50	1178412.75	193.06	2.0	191.06	14.0	177.06
PZ-16S	1924549.58	1178254.00	222.56	24.0	198.56	18.0	180.56
PZ-17D	1924055.90	1178359.45	306.56	94.0	212.56	---	---
PZ-18D	1923582.89	1178237.24	234.51	24.0	210.51	35.0	175.51
PZ-19D	1924019.45	1178782.47	276.32	64.0	212.32	25.0	187.32
PZ-20D	1924480.27	1178674.13	218.60	22.0	196.60	20.0	176.60
PZ-21D	1924841.72	1178936.15	190.49	4.0	186.49	---	---
PZ-22D	1924212.60	1179061.99	240.23	44.0	196.23	25.0	171.23
PZ-23S	1924263.59	1179501.24	205.70	14.0	191.70	---	---
PZ-23D	1924271.44	1179505.36	205.19	14.0	191.19	7.5	183.69
PZ-29S	1924720.51	1179969.94	214.08	10.0	204.08	---	---
PZ-29D	1924731.93	1179979.78	216.39	14.0	202.39	5.0	197.39
PZ-30D	1924055.77	1179974.47	234.93	29.0	205.93	14.0	191.93
PZ-32D	1924939.13	1180382.89	253.79	33.5	220.29	15.5	204.79
PZ-33D	1924274.62	1180417.85	267.11	44.5	222.61	9.5	213.11
PZ-34D	1923801.47	1180482.94	285.65	80.5	205.15	13.5	191.65
PZ-35D	1924493.37	1180673.93	313.73	104.0	209.73	10.5	199.23
PZ-39D	1924083.43	1181029.27	256.78	34.0	222.78	14.0	208.78
PZ-40D	1923537.27	1181232.20	279.46	62.0	217.46	21.5	195.96
PZ-42S	1923278.90	1178143.77	206.46	22.0	184.46	---	---
PZ-43S	1923738.00	1179035.25	256.46	39.0	217.46	---	---
PZ-44S	1923735.78	1179417.36	241.41	36.5	204.91	---	---
PZ-45S	1924524.33	1179708.31	226.38	19.0	207.38	---	---
PZ-46S	1923633.59	1179941.95	284.94	74.0	210.94	---	---
PZ-47S	1924592.47	1179236.31	202.78	4.0	198.78	---	---
PZ-48S	1922783.25	1177483.94	184.34	9.0	175.34	---	---
PZ-49S	1923462.70	1178968.74	278.79	68.0	210.79	---	---
PZ-50S	1923345.42	1179988.48	297.49	93.0	204.49	---	---
PZ-51S	1923023.12	1181576.21	336.38	114.0	222.38	---	---
PZ-52S	1923914.24	1178126.63	270.07	54.0	216.07	---	---
PZ-53S	1923784.23	1178431.40	256.53	43.0	213.53	---	---
PZ-54S	1923535.43	1180284.15	298.58	75.0	223.58	---	---
PZ-55S	1923712.20	1178772.92	255.64	35.0	220.64	---	---
PZ-56S	1923445.78	1179416.48	310.81	100.0	210.81	---	---
PZ-57S	1923243.26	1179694.00	310.00	100.0	210.00	---	---
PZ-58S	1923894.18	1180240.39	272.63	49.0	223.63	---	---
PZ-59S	1923429.98	1180771.84	314.25	84.0	230.25	---	---
PZ-60S	1923787.23	1180820.54	311.00	78.0	233.00	---	---
PZ-61S	1922865.21	1180787.19	251.98	24.0	227.98	---	---
PZ-62S	1923267.39	1180197.25	299.57	89.0	210.57	---	---
PZ-63S	1923030.09	1179981.24	267.15	54.0	213.15	---	---
PZ-64S	1922815.46	1179769.38	235.12	27.5	207.62	---	---
PZ-65S	1923365.74	1179373.99	329.32	123.5	205.82	---	---
PZ-66S	1923151.65	1178963.76	263.27	53.5	209.77	---	---
PZ-67S	1922703.72	1178956.67	247.47	25.0	222.47	---	---
PZ-68S	1922863.85	1178758.04	248.64	49.0	199.64	---	---
PZ-69S	1923055.67	1178326.78	239.50	35.0	204.50	---	---
PZ-70S	1922858.01	1178113.06	221.24	22.5	198.74	---	---
PZ-71S	1922414.84	1178537.54	239.46	31.0	208.46	---	---
PZ-72S	1922457.49	1178753.97	246.99	34.0	212.99	---	---
PZ-73S	1922019.95	1178831.14	233.02	30.5	202.52	---	---
PZ-74S	1922318.26	1178432.56	236.67	40.0	196.67	---	---
PZ-75S	1922416.23	1177966.38	179.92	10.0	169.92	---	---
PZ-76S	1922025.37	1178353.97	224.25	26.0	198.25	---	---
PZ-77S	1922327.47	1177739.34	192.55	13.5	179.05	---	---
PZ-78S	1921739.04	1178155.69	212.49	18.5	193.99	---	---
PZ-79S	1921173.99	1177964.97	172.76	13.0	159.76	---	---
PZ-80S	1922617.03	1177626.97	178.67	17.5	161.17	---	---
PZ-81S	1922264.34	1177488.00	187.87	11.5	176.37	---	---
PZ-82S	1922854.13	1177876.03	192.74	16.5	176.24	---	---
94-3	1922549.00	2278959.00	263.50	27.5	236.00	---	---

Table 5. Summary of Confining Clay Elevation Data from Borings; Hydrogeological Evaluation; Area A Expansion; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well ID	Easting (X)	Northing (Y)	Land Surface Elevation (ft. amsl)	Depth to Confining Layer (ft. bgs)	Top Elevation of Confining Layer (ft. amsl)	Thickness of Confining Layer (ft.)	Bottom Elevation of Confining Layer (ft. amsl)
94-4	1923051.00	1178530.00	270.50	70.0	200.50	---	---
94-8	1921725.00	1177839.00	218.30	20.0	198.30	---	---
94-9	1921759.00	1178807.00	204.00	25.0	179.00	---	---
94-10	1921223.00	1179076.00	237.00	48.0	189.00	---	---
94-11	1921362.00	1179592.00	276.30	79.0	197.30	---	---
94-12	1921603.00	1180386.00	265.00	12.0	253.00	---	---
94-13	1922296.00	1181160.00	287.50	15.5	272.00	---	---
94-14	1922749.00	1181183.00	280.10	13.0	267.10	28.5	238.60
94-15	1923070.00	1181025.00	286.40	65.5	220.90	---	---
94-16	1922653.00	1179465.00	260.80	41.5	219.30	---	---
94-17	1922538.00	1177830.00	181.40	9.0	172.40	25.0	147.40
94-17A	1922542.00	1177822.00	181.00	9.0	172.00	10.0	162.00
94-18	1921097.00	1171822.00	183.30	13.0	170.30	40.0	130.30
94-19	1921044.00	1178742.00	231.30	34.0	197.30	---	---
94-20	1921067.00	1179765.00	211.30	29.0	182.30	---	---
94-21	1921073.00	1180596.00	241.00	32.0	209.00	---	---
94-22	1921059.00	1181175.00	308.70	30.0	278.70	71.0	207.70
94-23	1921511.00	1181813.00	278.10	17.5	260.60	---	---
94-24	1922206.00	1181698.00	275.00	28.5	246.50	---	---
94-26	1922656.00	1181211.00	291.20	15.5	275.70	---	---
94-27	1922013.00	1181016.00	243.30	34.0	209.30	---	---
94-29	1921524.00	1180093.00	251.20	62.5	188.70	---	---
94-30	1921590.00	1180361.00	261.70	58.0	203.70	---	---
94-31	1921667.00	1181215.00	266.50	63.0	203.50	---	---
94-32	1921581.00	1181189.00	286.30	25.0	261.30	---	---
94-33	1921385.00	1181520.00	326.80	51.0	275.80	---	---
94-34	1922500.00	1181535.00	334.50	69.0	265.50	---	---
EXB3	1922743.00	1179558.00	263.90	68.0	195.90	---	---
EXB4	1923101.00	1180273.00	261.30	59.0	202.30	---	---
04-7	1921615.00	1178334.00	187.48	20.0	167.48	---	---

ft. amsl = feet above mean sea level

ft. bgs = feet below ground surface

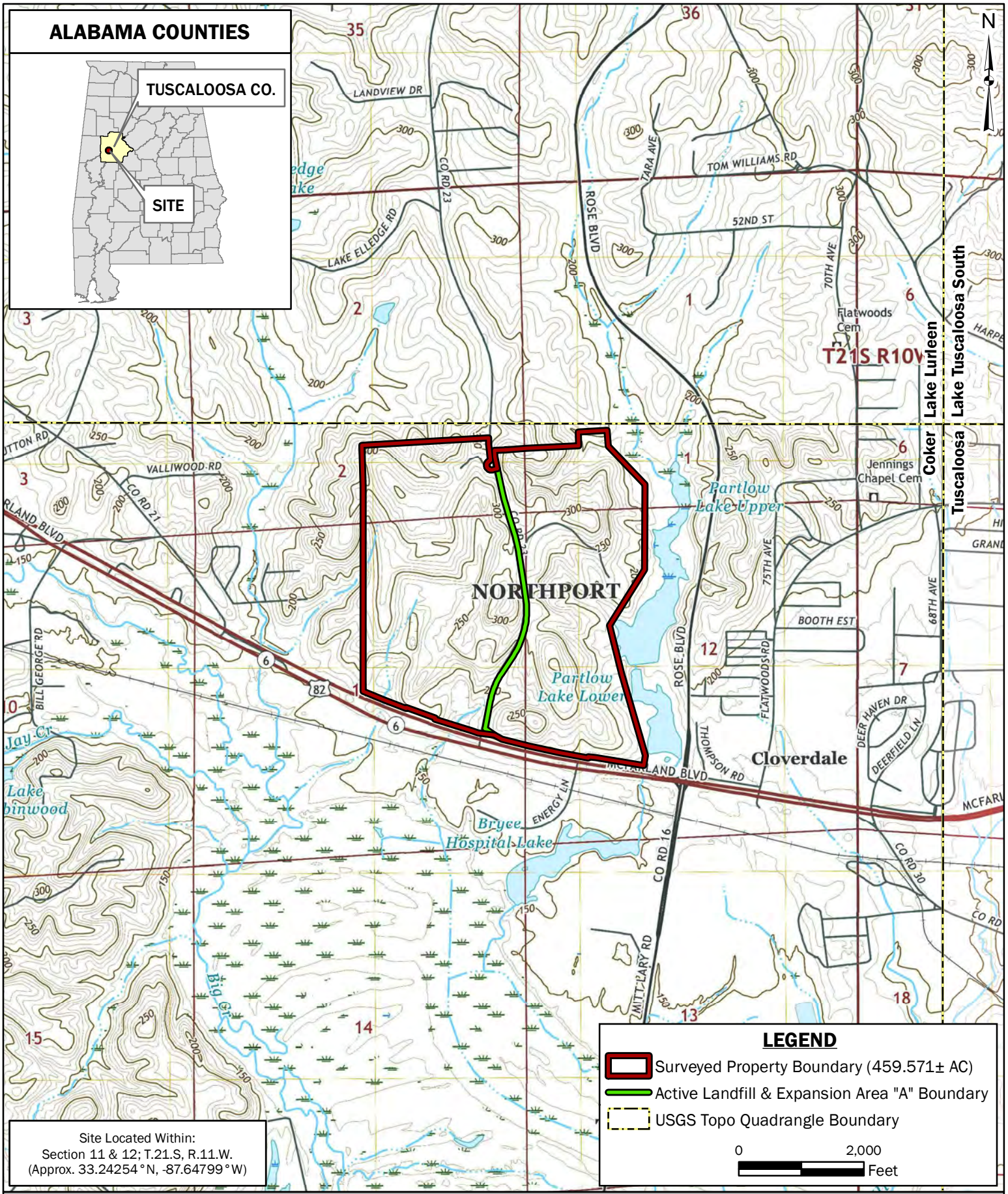
--- = confining clay layer was not encountered during borehole advancement

Table 7. Water Supply Well Inventory; Hydrogeological Investigation; Black Warrior Solid Waste Authority (BWSWA); Coker, Tuscaloosa County, Alabama; TTL Project No.: 000190103033.00

Well Identifer	Property Owner	Parcel ID	Mailing Address	City	State	Zip
1	James Daniel Hamner	1907360001006000	13197 Olivewood Road	Coker	AL	35452
2	Ray R. Knight etux Mary Joy	1907360001010000	13156 Olivewood Road	Coker	AL	35156
3	James H. Townsend	1907360001024000	13053 Olivewood Road	Coker	AL	35452
4	Frank Turner	2009310001016007	5300 Harper Road	Northport	AL	35473
5	Don H. Higgins	1907350001036010	12007 Mt Olive Road	Coker	AL	35452
6	Warrior Tractor & Equipment	3201020001001000	P.O. Box 412	Northport	AL	35476
7	Celesta Claire Riner	3201020001003000	13871 Lake Elledge Road	Coker	AL	35452
8	James Travis Booth	3103062001012000	4811 Harper Road	Northport	AL	35473
9	ChriStreetopher M. Byrne	3103062001017000	4709 Lavenuender Drive	Northport	AL	35473
10	John Denton	3103063001006000	6900 45th Street	Northport	AL	35473
11	Kelly M. Lambert	3110063001001000	6908 45th Street	Northport	AL	35473
12	James W. Mills	3103063001007000	6930 44th Street	Northport	AL	35473
13	David G. Sanders	3103063001004000	6940 44th Street	Northport	AL	35473
14	Deborah Grace Harris	3103063001002000	4401 70th Avenue	Northport	AL	35473
15	Jessie R. Hannah	3103063002013000	6906 43rd Street	Northport	AL	35473
16	James David Whitbeck	3202030001022001	11667 Upper Columbus Road	Coker	AL	35452
17	Charlene Hamner	3103063001033000	P.O. Box 76	Bankston	AL	35542
18	Carolyn Virginia Lee	3202030001022000	11672 Upper Columbus Road	Northport	AL	35473
19	Dorothy Locke Coley	3103063001032000	14200 Remington Ridge Drive	Northport	AL	35475
20	Bryant Allen ChaStreetine	3103063003007000	4000 Northwood Lake Drive	Northport	AL	35473
21	James Neville	3103063004001000	4110 67th Avenue	Northport	AL	35473
22	Janice McGee	3102030001024004	14077 Valliwood Road	Coker	AL	35452
23	Ramiro Benitez	3202030001024003	11559 Upper Columbus Road	Coker	AL	35452
24	Billy Jack Williamson	3103063004004000	6724 Flatwoods Road	Northport	AL	35473
25	Robert E. Hall	3103063004002004	6720 Flatwoods Road	Northport	AL	35473
26	Booth Holdings LLC	3202030001041000	14267 Hwy 82 W.	Coker	AL	35452
27	Booth Holdings LLC	3202030001041000	14267 Hwy 82 W.	Coker	AL	35452
28	Black Warrior Solid Waste Disposal	3202030001043000	3301 Landfill Drive	Coker	AL	35452
29	Benjamin F. Bigham	3103072001009000	6901 Flatwoods Road	Northport	AL	35473
30	Sheryl Matthews	3202030001044000	14095 Boswell Road	Coker	AL	35452
31	Causey Melindal	3202100001003000	14114 Boswell Road	Coker	AL	35452
32	Lanny G. Holbrook	3201121003002000	3725 71st Avenue	Northport	AL	35473
33	Judy G. Walters Rice	3201121001004000	7200 39th Street	Northport	AL	35473
34	Ready Mix Concrete Inc.	3202100001002000	12597 Shelly Hughes Road	Buhl	AL	35446
35	Gary Willard Boone	3201121001006000	7217 39th Street	Northport	AL	35473
36	Denise A. Bobo Cobbs	3201121001013000	7200 Flatwood Road	Northport	AL	35476
37	Mabel M. Coleman	3202100001013000	14220 Hwy 82 W.	Coker	AL	35452
38	David A. Shaw	3202100001021000	14126 Highway 82 W.	Coker	AL	35452
39	Louise E. Smelley	3201121001010000	12650 Old Marion Road	Tuscaloosa	AL	35405
40	Charles Hardin	3202100001017000	Highway 82 W.	Coker	AL	35452
41	Nolan Brantley	3202100001021001	14138 Hwy 82 W.	Coker	AL	35452
42	Mabel M. Coleman	3202100001013000	14220 Hwy 82 W.	Coker	AL	35452
43	Johnny R. Maughn	3202100001018000	14125 Maughn Drive	Coker	AL	35452
44	Jessica Maughn Westbrook	3202100001023003	14192 Maughn Drive	Coker	AL	35452
45	Frank H. Redd	3103072004012000	15643 68th Avenue	Northport	AL	35480
46	Bobbie Sue Hall	3201121004004000	5 Booth E.	Northport	AL	35473
47	Walter D. Hamner	3103072001015000	33 Booth E.	Northport	AL	35476
48	Kevin Arlis Booth	3201121004008001	20 Booth E.	Northport	AL	35473
49	Johnny Robert Maughn	3202100001023001	14125 Maughn Drive	Coker	AL	35452
50	Alabama Mental Health Board	3201110001035000	P.O. Box 301410	Montgomery	AL	36130
51	Brian L. Robertson	3103072004013003	3417 68th Avenue	Northport	AL	35473
52	Todd D. Melton & Taneika A. Little	3201121005011000	7301 Flatwoods Road	Northport	AL	35473
53	Johnny Mac Clark	3103072004015003	3010 66th Avenue	Northport	AL	35473
54	Charles Clark	3103072004015004	6704 34th Street	Northport	AL	35473
55	Charlie V. Mitchum	3202100001043000	11134 Bill George Road	Coker	AL	35452
56	Thompson Family Limited	3201124001001000	4020 75th Avenue	Northport	AL	35473
57	Charlie V. Mitchum	3202100001043000	11134 Bill George Road	Coker	AL	35452
58	Thompson Family Limited	3201124001001000	4020 75th Avenue	Northport	AL	35473
59	Bambie L. Streetrickland	3103073009001000	7019 5th Street	Northport	AL	35476
60	Alabama Mental Health Board	3201124001003002	P.O. Box 301410	Montgomery	AL	36130
61	USA Energy Company	3206140000001001	1550 McFarland Blvd NE Road	Tuscaloosa	AL	35406
62	Benson P. Bolling	3104182001008000	10479 Royal Points Drive	Northport	AL	35475

FIGURES

Figure 1. Site Location and Topographic Map
Figure 2. Site Location and Aerial Photograph
Figure 3. Approximate Extent of Waste in the Pre-Subtitle D Landfill
Figure 4. FEMA Flood Hazard Zone Map
Figure 5. Airport Location Map
Figure 6. Locations of Borings/Piezometers Drilled and Installed for Hydrogeological Investigation of Area A Expansion
Figure 7. Structure Contour Map of the Top of Confining Clay
Figure 8. Isopach Map of Confining Clay
Figure 9. Lines of Cross-Sections Map (A-A' to H-H')
Figure 10. Hydrogeologic Cross-Section A – A'
Figure 11. Hydrogeologic Cross-Section B – B'
Figure 12. Hydrogeologic Cross-Section C – C'
Figure 13. Hydrogeologic Cross-Section D – D'
Figure 14. Hydrogeologic Cross-Section E – E'
Figure 15. Hydrogeologic Cross-Section F – F'
Figure 16. Hydrogeologic Cross-Section G – G'
Figure 17. Hydrogeologic Cross-Section H – H'
Figure 18. Seasonal-High Groundwater for the Uppermost Saturated Zone
Figure 19. Potentiometric Surface and Directions of Groundwater Flow in the First - Saturated Zone
Figure 20. Potentiometric Surface and Directions of Groundwater Flow in the Lower-Saturated Zone
Figure 21. Regional Geologic Map
Figure 22. Generalized Stratigraphic Section
Figure 23. Coalbed Methane Well Location Map
Figure 24A. USGS Seismic Hazard Map
Figure 24B. Historical Earthquakes of Alabama Map
Figure 25. Map of Local Geology
Figure 26. Generalized Cross-Section Showing Lithofacies
Figure 27. Water Well Inventory Map



TTL

FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP

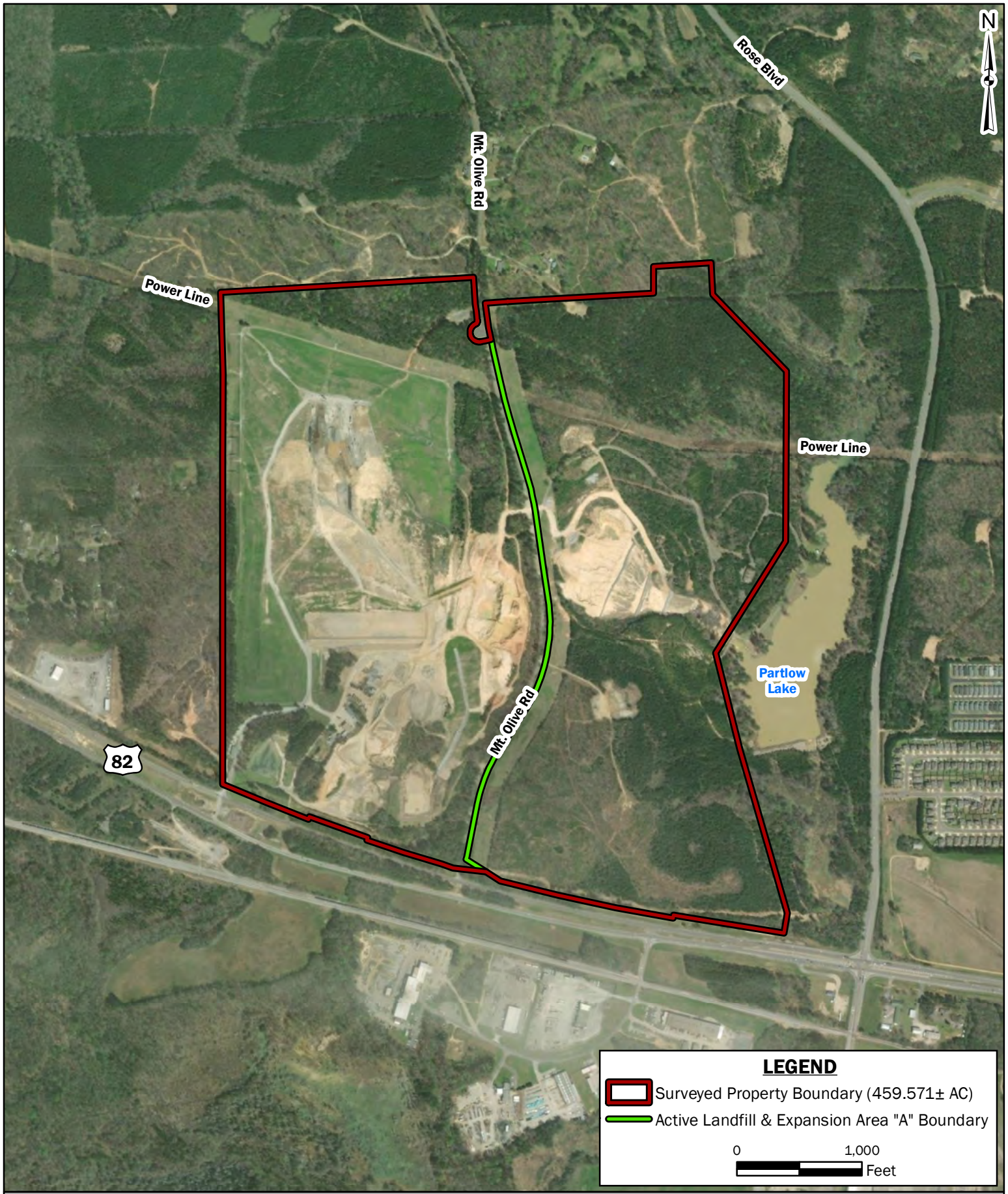
BLACK WARRIOR SOLID WASTE LANDFILL

HYDROGEOLOGICAL EVALUATION

COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Coker, Alabama USGS 7.5 Minute Quadrangle Map, 2018 (10-ft Contour Interval).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 2,000 ft



TTL

FIGURE 2: SITE LOCATION & AERIAL PHOTOGRAPH

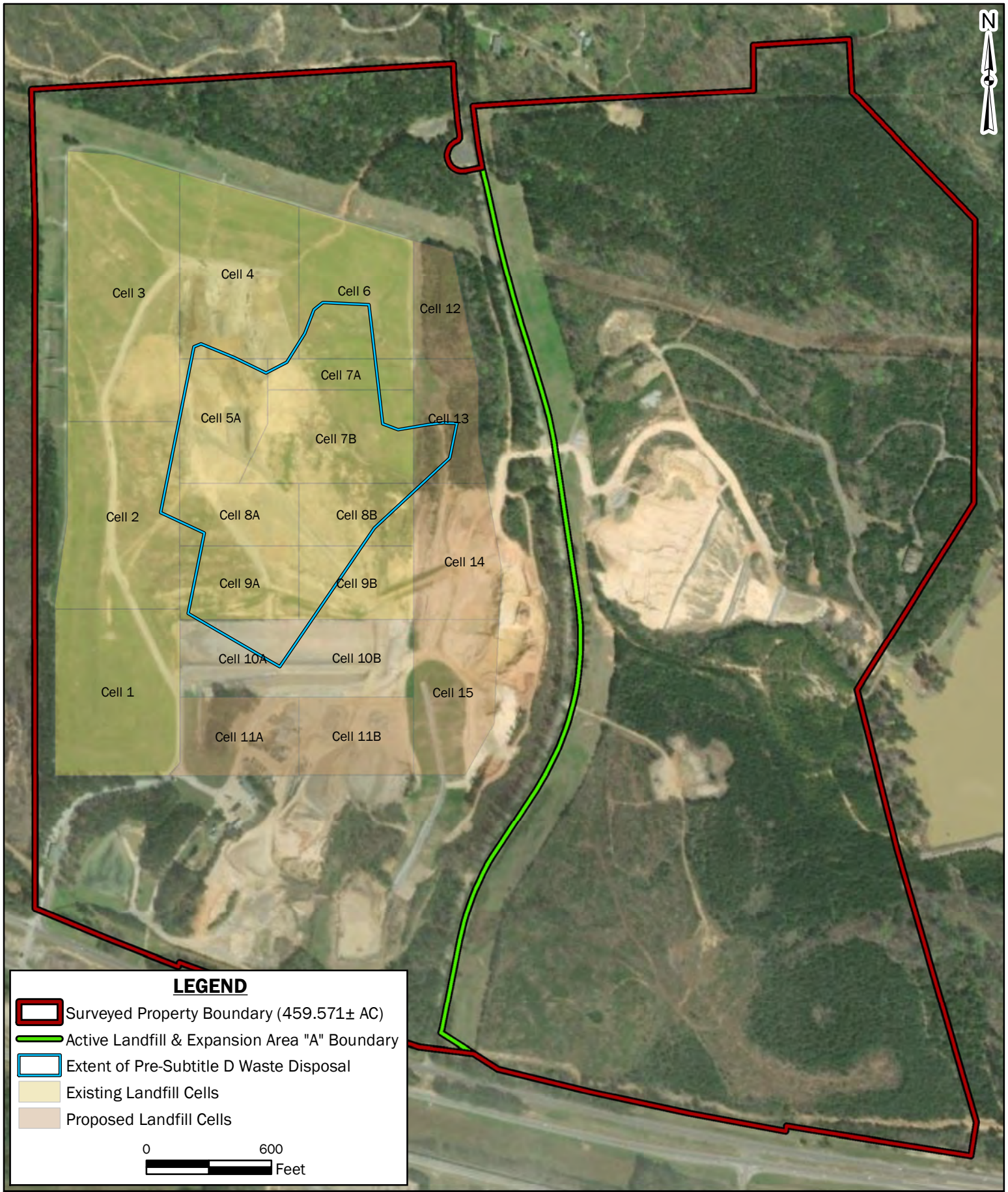
BLACK WARRIOR SOLID WASTE LANDFILL

HYDROGEOLOGICAL EVALUATION

COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 1,000 ft

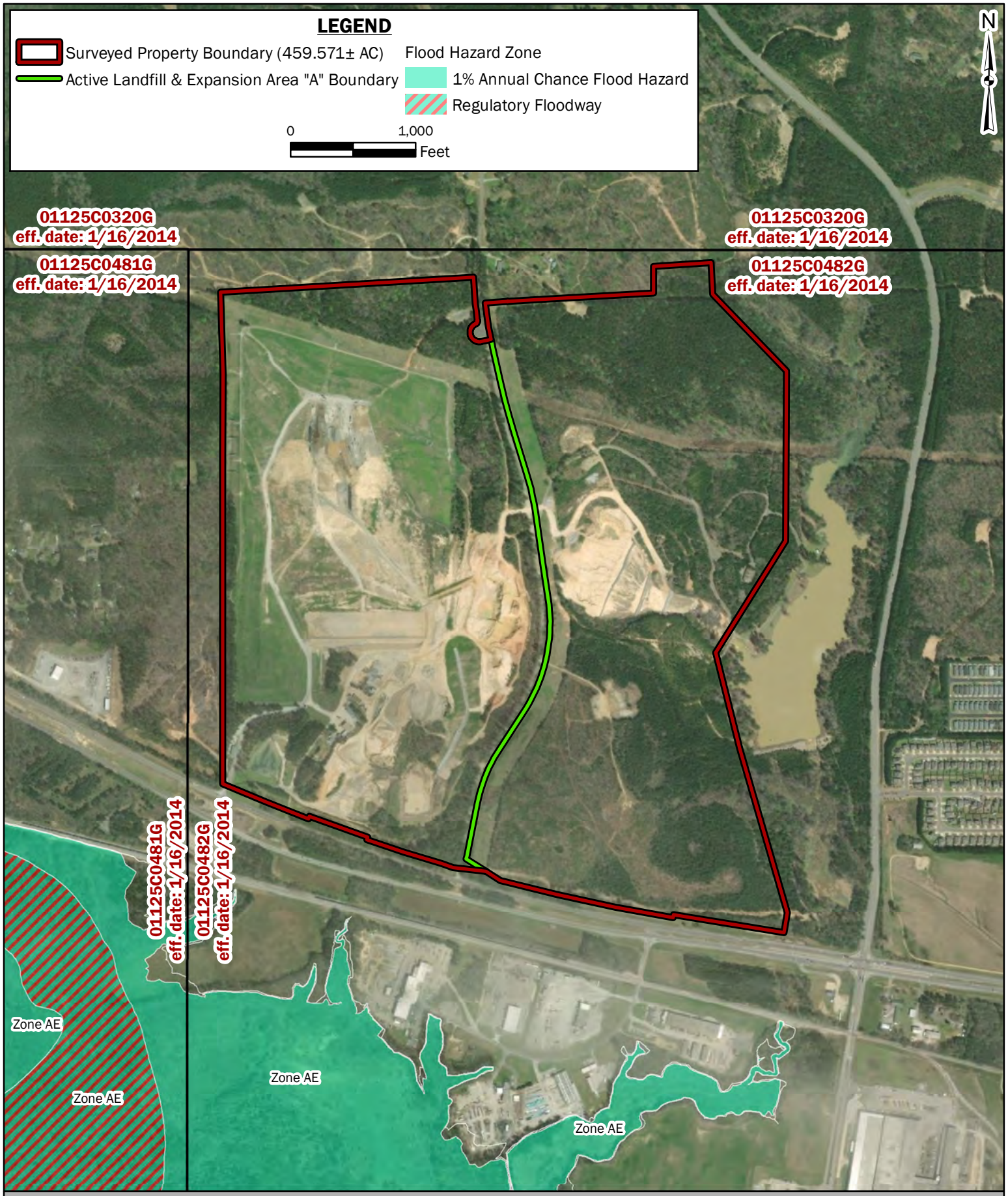


TTL

FIGURE 3: APPROX. EXTENT OF WASTE IN THE PRE-SUBTITLE D LANDFILL

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA
BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 600 ft



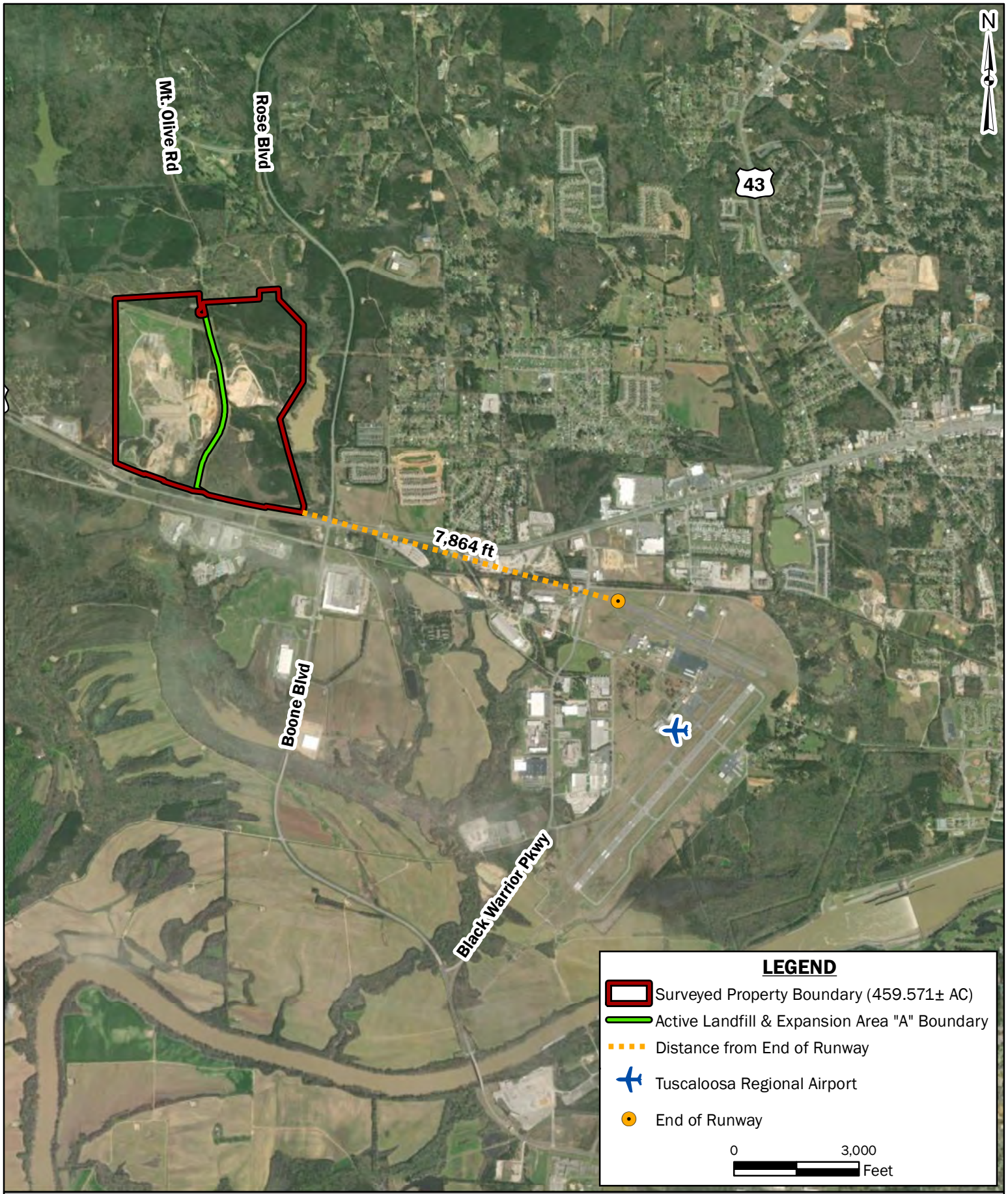
TTL

FIGURE 4: FEMA NATIONAL FLOOD HAZARD LAYER MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 1,000 ft



TTL

FIGURE 5: AIRPORT LOCATION MAP

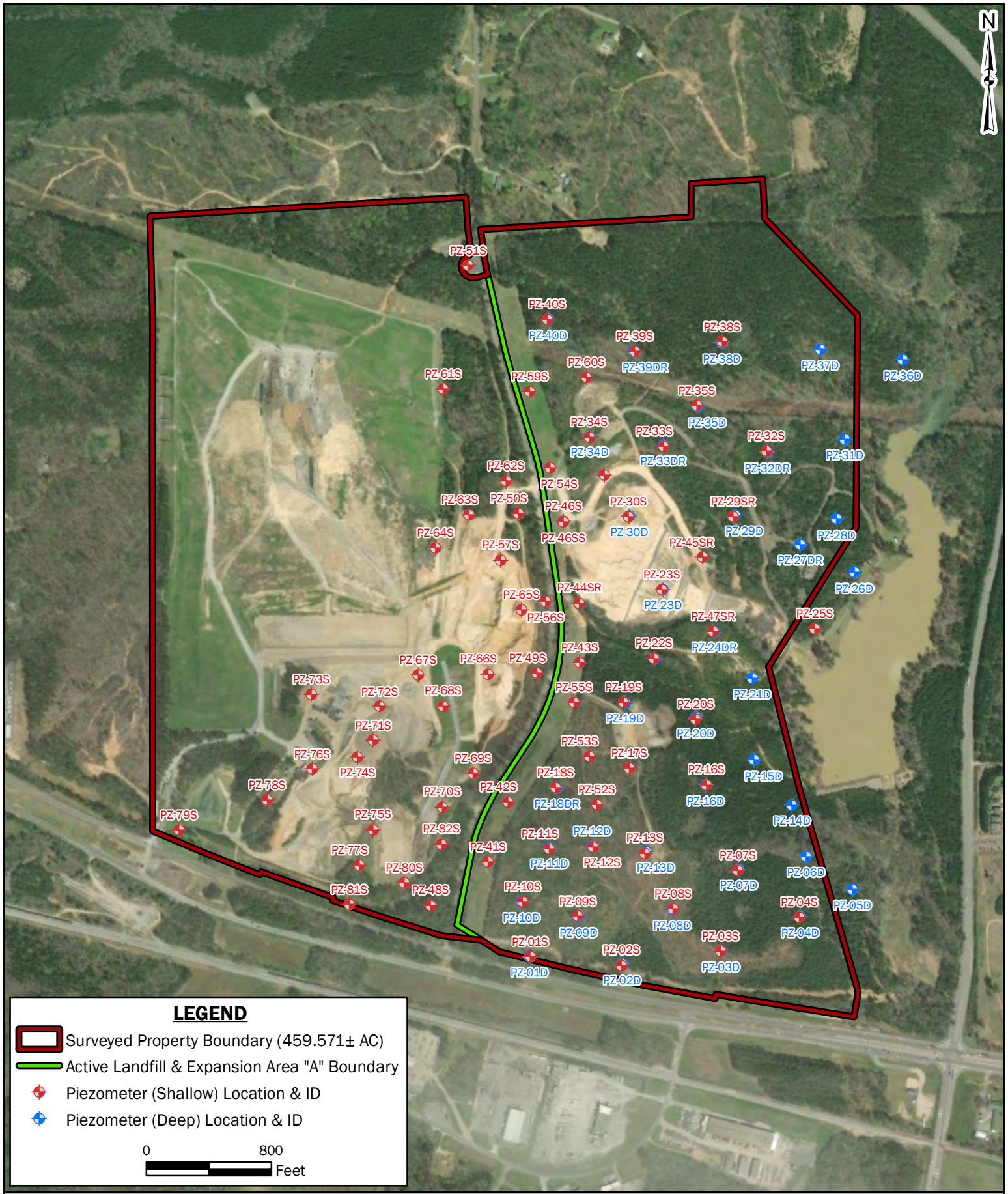
BLACK WARRIOR SOLID WASTE LANDFILL

HYDROGEOLOGICAL EVALUATION

COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 3,000 ft

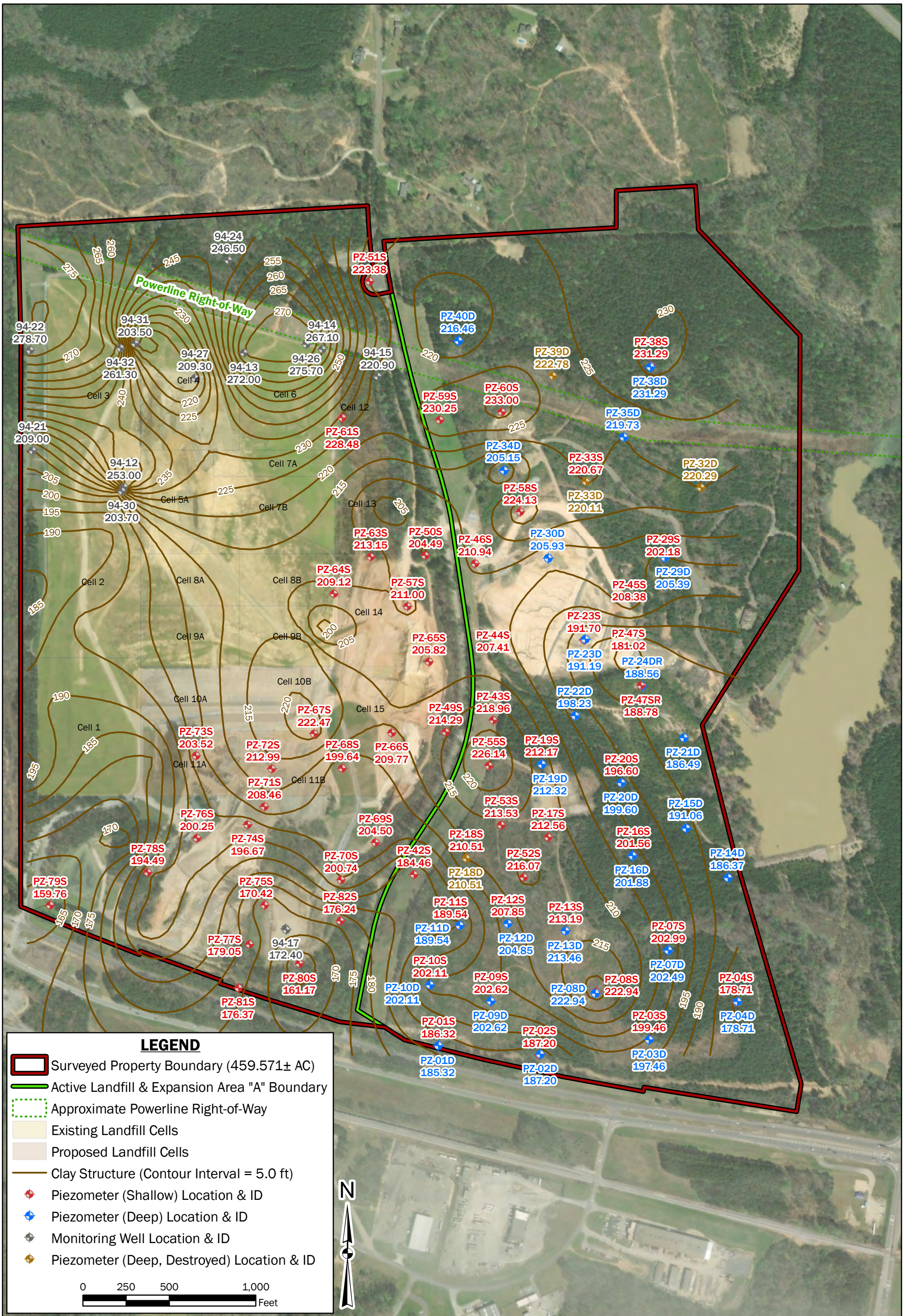


TTL

FIGURE 6: LOCATIONS OF BORINGS/PIEZOMETERS INSTALLED FOR THE AREA A EVALUATION

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA
BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 800 ft



TTL

FIGURE 7: STRUCTURE MAP OF THE TOP OF CONTINUING CLAY

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	6/28/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft

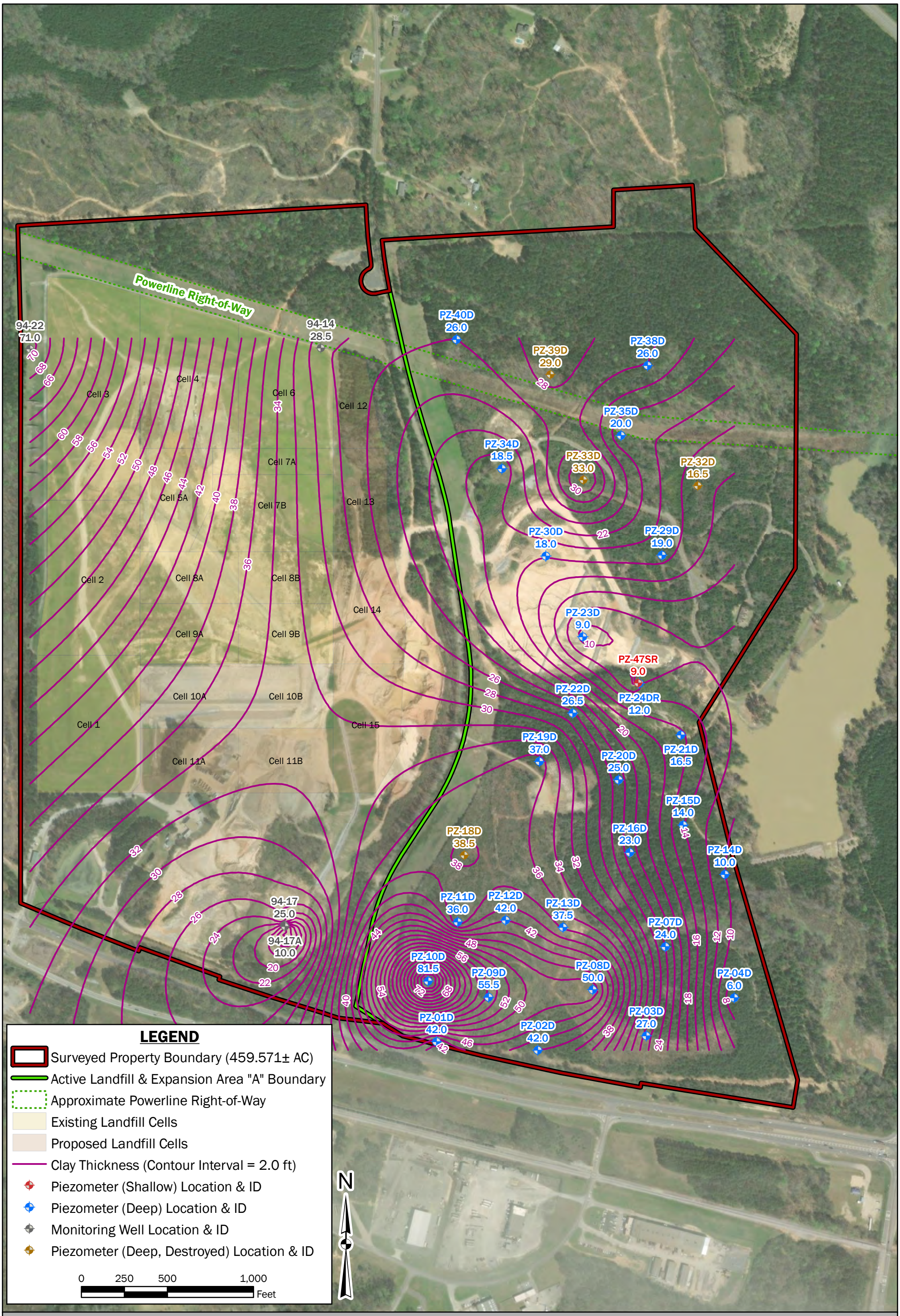


FIGURE 8: CLAY ISOPACHS MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	6/28/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft

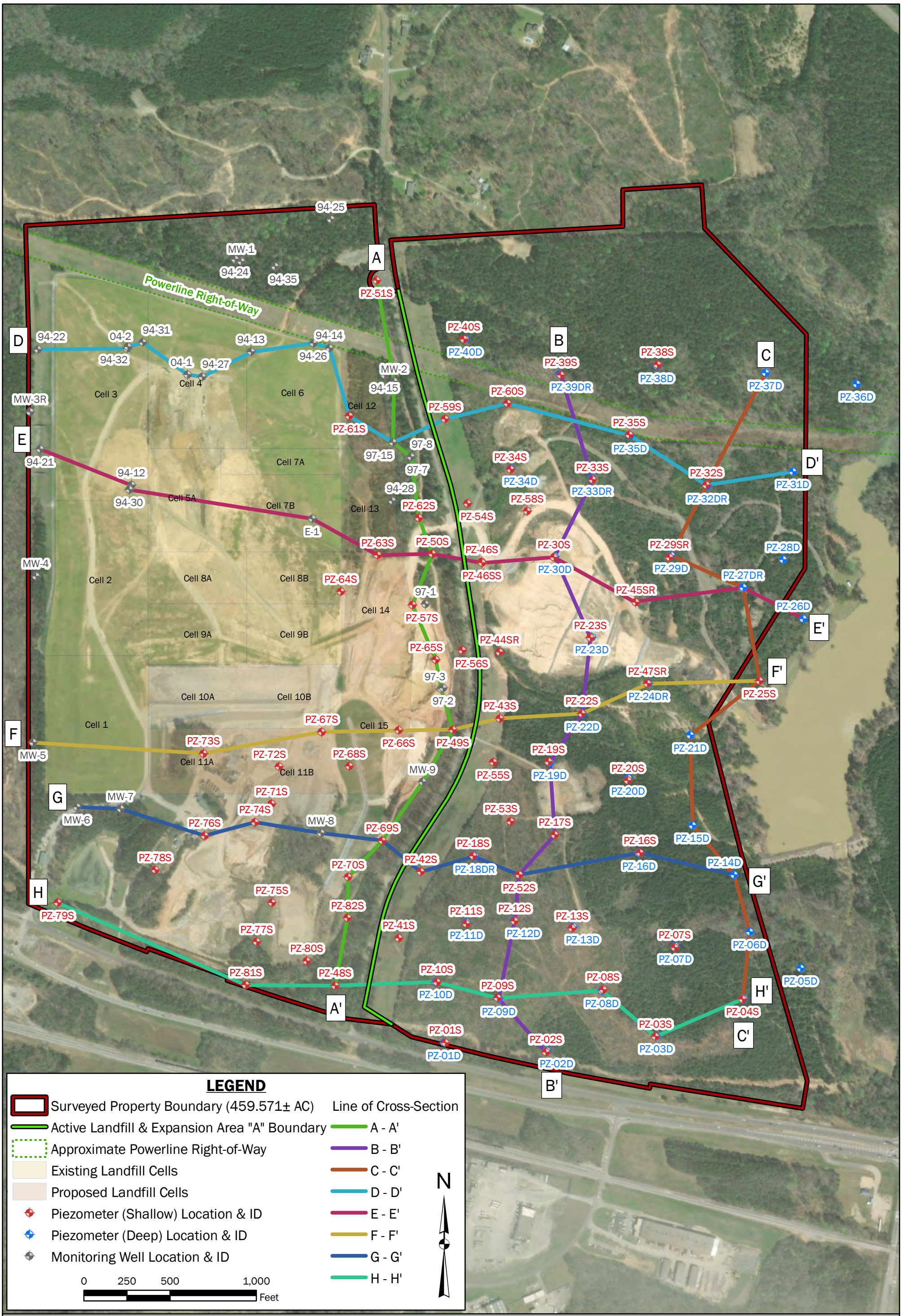
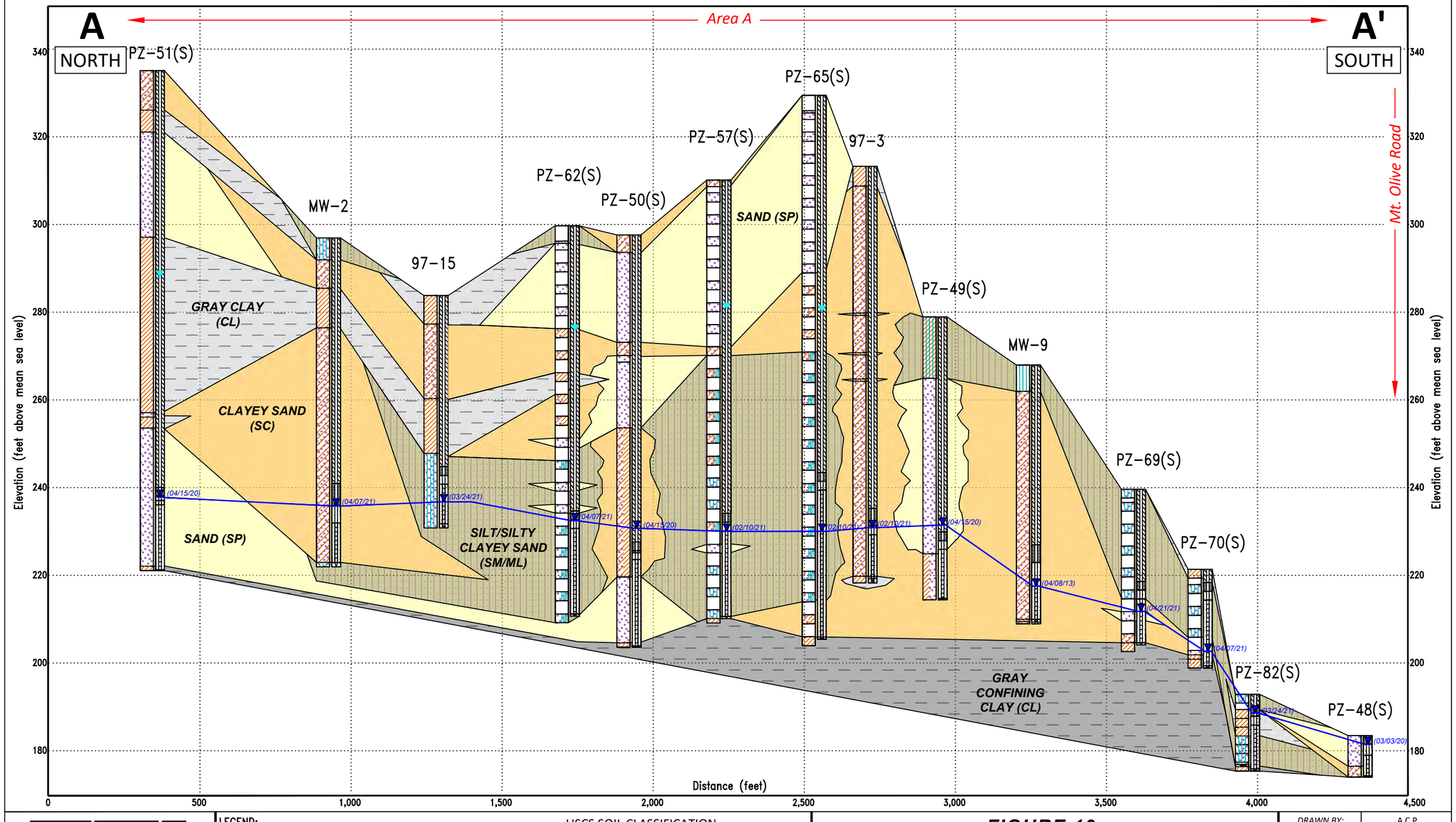


FIGURE 9: PZ & CROSS-SECTON LINE LOCATION MAP

BLACK WARRIOR SOLID WASTE LANDFILL - PARTLOW EXPANSION
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	4/16/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf)
Recovery% Core Size RQD%
Material Symbol
B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface
Second-Saturated Zone Pontentiometric Surface
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level

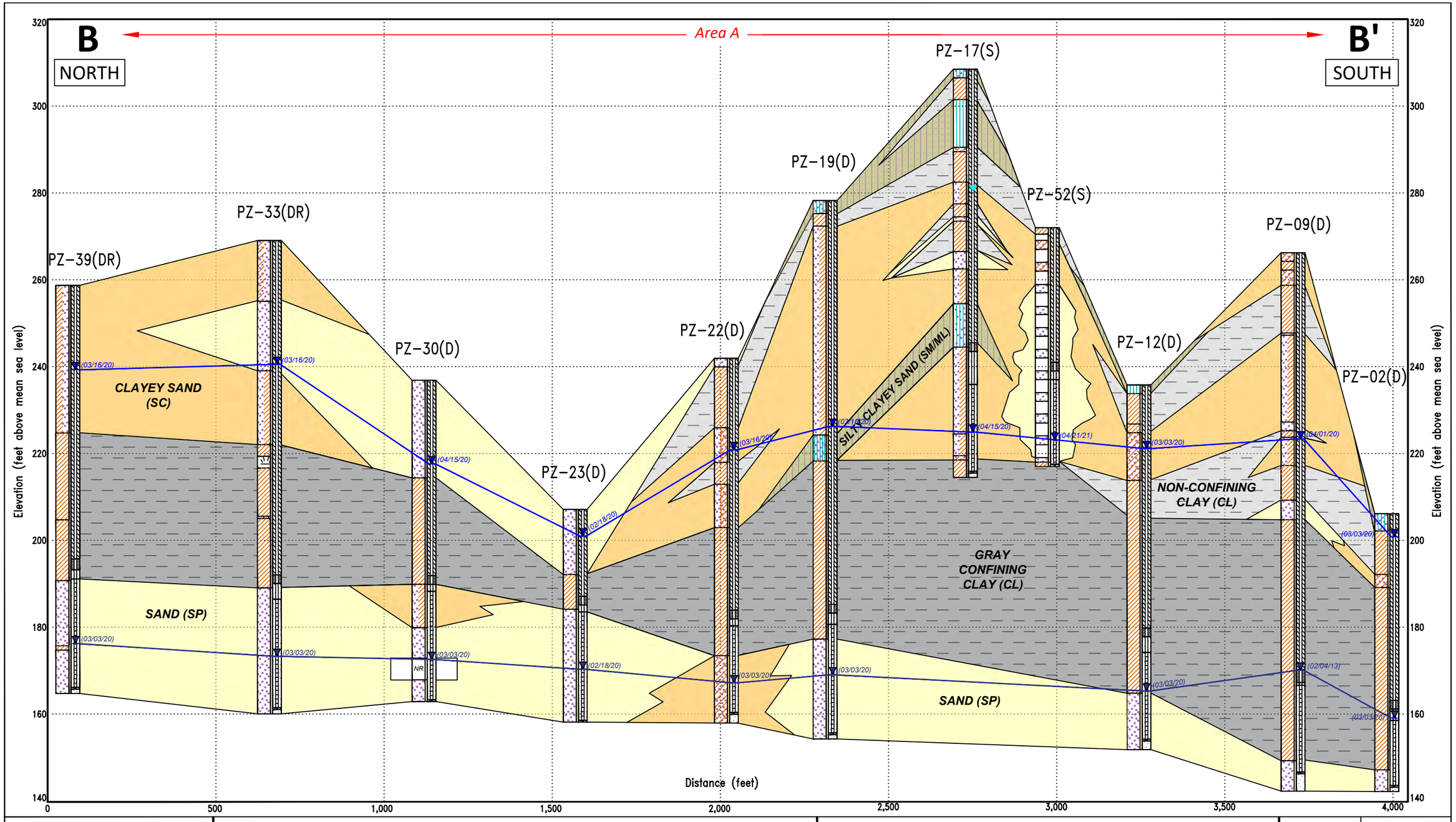
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	GRAY CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 10.
Generalized Hydrogeologic Cross-Section A - A'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/13/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf)
Recovery% Core Size RQD%
Material Symbol
B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface
Second-Saturated Zone Potentiometric Surface
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level

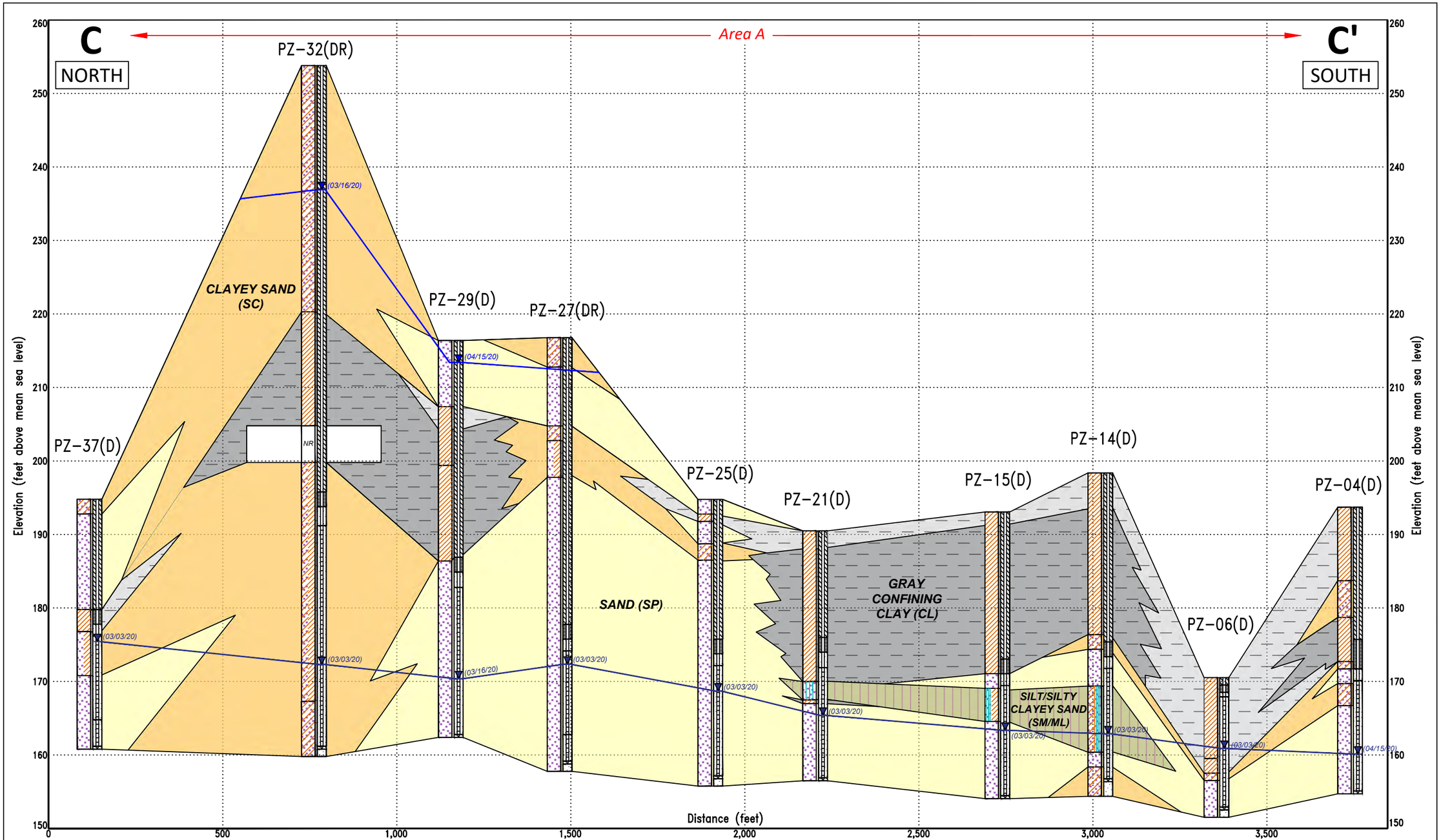
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 11.
Generalized Hydrogeologic Cross-Section B - B'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/13/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo. Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf) | Recovery/% Core Size RQD% | Material Symbol

B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface

Second-Saturated Zone Pontentiometric Surface

Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021

Perched Groundwater Level

USCS SOIL CLASSIFICATION

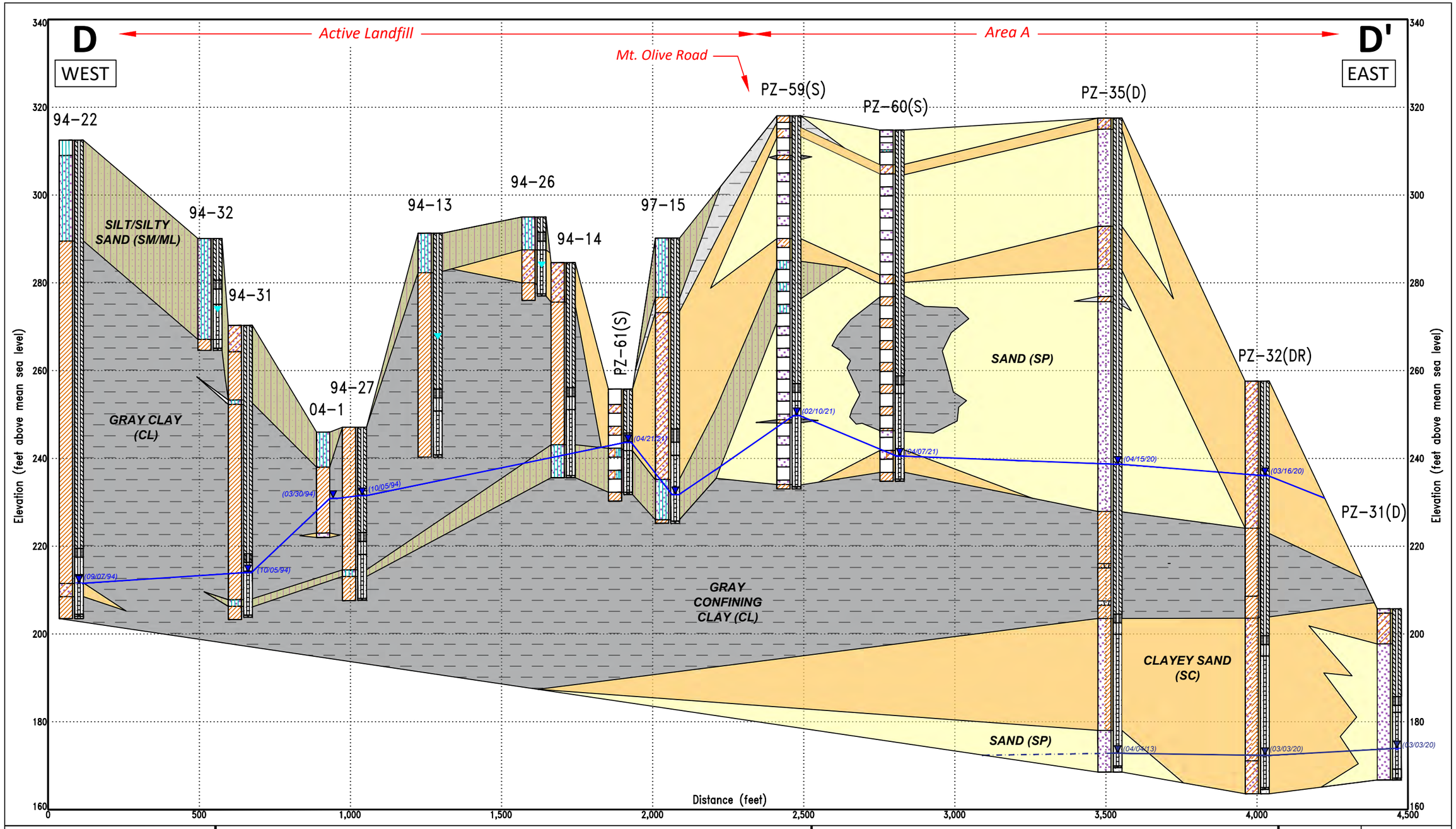
CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 12.

Generalized Hydrogeologic Cross-Section C - C'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/13/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf)
Recovery% Core Size RQD%
Material Symbol
B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface
Second-Saturated Zone Potentiometric Surface
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level

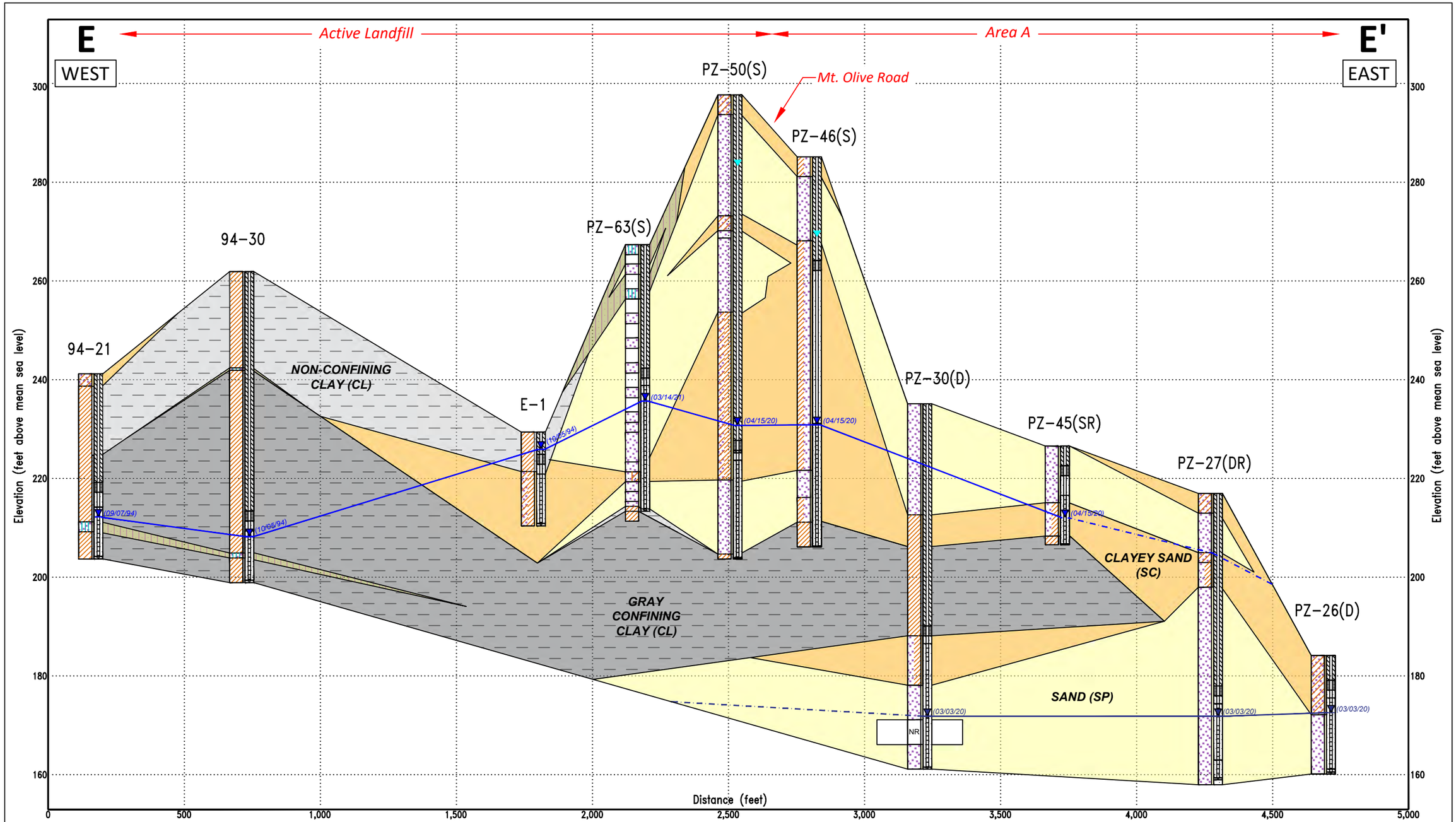
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 13.
Generalized Hydrogeologic Cross-Section D - D'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/13/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf) | Material Symbol | Recovery% Core Size RQD%

B.T. = Boring Terminated

- First-Saturated Zone Potentiometric Surface
- Second-Saturated Zone Pontentiometric Surface
- Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
- Perched Groundwater Level

USCS SOIL CLASSIFICATION

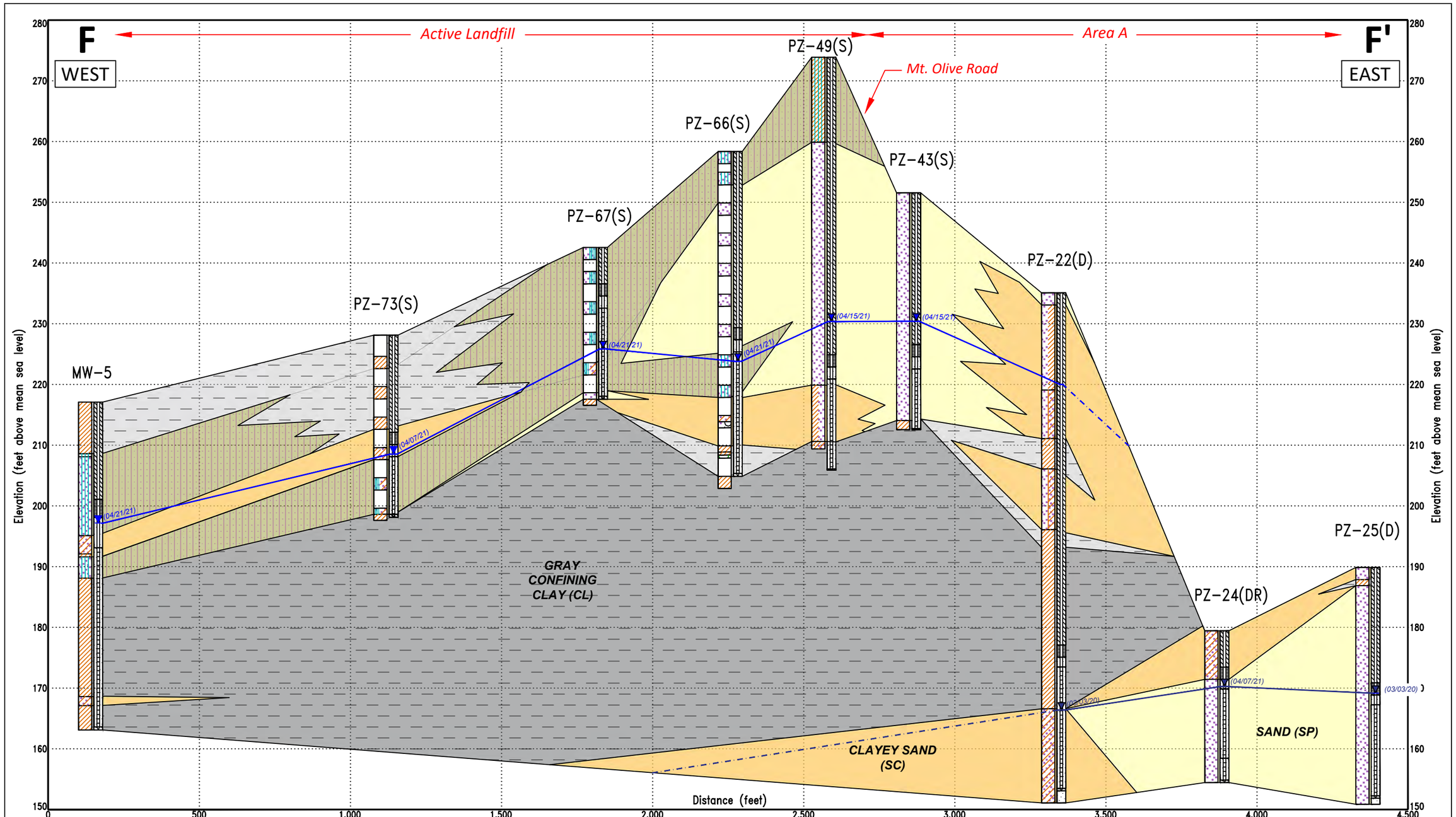
CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 14.

Generalized Hydrogeologic Cross-Section E - E'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/16/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf)
Recovery/% Core Size RQD/% Material Symbol
B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface
Second-Saturated Zone Pontentiometric Surface
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level

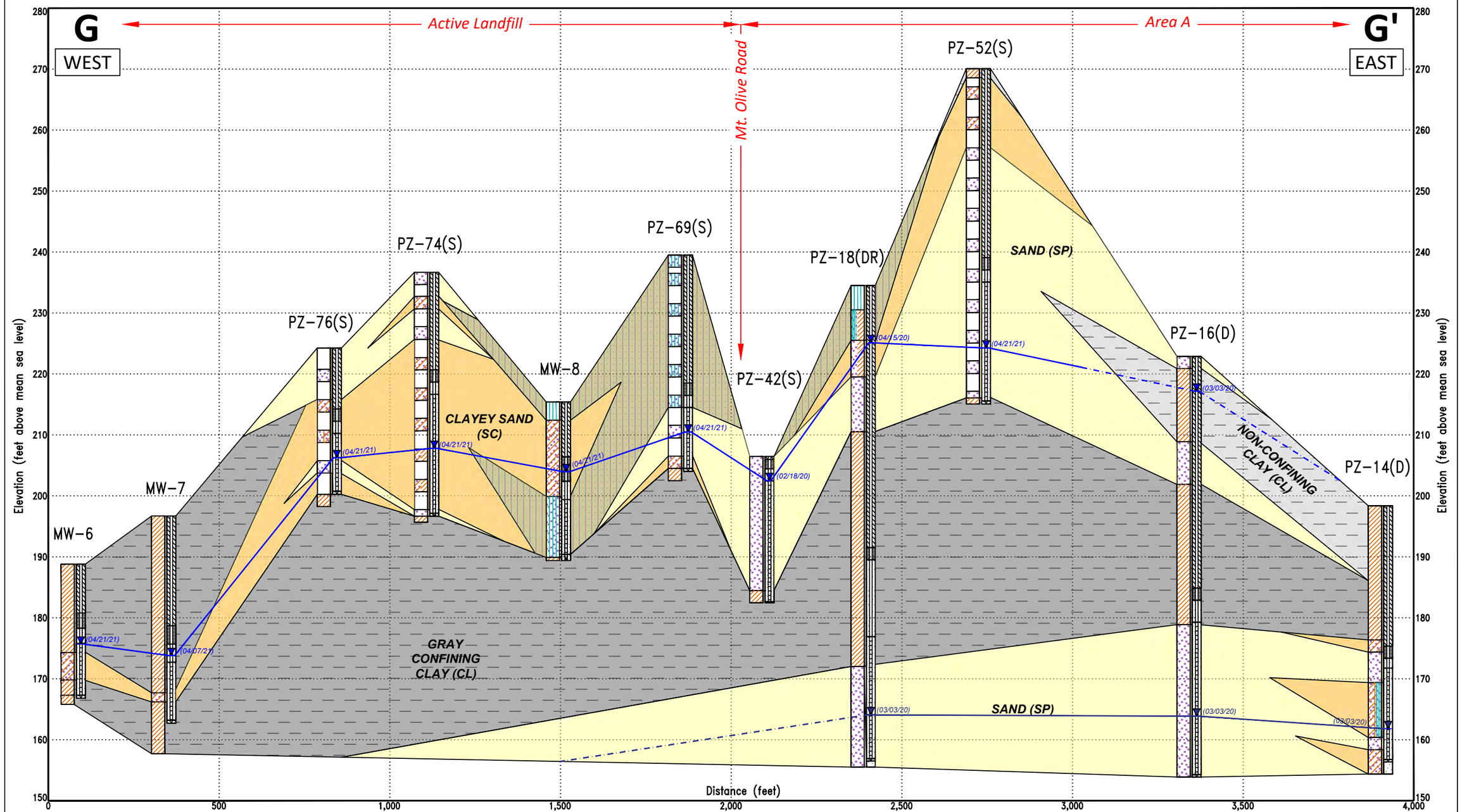
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 15.
Generalized Hydrogeologic Cross-Section F -F'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/16/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf) | Recovery% Core Size RQD% | Material Symbol

B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface

Second-Saturated Zone Pontentiometric Surface

Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021

Perched Groundwater Level

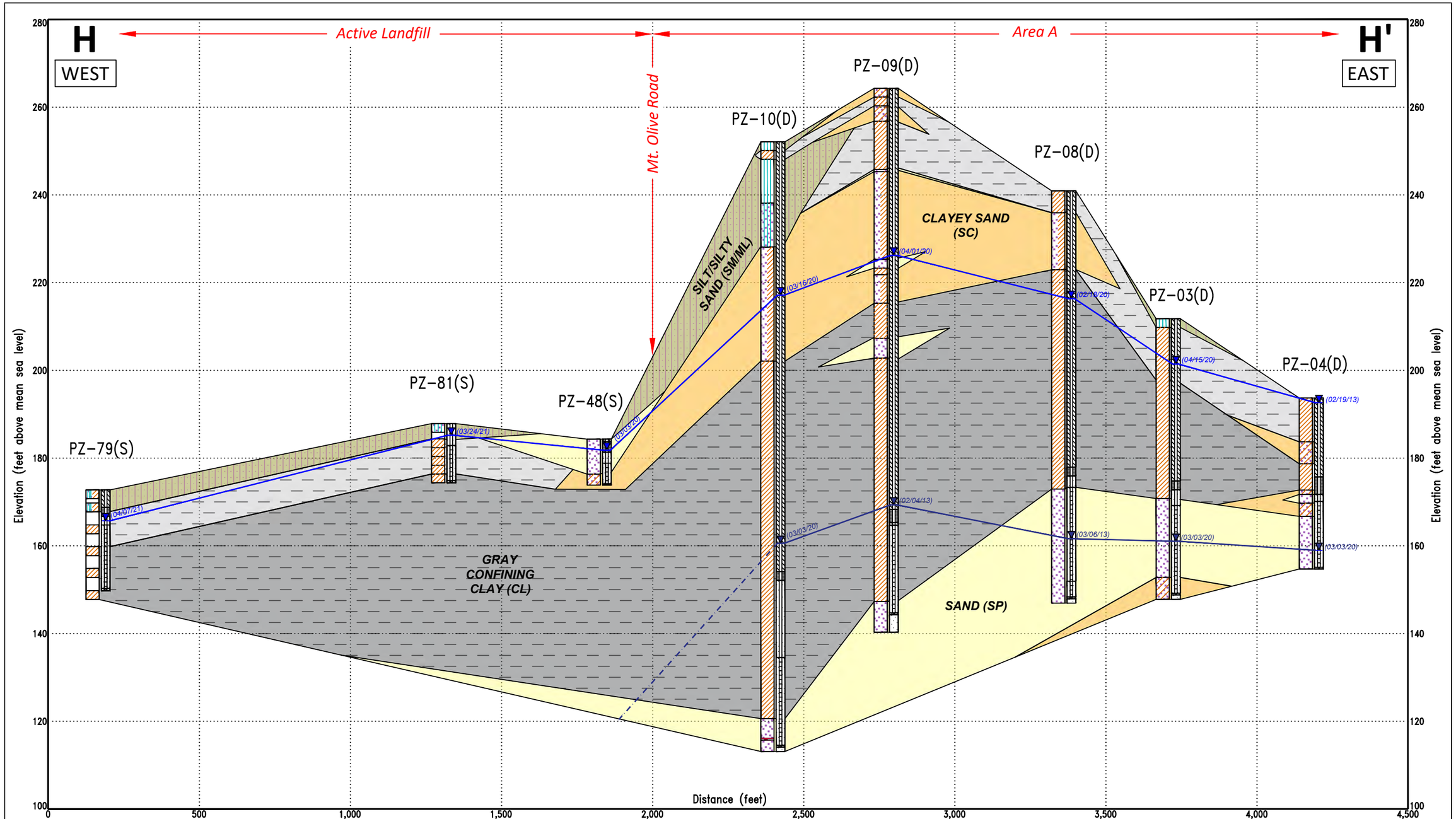
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 16.
Generalized Hydrogeologic Cross-Section G - G'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/16/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND:

N (bpf)
Recovery%
Core Size
RQD%
Material Symbol
B.T. = Boring Terminated

First-Saturated Zone Potentiometric Surface
Second-Saturated Zone Pontentiometric Surface
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level

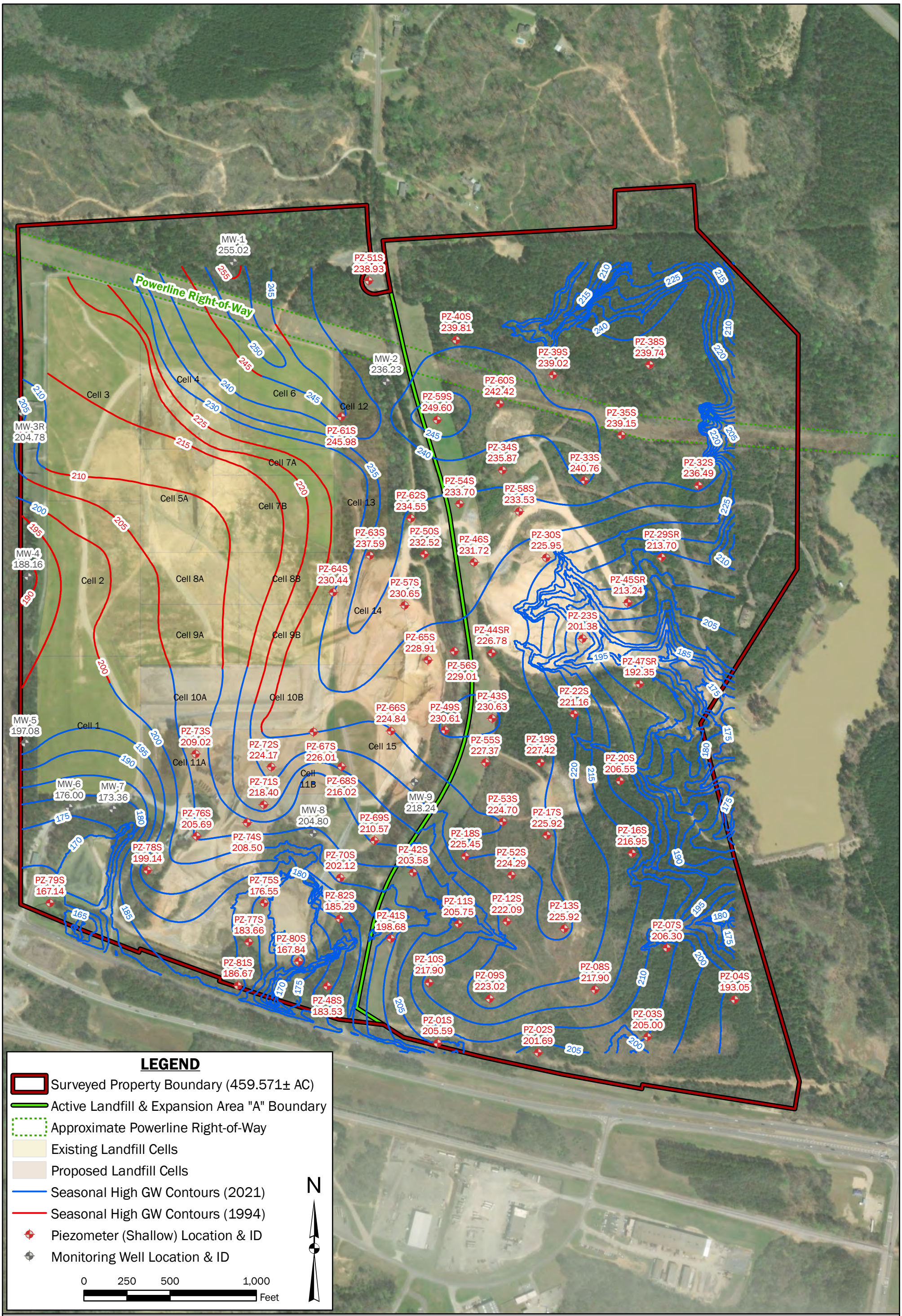
USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)	NO RECOVERY (NR)
					NR

FIGURE 17.
Generalized Hydrogeologic Cross-Section H - H'

Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/16/2021
FILE PATH:	\\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg



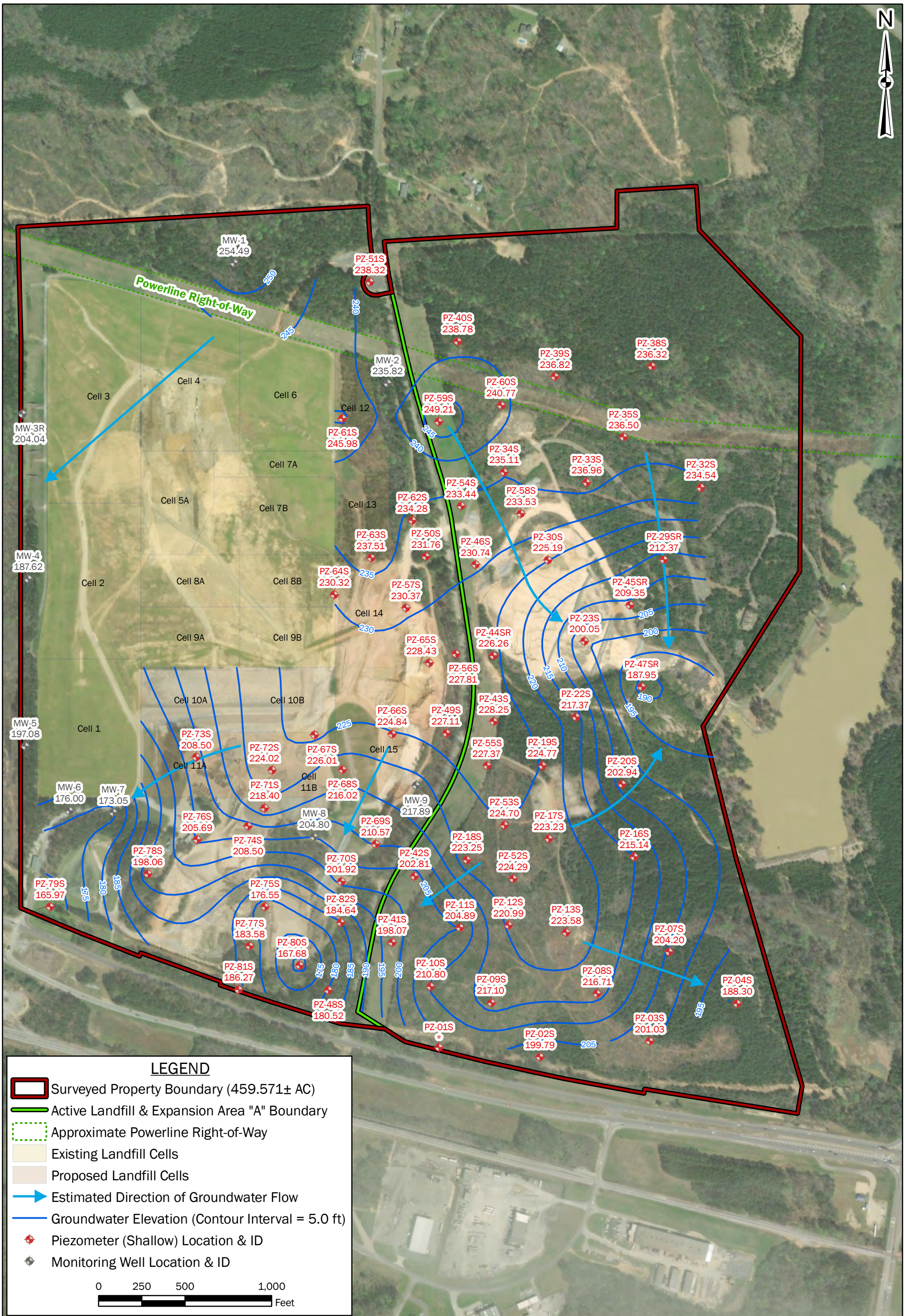
TTL

FIGURE 18: POTENTIOMETRIC SURFACE MAP OF THE SEASONAL HIGH GROUNDWATER OF THE FIRST-SATURATED ZONE

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	5/11/2021
REVISION DATE:	7/14/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft



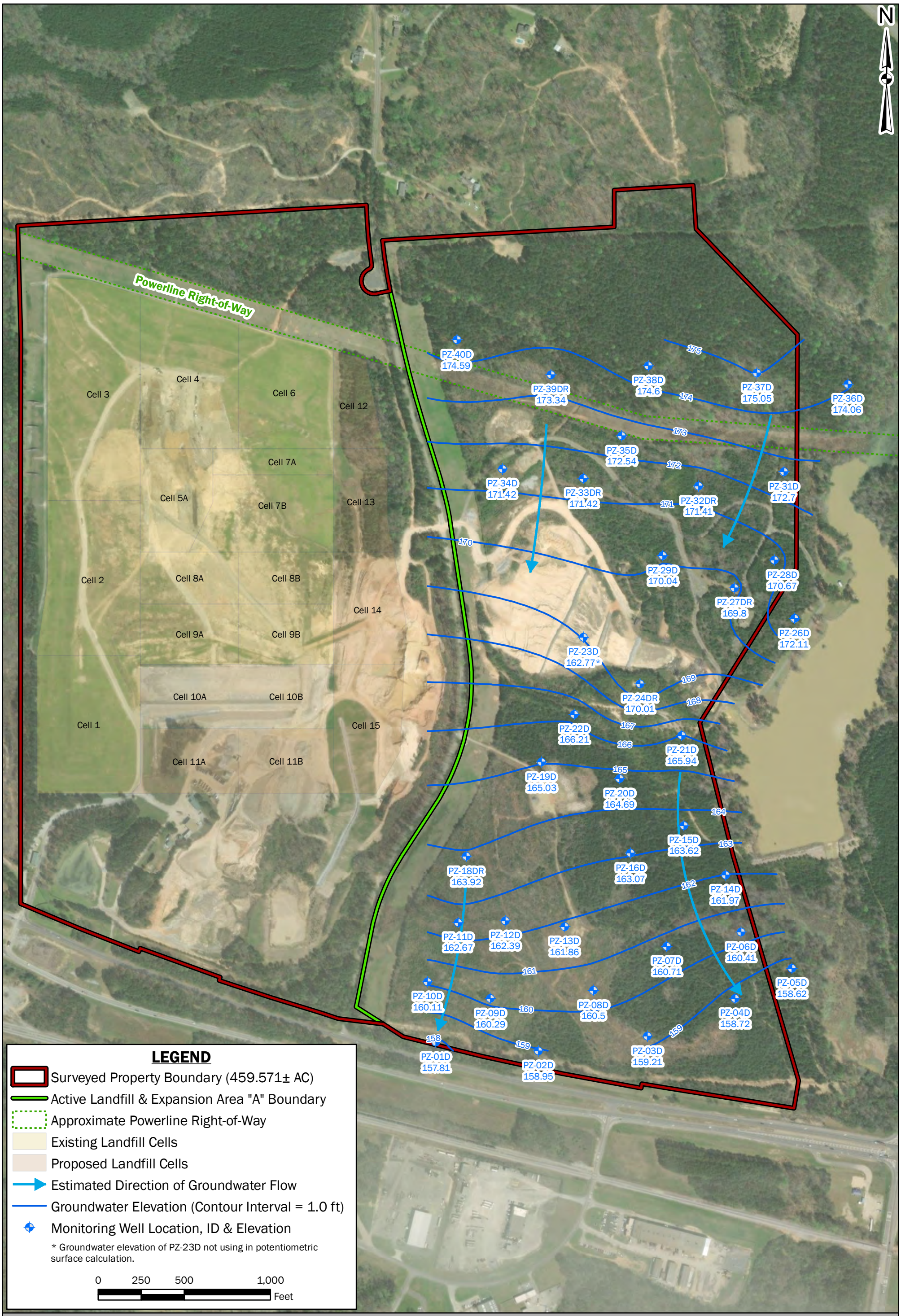
TTL

FIGURE 19: POTENTIOMETRIC SURFACE MAP OF THE FIRST-SATURATED ZONE - APRIL 21, 2021

BLACK WARRIOR SOLID WASTE LANDFILL - PARTLOW EXPANSION
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	5/20/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft



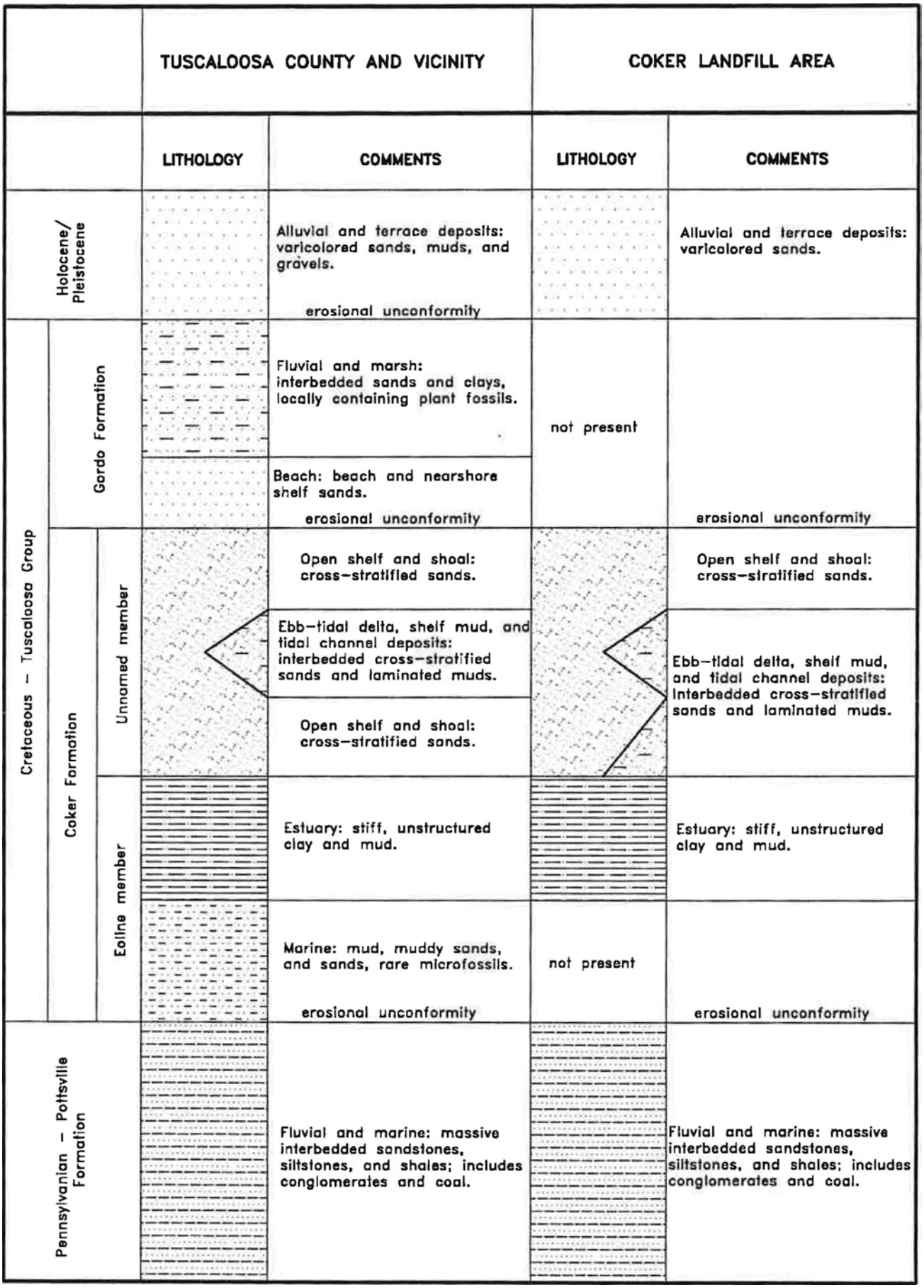
TTL

FIGURE 20: POTENTIOMETRIC SURFACE MAP OF THE LOWER SATURATED ZONE - APRIL 21, 2021

BLACK WARRIOR SOLID WASTE LANDFILL - PARTLOW EXPANSION
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	5/26/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 500 ft



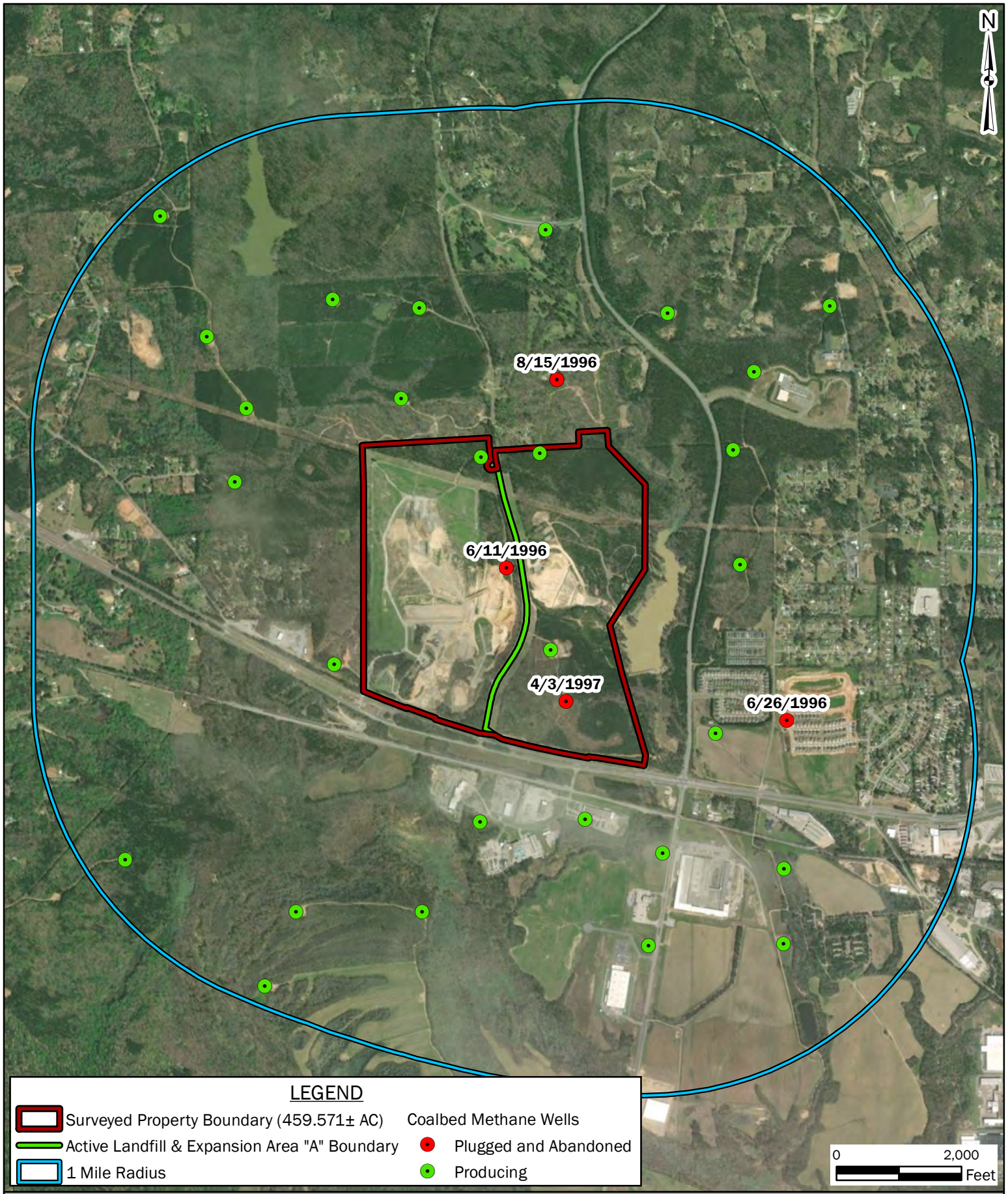
TTL

FIGURE 22: GENERALIZED GEOLOGICAL COLUMNAR SECTION FOR TUSCALOOSA COUNTY & VICINITY

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

SOURCE: Modified from Hummel, 1994.

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/14/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	N.T.S.



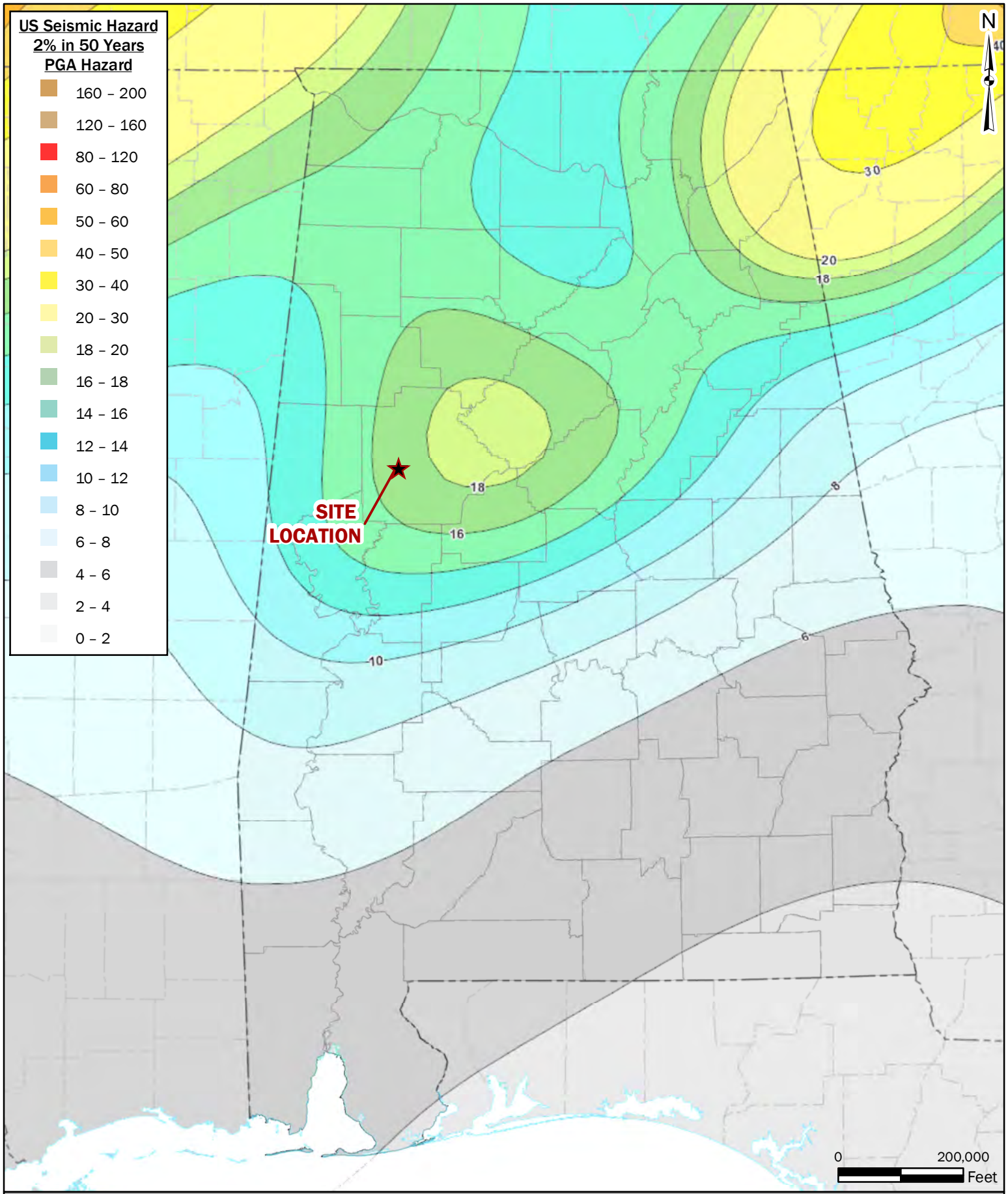
TTL

FIGURE 23: COALBED METHANE WELL LOCATION MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 2,000 ft

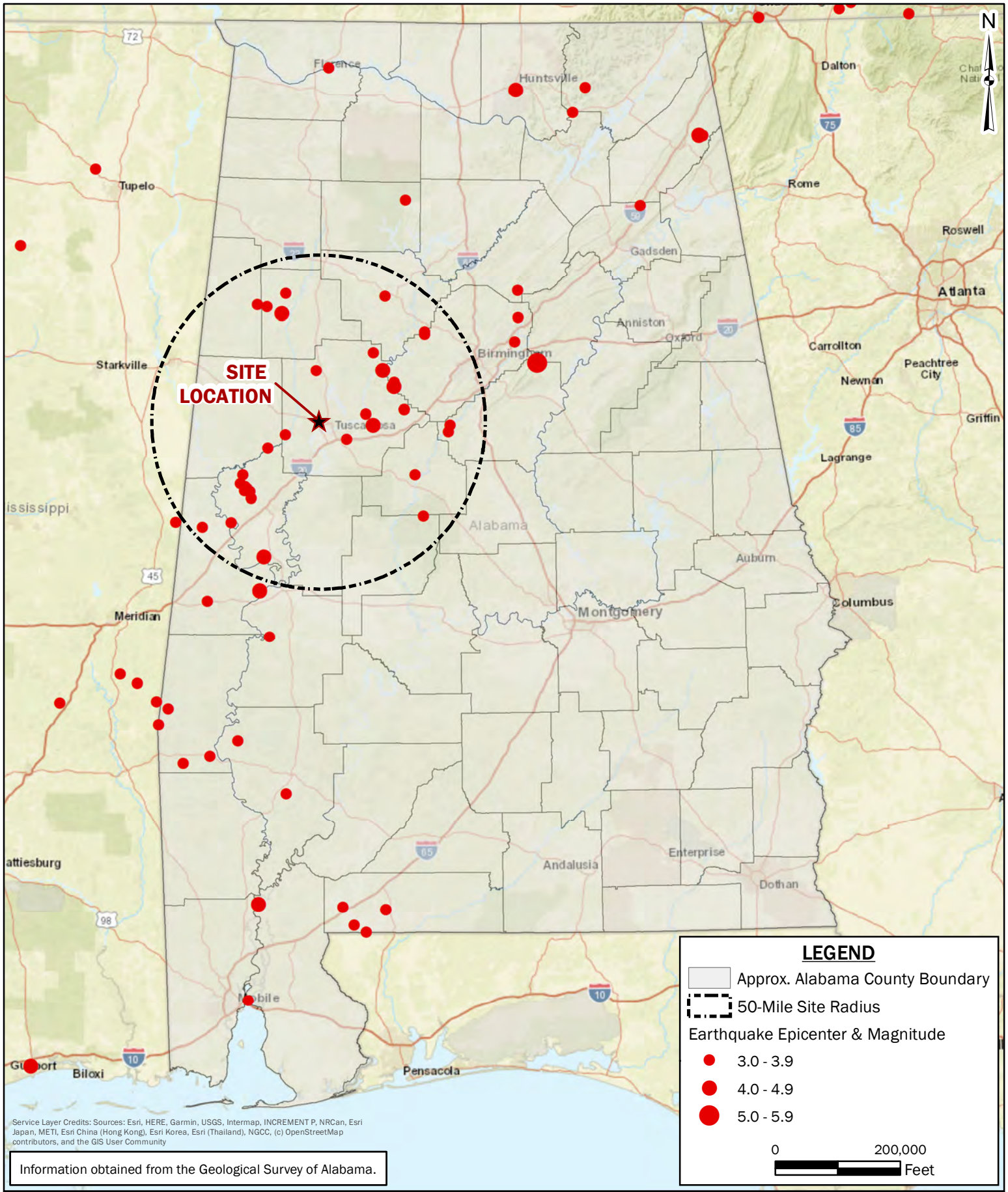


TTL

FIGURE 24A: USGS SEISMIC HAZARD MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA, COUNTY, ALABAMA
BASEMAP: U.S. Geological Service Seismic PGA Hazard.

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	5/17/2021
REVISION DATE:	7/14/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 200,000 ft



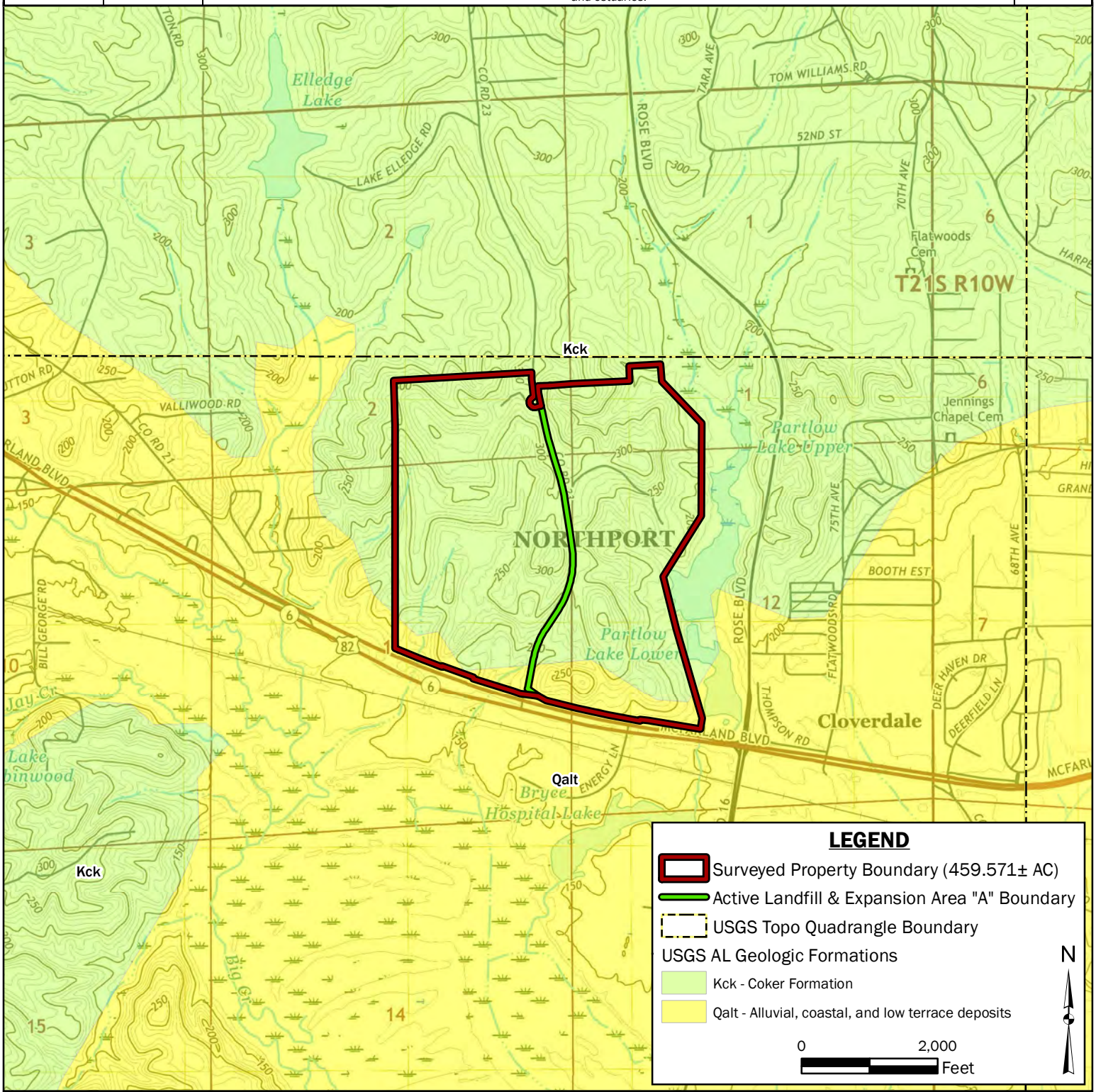
TTL

FIGURE 24B: HISTORICAL EARTHQUAKES OF ALABAMA

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA, COUNTY, ALABAMA
BASEMAP: ESRI World Street Map (See Service Layer Credits).

DRAWN BY: DEK
CHECKED BY: JMT
DRAWING DATE: 5/17/2021
REVISION DATE: 7/14/2023
TTL JOB NO.: 000190103033.00
APPROX. SCALE: 1 in = 200,000 ft

USGS Geologic Unit Identifier	USGS Unit Name	USGS Unit Description	Geologic Age
Kck	Coker Formation	Light-colored micaceous very fine to medium sand, cross-bedded sand, varicolored micaceous clay, and a few thin gravel beds containing quartz and chert pebbles. Beds of thinly laminated finely glauconitic very fine to fine sand, silt and dark-gray carbonaceous clay (Eoline Member) occur locally in the lower part in western AL. Locally quartz and chert gravels at the base of the formation range in size from very fine pebbles to large cobbles. In southeastern Elmore County the formation includes marine sediments consisting of glauconitic, fossiliferous, quartzose fine to medium sand and medium-gray carbonaceous silty clay. Not mapped east of the Tallapoosa River.	Cretaceous
Qalt	Alluvial, coastal, and low terrace deposits	Varicolored fine to coarse quartz sand containing clay lenses and gravel in places. Gravel composed of quartz and chert pebbles and assorted metmorphic and igneous rock fragments in streams near the Piedmont. In areas of the Valley and Ridge province gravel composed of angular to subrounded chert, quartz, and quartzite pebbles. Coastal deposits include fine to medium quartz sand with shell fragments and accessory heavy minerals along Gulf beaches and fine to medium quartz sand, silt, clay, peat, mud and ooze in the Mississippi Sound, Little Lagoon, bays, lakes, streams, and estuaries.	Holocene



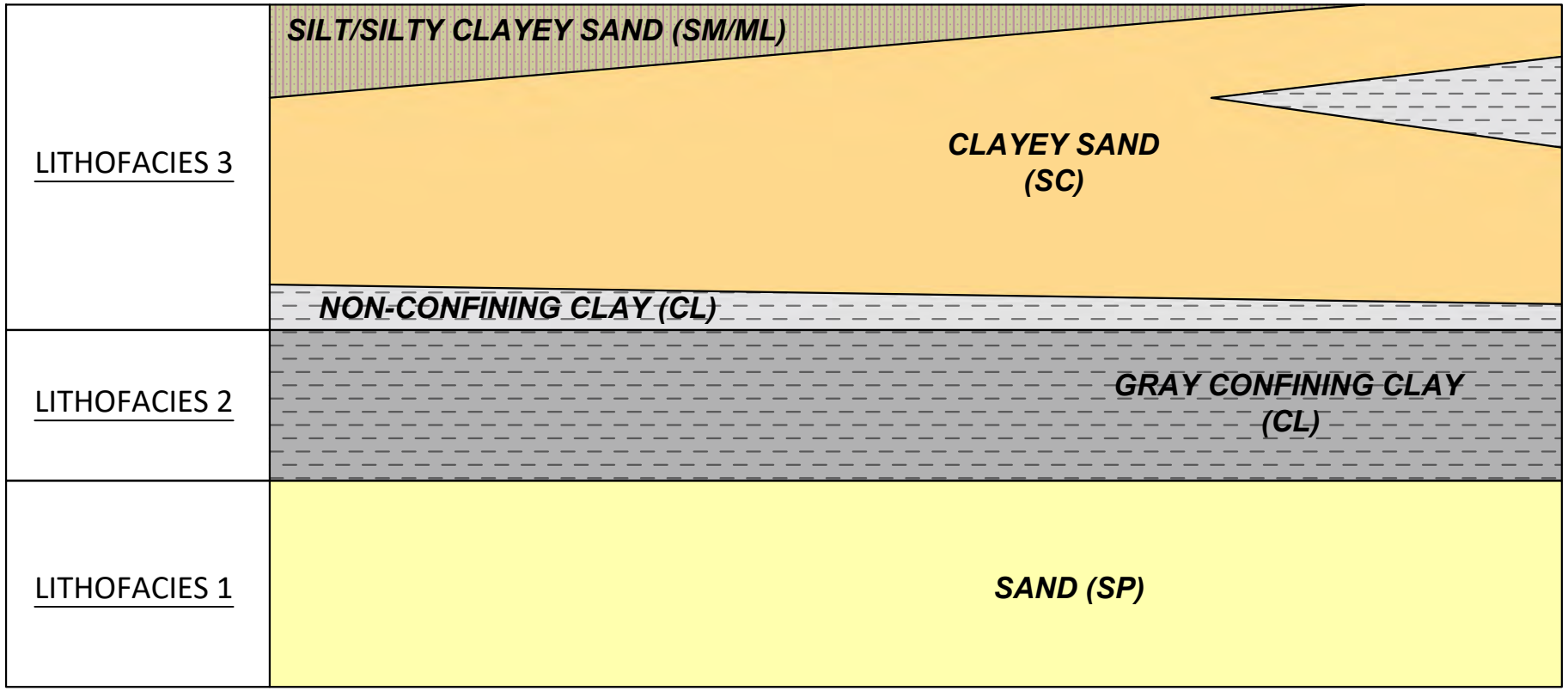
TTL

FIGURE 25: USGS GEOLOGIC UNIT MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Coker, Alabama USGS 7.5 Minute Quadrangle Map, 2018 (10-ft Contour Interval).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 2,000 ft



NOTE: CROSS-SECTION NOT TO SCALE

TTL
www.TTLUSA.com
TUSCALOOSA, ALABAMA

LEGEND: See Legend Key Sheet for explanation of symbols

N (spt)
Recovery/% Core Size RQD/%
Material Symbol
N Value/ Classification
Seasonal-High Groundwater Levels Collected at Select Dates from 2013, 2020, and 2021
Perched Groundwater Level
B.T. = Boring Terminated A.R. = Auger Refusal

USCS SOIL CLASSIFICATION

CLAYEY SAND (SC)	SILT/SILTY CLAYEY SAND (SM/ML)	SAND (SP)	NON-CONFINING CLAY (CL)	GRAY CONFINING CLAY (CL)

FIGURE 26.
Generalized Cross-Section Showing Lithofacies - Area A
Black Warrior Solid Waste Authority
Permit Modification for Partlow Expansion
Hydrogeological Evaluation
Coker, Tuscaloosa County, Alabama

DRAWN BY:	A C P
CHECKED BY:	J M T
TTL PROJECT NO.:	000190103033.00
DATE:	07/16/2021
FILE PATH:	\\10.1.1.97\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\Cross-Sections\A-A'.dwg

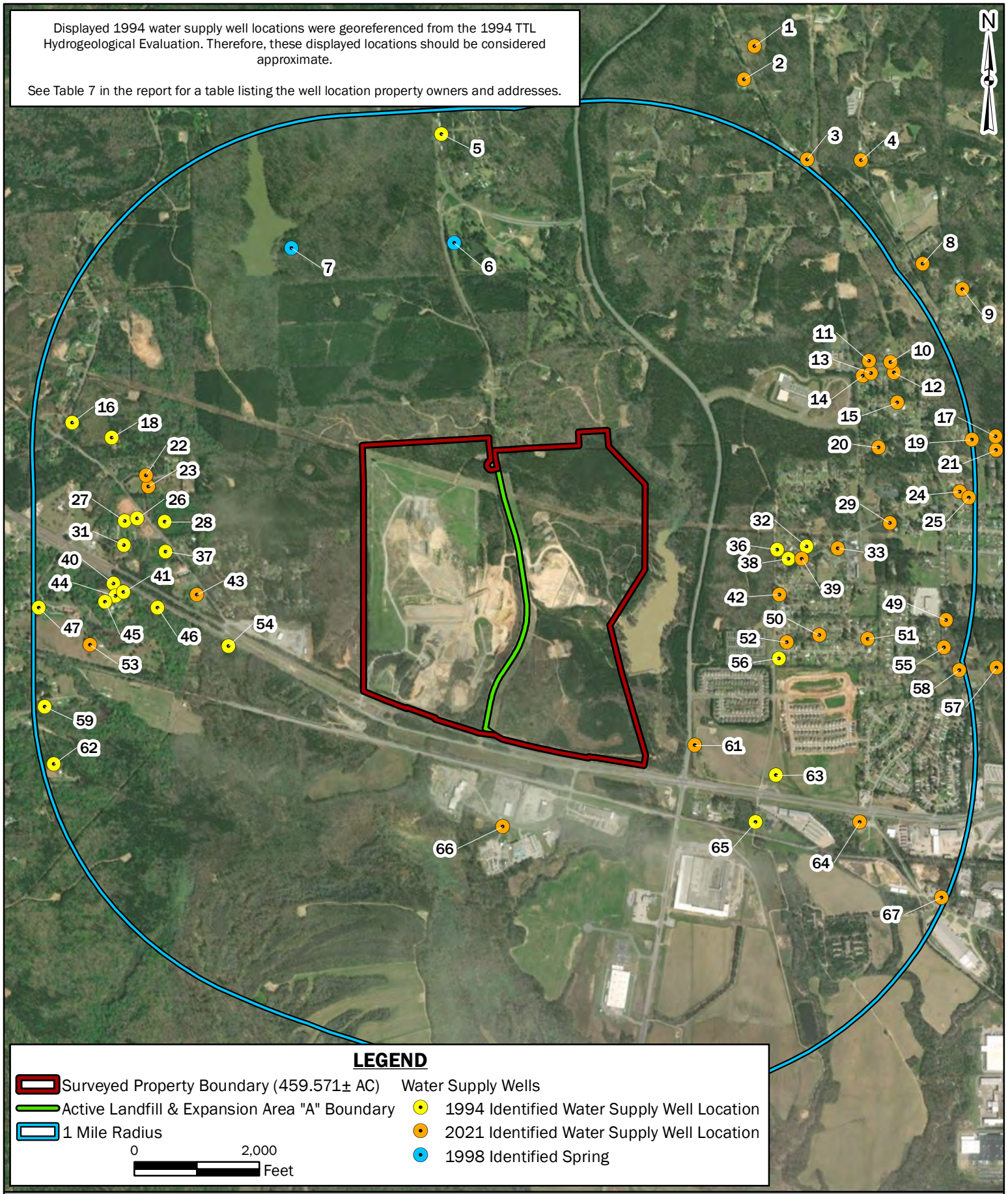


FIGURE 27: WATER SUPPLY WELL LOCATION MAP

BLACK WARRIOR SOLID WASTE LANDFILL
HYDROGEOLOGICAL EVALUATION
COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: Maxar Technologies, Vivid Imagery, 3/28/2022 (0.5 m Resolution).

DRAWN BY:	DEK
CHECKED BY:	JMT
DRAWING DATE:	3/29/2021
REVISION DATE:	7/17/2023
TTL JOB NO.:	000190103033.00
APPROX. SCALE:	1 in = 2,000 ft

APPENDIX A

Selected Site Photographs

Photograph 1: View of the Area A Expansion prior to drilling operations (2012).

Photograph 2: View of the Area A Expanion prior to drilling operations (2012).

Photograph 3: View of the stormwater collection pond (2012).

Photograph 4: View of returned soil samples from PZ-05 (2012).

Photograph 5: View of returned soil samples from the PZ-04 drilling location (2012).

Photograph 6: View of returned soil samples from the PZ-04 drilling location (2012).

Photograph 7: View of returned soil samples from the PZ-04 drilling location (2012).

Photograph 8: View of returned soil samples from the PZ-07 drilling location (2012).

Photograph 9: View of returned soil samples from the PZ-07 drilling location (2012).

Photograph 10: View of returned soil samples from the PZ-07 drilling location (2012).

Photograph 11: View of returned soil samples from the PZ-13 drilling location (2012).

Photograph 12: View of returned soil samples from the PZ-13 drilling location (2012).

Photograph 13: View of returned soil samples from the PZ-13 drilling location (2012).

Photograph 14: View of the site reconnaissance conducted at Area A during 2019.

Photograph 15: View of a destroyed piezometer casing during the survey performed in 2019.

Photograph 16: View of land surface erosion surrounding a piezometer installed in 2019.

Photograph 17: View of the CME drilling rig advancing the PZ-56 boring (2020).

Photograph 18: View of the active landfill looking west (2020).

Photograph 19: View of a returned soil sample during drilling operations (2020).

Photograph 20: View of the Area A Expansion looking southeast (2020).

Photograph 21: View of the drilling rig advancing a boring in Area A (2020).

Photograph 22: View of the dark gray confining clay within a split spoon sample (2020).

Photograph 23: View of the drilling crew placing the filter pack within the annulus of a borehole (20200.

Photograph 24: View of the dark gray confining clay found within a split-spoon sample of returned soil (2020).

Photograph 25: View of the ATV track-rig during drilling operations at Area A (2020).

Photograph 26: Alternate view of the track-rig during drilling operations at Area A (2020).

Photograph 27: View of an outcropping of the dark cray confining clay at Area A (2020).

Photograph 28: View of a drainage cut with exposed dark gray clay at lower elevations in Area A (2020).

Photograph 1.

Photograph 2.

Photograph 3.

Photograph 4.

Photograph 5.

Photograph 6.

Photograph 7.

Photograph 8.

Photograph 9.

Photograph 10.

Photograph 11.

Photograph 12.

Photograph 13.

Photograph 14.

Photograph 15.

Photograph 16.

APPENDIX B:

Soil Boring and Piezometer/Monitoring Well Construction Logs

- B-I Area A Expansion Boring Logs (2012 – 2020)
- B-II Active Landfill Boring Logs (1988 – 1997)

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

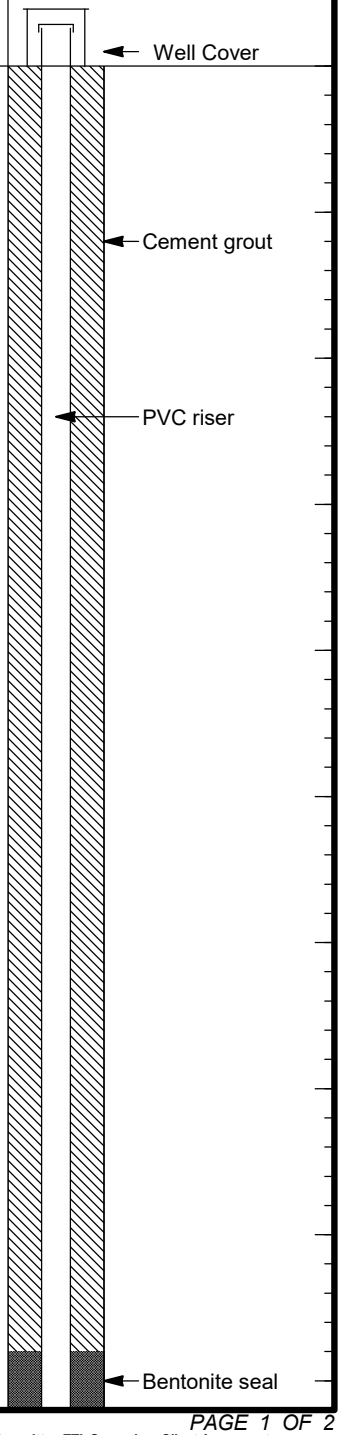
LOG OF BORING PZ-01 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/6/2012 - 8/7/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	206.43 Ft. AMSL
REMARKS		**GROUND ELEVATION**	204.32 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	75		SANDY CLAY, strong brown (7.5YR 5/6) with gray and red mottles, moist	
5			4-9	100		SANDY CLAY, light brown-gray (10YR 6/2), somewhat plastic, trace of fine gravel, moist	
10			9-14	60		SANDY CLAY, light brown-gray (10YR 6/2) with strong brown mottles, wet	
15			14-19	100		CLAY, dark brown (10YR 3/3) and strong brown, somewhat plastic, moist	
						CLAY, dark gray (5Y 4/1), plastic, moist	
20			19-24	100		CLAY and SILTY CLAY, dark gray (10YR 4/1), moist	
						----lignite seam, 0.2' thick----	
25			24-29	100		CLAY, very dark gray (10Y 3/1), interbedded with gray (10Y 5/N) SILT, dry	
30		CL	29-34	100		----lignite seam, 0.1' thick----	
						CLAY, black and very dark gray (5Y 3/1), hard, dry	
35			34-39	80		CLAY, dark gray, interbedded with gray SILT, dry	
						----lignite seam, 0.2' thick----	
						CLAY, black to dark gray	
40			39-44	80		CLAY, very dark gray, carbonized detritus on bedding planes, dry	
						CLAY, black (5Y 2.5/2)	
45			44-49	80		CLAY, black, lignite,	

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303 3.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-01 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/6/2012 - 8/7/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						CLAY, very dark green-gray, dry		
50			49-54	100		CLAY, dark gray, carbonized detritus on bedding planes, dry		PVC well screen
55			54-59	100		CLAY, dark gray, carbonized detritus on bedding planes, dry		
60			59-64	80		CLAY, dark gray, carbonized detritus on bedding planes, dry		
						SAND, dark gray (5Y 4/1), some black organic lamination, saturated		Silica sand pack
						----clay seam, 0.3' thick-----		
65		SP	64-69	50		SAND, gray, 5Y 5/1, few CLAY lamination, saturated		Well depth=68'
						BORING TERMINATED AT 69 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

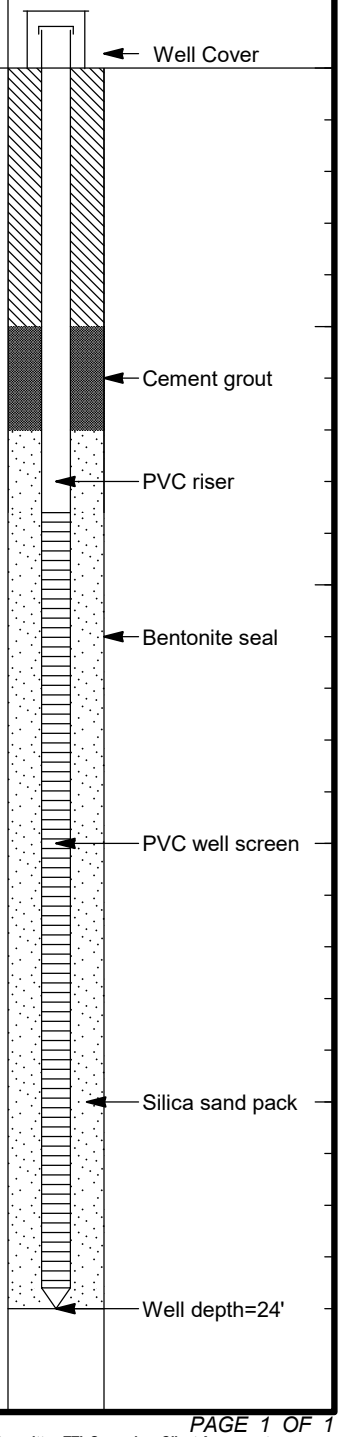
BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-01 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/7/2012 - 8/7/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	206.08 Ft. AMSL
REMARKS		**GROUND ELEVATION**	204.32 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						SANDY CLAY, strong brown (7.5YR 5/6) with gray and red mottles, moist	
5						SANDY CLAY, light brown-gray (10YR 6/2), somewhat plastic, trace of fine gravel, moist	
						SANDY CLAY, light brown-gray (10YR 6/2) with strong brown mottles, wet	
10		CL					
						CLAY, dark brown (10YR 3/3) and strong brown, somewhat plastic, moist	
15							
						CLAY, dark gray (5Y 4/1), plastic, moist	
						CLAY and SILTY CLAY, dark gray (10YR 4/1), moist	
20							
						----lignite seam, 0.2' thick----	
						BORING TERMINATED AT 24 FEET.	



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-02 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/27/2012 - 6/27/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	208.13 Ft. AMSL
REMARKS		**GROUND ELEVATION**	204.20 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SM	0-4	75		SILTY SAND, brown (10YR 4/3), dry
5		CL	4-9	100		SANDY CLAY, yellow-brown, soft, moist to wet CLAY, gray-brown (10YR 5/2) with red (2.5YR 6/8) mottles
10			9-14	100		SILTY CLAY, gray (7.5YR 6/1) and yellow-red (5YR 5/8) ----wet----
15		SC	14-19	100		CLAYEY SAND, gray (5Y 6/1) with SILTY SAND lamination, saturated ----lignite seam, 0.2' thick---- CLAY, black (5Y 2.5/1) with fine SILT laminations and lignite, dry
20			19-24	100		CLAY, dark gray, dry CLAY, black (5Y 2.5/1) with lignite, dry CLAY, dark gray (5Y 4/1) with light gray (5Y 7/1) SILT laminations, dry
25			24-29	100		CLAY, very dark gray (5Y 3/1)
30			29-34	100		----lignite seam, 0.5' thick---- CLAY, very dark gray (5Y 3/1) ----lignite seam, 0.5' thick----
35		CL	34-39	100		CLAY, very dark gray (5Y 3/1), hard, dry
40			39-44	100		CLAY, very dark gray (5Y 3/1), hard, dry ----lignite seam, 0.1' thick---- ----lignite seam, 0.4' thick----
45			44-49	100		----lignite seam, 0.5' thick---- CLAY, very dark gray (5Y 3/1), hard, dry

WATER LEVEL & DATE

PIEZOMETER DIAGRAM

Well Cover
Cement grout
PVC riser
Bentonite seal

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-02 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/27/2012 - 6/27/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						----lignite seam----		
						----lignite seam----		
50			49-54	100		CLAY, dark gray with light gray SILT laminations, dry		PVC well screen
55			54-59	100		CLAY, dark gray with light gray SILT laminations (~1" thick), dry to saturated		Silica sand pack
						----lignite seam, 0.1' thick----		
60		SP	59-64	80		SAND, gray (7.5 YR 6/1) with few black organic laminations, saturated		Well depth=63'
						BORING TERMINATED AT 64 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

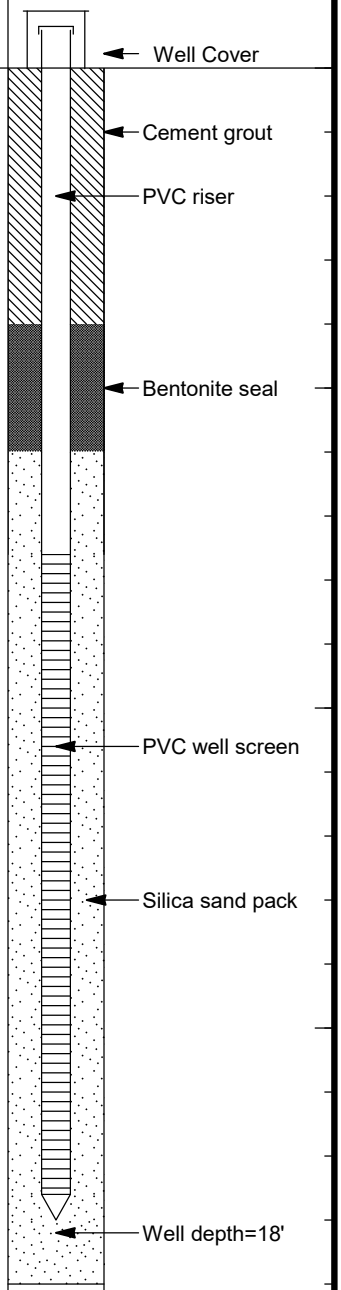
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-02 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/27/2012 - 6/27/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	207.93 Ft. AMSL
REMARKS		**GROUND ELEVATION**	203.84 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM				SILTY SAND, brown (10YR 4/3), dry	
						SANDY CLAY, yellow-brown, soft, moist to wet	
5							
						CLAY, gray-brown (10YR 5/2) with red (2.5YR 6/8) mottles	
		CL				SILTY CLAY, gray (7.5YR 6/1) and yellow-red (5YR 5/8)	
10							
						----wet----	
						CLAYEY SAND, gray (5Y 6/1) with SILTY SAND laminations, saturated	
15		SC					
		CL				CLAY, black (5Y 2.5/1) with fine SILT laminations and lignite, dry	
						BORING TERMINATED AT 19 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

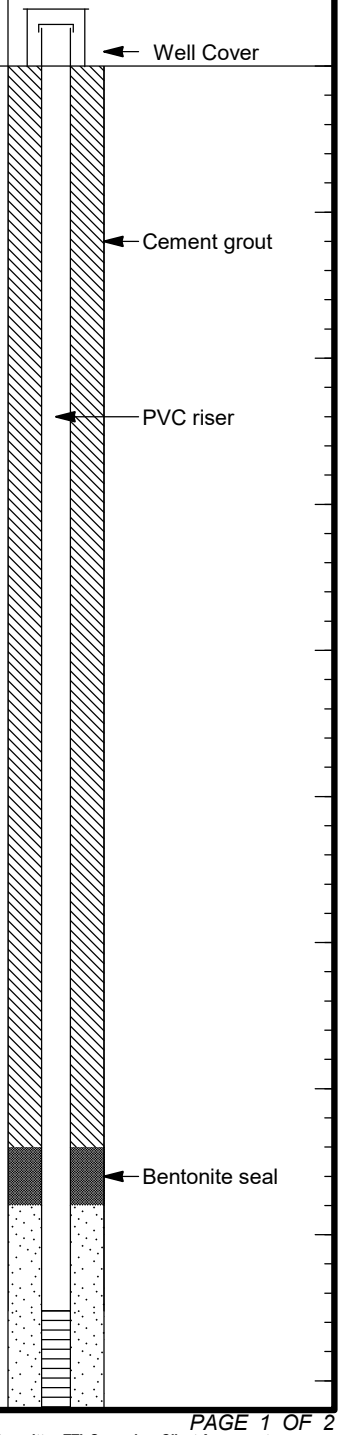
LOG OF BORING PZ-03 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/7/2012 - 8/7/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	214.52 Ft. AMSL
REMARKS		**GROUND ELEVATION**	211.79 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	ML	0-4	75		SILTY loam, yellow-brown
					CLAY, red and yellow-red, hard, dry
5		4-9	20		SILTY CLAY, yellow-red, dry
10		9-14	60		SILTY CLAY, pale gray-brown and strong brown, dry
					SILTY CLAY, gray
15		14-19	100		CLAY, dark gray, interbedded with fine gray SILT laminations, dry
					----lignite seam, 0.2' thick----
					CLAY, very dark gray with carbonized detritus on bedding planes
20	CL	19-24	80		CLAY, very dark gray with carbonized detritus on bedding planes
					----lignite seam, 0.2' thick----
					----lignite seam, 0.2' thick----
25		24-29	80		CLAY, dark gray, interbedded with light gray SILT laminations, dry
					CLAY, black (5Y 2.5/1)
30		29-34	80		CLAY, very dark gray, dry
35		34-39	100		CLAY with iron hard pan, dark brown and strong brown, paleo root-channels, dry
40		39-44	100		CLAY, brown (7.5 YR 4/2), hard, dry
					Iron hard pan concretion, red and strong brown
					SAND, very pale brown (10YR 7/4), dry
45		44-49	60		

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-03 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/7/2012 - 8/7/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, yellow (10YR 7/6) and yellow-brown (10YR 5/8),		
						----gray CLAY seam, 0.2' thick----		
50		SP	49-54	60		SAND, light yellow-brown (10YR 6/4), dry		PVC well screen
						SAND, pale yellow (2.5Y 7/4), wet		
55			54-59	60		SAND, pale yellow and olive-yellow (2.5Y 6/6), saturated		Silica sand pack
60		SC	59-64	80		SAND, yellow-brown and pale yellow, few CLAY rip up clasts, saturated		Well depth=63'
						BORING TERMINATED AT 64 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

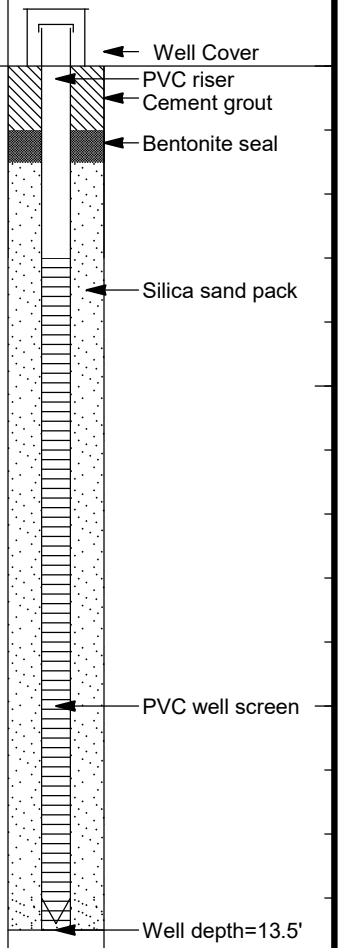
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-03 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2012 - 12/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	214.51 Ft. AMSL
REMARKS		**GROUND ELEVATION**	211.46 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-5	66		SAND (topsoil), silty, moderate yellowish brown (10YR 5/4); moist	
						CLAY with sand, moderate brown (5YR 4/4); moist	
			4-9	100		CLAYEY SAND, ~20% clay, dark yellowish orange (10YR 6/6), coarse grained, dry	
5		CL/SP				Ironstone and Lignite seam; dry	
						CLAY, pale yellowish brown (10YR 6/2)	
			9-14	100		INTERBEDDED SAND and CLAY, light brown (5YR 5/6) to pale yellowish brown (10YR 6/2); moist	
10							
		CL				SILTY CLAY, ~45% silt, medium dark gray (N4); dry	
						BORING TERMINATED AT 14 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

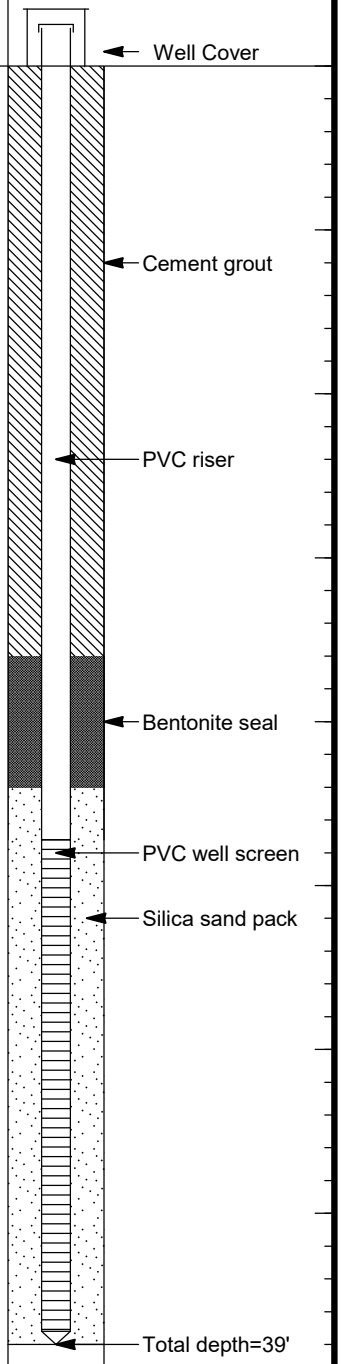
LOG OF BORING PZ-04 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/26/2012 - 6/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	197.27 Ft. AMSL
REMARKS		**GROUND ELEVATION**	193.71 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	100		CLAY, light brown (7.5YR 6/3) with red (2.5YR 4/8) mottles, dry
5		CL	4-9	100		CLAY, gray-brown (10YR 5/2) with few red (5YR 5/8) mottles, moist
10		SC	9-14	60		CLAY, gray (5YR 6/1) SAND, strong brown (7.5YR 6/8) with interbedded gray CLAY laminations, wet ----saturated----
15		CL	14-19	100		SAND, strong brown with some CLAY, saturated CLAY, dark gray (7.5YR 4/1), hard, dry
20		SC SP	19-24	100		CLAY, brown (7.5YR 5/2) with SILT laminations, moist to dry CLAYEY SAND, gray (5YR 6/1) SAND, yellow-brown (10YR 6/8)
25		SC	24-29	100		CLAYEY SAND, pale yellow (2.5Y 7/3) with yellow-brown (10YR 5/8) laminations, moist to dry
30		SP	29-34	20		SAND, pale brown (10YR 6/3) with few yellow-brown mottles SAND, red (2.5YR 5/6), medium loose, moist to dry
35			34-39	60		SAND, yellow-brown, loose, saturated
						BORING TERMINATED AT 39 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

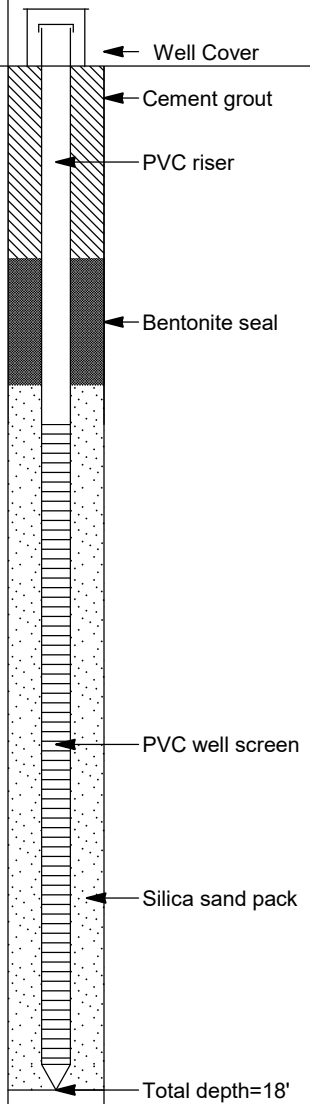
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-04 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/26/2012 - 6/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	198.70 Ft. AMSL
REMARKS		**GROUND ELEVATION**	194.40 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						CLAY, light brown (7.5YR 6/3) with red (2.5YR 4/8) mottles, dry	
5		CL				CLAY, gray-brown (10YR 5/2) with few red (5YR 5/8) mottles, moist	
						CLAY, gray (5YR 6/1)	
10						SAND, strong brown (7.5YR 6/8) with interbedded gray CLAY laminations, wet	
		SC				----saturated----	
						SAND, strong brown with some CLAY, saturated	
15		CL				CLAY, dark gray (7.5YR 4/1), hard, dry	
						BORING TERMINATED AT 16 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

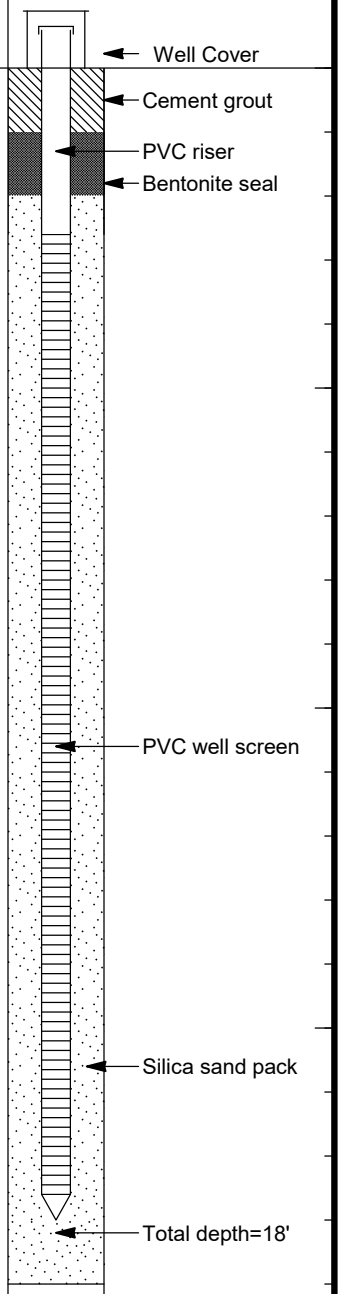
LOG OF BORING PZ-05 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/26/2012 - 6/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	167.80 Ft. AMSL
REMARKS		**GROUND ELEVATION**	164.99 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
	CL	0-4	75		SILTY and SAND CLAY, yellow-brown (10YR 5/8) soft, moist
5		4-9	100		SANDY CLAY, gray (10YR 6/1) with abundant yellow-brown (10YR 5/4) mottles moist
					---gray with few yellow-brown mottles----
10		9-14	100		SANDY CLAY
	SC				CLAYEY SAND, light gray (10YR 7/1) with brown-yellow (10YR 6/8) stiff CLAY, wet
					----loose SAND----
15	SP	14-19	80		SAND, light yellow-brown (10YR 6/4)
					----light-brown (10YR 5/8) with some well-rounded gravel----
					BORING TERMINATED AT 19 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303300 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

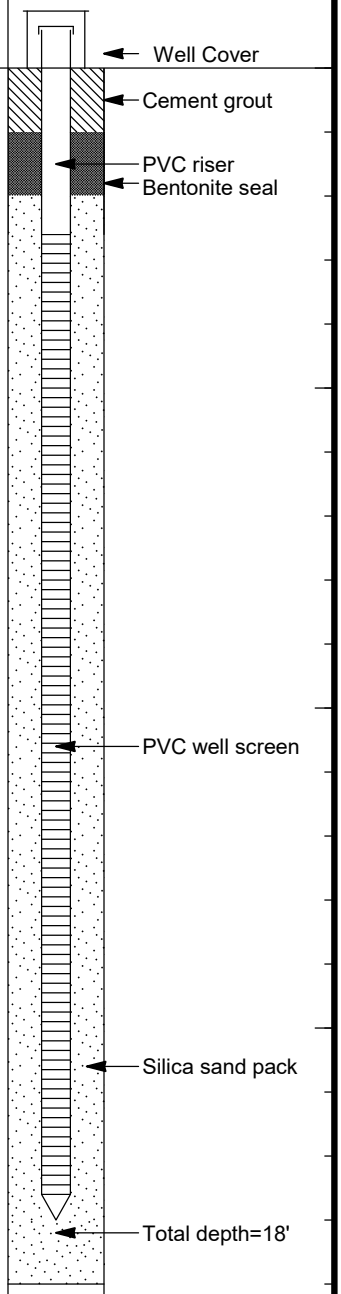
LOG OF BORING PZ-06 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/26/2012 - 6/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	173.66 Ft. AMSL
REMARKS		**GROUND ELEVATION**	170.52 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	75		CLAY, light brown-gray (10YR 6/2) with yellow-brown (10YR 5/8) mottles, dry
			4-9	100		CLAY, light brown-gray (10YR 6/2) with yellow-brown (10YR 5/8) mottles, hard, dry
5		CL				
			9-14	100		
10						SANDY CLAY, wet
		CH				
		SC				Iron hard pan (concretions), and yellow-brown (10YR 5/6) CLAYEY SAND, wet
			14-19	80		SAND, olive-yellow (2.5Y 6/6) and brown-yellow (10YR 6/8), saturated
15		SP				
						BORING TERMINATED AT 19 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-07 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/27/2012 - 6/27/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	213.60 Ft. AMSL
REMARKS		**GROUND ELEVATION**	209.78 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	50		CLAY, yellow-red (5YR 5/8) with gray (5YR 6/1) mottles, moist
5			4-9	100		SILTY CLAY, gray (7.5YR 4/2) with brown-yellow (10YR 6/8) mottles, moist to wet
						CLAY, dark gray (10YR 4/1), hard, dry
10			9-14	100		CLAY, very dark green-gray (10Y 3/1) to dark green-gray, hard
15		CL	14-19	100		CLAY, dark green-gray (10Y 4/1), very fine laminated bedding, hard, dry ----lignite seam, 0.5' thick---- ----lignite seam, 0.2' thick----
20			19-24	100		CLAY, black (5YR 2.5/1), hard, dry ----lignite seam, 0.4' thick---- ----lignite seam, 0.2' thick----
25			24-29	100		CLAY, very dark gray (7.5YR 3/1), hard, dry
30			29-34	100		CLAY, brown (7.5YR 4/2) with strong brown (7.5YR 5/8) SILTY CLAY and iron pan (concretions), dry CLAY, brown (7.5YR 4/2) interbedded with light gray (10YR 7/1) and yellow-brown (10YR 5/8) SAND, iron pan (concretions), dry SILT and FINE SAND, gray and yellow-brown, dry
35			34-39	80		FINE SAND, light gray (10YR 7/2) interbedded with brown CLAY, iron pan (concretions),dry
40		SM/SC	39-44	100		FINE SAND, light brown-gray (10YR 6/2) interbedded with brown CLAY and brown-yellow SILT, dry
45			44-49	60		

Continued Next Page

WATER LEVEL & DATE

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Bentonite seal

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-07 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/27/2012 - 6/27/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, yellow-red (5YR 5/8) and very pale brown (10YR 7/4) with brown CLAY laminations, dry		Silica sand pack
50		SP	49-54	60		SAND, light brown-gray (10YR 4/2) and yellow-brown (10YR 5/8), moist		PVC well screen
						----saturated----		
55			54-59	80		SAND, brown-yellow (10YR 6/8) and light gray(10YR 7/1), saturated		Well depth=58'
						BORING TERMINATED AT 59 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\0001901033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

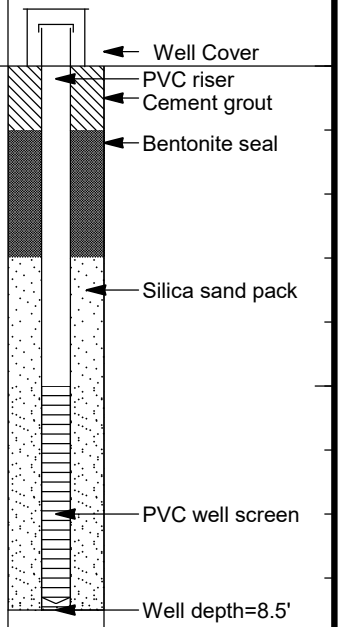
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-07 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2012 - 12/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	213.62 Ft. AMSL
REMARKS		**GROUND ELEVATION**	210.49 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	88		SANDY CLAY, light brown (5YR 5/6) to pale yellowish brown (10YR 6/2), crossbedded, micaceous; saturation at 3.5'	
5		CL	4-8.5	89		CLAY (<15% sand), pale yellowish brown (10YR 6/2)	
						CLAYEY SAND, dark yellowish brown (10YR 4/2); micaceous, lignite and ironstone traces; saturated	
						SANDY CLAY (~30% sand), medium gray (N5) to medium dark gray (N4)	
						BORING TERMINATED AT 8.5 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

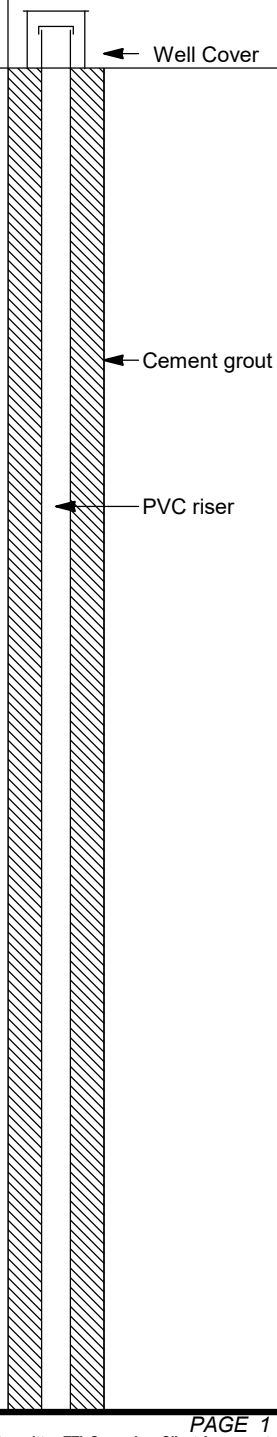
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-08 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/1/2012 - 10/2/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	242.85 Ft. AMSL
REMARKS		**GROUND ELEVATION**	240.94 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-4	88		SILTY CLAY, red (2.5YR 4/8) and pinkish gray (5YR 7/2), mottled, roots in upper 1'	
5			4-9	66		SAND, yellowish red (5YR 5/8), fine to medium grained, CLAY in bottom 1', pinkish gray	
10		SP/CL	9-14	44		SAND, yellowish red, interbedded with few CLAY seams, light gray (5YR 7/1), SAND in bottom 0.5', red (10R 4/6), medium grained	
15			14-19	80		SANDY CLAY, light gray, to SAND, reddish yellow (7.5YR 6/6), moist	
						CLAY, very dark gray (10YR 3/1), hard	
20			19-24	86		CLAY, very dark gray, hard, bedded, to CLAYEY SAND (60% sand), greenish gray (GLEY2 5/1), dry	
25			24-29	86		CLAY, very dark gray, then CLAYEY SAND, greenish gray, then SAND, dark greenish gray (GLEY2 4/1), moist	
30			29-34	84		CLAY, dark greenish gray, interbedded with CLAYEY SAND, saturated, some rock fragments	
						CLAY, dark gray (5YR 4/1), hard	
35			34-39	100		CLAY with SAND (20% sand), laminated, dry	
40		CL	39-44	100		CLAY and CLAY with SAND. dark gray, dry	
45			44-49	100			

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

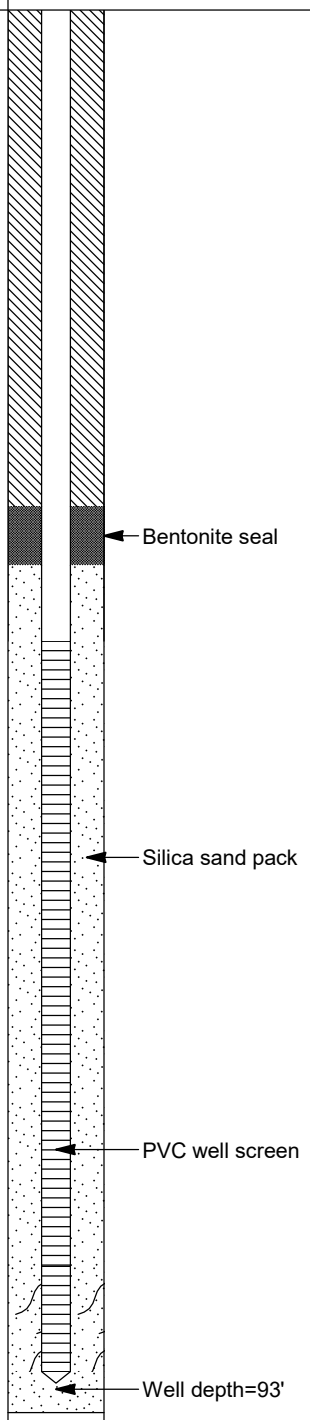
LOG OF BORING PZ-08 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/1/2012 - 10/2/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						----lignite seam, 0.5' thick----	
50			49-54	100		CLAY and CLAY with SAND. dark gray, dry	
						CLAY, very dark gray	
55			54-59	100		CLAY, dark gray	
60			59-64	100		CLAY with SAND (10% sand), gray (10YR 5/1), sand percentage increasing with depth	
65			64-69	100		CLAY, then iron hard pan, reddish brown (2.5YR 4/3) and reddish yellow (7.5YR 6/8)	
						SAND, pink (7.5YR 8/4), fine, dry	
70		SP	69-74	42		SAND, pale brown (10YR 6/3) to yellowish red (5YR 5/8), fine grained, cross-bedded, dry	
75			74-79	66		SAND, pale brown to yellowish red, micaceous	
80			79-84	56		SAND, pale brown to yellowish red, very moist	
85			84-89	76		SAND, pale brown to yellowish red, saturated	
90			89-94	90		SAND, very pale brown (10YR 7/4), fine to medium grained, saturated	
						BORING TERMINATED AT 94 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

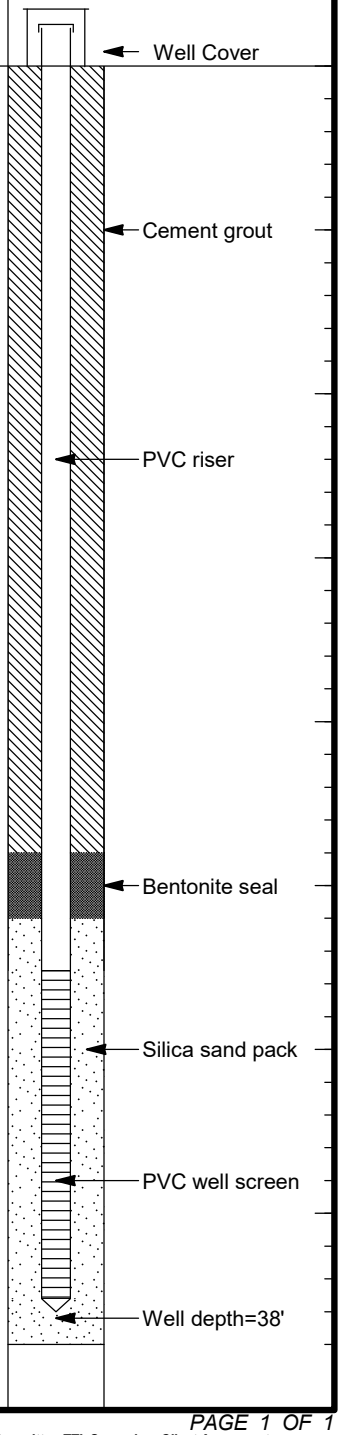
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-08 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/2/2012 - 10/2/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	243.01 Ft. AMSL
REMARKS		**GROUND ELEVATION**	240.94 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-4	88		SILTY CLAY, red (2.5YR 4/8) and pinkish gray (5YR 7/2), mottled, roots in upper 1'	
5			4-9	66		SAND, yellowish red (5YR 5/8), fine to medium grained, CLAY in bottom 1', pinkish gray	
10		SP/CL	9-14	44		SAND, yellowish red, interbedded with few CLAY seams, light gray (5YR 7/1), SAND in bottom 0.5', red (10R 4/6), medium grained	
15			14-19	80		SANDY CLAY, light gray, to SAND, reddish yellow (7.5YR 6/6), moist	
						CLAY, very dark gray (10YR 3/1), hard	
20			19-24	86		CLAY, very dark gray, hard, bedded, to CLAYEY SAND (60% sand), greenish gray (GLEY2 5/1), dry	
25		CL	24-29	86		CLAY, very dark gray, then CLAYEY SAND, greenish gray, then SAND, dark greenish gray (GLEY2 4/1), moist	
30			29-34	84		CLAY, dark greenish gray, interbedded with CLAYEY SAND, saturated, some rock fragments	
35			34-39	100		CLAY, dark gray (5YR 4/1), hard	
						CLAY with SAND (20% sand), laminated, dry	
						BORING TERMINATED AT 39 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-09 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/1/2012 - 8/2/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	267.58 Ft. AMSL
REMARKS		**GROUND ELEVATION**	264.30 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SC	0-4	75		CLAYEY SAND, light brown (2.5Y 6/3), moist to dry	
		CL				SANDY CLAY, yellow-red (5YR 5/8)	
5		SC	4-9	60		FINE SAND, strong brown (7.5YR 6/8)	
						Iron pan concretions	
						CLAY, strong brown and gray (75.YR 6/1), moist to dry	
10		CL	9-14	100		CLAY, dark gray-brown (10YR 4/2), interbedded with gray (10YR 6/1) fine SILT laminations, dry	
15			14-19	100		CLAY and iron pan concretions CLAY, dark gray-brown, interbedded with strong brown and gray SAND and SILT, dry	
		SP				SAND, gray, dry	
20		SP/CL	19-24	60		SAND, very pale brown (10YR 7/3), interbedded with few gray CLAY seams (<1" thick), dry	
25			24-29	60		SAND, very pale brown (10YR 7/3), interbedded with few gray CLAY seams (<1" thick), dry	
30			29-34	60		SAND, red (2.5 YR 4/8), strong brown and gray, interbedded with few gray CLAY seams, dry	
35			34-39	60		SAND, brown-yellow (10YR 6/4), interbedded with light brown-gray CLAY and SANDY CLAY, dry to moist	
40		SP	39-44	100		SAND, brown-yellow, dry	
		CL				CLAY, light brown-gray, dry	
						SAND interbedded with CLAY, red mottles, dry	
45			44-49	80			

Continued Next Page

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-09 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/1/2012 - 8/2/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP/CL				SAND, strong brown, interbedded with light gray-brown CLAY, moist to wet		
50		CH	49-54	100		CLAY, very dark gray (3/N), plastic, wet ----lignite seam, 1.5' thick----		
55			54-59	60		CLAY, strong brown and red-gray (5YR 5/2), wet		
		SP				SAND, strong brown, few gray CLAY rip up clasts, saturated		
60			59-64	100		SAND, strong brown and yellow-brown, saturated SAND, dusky red (5Y 3/2), iron hard pan concretions, CLAY, very dark gray with gray SILT laminations		
65			64-69	100		CLAY and SILT, very dark green-gray (5BG 3/1), moist to wet CLAY, very dark blue-gray (5PB 3/1), hard, moist ----lignite seam, 0.4' thick---- ----lignite seam, 0.2' thick----		
70			69-74	100		CLAY, black (2.5Y 2.5/1), lignite, dry CLAY, very dark gray, interbedded with gray SILT laminations, dry		
75			74-79	100		CLAY, green-gray & very dark gray, interbedded with gray SILT laminations, dry		
80			79-84	100		CLAY, black, shale-like bedding, dry		
85			84-89	100		CLAY, very dark gray, interbedded with SILT laminations, dry		
90		CL	89-94	100		CLAY, very dark gray, shale-like bedding, dry		
95			94-99	100		CLAY, very dark gray, shale-like bedding, dry		Bentonite seal

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-09 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/1/2012 - 8/2/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100			99-104	100		CLAY, dark gray to black		
105			104-109	100		CLAY, very dark gray, hard, few thin lignite seams, dry		Silica sand pack
110			109-114	100		CLAY, dark gray, dry ----lignite seam, 0.1' thick----		PVC well screen
115			114-119	100		SILTY CLAY, very dark gray (3/N), dry		
						SAND, gray and light gray, saturated		
120		SP	119-124	80		SAND, light brown-gray (2.5Y 6/2), few black organic laminations and CLAY seams, saturated		Well depth=120'
						BORING TERMINATED AT 124 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-09 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/2/2012 - 8/2/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	267.73 Ft. AMSL
REMARKS		**GROUND ELEVATION**	264.12 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	SC				CLAYEY SAND, light brown (2.5Y 6/3), moist to dry
	CL				SANDY CLAY, yellow-red (5YR 5/8)
	SC				FINE SAND, strong brown (7.5YR 6/8)
5					Iron pan concretions
					CLAY, strong brown and gray (75.YR 6/1), moist to dry
					CLAY, dark gray-brown (10YR 4/2), interbedded with gray (10YR 6/1) fine SILT laminations, dry
10	CL				
					CLAY and iron pan concretions
15					CLAY, dark gray-brown, interbedded with strong brown and gray SAND and SILT, dry
	SP				SAND, gray, dry
20					SAND, very pale brown (10YR 7/3), interbedded with few gray CLAY seams (<1" thick), dry
					SAND, very pale brown (10YR 7/3), interbedded with few gray CLAY seams (<1" thick), dry
25	SP/CL				
					SAND, red (2.5 YR 4/8), strong brown and gray, interbedded with few gray CLAY seams, dry
30					
					SAND, brown-yellow (10YR 6/4), interbedded with light brown-gray CLAY and SANDY CLAY, dry to moist
35					
	SP				SAND, brown-yellow, dry
40	CL				CLAY, light brown-gray, dry
					SAND interbedded with CLAY, red mottles, dry
45					

WATER LEVEL & DATE

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Silica sand pack

Bentonite seal

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-09 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/2/2012 - 8/2/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP/CL				SAND, strong brown, interbedded with light gray-brown CLAY, moist to wet		
50		CH				CLAY, very dark gray (3/N), plastic, wet ----lignite seam, 1.5' thick---- CLAY, strong brown and red-gray (5YR 5/2), wet		PVC well screen
55								
60		SP				SAND, strong brown, few gray CLAY rip up clasts, saturated SAND, strong brown and yellow-brown, saturated SAND, dusky red (5Y 3/2), iron hard pan concretions,		
		CL				CLAY, very dark gray with gray SILT laminations		Well depth=63'
						BORING TERMINATED AT 64 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-10 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/3/2012 - 8/6/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	253.95 Ft. AMSL
REMARKS		**GROUND ELEVATION**	252.11 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		ML				SILT-loam, dark brown, dry	
		CL				CLAY, dark red-brown (2.5 YR 4/8), dry	
5		ML				CLAYEY SILT and SILT, yellow-red (5YR 5/8), dry	
10						SANDY SILT, pale yellow (2.5Y 7/4), dry	
15		SM				SILTY SAND, white (10YR 8/1) and yellow (10YR 7/6), dry	
20						SILTY SAND, white (10YR 8/1) and yellow (10YR 7/6), dry	
25						SAND, white and yellow, dry	
30						SAND, brown-yellow (10YR 6/8) and white gray (10YR 7/2), few CLAY seams (<1/2") thick	
35		SP/CL				SAND, brown-yellow, dry	
						CLAY, light brown-gray (10YR 6/2) with pale brown SILT laminations, plastic	
						SAND, brown-yellow, dry	
40						SAND, brown-yellow (10YR 6/8) and yellow-brown (10YR 6/8), interbedded with gray-brown (10YR 5/2) CLAY, bedding ~2" thick, dry to moist	
45							

PIEZOMETER DIAGRAM

- Well Cover
- Cement grout
- PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\03033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-10 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/3/2012 - 8/6/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50						Iron hard pan, yellow-red, then SAND, dry to moist GRAVEL, dark brown, wet Iron hard pan concretions CLAY, dark gray, interbedded with gray SILT laminations, hard		
55						SAND interbedded with CLAY, saturated CLAY, very dark gray (3/N) and very dark green-gray (10Y3/1) interbedded		
60						----iron hard pan---- CLAY, very dark gray, interbedded with very dark green gray FINE SAND seams (~3" thick), dry		
65						CLAY, very dark gray interbedded with gray SILT laminations, dry ----lignite seam with free water, saturated----		
70						CLAY, very dark gray interbedded with fine gray SILTY CLAY laminations, dry		
75						CLAY, very dark gray fine laminations, dry		
80						----lignite seam with free water, saturated---- CLAY, very dark gray dry		
85						----lignite seam, 0.5' thick----- CLAY, carbonaceous, hard CLAY, dark gray (2.5Y 4/1), then dark green-gray (10Y 4/1), dry		
90		CL				CLAY, very dark green black (5GY 3/1), massive structure, dry		
95						CLAY, black (10YR 2/1), hard, dry		

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-10 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/3/2012 - 8/6/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100						CLAY, very dark gray, shale-like bedding, carbonized detritus on bedding planes, dry		Bentonite seal
						----lignite seam, 0.2' thick----		
105						CLAY, very dark gray, shale-like bedding, carbonized detritus on bedding planes, dry		
110						CLAY, very dark gray, shale-like bedding, carbonized detritus on bedding planes, dry		
115						CLAY, very dark gray, shale-like bedding, carbonized detritus on bedding planes, dry		
120						CLAY, very dark gray, interbedded with gray SILT laminations, dry		Silica sand pack
						CLAYEY SILT, gray		
125						CLAYEY SILT, gray, dry		PVC well screen
						----gray CLAY seam, 0.3' thick----		
130						SILTY CLAY, dark gray, massive structure, hard, dry		
						SAND, saturated		
		SP				SAND, gray, saturated		
135		CH				----SILTY CLAY seam----		
		SP				SAND, gray, saturated		Well depth=138'
						BORING TERMINATED AT 139 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

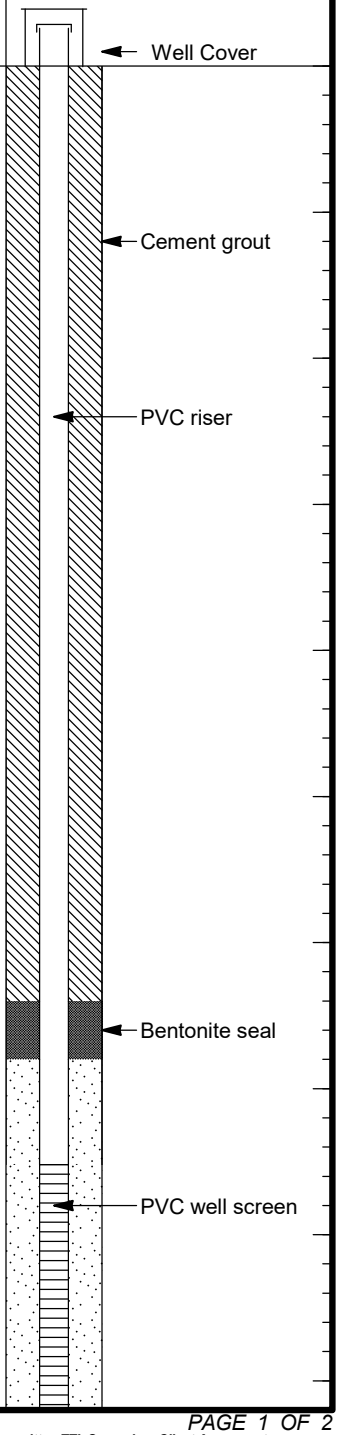
LOG OF BORING PZ-10 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/6/2012 - 8/6/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	253.98 Ft. AMSL
REMARKS		**GROUND ELEVATION**	252.11 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	ML				SILT-loam, dark brown, dry
	CL				CLAY, dark red-brown (2.5 YR 4/8), dry
	ML				CLAYEY SILT and SILT, yellow-red (5YR 5/8), dry
5					
10					SANDY SILT, pale yellow (2.5Y 7/4), dry
15	SM				SILTY SAND, white (10YR 8/1) and yellow (10YR 7/6), dry
20					SILTY SAND, white (10YR 8/1) and yellow (10YR 7/6), dry
25					SAND, white and yellow, dry
30	SP				SAND, brown-yellow (10YR 6/8) and white gray (10YR 7/2), few CLAY seams (<1/2") thick
35					SAND, brown-yellow, dry
	CL				CLAY, light brown-gray (10YR 6/2) with pale brown SILT laminations, plastic
					SAND, brown-yellow, dry
40	SP				SAND, brown-yellow (10YR 6/8) and yellow-brown (10YR 6/8), interbedded with gray-brown (10YR 5/2) CLAY, bedding ~2" thick, dry to moist
45					

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-10 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/6/2012 - 8/6/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50		GP				Iron hard pan, yellow-red, then SAND, dry to moist GRAVEL, dark brown, wet Iron hard pan concretions		Silica sand pack
		CL				CLAY, dark gray, interbedded with gray SILT laminations, hard SAND interbedded with CLAY, saturated		Well depth=53'
						BORING TERMINATED AT 54 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

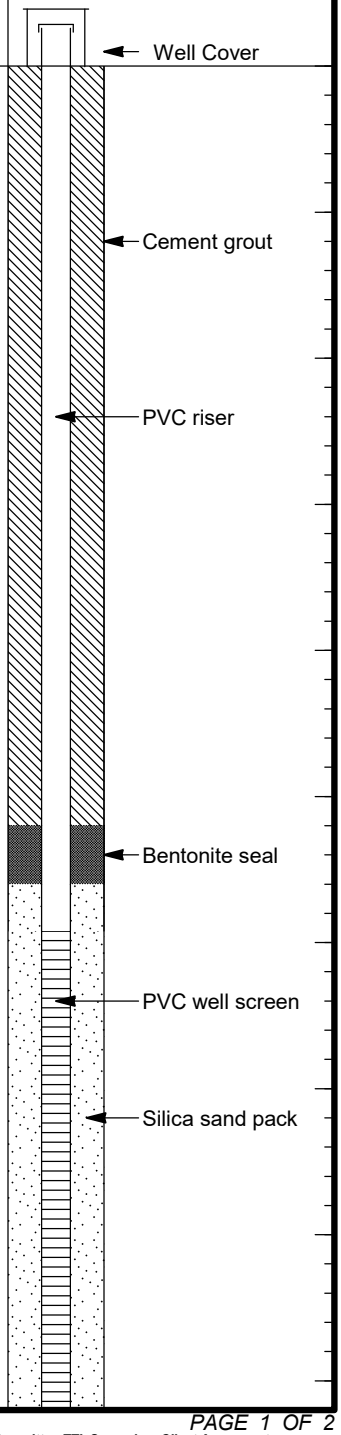
LOG OF BORING PZ-11 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/26/2012 - 7/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	209.98 Ft. AMSL
REMARKS		**GROUND ELEVATION**	206.54 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
	CL-ML	0-4	75		SILTY CLAY, brown-yellow (10YR 6/6) interbedded with SAND, moist
5		4-9	80		SANDY CLAY, gray and yellow-brown, moist to wet
					CLAYEY SAND, gray, wet
10	SP/CL	9-14	50		SANDY CLAY, light gray (10YR 7/2) with brown-yellow (10YR 6/8) mottles, wet
					CLAYEY SAND, gray, saturated
15		14-19	100		CLAYEY SAND, dark gray (7.5YR 4/1), soft, saturated
					SANDY CLAY, dark yellow-brown (10YR 4/4), saturated
					CLAY, very dark gray (10YR 3/1) with fine light gray SILT laminations, hard, dry
20		19-24	0		----no recovery----
25		24-29	0		----no recovery----
30		29-34	0		----no recovery----
35	CL	34-39	20		CLAY, dark gray
40		39-44	20		CLAY, dark gray
45		44-49	20		

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-11 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/26/2012 - 7/26/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						CLAY, dark gray		
50			49-54	50		CLAY, very dark gray (5Y 3/1) with fine light gray sand laminations, and lignite, dry		
						SAND, gray (5Y 6/1) and light yellow-brown (2.5Y 6/2), saturated		
55		SP	54-59	60		SAND, gray (10YR 6/1), saturated		Well depth=55'
						BORING TERMINATED AT 59 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

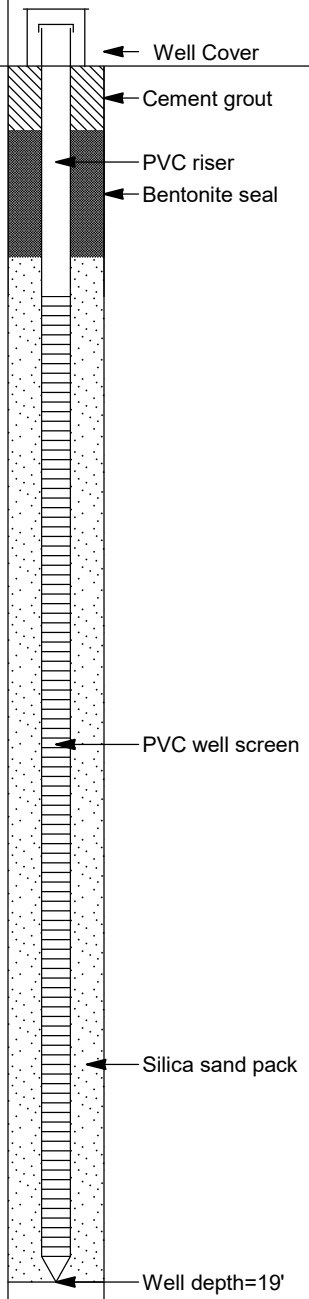
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-11 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/29/2012 - 6/29/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	210.13 Ft. AMSL
REMARKS		**GROUND ELEVATION**	206.54 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						SILTY CLAY, brown-yellow (10YR 6/6) interbedded with SAND, moist	
		CL				SANDY CLAY, gray and yellow-brown, moist to wet	
5							
						CLAYEY SAND, gray, wet	
						SANDY CLAY, light gray (10YR 7/2) with brown-yellow (10YR 6/8) mottles, wet	
10		SC					
						CLAYEY SAND, gray, saturated	
						CLAYEY SAND, dark gray (7.5YR 4/1), soft, saturated	
15							
		CH				SANDY CLAY, dark yellow-brown (10YR 4/4), saturated	
		CL				CLAY, very dark gray (10YR 3/1) with fine light gray SILT laminations, hard, dry	
						BORING TERMINATED AT 19 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-12 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/31/2012 - 7/31/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	236.71 Ft. AMSL
REMARKS		**GROUND ELEVATION**	233.85 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		ML	0-4	75		SILT-loam, dark brown, then yellow-brown (10YR 5/4) SANDY SILT, dry		Well Cover
						SANDY CLAY, red (2.5YR 4/6)		
5		CL	4-9	100		SANDY CLAY, brown-yellow (10YR 6/8), dry		
		ML	9-14	100		CLAYEY SILT, brown-yellow (10YR 6/6), dry		Cement grout
10						CLAYEY SAND		
		SC	14-19	100		CLAYEY SAND, brown-yellow (10YR 6/6)		PVC riser
15						SAND, white (7.5 YR 5/8), some CLAY, saturated		
			19-24	80		SAND, light gray (10YR 7/2)		
20						SANDY CLAY, yellow-red (5YR 5/8), saturated		
			24-29	100		CLAY, pale brown (10YR 6/3), laminated structure, somewhat plastic, saturated		
25						CLAY, brown-yellow (10YR 6/8) and light brown-gray (10YR 6/2), wet		
						CLAY, very dark gray (2.5Y 3/1) with gray and dark green-gray (10Y 4/1) SILT, hard, dry		
30			29-34	100		CLAY, dark gray interbedded with dark green-gray SILT, dry		
35			34-39	100		CLAY, green-black (10Y 2.5/1) with green-gray (10Y 5/1) SILT laminations		
						CLAY, very dark gray to dark gray, few pyrite concretions, dry		
40			39-44	100		CLAY, black (10YR 2/1) and dark green-gray, lignite seams, dry		
45			44-49	100		----lignite seam 0.4' thick---- *Continued Next Page*		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-12 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/31/2012 - 7/31/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL				CLAY, very dark gray with carbonized detritus on bedding, dry		
50			49-54	100		CLAY, very dark gray and dark green-gray, massive bedding, hard, dry		
55			54-59	100		CLAY, very dark gray-brown, massive bedding, hard, dry		Bentonite seal
60			59-64	100		CLAY, very dark gray-brown, massive bedding, hard, dry		
65			64-69	100		CLAY, very dark gray-brown, massive bedding, carbonized detritus on bedding, dry		Silica sand pack
70			69-74	100		Iron hard-pan concretions, then strong brown (7.5YR 5/6) SAND, cross-bedded, dry		PVC well screen
		SP				SAND, light gray, saturated		
75			74-79	100		SAND, light gray (10YR 7/2) with yellow (10YR 7/6) cross-bedding, saturated		
80			79-84	100		SAND, light yellow-brown (2.5Y 6/3) and pale yellow (2.5Y 7/3), few thin CLAY seams saturated		Well depth=82'
						BORING TERMINATED AT 84 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

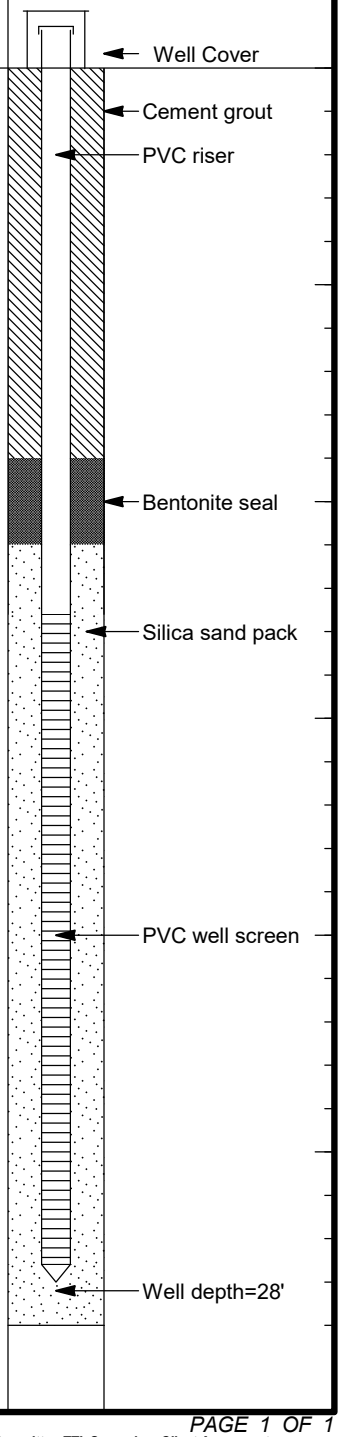
LOG OF BORING PZ-12 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/1/2012 - 8/1/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	237.39 Ft. AMSL
REMARKS		**GROUND ELEVATION**	233.85 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	ML				SILT-loam, dark brown, then yellow-brown (10YR 5/4) SANDY SILT, dry
					SANDY CLAY, red (2.5YR 4/6)
5	CL				SANDY CLAY, brown-yellow (10YR 6/8), dry
					CLAYEY SILT, brown-yellow (10YR 6/6), dry
10	ML				
					CLAYEY SAND
15	SC				CLAYEY SAND, brown-yellow (10YR 6/6)
					SAND, white (7.5 YR 5/8), some CLAY, saturated
20					SAND, light gray (10YR 7/2)
					SANDY CLAY, yellow-red (5YR 5/8), saturated
25	CL				CLAY, pale brown (10YR 6/3), laminated structure, somewhat plastic, saturated
					CLAY, brown-yellow (10YR 6/8) and light brown-gray (10YR 6/2), wet
					CLAY, very dark gray (2.5Y 3/1) with gray and dark green-gray (10Y 4/1) SILT, hard, dry
					BORING TERMINATED AT 29 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-13 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/28/2012 - 6/28/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	273.50 Ft. AMSL
REMARKS		**GROUND ELEVATION**	269.46 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		CL	0-4	75		CLAY, light brown-gray (10YR4/2) with strong brown (7.5YR 5/6) mottles, dry	
			4-9	80		CLAY, brown (7.5YR 5/2) with yellow SILT laminations and iron pan concretions, dry	
10			9-14	100		CLAY, brown (7.5YR 5/2) with yellow SILT laminations and iron pan concretions, dry	
15			14-19	80		FINE SAND, very pale brown (10YR 7/4) interbedded with brown CLAY, dry	
20			19-24	80		SAND, yellow (10YR 7/4) and very pale brown, few CLAY laminations (~1" thick), dry	
25			24-29	80		SAND, yellow, dry ----clay seam----	
30		SP-SC	29-34	80		SAND, yellow, dry ----clay seam---- ----clay seam----	
35			34-39	80		SAND, yellow (10YR 7/4) and very pale brown, few CLAY laminations (~1" thick), dry	
40			39-44	80		SAND, very pale brown (10YR 8/2) and brown-yellow, dry	
45			44-49	80			

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-13 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/28/2012 - 6/28/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, yellow with few gray CLAY laminations (~1/4" thick), moist		
50			49-54	80		SAND, yellow, saturated		
		CH				CLAY, gray and strong brown		
55		SP-SC	54-59	100		Lithified SILTY CLAY/CLAYSTONE and iron pan concretion, dark brown, saturated		
						CLAY, dark gray, dry		
60			59-64	100		CLAY, gray to black with lignite, hard, dry		
65			64-69	100		CLAY, dark gray (10YR 4/1) with gray (10YR 5/1) SILT laminations (<1/4" thick), very stiff to hard, moist		
70			69-74	100		----lignite seam, 0.4' thick---- CLAY, dark gray with gray silt laminations (1/4" to 1/2" thick), moist to wet		
75		CL	74-79	100		----wet silt, then lignite seam, 0.5' thick---- CLAY, black and dark gray		
80			79-84	100		CLAY, very dark gray (2.5YR 3/1), then gray SILTY CLAY, dry		
85			84-89	100		CLAY, very dark gray, hard, dry		Bentonite seal
90			89-94	100		CLAY, gray to dark gray, hard, dry		
						Iron pan concretion, strong brown (7.5YR 5/8)		
95		SC	94-99	100		SAND and iron pan, very pale brown (10YR 7/3), moist		Silica sand pack

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-13 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/28/2012 - 6/28/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100		SP	99-104	80		----brown clay seam---- SAND, pale brown and light yellow-brown, moist		
105			104-109	100		SAND, brown-yellow (10YR 6/8) and very pale brown (10YR 7/3), moist to wet		PVC well screen
110			109-114	0		No recovery, saturated sands fell out of sampler		
						BORING TERMINATED AT 114 FEET.		Well depth=114'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

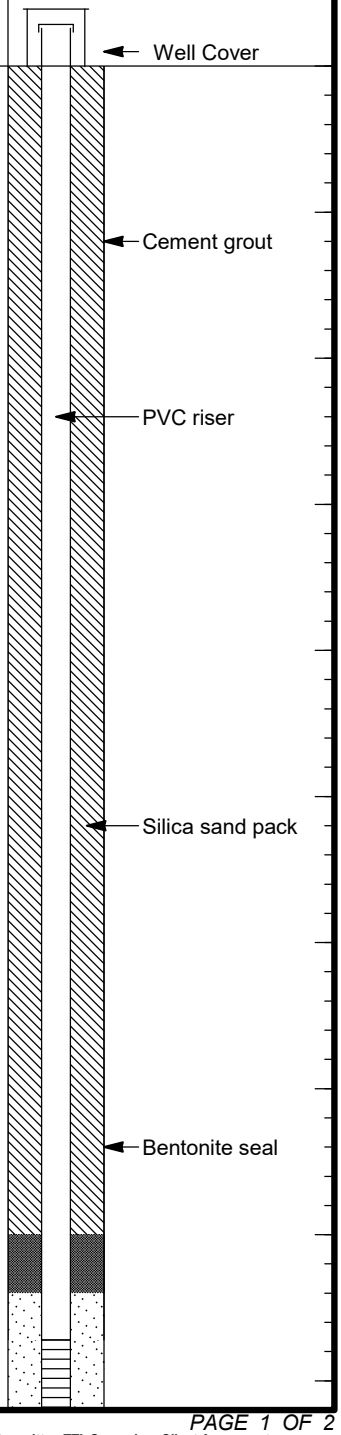
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-13 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/29/2012 - 6/29/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	273.88 Ft. AMSL
REMARKS		**GROUND ELEVATION**	269.19 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						CLAY, light brown-gray (10YR4/2) with strong brown (7.5YR 5/6) mottles, dry	
5						CLAY, brown (7.5YR 5/2) with yellow SILT laminations and iron pan concretions, dry	
10		CL				CLAY, brown (7.5YR 5/2) with yellow SILT laminations and iron pan concretions, dry	
15						FINE SAND, very pale brown (10YR 7/4) interbedded with brown CLAY, dry	
20						SAND, yellow (10YR 7/4) and very pale brown, few CLAY laminations (~1" thick), dry	
25						SAND, yellow, dry ----clay seam----	
30						SAND, yellow, dry ----clay seam---- ----clay seam----	
35		SP-SC				SAND, yellow (10YR 7/4) and very pale brown, few CLAY laminations (~1" thick), dry	
40						SAND, very pale brown (10YR 8/2) and brown-yellow, dry	
45						*Continued Next Page*	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\03033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-13 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/29/2012 - 6/29/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50						SAND, yellow with few gray CLAY laminations (~1/4" thick), moist		PVC well screen
						SAND, yellow, saturated		
		CH				CLAY, gray and strong brown		
55		SP-SC				Lithified SILTY CLAY/CLAYSTONE and iron pan concretion, dark brown, saturated		
		CL				CLAY, dark gray, dry		
						BORING TERMINATED AT 59 FEET.		Well depth=59'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

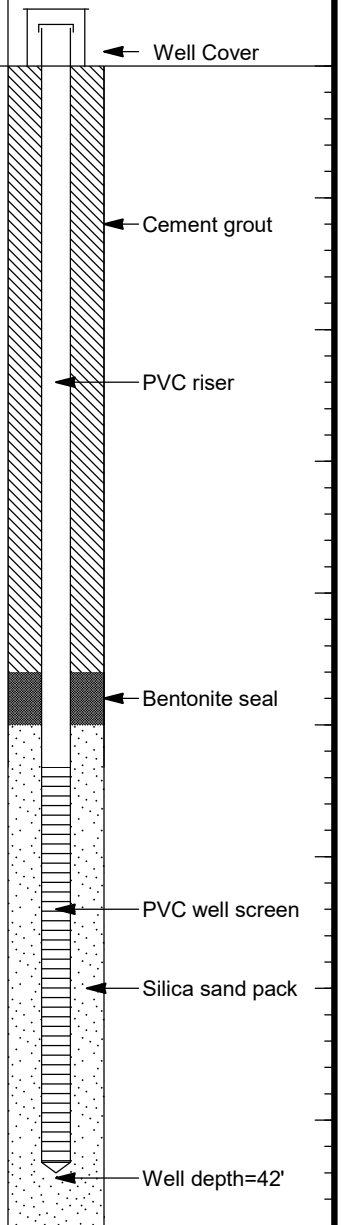
LOG OF BORING PZ-14 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/25/2012 - 6/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	201.53 Ft. AMSL
REMARKS		**GROUND ELEVATION**	198.37 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	CL	0-4	75		CLAY, brown to brown-yellow, dry
5		4-9	100		CLAY, gray (2.5Y 5/1) with dark red (10R 3/6) and yellow-brown (10YR 5/8) mottles, slightly plastic, dry
10		9-14	100		CLAY, dark red-brown (5YR 3/2) Black LIGNITE, then black CLAY, dry
15		14-19	100		CLAY, very dark gray (5YR 3/1), hard, slightly plastic, dry
20		19-24	100		CLAY, dark brown (2.5Y 4/3) with yellow-brown (10YR 5/8) SILT laminations and iron concretions
	SC				Laminated CLAYEY FINE SAND, light brown-gray (10YR 6/2), dry
25	SP	24-29	80		SAND, light red-brown (5YR 6/3) with yellow-red laminations ----iron hard pan (concretions)---- ----iron hard pan (concretions)----
30	SC-SM	29-34	60		FINE SAND, some SILT, brown-yellow (10YR 6/8) and pale brown (10YR 6/3), dry Yellow (2.5Y 8/6) FINE SAND, dry
35		34-39	60		SAND, light gray (10YR 7/2) with red-yellow (7.5YR 7/8) CLAYEY SAND laminations, wet
	SP				FINE SAND, saturated
40		39-44	80		SAND, yellow-brown (10YR 5/6)
	SC				SAND with pale brown and dark brown cross-bedded CLAY laminations, saturated
					BORING TERMINATED AT 44 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

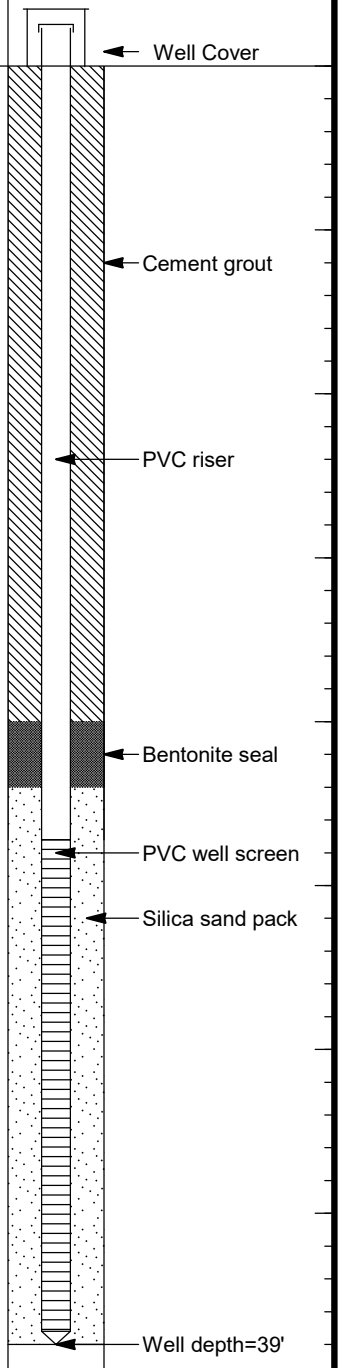
LOG OF BORING PZ-15 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/25/2012 - 6/25/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	196.71 Ft. AMSL
REMARKS		**GROUND ELEVATION**	193.06 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	75		CLAY, dark red-gray and gray with dusky red mottles, moist
5			4-9	100		CLAY, CLAY, dark gray and gray with few yellow-brown mottles ----lignite seam----
10		CL	9-14	100		CLAY, dark brown (10YR 3/3) and very dark gray, hard, dry ----lignite seam----
15			14-19	100		----lignite seam---- CLAY, very dark gray, hard, dry SILTY CLAY with iron hard pan, brown and yellow-brown, dry
20			19-24	100		SILTY CLAY, brown (10YR 4/3) and yellow-brown, dry
		SP				SAND, light gray (10YR 7/2) with yellow-brown cross bedding, dry ----clay seam----
25		SM/CL	24-29	100		SILTY SAND, olive-yellow (2.5Y 6/8)
30		SP	29-34	60		SILTY CLAY, red-brown SAND, brown-yellow, wet SAND, gray (10YR 6/1) with yellow-brown (10YR 6/4) mottles, saturated ---brown-yellow (10YR 6/8)----
35			34-39	60		SAND, brown-yellow and pale brown cross-bedding, saturated
						BORING TERMINATED AT 39 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-16 D & PIEZOMETER CONSTRUCTION

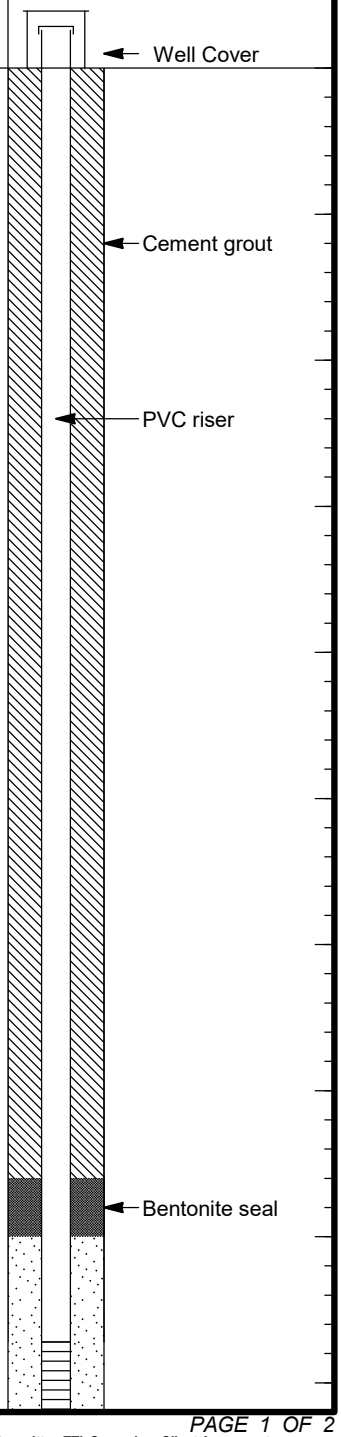
PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/8/2012 - 8/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	224.79 Ft. AMSL
REMARKS		**GROUND ELEVATION**	222.88 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SP	0-4	75		SAND, very pale brown, wet to dry
						CLAY, yellow-red
5		CL	4-9	100		SANDY CLAY, yellow-red (5YR 5/6), moist
10			9-14	100		SANDY CLAY, yellow-red, very pale brown mottles, wet to saturated
15		SP	14-19	80		SAND, brown-yellow (10YR 6/8), saturated
20			19-24	100		CLAY, very dark gray, very stiff, dry
25		CL	24-29	50		CLAY, very dark gray, interbedded with gray SILT laminations, dry
30			29-34	100		----lignite seam, 0.5' thick---- CLAY, dark green-gray (10Y 4/1), dry
35			34-39	100		Black CLAY with lignite, moist
40			39-44	100		CLAY, brown and strong brown (7.5YR 5/6), iron hard pan, dry
45			44-49	60		SAND, strong brown with gray CLAY, iron hard pan, dry

Continued Next Page

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-16 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/8/2012 - 8/8/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, very pale brown (10YR 7/3)		
50			49-54	80		SAND, very pale brown dry		PVC well screen
55		SP	54-59	100		SAND, very pale brown dry ----CLAY seam, 0.4' thick----		Silica sand pack
60			59-64	60		SAND, very pale brown and yellow-brown, saturated		
65			64-69	80		SAND, very pale brown and yellow-brown, saturated		
						BORING TERMINATED AT 69 FEET.		Well depth=69'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

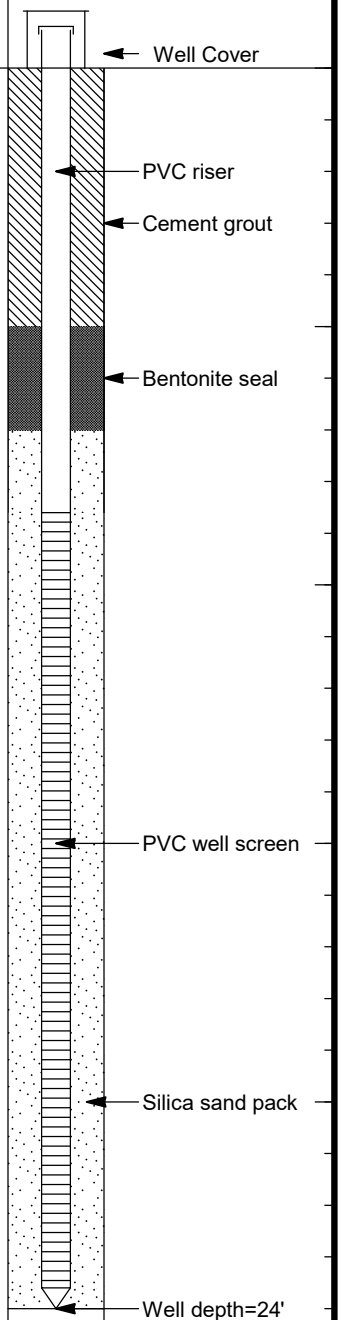
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-16 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/8/2012 - 8/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	226.11 Ft. AMSL
REMARKS		**GROUND ELEVATION**	222.56 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SP				SAND, very pale brown, wet to dry	
						CLAY, yellow-red	
						SANDY CLAY, yellow-red (5YR 5/6), moist	
5		CL					
						SANDY CLAY, yellow-red, very pale brown mottles, wet to saturated	
10							
						SAND, brown-yellow (10YR 6/8), saturated	
15		SP					
20						CLAY, very dark gray, very stiff, dry	
		CL					
						BORING TERMINATED AT 24 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-17 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/25/2012 - 7/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	308.42 Ft. AMSL
REMARKS		**GROUND ELEVATION**	306.56 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SM	0-4	50		SILTY SAND, strong brown (7.5YR 5/8), dry	
						SANDY CLAY, red (2.5YR 4/6), moist	
		CL	4-9	100		SANDY CLAY, yellow-red (5YR 5/8)	
5							
						CLAYEY SILT, brown-yellow (10YR 6/6), dry	
		ML	9-14	100		CLAYEY SILT, brown-yellow (10YR 6/8), dry	
10							
			14-19	100		CLAYEY SILT, brown-yellow (10YR 6/8), dry	
15							
		SC				SAND with CLAY, strong brown (7/5YR 5/6), iron concretions, dry	
			19-24	100		SILTY CLAY, strong brown and light gray, moist	
20		CL				CLAY, gray, interbedded with light brown-gray CLAYEY SILT, moist	
			24-29	60		CLAY, pink-gray (5YR 6/2), laminated bedding, dry	
25							
		SP/CL				SAND, yellow-brown (10YR 5/8), interbedded with CLAY laminations and iron concretions, dry	
			29-34	100		SAND, yellow-brown and pale brown, wet	
30							
		CL				CLAY, light gray with thin yellow-brown SILT laminations, dry	
		SP	34-39	80		CLAY, dark gray (7.5YR 4/1) and very dark gray (10YR 3/1), hard, dry	
35						SAND, green-gray (10YR 5/1), wet	
		CL				CLAY, green-black (10Y 2.5/1) with fine SILT laminations, hard, wet to dry	
			39-44	80		CLAY, very dark gray, interbedded with yellow-brown SAND and iron pan concretions, dry	
40						CLAY, dark gray	
		SP				SAND, red-brown and pale brown, wet	
			44-49	60			
45							

Continued Next Page

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-17 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/25/2012 - 7/26/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50		SP/CL	49-54	50		SAND, light gray and brown-yellow, interbedded with pale brown CLAY, saturated CLAY, red-gray (5YR 5/2), hard, moist SAND, red-yellow, interbedded with light gray CLAY laminations and iron concretions, dry		
55		ML	54-59	50		SILTY SAND, red-yellow (5YR 7/6), dry		
60			59-64	60		SILTY SAND, red-yellow (5YR 7/6), dry		
65		SP/CL	64-69	50		SAND, red-yellow and very pale brown, interbedded with few light gray CLAY laminations, dry		Bentonite seal
70			69-74	60		SAND, red-yellow and very pale brown, interbedded with light gray CLAY laminations, dry		
75			74-79	60		SAND, red-yellow and very pale brown, interbedded with light gray CLAY laminations, dry ----SILT seam----		
80			79-84	60		SAND, yellow (10YR 7/6) interbedded with gray CLAY laminations, dry		PVC well screen
85		SP/CH	84-89	60		SAND, yellow (10YR 7/6) interbedded with gray CLAY laminations, wet to saturated		Silica sand pack
90		SC	89-94	100		CLAYEY SAND, dark yellow-brown, saturated CLAY, yellow-brown with gray mottles,		
		CL				CLAY, dark gray (10YR 4/1) to black (10YR 2/1), lignite seams, dry		Well depth=93'
						BORING TERMINATED AT 94 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

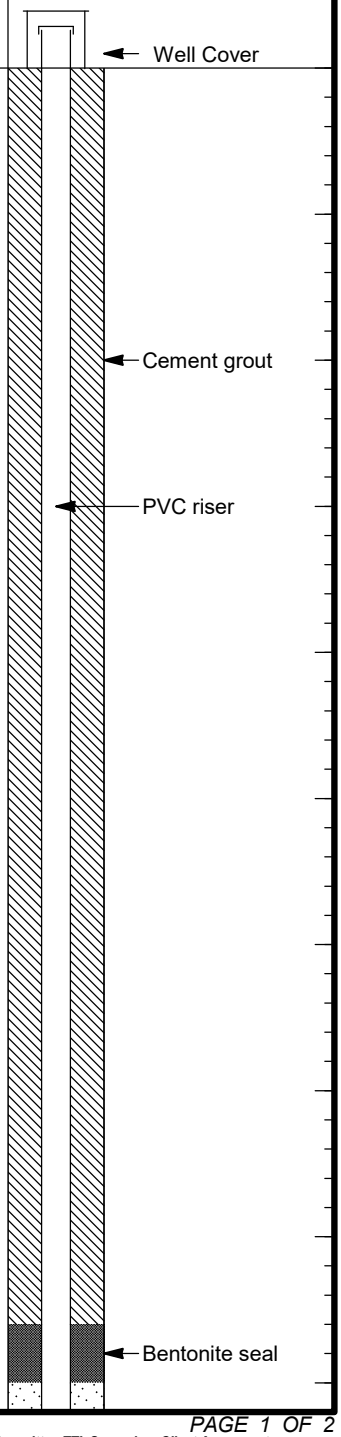
LOG OF BORING PZ-18 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/30/2012 - 7/30/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	237.92 Ft. AMSL
REMARKS		**GROUND ELEVATION**	234.51 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	ML	0-4	75		SILT-loam, dark gray brown (10YR 4/2), dry
5	SM/CL	4-9	100		SILTY FINE SAND, very pale brown (10YR 7/3), dry SANDY CLAY, red-yellow (5YR 5/8), dry SILTY CLAY, red-yellow (10R 4/8), dry
10	SP/CL	9-14	100		FINE SAND, yellow (10YR 7/6), moist
15	SP	14-19	80		----light gray CLAY seam----- SILTY SAND, light gray to white (10YR 8/1), wet to saturated SAND, yellow (10YR 7/6), cross-bedded structure, few light gray (7.5 YR 7/1) CLAY seams, saturated
20		19-24	60		SAND, yellow-brown (10YR 5/4), dark yellow-brown (10YR 3/4) and black (10YR 1/1), iron pan concretions, saturated to dry
25	CL	24-29	100		CLAY, dark gray (10YR 4/1) to very dark gray (10YR 3/1), lignite seams with pyrite, hard, dry
30		29-34	100		CLAY, very dark gray (5Y 3/1) with gray (5Y 5/1) SILT laminations, moist to dry
35		34-39	100		CLAY, very dark gray (5Y 3/1) with gray (5Y 5/1) SILT laminations, pyritized concretions, moist to dry
40		39-44	100		CLAY, green-gray (10G 4/1) with SILT laminations, dry ---lignite seams and irregular bedding----
45		44-49	100		

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-18 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/30/2012 - 7/30/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						CLAY, very dark gray with gray SILT laminations, hard, few small pyrite concretions, dry		
50			49-54	100		CLAY, dark olive-gray (5Y 3/2), hard, dry		
55			54-59	100		CLAY, dark gray, hard, dry		
60			59-64	100		SILTY CLAY, green-gray, dry CLAY, gray, hard, dry		Silica sand pack
						Iron pan concretion, strong brown, SANDY, dry SAND, pink-gray (7.5 YR 7/2), dry		
65			64-69	60		SAND, light gray (10YR 7/2) with yellow-brown (10YR 5/8) cross-bedding, dry		
70		SP	69-74	60		SAND, brown-yellow (10YR 6/6), very pale brown (10YR 7/3), saturated		PVC well screen
75			74-79	0		----no recovery, saturated sand fell out of sampler----		Well depth=78'
						BORING TERMINATED AT 79 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

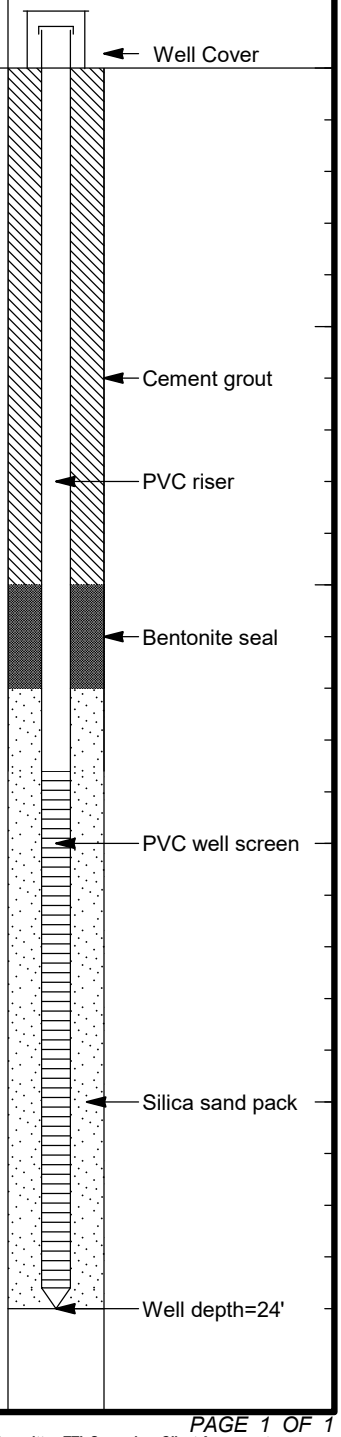
LOG OF BORING PZ-18 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/31/2012 - 7/31/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	238.24 Ft. AMSL
REMARKS		**GROUND ELEVATION**	234.51 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
	ML				SILT-loam, dark gray brown (10YR 4/2), dry
	SM				SILTY FINE SAND, very pale brown (10YR 7/3), dry
5	CL				SANDY CLAY, red-yellow (5YR 5/8), dry SILTY CLAY, red-yellow (10R 4/8), dry
10	SP				FINE SAND, yellow (10YR 7/6), moist ----light gray CLAY seam----- SILTY SAND, light gray to white (10YR 8/1), wet to saturated
15	SP/CL				SAND, yellow (10YR 7/6), cross-bedded structure, few light gray (7.5 YR 7/1) CLAY seams, saturated SAND, yellow-brown (10YR 5/4), dark yellow-brown (10YR 3/4) and black (10YR 1/1), iron pan concretions, saturated to dry
20					BORING TERMINATED AT 24 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\03033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-19 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/24/2012 - 7/24/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	278.77 Ft. AMSL
REMARKS		**GROUND ELEVATION**	276.32 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-4	50		SILTY SAND, gray-brown (10YR 5/2)	
						CLAY, dark red (2.5YR 3/6), hard, dry	
5			4-9	100		CLAY, red-gray (10R 5/1) and light gray (5YR 7/1), dry	
						SANDY CLAY, red (2.5YR 4/6) and yellow-brown (10YR 5/8), dry	
10			9-14	50		FINE SAND, yellow-red (5YR 5/6) with light gray CLAY laminations, dry	
15			14-19	60		SAND, red yellow (5YT 7/8) with few light gray CLAY laminations, dry	
20			19-24	50		SAND, red yellow (5YT 7/8)	
25			24-29	50		SAND, red yellow (5YT 7/8) with few light gray CLAY laminations, dry	
30		SP/CL	29-34	60		SAND, red-yellow, iron concretions, dry	
						CLAY, pink-gray (5YR 6/2)	
35			34-39	100		CLAY, pink-gray, interbedded with red-yellow SAND, dry to moist	
40			39-44	80		CLAY, light gray and red-gray, few SAND seams, dry	
						SAND, red-yellow, dry	
45			44-49	60			

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-19 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/24/2012 - 7/24/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, red-yellow (7.5 YR 6/6) interbedded with light gray CLAY, dry to moist		
50			49-54	80		SILTY CLAY interbedded with CLAY, yellow-brown (10YR 5/6), light gray, and red-gray, moist SAND, saturated		
55		SC/SM	54-59	100		SILTY SAND and SAND, red-yellow, interbedded with gray CLAY laminations, saturated		
60			59-64	100		SAND, brown (7.5YR 4/3), saturated CLAY, strong brown (7.5YR 5/8)		
						SILTY CLAY, gray (5Y 5/1) and very dark gray (5Y 3/1) CLAY, hard, dry		
65			64-69	100		CLAY, dark green-gray (10Y 4/1), interbedded with green-gray SILT (10Y 5/1), hard, moist to dry		
70			69-74	100		CLAY, dark green-gray (10Y 4/1), interbedded with green-gray SILT (10Y 5/1), hard, moist to dry		
75			74-79	100		CLAY, dark gray (2.5Y 4/1), finely laminations, then massive bedding structure, dry ----lignite seam----		
80		CL	79-84	100		CLAY, green-black (10Y 2.5/1), blocky bedding structure, hard, dry		
85			84-89	100		CLAY, very dark green-gray (10Y 3/1), shale-like bedding, dry		
90			89-94	100		CLAY, very dark green-gray (10Y 3/1), shale-like bedding, dry ----lignite seam, 0.5' thick---- CLAY, green-gray, some SILT, hard, dry		
95			94-99	100		CLAY, green-gray, some SILT, hard, dry to moist		Bentonite seal

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-19 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/24/2012 - 7/24/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100			99-104	100		CLAY, very dark gray (10YR 3/1), dry		
						SAND, red-yellow with iron concretions, dry		
						SAND, light gray (2.5Y 7/2) interbedded with olive-brown (2.5Y 4/4) SILTY CLAY, dry		
105			104-109	100		SAND, light gray with yellow-brown laminations, dry		Silica sand pack
110		SP	109-114	100		SAND, pale yellow (2.5Y 8/2), very pale brown (10YR 7/3), and pale brown (10YR 6/3) ----saturated----		PVC well screen
115			114-119	60		SAND, brown-yellow (10YR 6/8), wet		
120			119-124	80		SAND, light yellow-brown (2.5Y 6/3), saturated		Well depth=114'
						BORING TERMINATED AT 124 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-19 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/25/2012 - 7/25/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	278.96 Ft. AMSL
REMARKS		**GROUND ELEVATION**	276.17 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SM				SILTY SAND, gray-brown (10YR 5/2)	
						CLAY, dark red (2.5YR 3/6), hard, dry	
						CLAY, red-gray (10R 5/1) and light gray (5YR 7/1), dry	
5		CL				SANDY CLAY, red (2.5YR 4/6) and yellow-brown (10YR 5/8), dry	
						FINE SAND, yellow-red (5YR 5/6) with light gray CLAY laminations, dry	
10							
		SP/CL				SAND, red yellow (5YT 7/8) with few light gray CLAY laminations, dry	
15							
						SAND, red yellow (5YT 7/8)	
20		SP					
						SAND, red yellow (5YT 7/8) with few light gray CLAY laminations, dry	
25		SP/CL					
						SAND, red-yellow, iron concretions, dry	
30							
						CLAY, pink-gray (5YR 6/2)	
35		CL				CLAY, pink-gray, interbedded with red-yellow SAND, dry to moist	
						CLAY, light gray and red-gray, few SAND seams, dry	
40							
						SAND, red-yellow, dry	
45		SP					

Continued Next Page

PIEZOMETER DIAGRAM

- Well Cover
- Cement grout
- PVC riser
- Silica sand pack
- Bentonite seal

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-19 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	7/25/2012 - 7/25/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP/CL				SAND, red-yellow (7.5 YR 6/6) interbedded with light gray CLAY, dry to moist		
50						SILTY CLAY interbedded with CLAY, yellow-brown (10YR 5/6), light gray, and red-gray, moist		PVC well screen
		SP				SAND, saturated		
55		SC/SM				SILTY SAND and SAND, red-yellow, interbedded with gray CLAY laminations, saturated		
60						SAND, brown (7.5YR 4/3), saturated		
		CL				CLAY, strong brown (7.5YR 5/8)		
						SILTY CLAY, gray (5Y 5/1) and very dark gray (5Y 3/1) CLAY, hard, dry		Well depth=63'
						BORING TERMINATED AT 64 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-20 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/8/2012 - 8/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	220.91 Ft. AMSL
REMARKS		**GROUND ELEVATION**	218.40 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		ML	0-4	75		SILTY SAND, brown, dry
						SANDY CLAY, red
5		CL	4-9	40		SANDY CLAY, yellow-red, pale brown mottles, dry to moist
10		SP	9-14	60		SAND, yellow (10YR 7/8) and yellow-red (5YR 5/8), few light gray CLAY laminations, dry
15			14-19	60		SAND, yellow (10YR 7/8) and yellow-red (5YR 5/8), few light gray CLAY laminations, dry
						----iron hard pan----
20		CL	19-24	100		CLAY, dark green-gray (5BG 4/1), moist to dry
						CLAY, very dark gray, lignite
25			24-29	100		CLAY, dark gray (2.5Y 4/1), dry
						CLAY, very dark gray, lignite seams, hard
30			29-34	100		CLAY, dark gray (2.5 4/1), massive bedding structure, dry
35			34-39	100		CLAY, dark gray (2.5 4/1), massive bedding structure, dry
40			39-44	100		CLAY, dark gray (2.5 4/1), massive bedding structure, dry
						CLAY, very dark gray, carbonized detritus on bedding planes
45		SP-SC	44-49	100		Iron pan, strong brown (7.5 YR 5/8)
						CLAY, brown (7.5YR 4/3)

WATER LEVEL & DATE

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Bentonite seal

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-20 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/8/2012 - 8/8/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, pale brown to pale yellow		
50		SP	49-54	80		SAND, light gray (10YR 7/2) and strong brown, dry to moist		PVC well screen
55			54-59	60		SAND, light gray-brown, wet		
		SC				SAND, red (2.5YR 5/6) and strong brown, some CLAY		
60		SP	59-64	80		SAND, pale yellow (2.5Y 7/3), saturated		Silica sand pack
65			64-69	100		SAND, pale yellow (2.5Y 7/3), saturated		Well depth=69'
						BORING TERMINATED AT 69 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

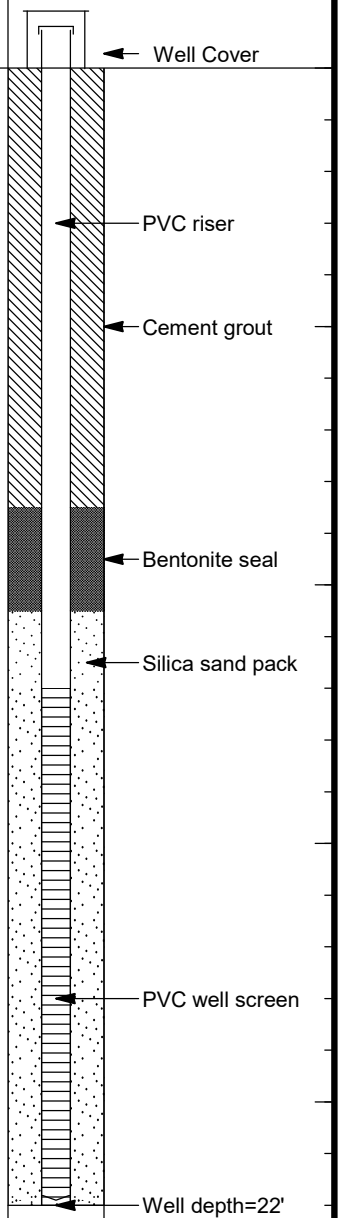
LOG OF BORING PZ-20 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2012 - 12/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	221.69 Ft. AMSL
REMARKS		**GROUND ELEVATION**	218.60 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
	SC	0-4	113		CLAYEY SAND (~20% clay), dark yellowish brown (10YR 4/2) to light brown (5YR 5/6), organic material, medium to coarse grained
					SANDY CLAY (~20-30% sand), light brown (5YR 5/6), some reddish-yellow mottles
5	SP/CL	4-9	75		INTERBEDDED SAND AND CLAY, SAND: light brown (5YR 5/6) to dark yellowish orange (10YR 6/6), very fine grained. CLAY: pale yellowish brown (10YR 6/2), beds 1-4" thick, red mottles; dry
10	SP	9-14	40		SAND, pale yellowish orange (10YR 8/6) to light brown (5YR 5/6), infrequent clay beds <1" thick, crossbedding, micaceous
15		14-19	44		SAND, pale yellowish orange (10YR 8/6), with interbedded very light gray (N7) beds, ~3" thick, very fine grained; very saturated
20		19-24	100		lignite bed ~1" thick, ironstone and brownish clay
	CL				CLAY, medium gray to light gray (N5 to N7)
					BORING TERMINATED AT 24 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

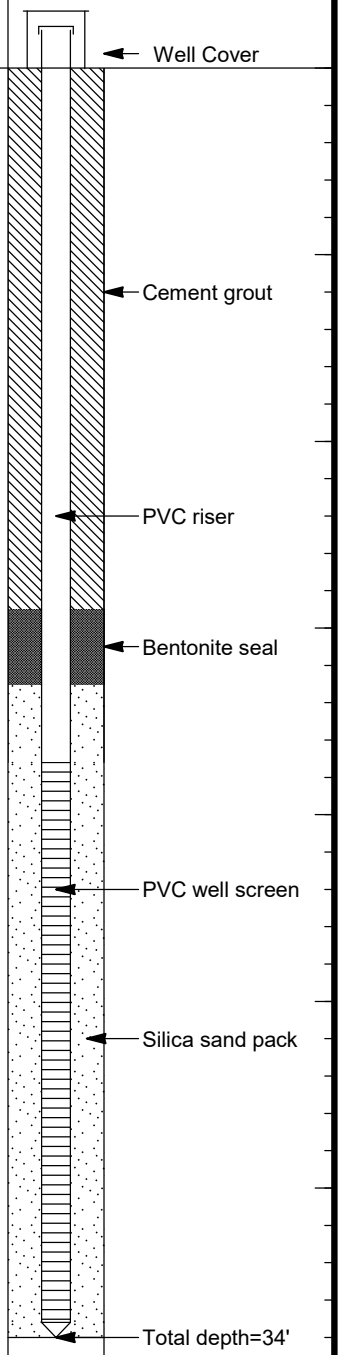
LOG OF BORING PZ-21 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	6/25/2012 - 6/25/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	193.98 Ft. AMSL
REMARKS		**GROUND ELEVATION**	190.49 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		0-4	75		CLAY, dark red-gray (10R 4/1) with dusky red mottles, dry
					----red-gray with strong brown mottles, dry
		4-9	100		CLAY, dark gray (5Y 4/1), dry, hard
5					----black (5Y 2.5/1), weathered, shale-like bedding, carbonaceous, dry
		9-14	100		CLAY, black (7.5YR 2.5/1) with shale-like bedding, dry
10	CL				
		14-19	100		CLAY, dark gray (7.5 YR 4/1) with silt laminations, dry
15					Brown CLAY (7.5YR 4/3) with iron pan bedding, dry
		19-24	80		CLAY, red-brown (5YR 4/3) with iron concretions
20	SM				SILTY SAND, light gray and red-yellow, moist
	CL				SILTY CLAY, gray (7.5YR 6/1)
		24-29	100		----SAND, wet---- SAND, yellow (10YR 7/6) and brown-yellow (10YR 6/8), wet
25	SP				
		29-34	60		SAND, yellow-brown, (10YR 5/8) some mica, saturated
30					BORING TERMINATED AT 34 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-22 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/9/2012 - 8/10/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	242.71 Ft. AMSL
REMARKS		**GROUND ELEVATION**	239.99 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP	0-4	63		SAND, very pale brown		Well Cover
						SANDY CLAY, red and yellow-red		
5			4-9	40		SANDY CLAY, strong brown (7.5YR 6/8), dry		
		SP/CL						
10			9-14	40		SANDY CLAY, strong brown (7.5YR 6/8), dry		Cement grout
15			14-19	40		SANDY CLAY, strong brown (7.5YR 6/8), dry		PVC riser
						SAND, very pale brown		
		SP-SC						
20			19-24	50		CLAYEY SAND, strong brown, interbedded with very pale brown SAND dry		
						CLAY, brown-yellow (10YR 6/8) and pink-gray (5YR 6/2), interbedded with brown-yellow SAND, saturated		
25		CL	24-29	60				
						SILTY CLAY, gray (10YR 6/1)		
			29-34	40		SAND, red-yellow (7.5YR 6/6) saturated		
30								
		SP-SC				----gray CLAY seam, 0.2' thick----		
35			34-39	100		SAND, brown-yellow, saturated		
40			39-44	100		CLAY, strong brown and gray laminated, dry		
						CLAY, dark gray, hard		
45			44-49	100				

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-22 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/9/2012 - 8/10/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50		CL	49-54	100		CLAY, very dark gray, dry CLAY, very dark gray, dry Black CLAY with lignite CLAY, very dark gray, dry ----lignite seam, 0.5' thick----		
55			54-59	100		CLAY, very dark gray and black, few lignite seams		
60			59-64	100		CLAY, black, carbonaceous, dry		Bentonite seal
65			64-69	100		Black CLAY with lignite CLAY, very dark gray, carbonized detritus on bedding planes		Silica sand pack
70			69-74	100		----iron hard pan---- ----iron hard pan---- SAND, very pale brown, few CLAY seams, wet ----saturated----		PVC well screen
75		SC	74-79	100		SAND, yellow-brown (10YR 5/8) with few gray CLAY seams, wet to saturated		
80			79-84	80		SAND, gray and strong brown, few gray CLAY seams, saturated		Well depth=82'
						BORING TERMINATED AT 84 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

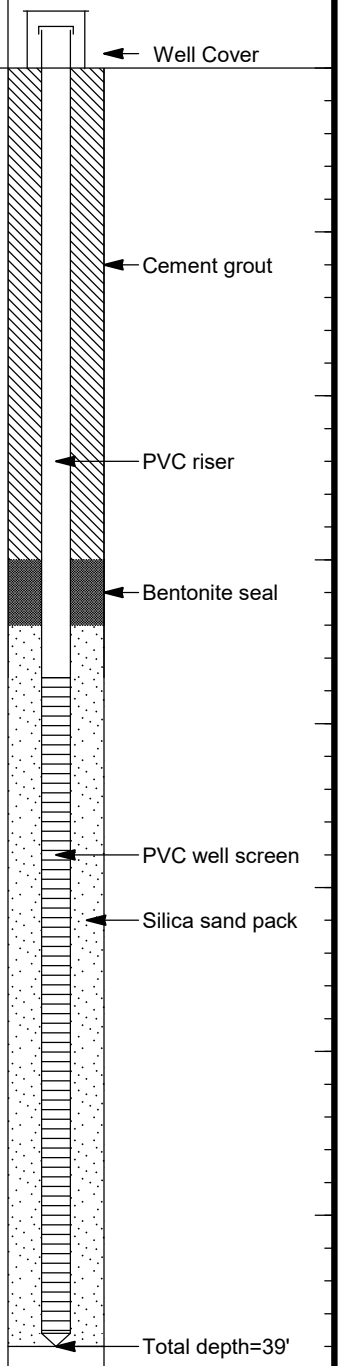
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-22 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Shaughnessy
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	8/10/2012 - 8/10/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	242.40 Ft. AMSL
REMARKS		**GROUND ELEVATION**	240.23 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SP				SAND, very pale brown	
						SANDY CLAY, red and yellow-red	
5		CL				SANDY CLAY, strong brown (7.5YR 6/8), dry	
10						SANDY CLAY, strong brown (7.5YR 6/8), dry	
15						SANDY CLAY, strong brown (7.5YR 6/8), dry	
						SAND, very pale brown	
20		SP-SC				CLAYEY SAND, strong brown, interbedded with very pale brown SAND dry	
25		CL				CLAY, brown-yellow (10YR 6/8) and pink-gray (5YR 6/2), interbedded with brown-yellow SAND, saturated	
						SILTY CLAY, gray (10YR 6/1)	
30						SAND, red-yellow (7.5YR 6/6) saturated	
		SP-SC				----gray CLAY seam, 0.2' thick----	
35						SAND, brown-yellow, saturated	
						BORING TERMINATED AT 39 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

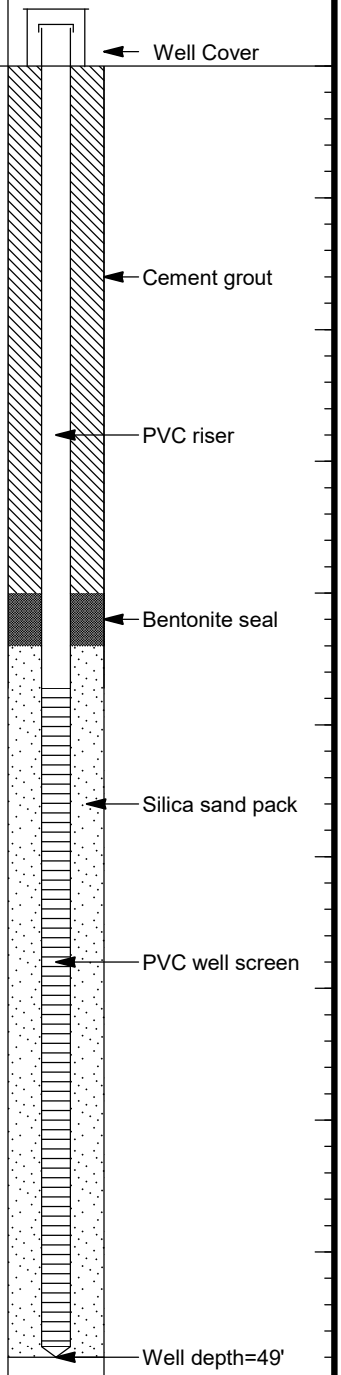
LOG OF BORING PZ-23 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/25/2012 - 10/25/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	208.35 Ft. AMSL
REMARKS		**GROUND ELEVATION**	205.19 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	50		SAND, dark yellowish brown (10 YR 4/2), to grayish yellow (5Y 8/4), fine grained, dry
5		SP	4-9	45		SAND, grayish yellow (5Y 8/4), and grayish orange (10YR 7/4), medium to fine grained, interbedded, moist
10			9-14	66		SAND, dark yellowish orange (10YR 6/2) to dark yellowish orange (10YR 6/6), interbedded, very moist.
15		CL	14-19	85		-----lignite bed------ CLAY, dark gray (N3), and medium dark gray (N4), some lignite interbedding, dry
20			19-24	100		
25		SP	24-29	80		SAND, cemented, and coarse grained, thin ironstone bedding, clay lenses, pale yellowish brown (10YR 6/2), and brownish gray (5YR 4/1), crossbedded, dry SAND, pale yellowish brown (10YR 6/2), dark yellowish orange (10YR 6/6), to very pale orange (10 YR 8/2), very fine grained, some clay lenses, ironstone, crossbedded, dry
30			29-34	60		
35			34-39	56		SAND, dark yellowish orange (10 YR 6/6), to pale yellow (10 YR 8/6), crossbedded, lignite traces ~39', moist
40			39-44	60		SAND, dark yellowish orange (10YR 6/6), and light brown (5YR 5/6), very fine grained, ironstone and lignite traces, saturated
45			44-49	100		SAND, pale yellowish brown (10YR 6/2), to grayish orange pink (5YR 7/2), very fine grained, lignite traces, crossbedded, saturated SAND, very pale orange (10YR 8/2), fine grained, thinly laminated, lignite traces, saturated
						BORING TERMINATED AT 49 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

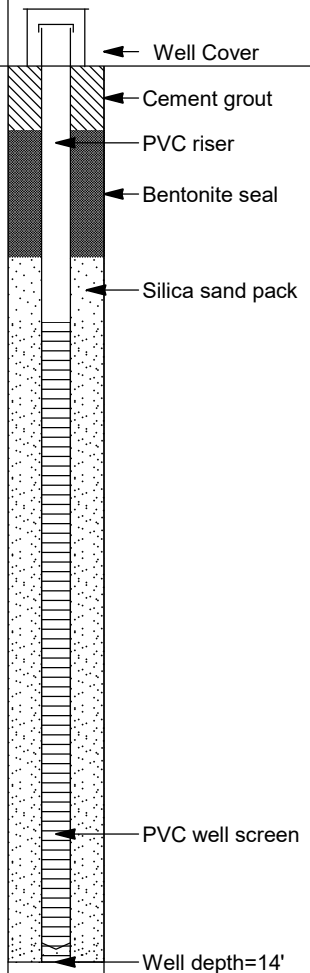
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-23 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/12/2012 - 12/12/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	208.67 Ft. AMSL
REMARKS		**GROUND ELEVATION**	205.83 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	38		SAND, dark yellowish brown (10YR 4/2) to gray yellow (5Y 8/4), some organic material; moist	
5		SP	4-9	50		SAND, grayish orange (10YR 7/4) to grayish yellow (5Y 8/4), medium to fine grained, light crossbedding, moist	
10			9-14	50		SAND, pale yellowish brown (10YR 6/2) to very pale orange (10YR 8/2)	
		CL				small lignite bed followed by CLAY, medium light gray to dark gray (N6 - N3)	
						BORING TERMINATED AT 14 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

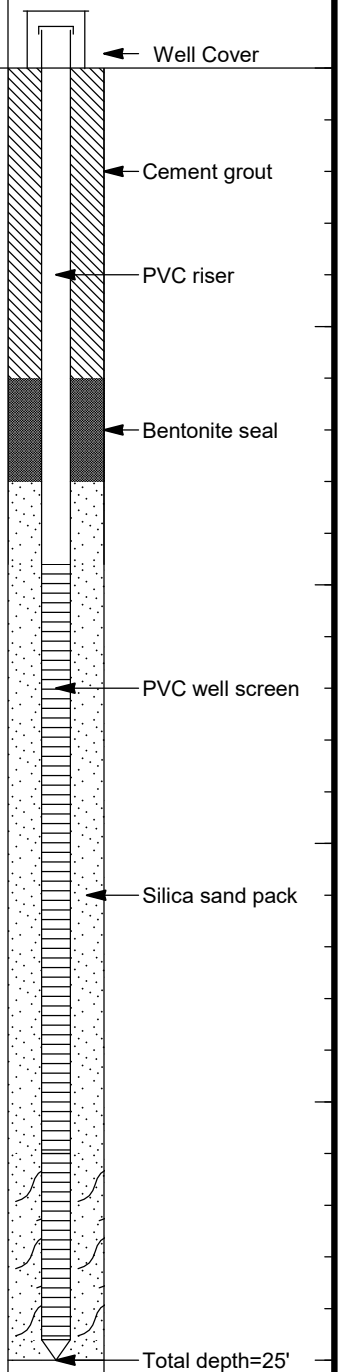
LOG OF BORING PZ-24 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/8/2012 - 10/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	187.54 Ft. AMSL
REMARKS		**GROUND ELEVATION**	184.34 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SC	0-5	100		CLAYEY SAND, dark yellowish brown (10YR 4/4), some root fragments
						SAND with some CLAY, light yellowish brown (10YR 6/4), moist
5			5-10	80		CLAYEY SAND (70% sand), brownish yellow (10YR 6/6), then SANDY CLAY, reddish yellow (5YR 6/8) and light gray (5YR 7/1), mottled
		SP				SAND, pale yellow (2.5Y 8/3) and very pale brown (10YR 8/3), fine grained, cross-bedded, dry
10			10-15	54		SAND, yellow (10YR 7/8), reddish yellow, and very pale brown, fine to medium grained, cross-bedded, moist
15			15-20	66		SAND, yellowish brown (10YR 5/6), white (7.5YR 8/1), and very pale brown, fine grained, micaceous, very moist to wet
20			20-25	50		SAND, yellow and white, micaceous, saturated
25						BORING TERMINATED AT 25 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

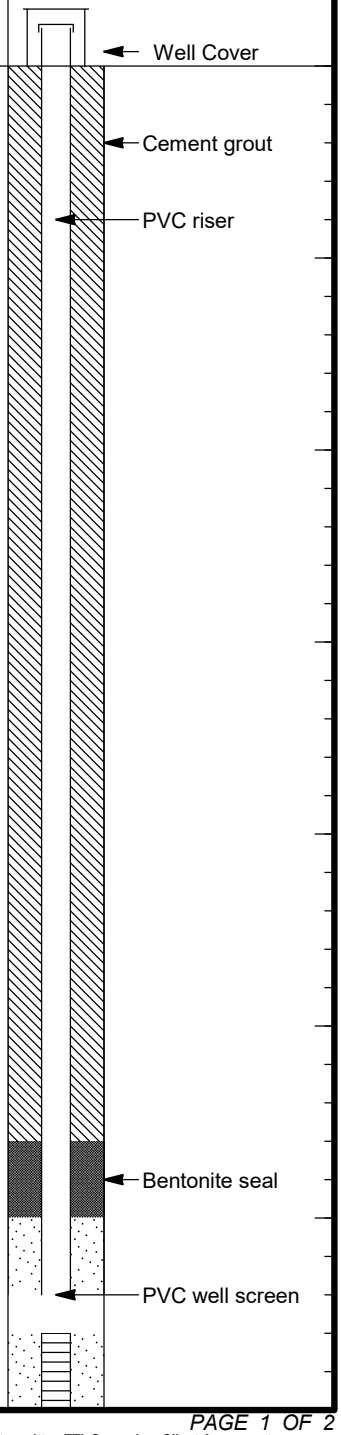
BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARTLOW EXPANSION PROPERTY

LOG OF BORING PZ-24 D(R) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2019 - 12/11/2019
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	
REMARKS		**GROUND ELEVATION**	
		DEPTH TO WATER	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-2	100	NM		
		CL/CH				lean sandy CLAY, light brown (SYR 5/6). moist, low plasticity	
5		CL/CH	5-7	100	NM	fat CLAY, high plasticity, slightly moist, mottled medium gray (N5), light brown (SYR 5/6), and medium redish brown (10R 4/6)	
10		CH	10-12	100	NM	CLAY, fat, stiff, average plasticity, slightly moist, mottled medium gray (N5), light brown (SYR 5/6), and medium redish brown (10R 4/6), colors evenly split 30/30/30	
15		SC	15-17	100	NM	sandy CLAY, dense, 70/30 clay to sand, gradational contact to dense, hard, hat clay, light olive gray 5Y5/2 to dark gray (N3), (outside of spoon wet and saturated)	
20		CH/SC	20-22	100	NM		
25		CH/SP	25-27	100	NM	fat CLAY, dense, high plasticity, medium dark gray (N4) to 25.5, last 6" is well sorted DRY, fine grained qtz sand, subrounded, start of second aquifer	
			27-29	40	NM		
30		SP	30-32	50	NM	dry SAND, clean well sorted beach sand, dry, very pale orange (10YR 8/2)	
			34-36	100	NM	dry SAND, clean, well sorted, moist, very pale orange (10YR	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\GINT\BWSWA EXPANSION LOGS (PZ01-PZ51).GPJ 5/21/21 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARTLOW EXPANSION PROPERTY

LOG OF BORING PZ-24 D(R) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2019 - 12/11/2019

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP				8/2) with thin layers of light-brown (SYR 5/6)		
40		SP				SAND, saturated, dark yellowish orange (10YR 6/6) BORING TERMINATED AT 42 FEET.		Silica sand pack Total depth=24'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\GINT\BWSWA EXPANSION LOGS (PZ01-PZ51).GPJ 5/21/21 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

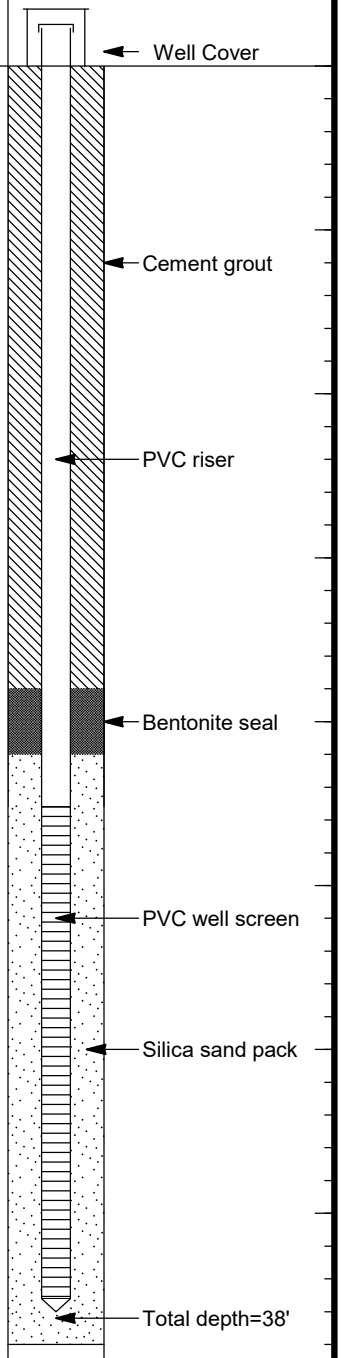
LOG OF BORING PZ-25 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/4/2012 - 10/4/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	196.61 Ft. AMSL
REMARKS		**GROUND ELEVATION**	194.77 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
	SP	0-4	83		4" topsoil, then SAND, brownish yellow (10YR 6/6), moist
	CL				SILTY CLAY, light gray (10YR 7/2) and red (10R 5/8), mottled
					SAND, reddish yellow (7.5YR 6/8) and light gray (10YR 7/2), fine grained, mottled
5		4-9	20		SAND, light yellowish brown (10YR 6/4), light gray (10YR 7/2), and red, fine to medium grained, moist
10		9-14	36		CLAYEY SAND, light gray (10YR 7/2) and red (10R 5/8) mottled, then SAND, reddish yellow (7.5YR 6/8) and light yellowish brown (10YR 6/4)
15		14-19	60		SAND, very pale brown (10YR 8/3) and reddish yellow (7.5YR 6/8), very fine grained, cross-bedded, some clayey sands, moist
20	SP	19-24	70		SAND, very pale brown and reddish yellow (7.5YR 6/8), very fine grained, cross-bedded, moist
25		24-29	54		SAND, very pale brown, reddish yellow (7.5YR 6/8), and white (10YR 8/1), cross-bedded, very moist
30		29-34	40		SAND, mostly very pale brown and white (10YR 8/1), few cross-beds, saturated
35		34-39	54		SAND, very pale brown, white (10YR 8/1), and reddish yellow (7.5 YR 6/8), very fine grained, cross-bedded, saturated
					BORING TERMINATED AT 39 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

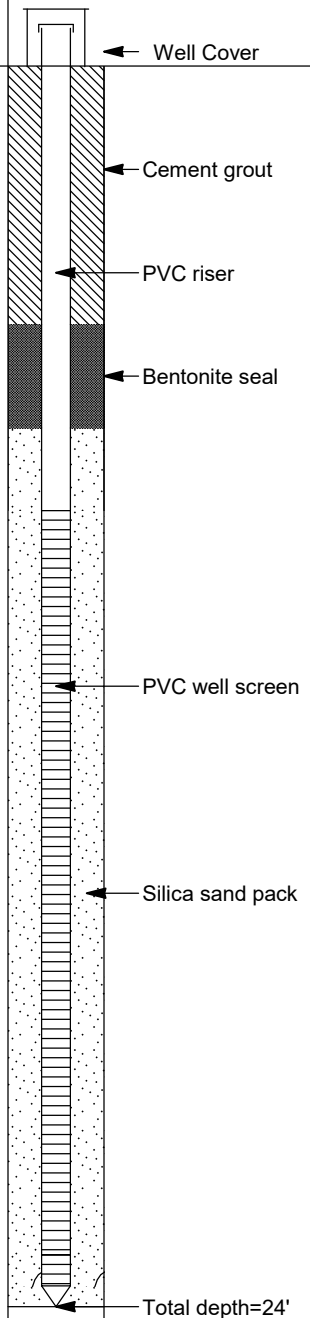
LOG OF BORING PZ-26 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/8/2012 - 10/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	187.15 Ft. AMSL
REMARKS		**GROUND ELEVATION**	183.94 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	100		4" topsoil, then CLAYEY SAND, brown (7.5YR 5/4), then SANDY CLAY, (2.5YR 4/4), then CLAYEY SAND, reddish yellow (7.5YR 6/8) and light brown (7.5YR 6/4)
5		SC	4-9	40		CLAYEY SAND (25% clay), light gray (10YR 7/2) and reddish yellow, moist
			9-14	46		
10						SAND, very pale brown (10YR 7/3), light gray, and white, fine grained, cross-bedded
			14-19	64		SAND, brownish yellow (10YR 6/8), reddish yellow (5YR 6/6), and very pale brown, some thin interbedded clays, rip-up clasts and bioturbation present, moist to wet
15		SP				
			19-24	50		SAND, brownish yellow and yellow, some clayey sand, cross-bedded, saturated
20						
						BORING TERMINATED AT 24 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

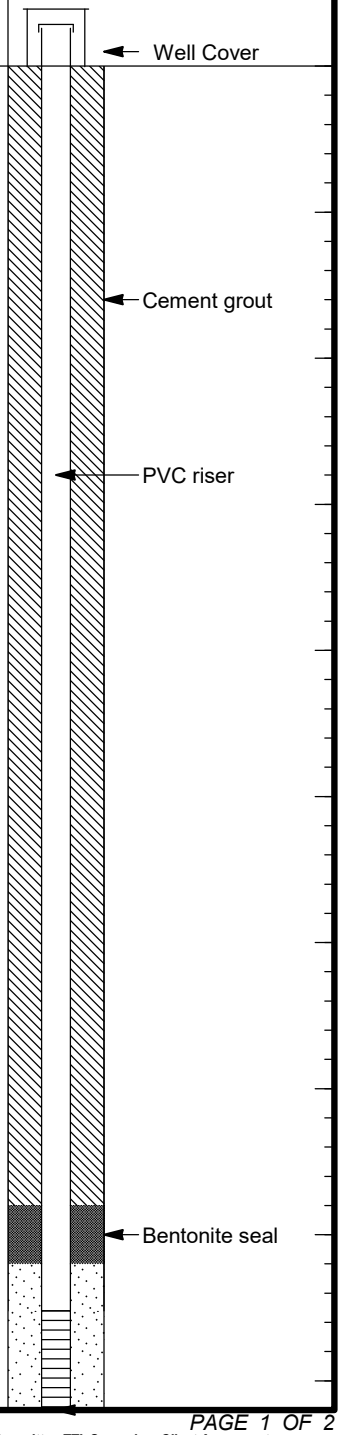
LOG OF BORING PZ-27 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/5/2012 - 10/5/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	218.38 Ft. AMSL
REMARKS		**GROUND ELEVATION**	216.77 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SC	0-4	83		SANDY CLAY, reddish brown (5YR 5/4), medium grained, topsoil, some root fragments	
5		SP	4-9	60		SAND, yellow (10YR 7/8) and yellowish red (5YR 4/6), medium grained, moist	
10			9-14	100			
		SC				CLAYEY SAND, yellowish red (5YR 5/8), medium grained, micaceous, moist	
15		SP/CL	14-19	42		SAND, yellow and yellowish red, interbedded with CLAYEY SAND (10% clay), yellowish red, moist	
20		SP	19-24	56		SAND, reddish yellow (7.5 YR 6/8) and light gray (5Y 7/1), medium to coarse grained, dry, some interbedded clay	
25			24-29	78		SAND with some GRAVEL, reddish yellow (7.5YR 6/8), medium to coarse grained, dry, then SANDY CLAY, pale brown (10YR 6/3), clay content increasing with depth	
						SANDY CLAY, pale brown (10 YR 6/3), moist	
30			29-34	80		SAND, yellow (10YR 7/6) and light gray (5YR 7/1), fine grained, some cross-bedding, dry	
35			34-39	54		SAND, white (5YR 8/1), fine grained, cross-bedding, dry	
40			39-44	70		SAND, yellow (2.5YR 8/8) and pale yellow (2.5YR 8/2), fine grained, moist	
45			44-49	62		SAND, yellow (2.5 YR 8/8) to reddish yellow (7.5 YR 6/8), medium grained, cross-bedding, very moist	

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-27 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/5/2012 - 10/5/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50			49-54	80		SAND, yellow (2.5YR 7/8) to very pale brown (10YR 7/3), medium to fine grained, saturated		PVC well screen; Silica sand pack
55			54-59	74		SAND, brownish yellow (10YR 6/8), fine grained, saturated		Total depth=58'
						BORING TERMINATED AT 59 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

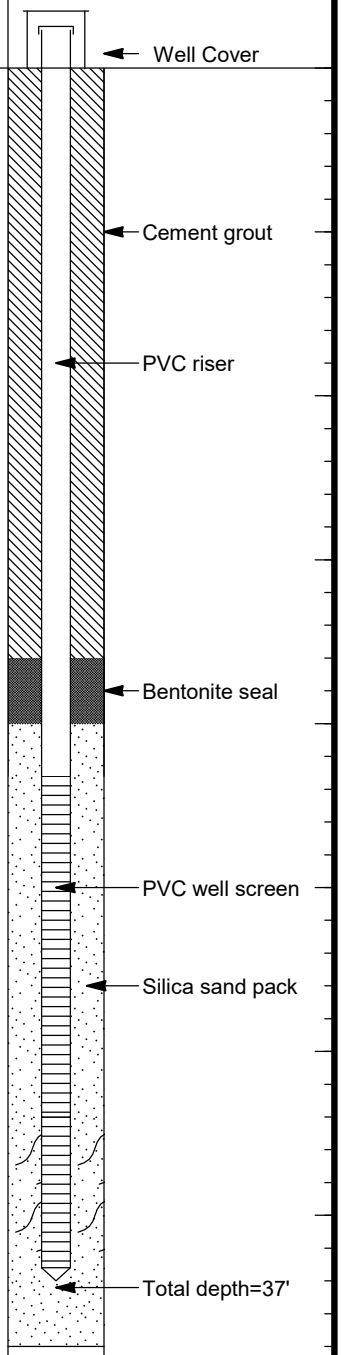
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-28 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/8/2012 - 10/8/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	199.73 Ft. AMSL
REMARKS		**GROUND ELEVATION**	196.98 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SC	0-4	88		4" topsoil, then SANDY CLAY, yellowish brown (10YR 5/4), then SILTY CLAY, red (10R 4/8) and light gray (10R 7/1), mottled	
5		SC	4-9	100			
		SP				SAND, yellow (10YR 7/6) and very pale brown (10YR 8/3), fine to medium grained, dry	
10		SP	9-14	66			
		SP/CL				CLAY and SILTY CLAY, light gray and reddish yellow, thinly bedded	
15		SP/CL	14-19	74			
20		SP/CL	19-24	66			
25		SP	24-29	64		SAND, very pale brown and reddish yellow, fine to medium grained, some cross-bedding, iron staining, moist to very moist	
30		SP	29-34	40		SAND, very pale brown, reddish yellow, and white, cross-bedding, some black carbon staining, wet to saturated	
35		SP	34-39	54		SAND, yellow (7/6 10YR and 7/8 10YR), saturated	
						BORING TERMINATED AT 39 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-29 D & PIEZOMETER CONSTRUCTION

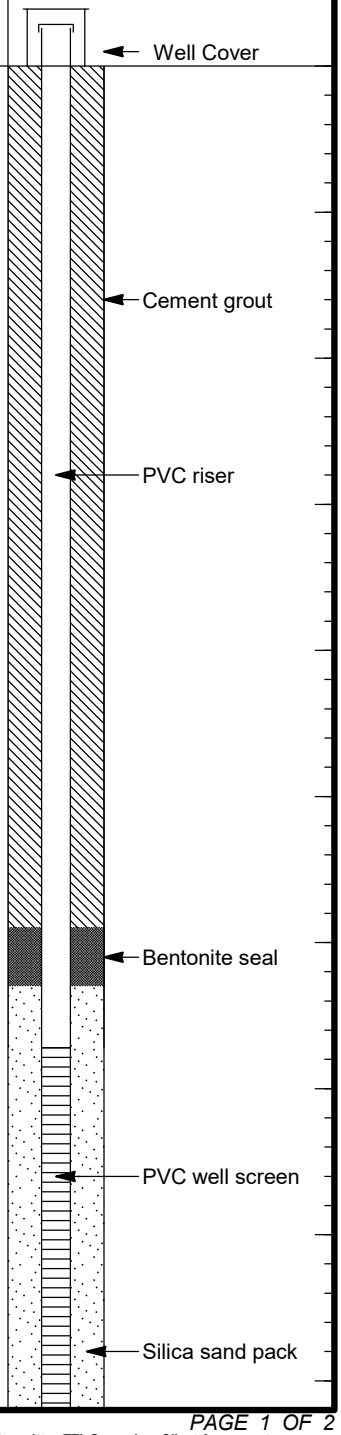
PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/10/2012 - 10/10/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	217.59 Ft. AMSL
REMARKS		**GROUND ELEVATION**	216.39 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SP	0-4	100		SAND, grayish orange (10YR 7/4) and light brown (5YR 5/6), fine to medium grained, silty, some roots
5			4-9	56		SAND, light brown (5YR 5/6) to very pale orange (10YR 8/2), fine to medium grained, some clay (10%), becoming more clay-rich with depth
						- approximately 3-4" of water on top of clay.
10		CL	9-14	100		CLAY, medium light gray (N6), slightly silty, stiff, plastic, becoming less silty and darker with depth
						---lignite seam--- - ~0.5"
15			14-19	100		CLAY, medium gray (N5), soft, plastic
		SP/CL				CLAY, interbedded medium gray (N5), very light gray (N8) and dark yellow orange (10YR 6/6), stiff, plastic, with SAND light brown(5YR 5/6), very fine grained, dry
20			19-24	92		
25			24-29	100		CLAY, brown gray (5YR 4/1), slightly silty, stiff, with thin (0.05 - 1.5") lenses of SAND, pale yellow orange (10YR 8/6) to very light gray (N8), fine grain, dry
30			29-34	86		SAND, light brown (5YR 5/6) to very pale orange (10YR 3/2) to moderate red (5R 5/4 to 5R 4/6) fine grained, micaceous
35			34-39	74		SAND, pale yellowish orange (10YR 8/6) to grayish orange pink (10YR 7/2), fine grained, dry
40		SP	39-44	60		SAND, grayish orange pink (10R 8/2), very pale orange (10YR 8/2), and pale yellow orange (10YR 8/6), thinly cross-bedded, fine grained, dry
45			44-49	68		SAND, as in 39-43 feet; saturated at 47'

Continued Next Page

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-29 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/10/2012 - 10/10/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50			49-54	62				
						BORING TERMINATED AT 54 FEET.		Total depth=54'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

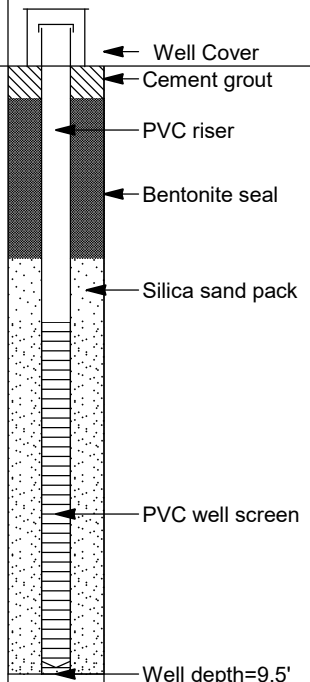
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-29 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2012 - 12/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	223.17 Ft. AMSL
REMARKS		**GROUND ELEVATION**	220.58 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	50		SAND (topsoil), grayish orange (10YR 7/4), fine grained, organic material; saturated	
						SILTY SAND, light brown (5YR 5/6), some lignite traces	
5		SP	4-9	90		SAND with clay, (~15% clay), dark yellowish orange (10YR 6/6) and some light brown (5YR 5/6)	
						SAND, very pale orange (10YR 8/2), very fine grained; saturated	
						2" lignite seam followed by: SAND, coarse grained, dark yellowish brown (10YR 4/2); dry	
10		CL	9-11.9	100		CLAY, (~20% sand), brownish gray (5YR 4/1) to medium gray (N5), plastic	
						BORING TERMINATED AT 11.9 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-30 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/24/2012 - 10/24/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	237.14 Ft. AMSL
REMARKS		**GROUND ELEVATION**	234.93 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
			0-4	38		SAND, dark yellowish orange (10YR 6/6) to moderate red brown (10R 4/6), medium to fine grained, topsoil, dry		Well Cover
5			4-9	30				
10		SP	9-14	60		SAND, pale yellowish orange (10YR 8/6), fine grained, interbedded with SANDY CLAY yellowish gray (5Y 7/2), dry		Cement grout
15			14-19	46		-----lignite bed---- - ~2"		PVC riser
20			19-24	62		SAND, grayish orange (10YR 7/4) to very pale orange (10YR 8/2) to dark reddish brown (10R 3/4), with some SANDY CLAY (yellowish gray (5Y 7/2) crossbedded, very saturated		
25		CL	24-29	100		----ironstone bed---- dry CLAY, medium gray (N5), sand content ~15% increasing with depth, dry SANDY CLAY, medium gray (N5), sand content decreasing with depth, micaceous, dry		
30			29-34	100		CLAY medium dark gray (N4) to gray black (N2), with repeating ~6" lignite and ~10" SANDY CLAY beds, medium gray (N5) to medium light gray (N6) sand content 30%, dry		
35			34-39	100				
40			39-44	100		CLAY medium light gray (N6), sand content increases with depth		
45			44-49	100		SANDY CLAY, medium bluish gray (5B 5/1), dry		

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310303 3.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-30 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/24/2012 - 10/24/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						CLAYEY SAND, medium light gray (N6), very fine grained, clay content ~20%,		Bentonite seal
50		SP/CL	49-54	80		SANDY CLAY, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), very fine to coarse grained, some cemented sand in "wafer" shapes, ironstone, dry		
						CLAY, dark yellowish brown (10YR 4/2), cyclicly interbedded every 6" with SAND grayish orange (10YR 7/4) very fine grained, dry		
55			54-59	46				PVC well screen
						SAND, grayish orange (10 YR 7/4) to very pale yellowish orange (10 YR 8/2), very fine grained, lightly crossbedded, single CLAY bed <1" thick, dry		
60		SP	59-64	60				Silica sand pack
65			64-69	0		No Recovery; presumed to be saturated sand		
70		SP	69-74	40		SAND, very pale orange (10YR 8/2), very fine grained, some crossbedding, saturated		Total depth=74'
						BORING TERMINATED AT 74 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

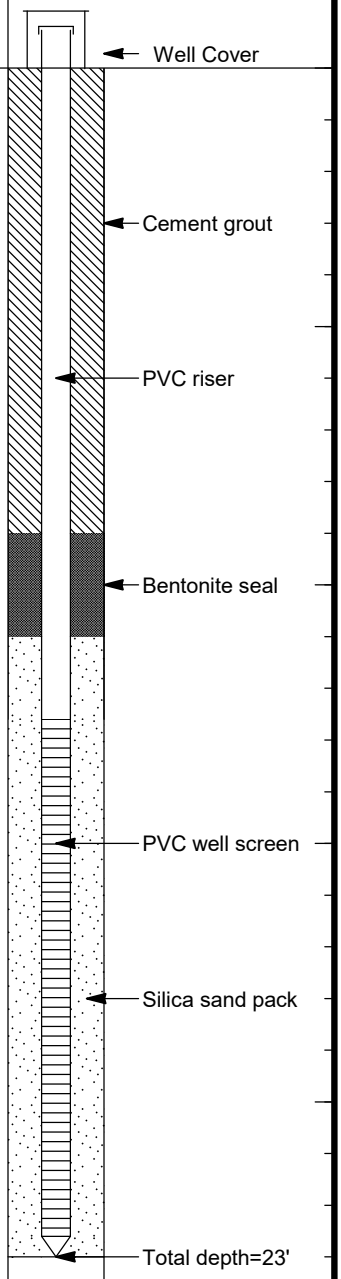
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-30 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/24/2012 - 10/24/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	237.85 Ft. AMSL
REMARKS		**GROUND ELEVATION**	234.93 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						SAND, dark yellowish orange (10YR 6/6) to moderate red brown (10R 4/6), medium to fine grained, topsoil, dry	
		SP				SAND, pale yellowish orange (10YR 8/6), fine grained, interbedded with SANDY CLAY yellowish gray (5Y 7/2), dry	
						-----lignite bed---- - ~2"	
						SAND, grayish orange (10YR 7/4) to very pale orange (10YR 8/2) to dark reddish brown (10R 3/4), with some SANDY CLAY (yellowish gray (5Y 7/2) crossbedded, very saturated	
						----ironstone bed---- dry	
		CL				CLAY, medium gray (N5), sand content ~15% increasing with depth, dry	
						BORING TERMINATED AT 23 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

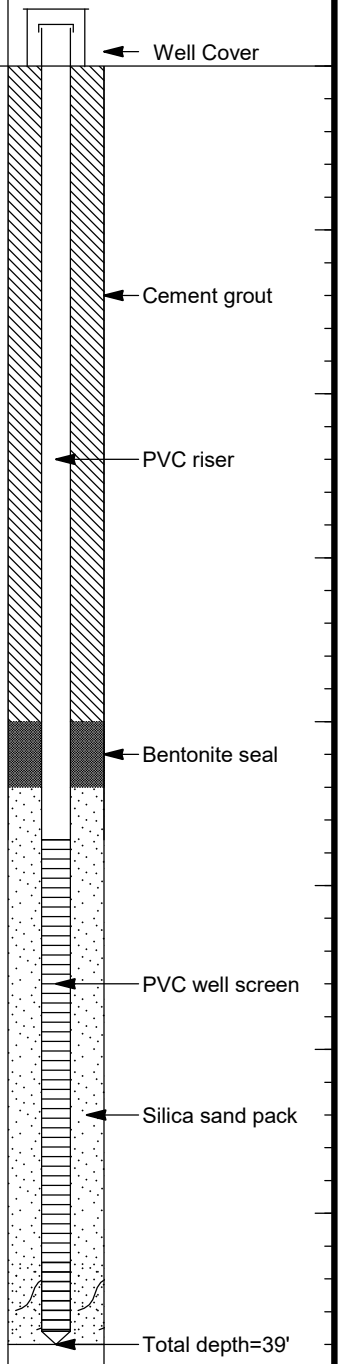
LOG OF BORING PZ-31 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/10/2012 - 10/10/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	205.16 Ft. AMSL
REMARKS		**GROUND ELEVATION**	201.93 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	SP	0-4	48		SAND, very pale brown (10YR 7/4), fine to medium grained, silty
	SC				CLAYEY SAND (30% clay), brownish yellow (10YR 6/6) to yellowish red (5YR 5/6), somewhat mottled, fine to medium grained
5		4-9	100		
					SAND, brownish yellow (10YR 7/4), fine grained, some cross-bedding, dry
10		9-14	24		
15		14-19	60		SAND, white (N9) to yellowish red (5YR 5/6), fine to medium grained, bedding, CLAY seam, light brownish gray (10YR 6/2)
20		19-24	62		SAND, white (N9) to yellowish red (5YR 5/6), some clay seams, some ironstone at 20'
	SP				
25		24-29	64		SAND, white (N9) to yellowish red (5YR 5/6), fine to medium grained
30		29-34	58		SAND, white (N9) to yellowish red (5YR 5/6), fine to medium grained, wet to saturated
35		34-39	60		SAND, white (N9) to yellowish red (5YR 5/6), fine to medium grained, saturated
					BORING TERMINATED AT 39 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-32 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/22/2012 - 10/24/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	256.25 Ft. AMSL
REMARKS		**GROUND ELEVATION**	253.79 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SC	0-4	56		SAND, modern yellowish brown (10YR 5/4) to modern reddish brown (10YR 4/6) and light brown (5YR 5/6), medium grained; dry	
5			4-9	45			
10			9-14	45			
15			14-19	40		CLAY, pale yellowish brown (10YR 6/2), interbedded with SAND light brown (5YR 5/6), coarse grained; dry	
20			19-24	30			
25			24-29	30		SAND, dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), coarse grained, crossbedded, lignite traces; dry	
30			29-34	60		SAND, grayish brown (5YR 3/2) to dark yellowish orange (10YR 6/6), medium grained, micaceous; very saturated	
35		CL	34-39	100		SAND, light brown (5YR 5/6), medium grained, lignite traces; dry CLAY, dark gray (N3) to medium light gray (N6), interbedded lignite, sand content increasing with depth; dry	
40			39-44	100		CLAYEY SAND to SANDY CLAY, medium bluish gray (5B 5/1), with sand content decreasing with depth; dry CLAY, medium dark gray (N4) to dark gray (N3), thinly laminated, alternating sand content	
45			44-49	30			

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

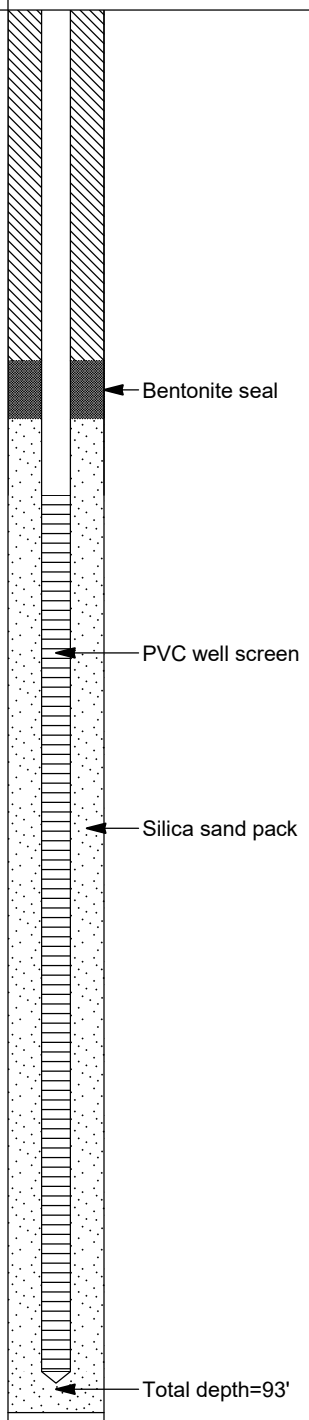
LOG OF BORING PZ-32 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/22/2012 - 10/24/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
50			49-54	0		-------Sample Not Retrieved-------, presumed gray clay	
55			54-59	100		SANDY CLAY, medium light gray (N6); dry	
60			59-64	100		SAND, dark yellowish orange (10YR 6/6), to pale yellowish brown (10YR 6/6) fine to very fine grained, crossbedded, ironstone, some cemented sand; dry	
65			64-69	100		CLAY, dark yellowish brown (10YR 4/2), cyclicly interbedded with SAND, pale yellowish brown (10YR 6/2), very fine grained, beds ~6-12" thick; dry	
70		SC/CL	69-74	100			
75			74-79	60		SAND CLAY, pale yellow brown (10YR 6/2) interbedded with SAND, gray orange (10YR 7/4), very fine grained, dry	
80			79-84	40		SAND, pale yellowish orange (10YR 8/6), fine to medium grained, lignite traces crossbedded; dry	
85			84-89	46		SAND, modern reddish brown (10R 4/6) to modern brown(5YR 3/4), coarse grained, cemented, lignite traces; dry	
90		SC	89-94	80		CLAYEY SAND, medium dark gray (N4); saturated SAND, grayish yellow (5Y 8/4), to yellowish gray (5Y 7/2), fine grained, some lignite traces; very saturated	
						BORING TERMINATED AT 94 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

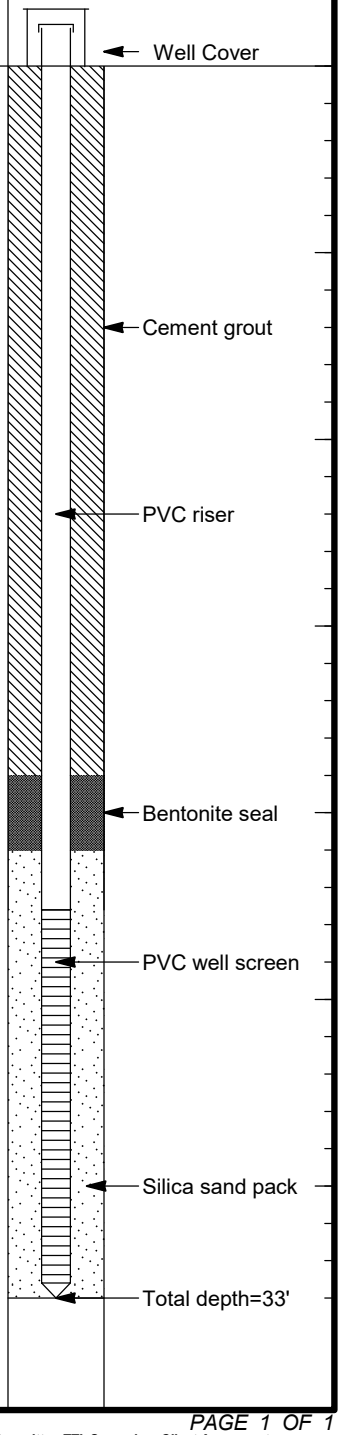
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-32 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/24/2012 - 10/24/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	256.97 Ft. AMSL
REMARKS		**GROUND ELEVATION**	253.79 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						SAND, modern yellowish brown (10YR 5/4) to modern reddish brown (10YR 4/6) and light brown (5YR 5/6), medium grained; dry	
5							
10		SC					
15						CLAY, pale yellowish brown (10YR 6/2), interbedded with SAND light brown (5YR 5/6), coarse grained; dry	
20						SAND, dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), coarse grained, crossbedded, lignite traces; dry	
25		SP				SAND, grayish brown (5YR 3/2) to dark yellowish orange (10YR 6/6), medium grained, micaceous; very saturated	
30						SAND, light brown (5YR 5/6), medium grained, lignite traces; dry	
						BORING TERMINATED AT 33 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303 3.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

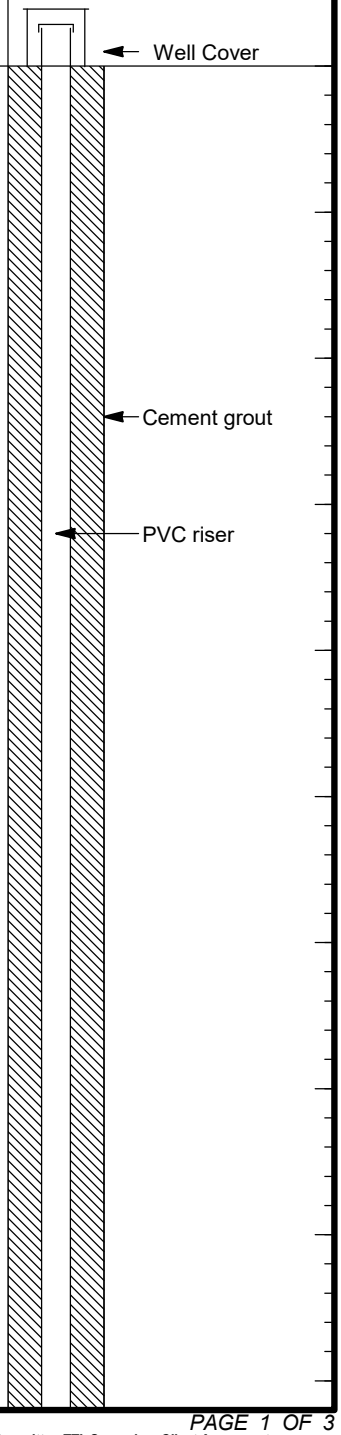
LOG OF BORING PZ-33 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/11/2012 - 10/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	270.98 Ft. AMSL
REMARKS		**GROUND ELEVATION**	267.67 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SC-SM	0-4	48		SAND, light brown (10YR 5/4), fine grained, silty, slightly clayey in places, dry	
5			4-9	76			
10			9-14	76			
15		SP	14-19	76		SAND, modern reddish brown (10R 4/6), fine grained, some ironstone	
20			19-24	56		SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained, 4" of ironstone; dry	
25			24-29	48			
30		SP/CL	29-34	48		CLAY, light gray (N8), interbedded with sand in thin beds	
35			34-39	100		SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained; dry SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained; dry CLAY, pale yellowish brown (10YR 6/2) to pale yellowish orange (10YR 8/4), stiff, plastic CLAY, medium dark gray (N4), stiff plastic, sandy; thin perched zone 33.5 - 34.3'	
40			39-44	78		SAND, dark yellowish orange (10YR 6/6), fine to medium grained, thin (<0.25") clay bedding, pale brown (5YR 5/2), fully saturated	
45			44-49	78		SAND, dark yellowish orange (10YR 6/6), fine grained, to CLAY, lean, sandy and brittle	

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-33 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/11/2012 - 10/11/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL				CLAY, medium dark gray (N4), dense sandy (~10% sand)		
50		PT	49-54	100		----LIGNITE SEAM----		
		CL-ML				CLAY, very light gray (N8) to medium gray (N5), ~25% sand, fine grained, micaceous		
55			54-59	100		CLAY, dark greenish gray (5GY 4/1), silty, thinly laminated to massive		
60			59-64	100				
		PT				-----LIGNITE SEAM-----		
65		CL-ML	64-69	100		CLAY, greenish gray (5GY 6/1) to dark greenish gray (5GY 4/1), alternating silty and massive		
70			69-74	100				
75			74-79	100		SANDY CLAY, (7.5YR 7/8), mottled, reddish yellow, some ironstone @ 78.5'		Bentonite seal
80			79-84	100		SAND, reddish yellow (7.5YR 7/8), yellow (10YR 7/8), to very pale brown (10YR 8/3), fine to very fine grained, some silty clay lenses, moist ~84.5-85'		
85			84-89	100				PVC well screen
90			89-94	100		SAND, mostly reddish yellow (7.5YR 7/8) and very pale brown (10YR 8/3), micaceous; moist to saturated		Silica sand pack
95		SP	94-99	40				

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-33 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/11/2012 - 10/11/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100			99-104	68				
105			104-109	60		SAND, yellow (10YR 7/8) to reddish yellow (7.5YR 7/8), some iron staining, fine - medium grained, saturated		Total depth=108'
						BORING TERMINATED AT 109 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

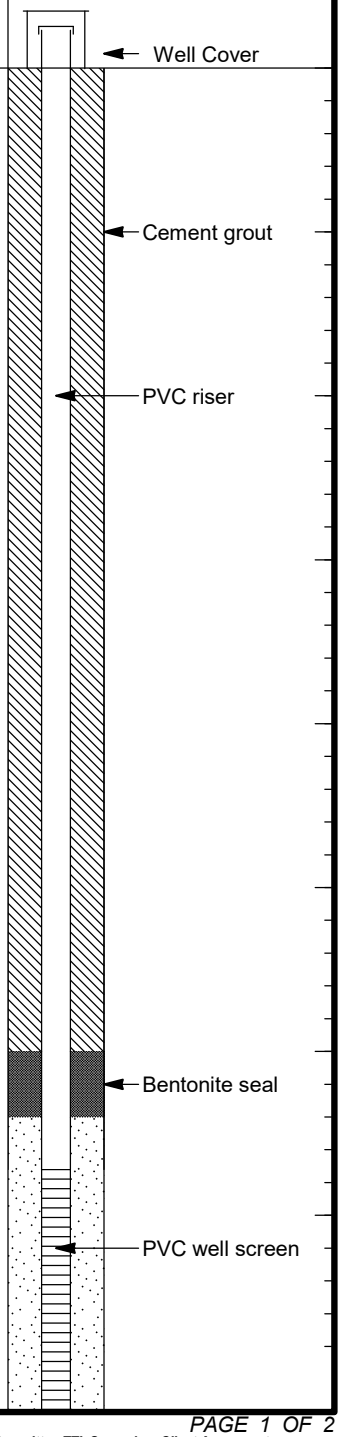
LOG OF BORING PZ-33 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/12/2012 - 10/12/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	270.47 Ft. AMSL
REMARKS		**GROUND ELEVATION**	267.67 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						SAND, light brown (10YR 5/4), fine grained, silty, slightly clayey in places, dry	
5		SC-SM					
10							
15						SAND, modern reddish brown (10R 4/6), fine grained, some ironstone	
20		SP				SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained, 4" of ironstone; dry	
25							
30						CLAY, light gray (N8), interbedded with sand in thin beds	
35		SP/CL				SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained; dry SAND, alternating colors modern reddish brown (10R 4/6) to yellowish gray (5Y 8/1), thin bedding, fine grained; dry CLAY, pale yellowish brown (10YR 6/2) to pale yellowish orange (10YR 8/4), stiff, plastic CLAY, medium dark gray (N4), stiff plastic, sandy; thin perched zone 33.5 - 34.3'	
						SAND, dark yellowish orange (10YR 6/6), fine to medium grained, thin (<0.25") clay bedding, pale brown (5YR 5/2), fully saturated	

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-33 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/12/2012 - 10/12/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, dark yellowish orange (10YR 6/6), fine grained, to CLAY, lean, sandy and brittle		Silica sand pack
		CL				CLAY, medium dark gray (N4), dense sandy (~10% sand)		
						BORING TERMINATED AT 39 FEET.		Total depth=49'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-34 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/15/2012 - 10/16/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	288.82 Ft. AMSL
REMARKS		**GROUND ELEVATION**	285.65 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SM	0-4	38		SAND, light brown (5YR 5/6) to dark yellow orange (10YR 6/6), medium grained, silty, loose; dry	
5			4-9	50			
10			9-14	65		SAND, dark yellowish orange (10YR 6/6) to pale yellowish brown (10YR 6/2) ,with clay (10% clay); moist	
						CLAYEY SAND, dark yellowish orange (10YR 6/6), medium grained, 30% clay; dry to moist	
15			14-19	90		CLAY, light gray (N7), interbedded with sand, dark yellowish orange (10YR 6/6) medium to fine grained, saturated thin perched zone @15-17.5'	
						SAND, light olive gray (5Y 6/1), fine grained,with alternating beds of CLAY light brown gray (5YR 6/1), beds ~10"; saturated	
20			19-24	80		SAND, dark yellowish orange (10YR 6/6), clay lenses <1" , thin lignite bed <2" thick,	
						SAND, yellowish gray (5Y 7/2), very fine grained, crossbedded; dry	
25			24-29	100		SAND, pale orange (10YR 8/2), very fine grained, crossbedded; moist	
						CLAY light brownish gray (5YR 6/1), alternating with beds of SAND yellowish gray (5Y 8/1) fine grained, dry	
30			29-34	100		SAND, dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), fine grained, some clay content increasing with depth, light brown gray (5YR 6/1); dry	
35			34-39	70			
40			39-44	64			
45		SP/CL	44-49	64		~2" ironstone; dry	
						SAND, dark yellowish orange (10YR 6/6) and very pale orange	

PIEZOMETER DIAGRAM: Well Cover; Cement grout; PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-34 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/15/2012 - 10/16/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						(10YR 8/2), fine grained, some clay lenses, light brown gray (5YR 6/1); dry		
						SAND, modern reddish brown (5R 5/4) to dark yellowish orange (10YR 6/6) and pale yellowish orange (10YR 8/6), fine to medium grained, crossbedded, micaceous; dry		
50			49-54	60				
55			54-59	45		SAND, pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), some clay bedding, micaceous; saturated		
60			59-64	68				
65			64-69	64				
70			69-74	60				
						SAND, medium gray (N5) to dark gray (N3), medium to large grained, some black, silty laminae, moist		
75			74-79	100		CLAYEY SAND, light gray (N7) to medium dark gray (N4) ~40% clay content, very fine grained, thinly laminated, micaceous; moist		
80			79-84	100				
						CLAY, grayish black (N2) to medium bluish gray (5B 5/1), sand content 10-25%, micaceous; damp near top, dryer with depth		
85			84-89	100				
						-----lignite seam------		
						CLAY interbedded with lignite, dark gray (N3); dry		
90		CL	89-94	100		SANDY CLAY, medium light gray (N6), sand content decreasing with depth, crossbedded; dry		
95			94-99	100		CLAY, medium light gray (N6) to medium gray (N4), some sand; dry		Bentonite seal

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-34 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/15/2012 - 10/16/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100		SP	99-104	100		SAND, light brown (5YR 5/6) to modern reddish brown (10R 4/6); dry		
						CLAYEY SAND, light brown gray (5YR 6/1), crossbedded		
						SAND, alternating colors gray orange (10YR 7/4), dark yellow orange (10YR 6/6) to pale yellowish brown (10YR 6/2), very fine grained, crossbedded 1-4" thick, some clay lenses of light olive gray (5Y 6/1); dry		
105			104-109	50				PVC well screen
110			109-114	50				Silica sand pack
115			114-119	0		-----SAMPLE NOT RECOVERED----- presumed saturated sand		
120			119-124	0				Total depth=123'
						BORING TERMINATED AT 124 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-34 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/16/2012 - 10/16/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	289.03 Ft. AMSL
REMARKS		**GROUND ELEVATION**	285.65 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
0						SAND, light brown (5YR 5/6) to dark yellow orange (10YR 6/6), medium grained, silty, loose; dry		Well Cover
5								
10						SAND, dark yellowish orange (10YR 6/6) to pale yellowish brown (10YR 6/2) ,with clay (10% clay); moist		Cement grout
15						CLAYEY SAND, dark yellowish orange (10YR 6/6), medium grained, 30% clay; dry to moist CLAY, light gray (N7), interbedded with sand, dark yellowish orange (10YR 6/6) medium to fine grained, saturated thin perched zone @15-17.5' SAND, light olive gray (5Y 6/1), fine grained,with alternating beds of CLAY light brown gray (5YR 6/1), beds ~10"; saturated		PVC riser
20						SAND, dark yellowish orange (10YR 6/6), clay lenses <1" , thin lignite bed <2" thick, SAND, yellowish gray (5Y 7/2), very fine grained, crossbedded; dry		
25						SAND, pale orange (10YR 8/2), very fine grained, crossbedded; moist CLAY light brownish gray (5YR 6/1), alternating with beds of SAND yellowish gray (5Y 8/1) fine grained, dry		
30						SAND, dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), fine grained, some clay content increasing with depth, light brown gray (5YR 6/1); dry		
35								
40								
45						~2" ironstone; dry SAND, dark yellowish orange (10YR 6/6) and very pale orange		

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-34 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/16/2012 - 10/16/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50						(10YR 8/2), fine grained, some clay lenses, light brown gray (5YR 6/1); dry SAND, modern reddish brown (5R 5/4) to dark yellowish orange (10YR 6/6) and pale yellowish orange (10YR 8/6), fine to medium grained, crossbedded, micaceous; dry		
55						SAND, pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), some clay bedding, micaceous; saturated		
60								Bentonite seal
65								PVC well screen
70								Silica sand pack
75						SAND, medium gray (N5) to dark gray (N3), medium to large grained, some black, silty laminae, moist CLAYEY SAND, light gray (N7) to medium dark gray (N4) ~40% clay content, very fine grained, thinly laminated, micaceous; moist		Total depth=78.5'
						BORING TERMINATED AT 79 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-35 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/18/2012 - 10/19/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	315.46 Ft. AMSL
REMARKS		**GROUND ELEVATION**	313.73 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0			0-4	75		SAND, moderate reddish brown (10R 4/6), medium grained, with clay, clay content ~20%; moist	
						SAND, dark yellowish orange (10YR 6/6), medium grained; dry	
5			4-9	36			
10			9-14	40		SAND, alternating moderate orange pink (5YR 8/4) and pale yellowish orange (10YR 8/6), medium to very fine grained, beds ~2 ft thick; dry	
15			14-19	40			
20			19-24	70			
25			24-29	50			
30			29-34	60		SAND, pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), some clay bedding <0.24" thick; dry	
35			34-39	50			
						SAND, moderate reddish orange (10R 6/6) to dark yellowish orange (10YR 6/6), very fine to medium grained, with CLAY light brownish gray (5YR 6/1), cyclicly interbedded; dry	
40			39-44	50			
45			44-49	52			

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310303 3.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-35 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/18/2012 - 10/19/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50			49-54	55		SAND, gray orange (10YR 7/4) to light brown (5YR 5/6), medium grained; lignite traces; saturated		
55			54-59	50		SAND, gray orange pink (5YR 7/2) to dark yellowish orange (10YR 6/6), fine to very fine grained, some clay, <1" ironstone bed, gravel sized; saturated		
						SANDY CLAY, light brown gray (5YR 6/1)		
						CLAY, light brown gray (5YR 6/1)		
60			59-64	72		SAND, dark yellowish orange (10YR 6/6) to grayish orange pink (5YR 7/2) cyclicly repeated, very fine grained, iron stained mottles; dry to slightly moist		
65			64-69	60		SAND, grayish orange (10YR 7/4) to pale yellowish orange (10YR 8/6), very fine grained, micaceous, thin clay laminations; dry		
70			69-74	60		SAND, dark yellowish orange (10YR 6/6) to yellowish gray (5Y 8/1), fine to very fine grained, lignite traces @ 78.5'; dry		
75			74-79	50				
80			79-84	88		SAND, moderate yellow (5Y 7/6) to dark yellowish orange (10YR 6/6) and yellowish gray (5Y 8/1), very fine grained, lignite traces @ 83.5'; very saturated		
85			84-89	80		SANDY CLAY, medium bluish gray (5B 5/1) to medium gray (N5), sand content ~30%, decreasing with depth; dry		
90		CL/SC	89-94	100				
95			94-99	100		CLAY, medium gray (N5); dry		

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

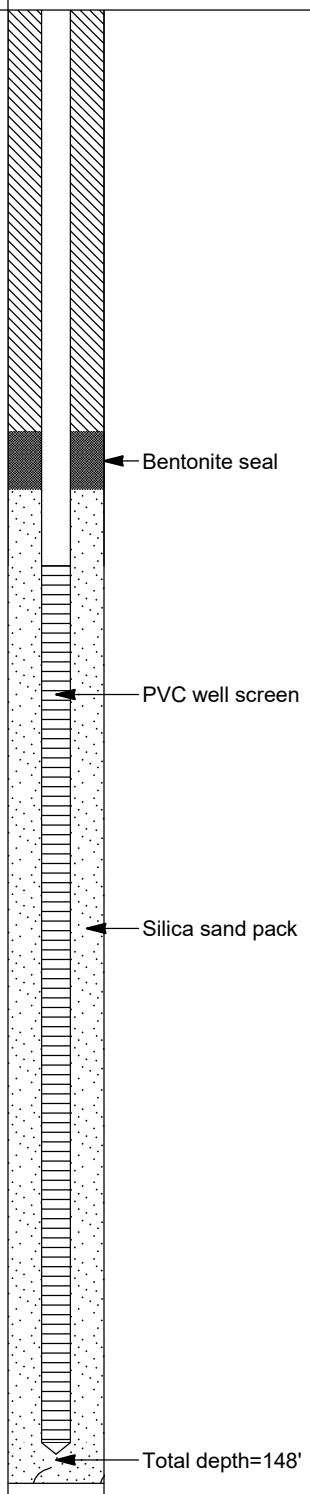
LOG OF BORING PZ-35 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/18/2012 - 10/19/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
100			99-104	100		SANDY CLAY, medium bluish gray (5B 5/1), sand content ~35%	
		PT				----lignite seam----	
						SANDY CLAY, medium bluish gray (5B 5/1), sand content increasing with depth; dry	
105			104-109	100		CLAY medium dark gray (N4), sand content <20%; dry	
		CL/SC				SANDY CLAY, medium bluish gray (5B 5/1)	
110			109-114	100			
		PT				-----lignite seam----	
		CL				CLAY dark gray (N3) to medium dark gray (N4), lignite traces; dry	
115			114-119	100		SANDY CLAY, light blue gray, (5B 7/1), sand content increasing with depth	
						SAND, light blue gray, very fine grain, clay content ~20%; dry	
120			119-124	100		SAND, moderate reddish brown (10R 4/6) to dark yellowish gray (10YR 6/6), cyclicly interbedded with clayey sand (~15% clay content), medium light gray (N6), medium to fine grained with depth; dry	
125		SP/CL	124-129	100			
130			129-134	100		CLAYEY SAND, pale yellowish brown (10YR 7/4) with SAND interbedded in 5"- 7" thick beds, very pale orange (10YR 8/2) and gray orange (10YR 7/4), to light brown (5YR 5/6), fine grained, (clay content~15%), thinly laminated; dry	
135			134-139	100			
140			139-144	100		SAND, grayish orange (10YR 7/4), very fine grained, lightly crossbedded, lignite traces; fully saturated	
145		SP	144-149	60			
						BORING TERMINATED AT 149 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-35 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/19/2012 - 10/19/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	315.87 Ft. AMSL
REMARKS		**GROUND ELEVATION**	313.73 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
0						SAND, moderate reddish brown (10R 4/6), medium grained, with clay, clay content ~20%; moist		Well Cover
5						SAND, dark yellowish orange (10YR 6/6), medium grained; dry		
10						SAND, alternating moderate orange pink (5YR 8/4) and pale yellowish orange (10YR 8/6), medium to very fine grained, beds ~2 ft thick; dry		Cement grout
15								PVC riser
20								
25		SP/CL						
30						SAND, pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), some clay bedding <0.24" thick; dry		
35								
40						SAND, moderate reddish orange (10R 6/6) to dark yellowish orange (10YR 6/6), very fine to medium grained, with CLAY light brownish gray (5YR 6/1), cyclicly interbedded; dry		
45								

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-35 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/19/2012 - 10/19/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50						SAND, gray orange (10YR 7/4) to light brown (5YR 5/6), medium grained; lignite traces; saturated		
55						SAND, gray orange pink (5YR 7/2) to dark yellowish orange (10YR 6/6), fine to very fine grained, some clay, <1" ironstone bed, gravel sized; saturated		
		SC				SANDY CLAY, light brown gray (5YR 6/1)		
		CL				CLAY, light brown gray (5YR 6/1)		
60						SAND, dark yellowish orange (10YR 6/6) to grayish orange pink (5YR 7/2) cyclicly repeated, very fine grained, iron stained mottles; dry to slightly moist		
						SAND, grayish orange (10YR 7/4) to pale yellowish orange (10YR 8/6), very fine grained, micaceous, thin clay laminations; dry		
65								
70		SP						Bentonite seal
						SAND, dark yellowish orange (10YR 6/6) to yellowish gray (5Y 8/1), fine to very fine grained, lignite traces @ 78.5'; dry		PVC well screen
75								
80						SAND, moderate yellow (5Y 7/6) to dark yellowish orange (10YR 6/6) and yellowish gray (5Y 8/1), very fine grained, lignite traces @ 83.5'; very saturated		Silica sand pack
						BORING TERMINATED AT 84 FEET.		Total depth=84'

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303300 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

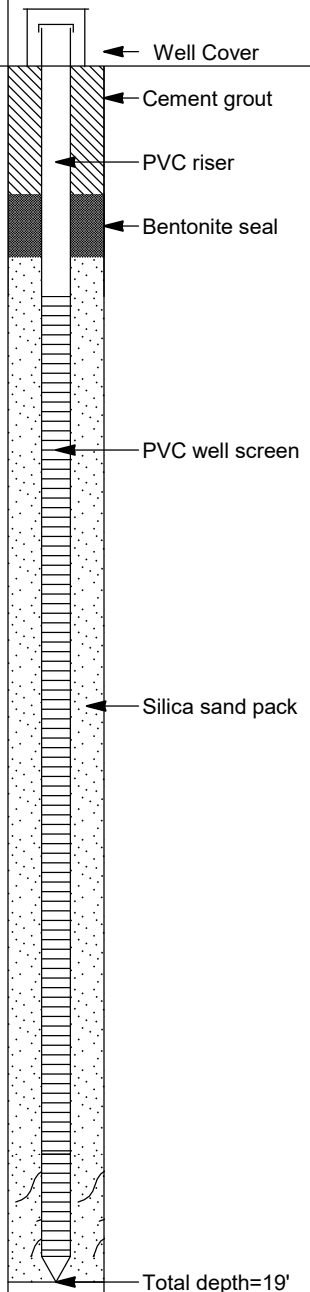
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-36 & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/11/2012 - 10/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	180.25 Ft. AMSL
REMARKS		**GROUND ELEVATION**	177.17 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	75		6" topsoil, then CLAYEY SAND (30% clay), brownish yellow (10YR 6/6), fine grained, soft, moist	
		SC	4-9	98			
5						CLAYEY SAND (5-10% clay), very pale brown (10YR 7/4), fine grained, some minor gravel, wet	
			9-14	64		SAND, very pale brown, thin quartz gravel layers from 11-12', saturated	
10		SP					
			14-19	84		SAND, very pale brown, no gravel, saturated	
15							
						BORING TERMINATED AT 19 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

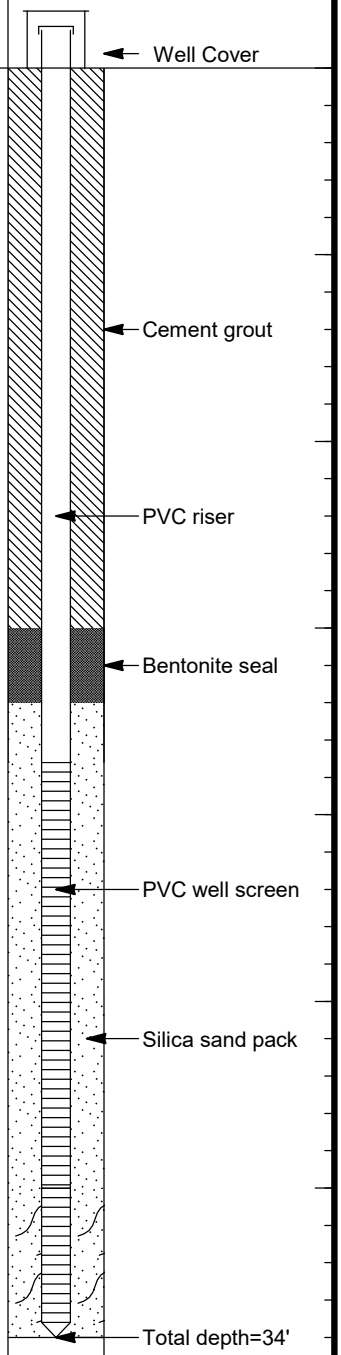
LOG OF BORING PZ-37 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	M. Tanner
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/11/2012 - 10/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	197.80 Ft. AMSL
REMARKS		**GROUND ELEVATION**	194.79 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0		SC	0-4	100		CLAYEY SAND (15-20%), reddish brown (5YR 4/4), fine grained
						SAND, yellow (10YR 8/6), fine grained, iron staining, some minor clay
5		SP	4-9	100		
						SAND, very pale brown to yellow, fine grained, cross-bedded, very thin (0.1") lignite seam
10			9-14	48		
15		CL	14-19	86		CLAY, light brownish gray (10YR 6/2) and reddish gray (5YR 5/2), laminated, stiff, plastic
						SAND, brownish yellow (10YR 6/6) and very pale brown, fine grained, interbedded with CLAY, 1-3" seams, moist to wet
20		SP/CL	19-24	56		
25		SP	24-29	62		SAND, yellow interbedded with white (5YR 8/1), black carbonaceous spotting along bedding, clay rip-up clasts(?) along bedding, saturated
			29-34	66		SAND, yellow interbedded with white, saturated
30						BORING TERMINATED AT 34 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

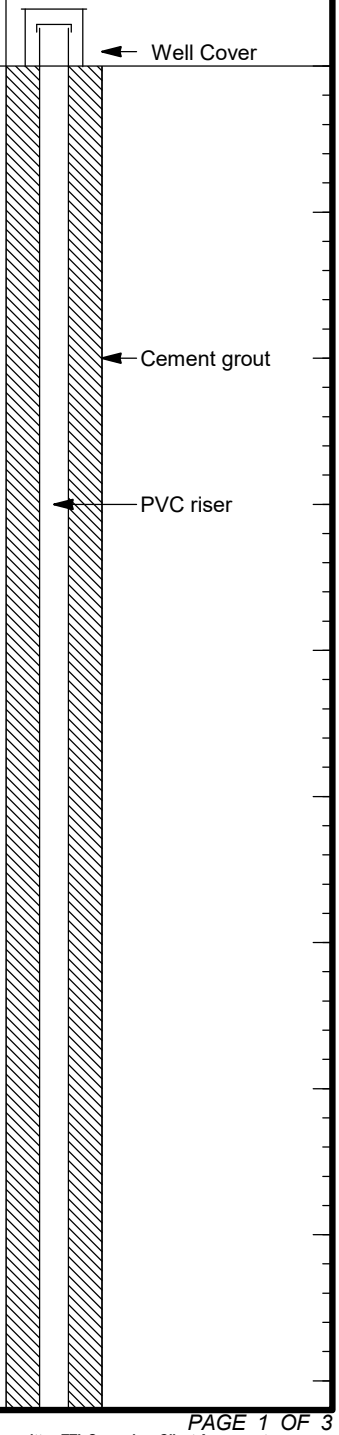
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-38 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/2/2012 - 10/3/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	283.65 Ft. AMSL
REMARKS		**GROUND ELEVATION**	279.29 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-4	83		Topsoil, SILTY CLAY, brown (7.5YR 4/3) to red (2.5YR 5/8), root fragments	
5		SM/CL	4-9	100		SILTY SAND, red and reddish yellow (7.5YR 6/8), mottled, moist	
10			9-14	100		SANDY CLAY, red, reddish yellow, and light gray (5YR 7/1), interbedded with SILTY SAND, red, some iron hard pan, moist	
15			14-19	76		CLAY, weak red (10R 4/4) and light gray, mottled, interbedded with SILTY SAND, reddish yellow (7.5YR 6/8)	
20		SP	19-24	54		SAND, light gray and reddish yellow, fine to medium grained, cross-bedded, dry	
25			24-29	44		SAND, light gray, reddish yellow, and light reddish brown (2.5YR 6/4), some thin (<1") clay layers, dry	
30			29-34	54		SAND, light gray and reddish yellow, thin clay lenses, some black carbon staining on cross-beds	
35			34-39	64		SAND, light gray and reddish yellow, thin clay lenses	
						Iron hard pan, yellowish red (2.5YR 5/8)	
40			39-44	60		SAND, reddish yellow (7.5YR 6/8) and strong brown (7.5YR 5/8), fine to medium grained, some hard pan	
45			44-49	50			

PIEZOMETER DIAGRAM



Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-38 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/2/2012 - 10/3/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						SAND, strong brown and red (2.5YR 4/8), saturated, then interbedded SAND and CLAY seams		
						CLAY, gray (10YR 5/1), lean, dry		
50			49-54	90		CLAY, gray to dark gray (10YR 4/1), massive, with some SANDY CLAY (20% sand) layers (0.5' thick), dark greenish gray (GLEY2 4/1)		
55			54-59	100		CLAY, gray to dark gray, with some SANDY CLAY ---lignite seam---		
60		CL	59-64	100		CLAY, gray, thinly laminated with SANDY CLAY, light gray (10YR 7/2) ---lignite seam---		
65			64-69	100		CLAY, gray, massive to thinly laminated, some CLAYEY SAND		
70			69-74	100		CLAY, massive, some lignite formation		
75			74-79	100		SILTY CLAY (50% silt), greenish gray (GLEY2 5/1) and light gray, dry		
80		CL	79-84	100		SANDY CLAY, strong brown (7.5YR 5/8), red (2.5YR 4/8), and light gray		
85			84-89	100		SILTY CLAY, gray, fossiliferous (plant fossils), interbedded with SAND, light gray, fine grained, with some iron hard pan		Bentonite seal
						SAND, reddish yellow (7.5YR 7/8), fine grained, dry		
90			89-94	90		SAND interbedded with CLAYEY SAND (20% clay), light gray (10YR 7/1) and yellow (10YR 7/6), dry		
95			94-99	80		SAND, light gray and very pale brown (10YR 7/3), fine grained, some hard pan		Silica sand pack

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-38 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/2/2012 - 10/3/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100		SP	99-104	66		SAND, light gray and very pale brown, 0.5' CLAY lense		PVC well screen
105			104-109	54		SAND, reddish yellow (7.5YR 6/8) and very pale brown, cross-bedded, moist to very moist		
110			109-114	64		SAND, reddish yellow, very pale brown, and black, medium grained, saturated		
115			114-119	86		SAND, brown (7.5YR 5/3), medium grained, saturated		Well depth=116'
						BORING TERMINATED AT 119 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

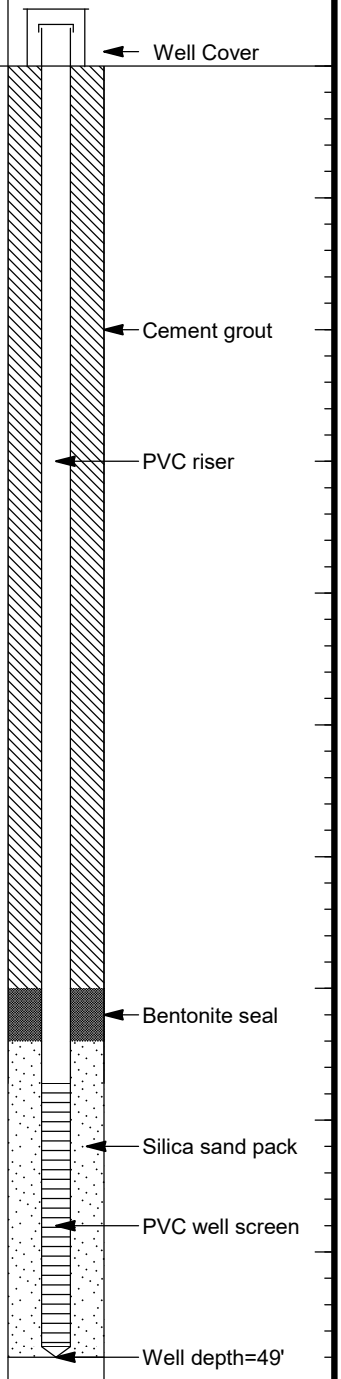
LOG OF BORING PZ-38 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	R. Tucker
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/3/2012 - 10/3/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	282.71 Ft. AMSL
REMARKS		**GROUND ELEVATION**	279.29 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0	CL	0-4	83		Topsoil, SILTY CLAY, brown (7.5YR 4/3) to red (2.5YR 5/8), root fragments
5	SM/CL	4-9	100		SILTY SAND, red and reddish yellow (7.5YR 6/8), mottled, moist
10	SM/CL	9-14	100		SANDY CLAY, red, reddish yellow, and light gray (5YR 7/1), interbedded with SILTY SAND, red, some iron hard pan, moist
15	SM/CL	14-19	76		CLAY, weak red (10R 4/4) and light gray, mottled, interbedded with SILTY SAND, reddish yellow (7.5YR 6/8)
20	SP	19-24	54		SAND, light gray and reddish yellow, fine to medium grained, cross-bedded, dry
25	SP	24-29	44		SAND, light gray, reddish yellow, and light reddish brown (2.5YR 6/4), some thin (<1") clay layers, dry
30	SP	29-34	54		SAND, light gray and reddish yellow, thin clay lenses, some black carbon staining on cross-beds
35	SP	34-39	64		SAND, light gray and reddish yellow, thin clay lenses
40	SP	39-44	60		Iron hard pan, yellowish red (2.5YR 5/8) SAND, reddish yellow (7.5YR 6/8) and strong brown (7.5YR 5/8), fine to medium grained, some hard pan
45	SP	44-49	50		SAND, strong brown and red (2.5YR 4/8), saturated, then interbedded SAND and CLAY seams
	CL				CLAY, gray (10YR 5/1), lean, dry
					BORING TERMINATED AT 49 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-39 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/16/2012 - 10/17/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	260.13 Ft. AMSL
REMARKS		**GROUND ELEVATION**	256.78 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		CL/SP	0-4	25		SAND, modern yellowish brown (10YR 5/4) to light brown (5YR 5/6), medium grained, (clay content ~10%); dry	
5			4-9	25			
10			9-14	15			
15			14-19	40		SAND pale yellowish orange (10YR 8/6) to very pale yellowish orange (10YR 8/2), medium to fine grained, micaceous, interbedded with clay in 1" thick beds, pale yellowish brown (10YR 6/2); dry	
20			19-24	45			
25			24-29	50		SAND, alternating colors dark yellowish orange (10YR 6/6) to light brown (5YR 5/6) with some clay laminae <0.25" thick, grayish orange (10YR 7/4); moist	
30			29-34	95		SAND, dark yellowish orange (10YR 6/6), to grayish orange (10YR 7/4), very fine grained, crossbedded, fully saturated	
35		CL	34-39	90		CLAY, medium gray (N5), sand interbedding approx. 5" thick (<25% sand), sand content decreasing with depth; dry	
40			39-44	100		CLAY, dark gray (N3), lignite traces SANDY CLAY, medium bluish gray (5B 5/1), lenticular bedding, (approx. 35-40% sand); dry	
45			44-49	100		CLAY, gray black (N2) *Continued Next Page*	

PIEZOMETER DIAGRAM

Well Cover

Cement grout

PVC riser

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

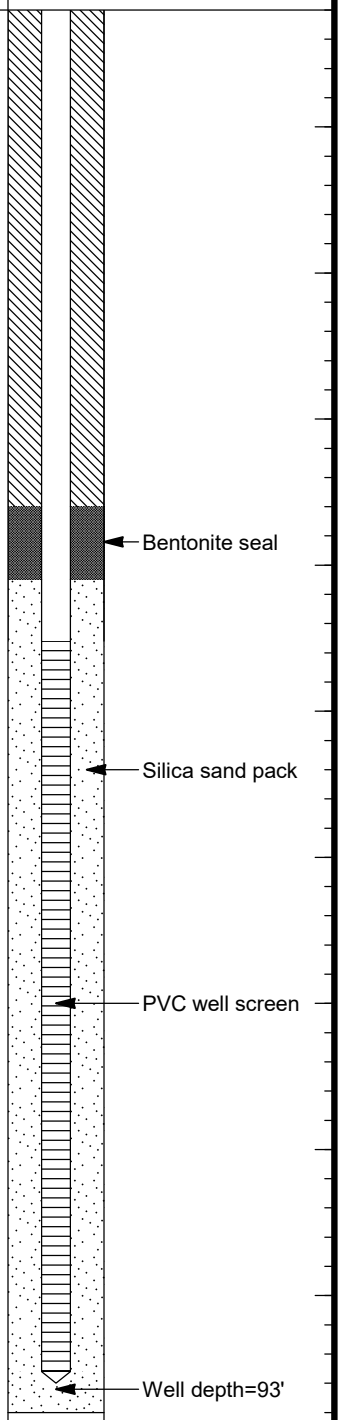
LOG OF BORING PZ-39 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/16/2012 - 10/17/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						SANDY CLAY, medium bluish gray (5B 5/1), lenticular bedding, (approx. 35-40%) sand; dry	
50			49-54	100		CLAY, light olive gray (5Y 6/1) to medium gray (N5), (approx. 25% sand); dry	
						-----Lignite seam-----	
55			54-59	100		SANDY CLAY, medium bluish gray (5B 5/1), (approx. 30% sand); dry	
60		CL	59-64	100		SANDY CLAY, medium gray (N5) to medium light gray (N6), (approx. 40% sand); dry	
65			64-69	100		SANDY CLAY, (approx 30% sand), cyclicly alternating colors of light brown (5YR 5/6) to moderate yellow (5Y 7/6)	
						SAND, pale yellowish brown (10YR 6/2), very fine grained; dry	
70			69-74	52			
75		SP	74-79	60		SAND, cyclicly alternating colors of light brown (5YR 5/6) to moderate yellow (5Y 7/6) and pale yellowish orange (10YR 8/6); dry	
80			79-84	100		SAND, dark yellowish orange (10YR 6/6), very fine grained; moist to very saturated	
		CL				CLAY, dark yellowish brown (10YR 4/2), (<10% sand), dry-moist	
85			84-89	32		SAND, grayish orange (10YR 7/4), fine grained, very saturated	
90		SP	89-94	88		SAND, dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), very fine grained, lignite traces; saturated	
						BORING TERMINATED AT 94 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010303300 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

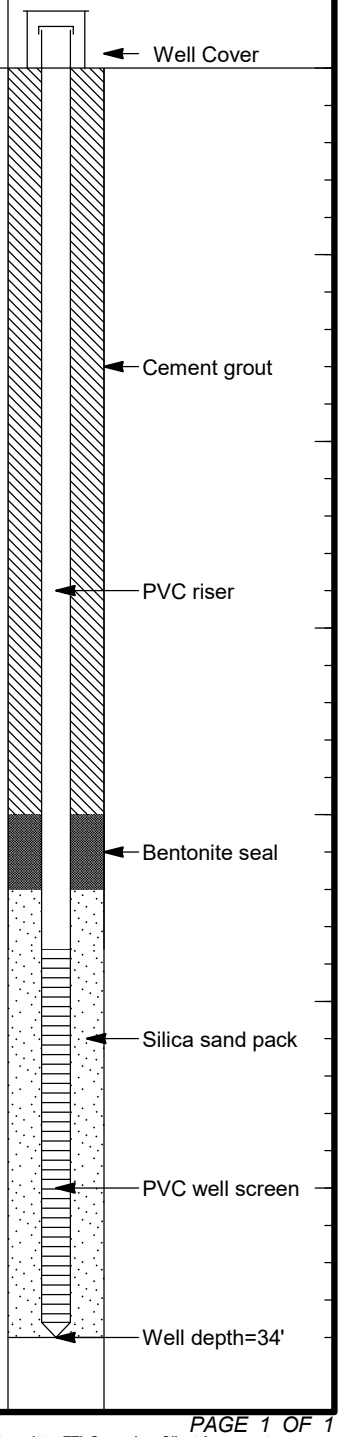
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-39 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/17/2012 - 10/17/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	260.48 Ft. AMSL
REMARKS		**GROUND ELEVATION**	256.78 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						SAND, modern yellowish brown (10YR 5/4) to light brown (5YR 5/6), medium grained, (clay content ~10%); dry	
15		CL/SP				SAND pale yellowish orange (10YR 8/6) to very pale yellowish orange (10YR 8/2), medium to fine grained, micaceous, interbedded with clay in 1" thick beds, pale yellowish brown (10YR 6/2); dry	
25						SAND, alternating colors dark yellowish orange (10YR 6/6) to light brown (5YR 5/6) with some clay laminae <0.25" thick, grayish orange (10YR 7/4); moist	
30						SAND, dark yellowish orange (10YR 6/6), to grayish orange (10YR 7/4), very fine grained, crossbedded, fully saturated	
						BORING TERMINATED AT 34 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-40 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/25/2012 - 10/26/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	282.76 Ft. AMSL
REMARKS		**GROUND ELEVATION**	279.46 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
			0-4	40		SAND, moderate brown (5YR 4/4) to dark yellowish orange (10YR 6/6), coarse to medium grained, topsoil; dry		Well Cover
5		SP	4-9	52		SAND, pale yellowish orange (10YR 8/6) medium grained; dry		
10			9-14	40		SAND, dark yellowish orange (10YR 6/6), micaceous, very saturated		
15			14-19	60		CLAY, brownish gray (5YR 4/1), interbedded with cemented sand and ironstone dark yellowish orange (10YR 6/6); dry		
20			19-24	68		SAND, cyclicly interbedded dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), medium grained; dry SAND, very pale orange (10YR 8/2), very fine to medium grained, some interbedded clay and ironstone; dry		
25			24-29	60		SAND, interbedded dark yellowish orange (10YR 6/6) to light brown (5YR 5/6), with some clay, brownish gray (5YR 4/1); dry		
30			29-34	52		SAND, cyclicly alternating pale yellowish orange (10YR 8/6), to very pale orange (10YR 8/2), and very light gray (N8), some clay crossbeds; saturation @ 44'		
35		SP/CL	34-39	52				
40			39-44	46				
45			44-49	52				

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-40 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/25/2012 - 10/26/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50			49-54	60		SAND, grayish orange (10YR 7/4), to dark yellowish brown (10YR 4/2), some clay beds <0.5" lined with lignite; very saturated		
55			54-59	60		SAND, dark yellowish orange (10YR 6/6) to pale yellowish orange (10YR 8/6), thinly laminated, lignite traces; very saturated		
60			59-64	40		2" ironstone bed; dry CLAY, medium gray (N5) to medium dark gray (N4), (<15% sand); dry		
65		CL/SP	64-69	92				
70			69-74	100		SAND, medium bluish gray (5B 5/1), very fine grained; saturated ------lignite seam------ SANDY CLAY, medium dark gray (N4), (~30% sand), uneven and small fractures, lean clay; dry		
75			74-79	100		-----lignite seam----- SANDY CLAY, medium dark gray (N4), (~30% sand); dry		
80		CL	79-84	100		CLAY, gray black (N2) to medium gray (N5); dry		
85			84-89	100		CLAY with sand, medium gray (N5) to medium light gray (N6), sand content varies widely (~15-30% sand); dry		
90			89-94	100		SAND, dark yellowish orange (10YR 6/6), and pale yellowish orange (10YR 6/2), cemented, clay beds ~6" thick; dry		
95		SP/CL	94-99	100		SAND, very pale orange (10YR 8/2), very fine grained, interbedded clay, pale yellowish brown (10YR 6/2), crossbedded; dry		

Continued Next Page

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-40 D & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/25/2012 - 10/26/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
100			99-104	100		SAND, very pale yellowish orange (10YR 8/2); dry		
105			104-109	40				
110		SP	109-114	90				
115			114-119	80		SAND, cyclicly alternating pale yellowish orange (10YR 6/2), grayish orange (10YR 7/4), to dark yellowish orange (10YR 6/6), very fine grained; very saturated		
120						SAND, grayish orange (10YR 7/4); very fine grained; very saturated		
						BORING TERMINATED AT 120 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310333.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

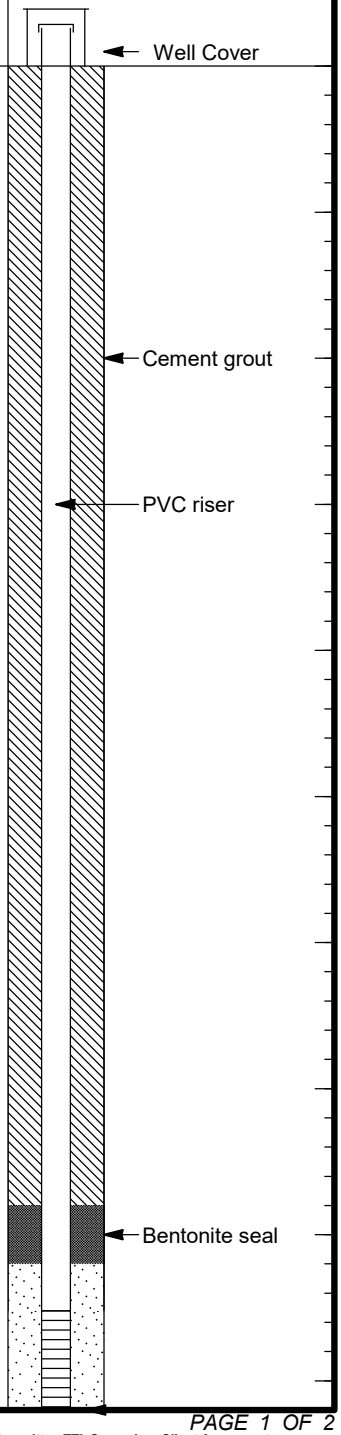
LOG OF BORING PZ-40 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/29/2012 - 10/29/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	283.20 Ft. AMSL
REMARKS		**GROUND ELEVATION**	280.39 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SP				SAND, moderate brown (5YR 4/4) to dark yellowish orange (10YR 6/6), coarse to medium grained, topsoil; dry	
5						SAND, pale yellowish orange (10YR 8/6) medium grained; dry	
10						SAND, dark yellowish orange (10YR 6/6), micaceous, very saturated	
15		CL/SP				CLAY, brownish gray (5YR 4/1), interbedded with cemented sand and ironstone dark yellowish orange (10YR 6/6); dry	
20						SAND, cyclicly interbedded dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), medium grained; dry	
25						SAND, very pale orange (10YR 8/2), very fine to medium grained, some interbedded clay and ironstone; dry	
30						SAND, interbedded dark yellowish orange (10YR 6/6) to light brown (5YR 5/6), with some clay, brownish gray (5YR 4/1); dry	
35						SAND, cyclicly alternating pale yellowish orange (10YR 8/6), to very pale orange (10YR 8/2), and very light gray (N8), some clay crossbeds; saturation @ 44'	
40		SP					
45							

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-40 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	10/29/2012 - 10/29/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50						SAND, grayish orange (10YR 7/4), to dark yellowish brown (10YR 4/2), some clay beds <0.5" lined with lignite; very saturated		Silica sand pack
55						SAND, dark yellowish orange (10YR 6/6) to pale yellowish orange (10YR 8/6), thinly laminated, lignite traces; very saturated		PVC well screen
60						SAND as in 57'; saturated, with 2" ironstone bed; dry		Well depth=63'
						BORING TERMINATED AT 64 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

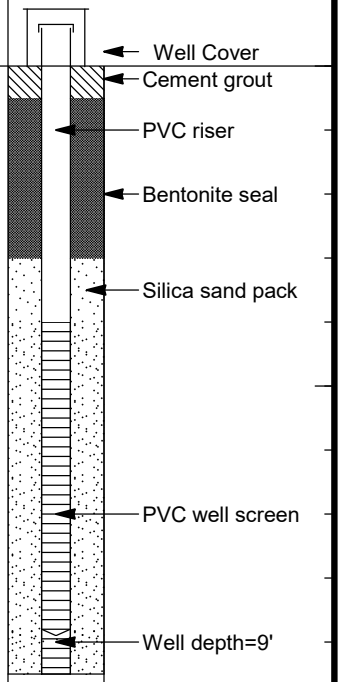
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-41 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/13/2012 - 12/13/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	201.12 Ft. AMSL
REMARKS		**GROUND ELEVATION**	198.28 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP	0-4	50		SAND (topsoil), dark yellowish brown (10YR 4/2), fine grained	
						SAND, very pale orange (10YR 8/2), fine grained; saturated	
5		CL	4-9	100		SANDY CLAY (~35% SAND), light gray (N7); dark yellowish orange (10YR 6/6) sand; dry	
		SP-SC				CLAYEY SAND, (~20-30% clay), light brownish gray (5YR 6/1)	
						BORING TERMINATED AT 9 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

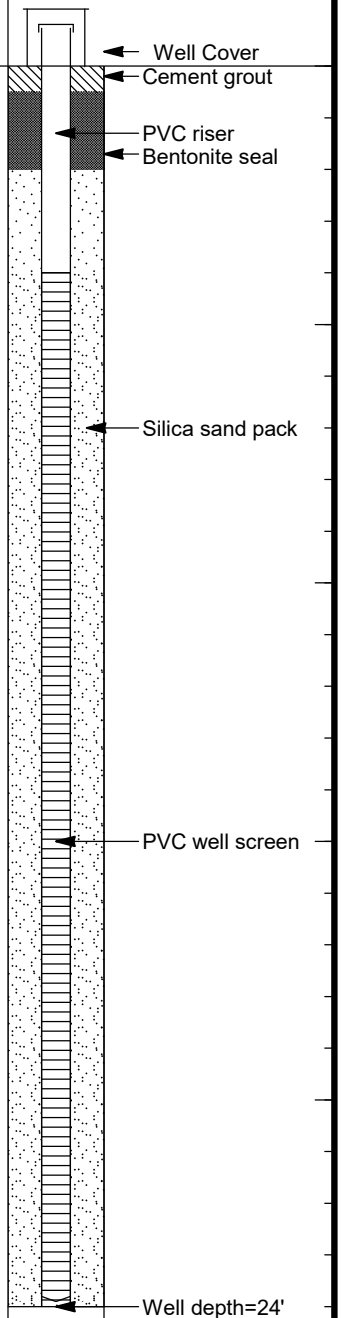
LOG OF BORING PZ-42 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/13/2012 - 12/13/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	209.26 Ft. AMSL
REMARKS		**GROUND ELEVATION**	206.46 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	42		SAND (topsoil), dark yellowish brown (10YR 4/2), medium grained, organic material
						SAND, light brownish (5YR 5/6), fine grained; dry
			4-9	80		SAND, pale yellowish orange (10YR 8/6) to light brown (5YR 5/6), some lignite traces <1" thick; very saturated
			9-14	100		CLAYEY SAND, very pale orange (10YR 8/2), fine grained, interbedded sand as in 4-12'; very saturated
			14-19	100		SAND, light brownish gray (5YR 5/6)
						CLAYEY SAND, brownish gray (5YR 4/1); very saturated; cemented sand layer ~1" thick
			19-24	100		
						CLAY, (<15% sand) brownish gray (5YR 4/1) to medium dark gray (N4); dry
						BORING TERMINATED AT 24 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

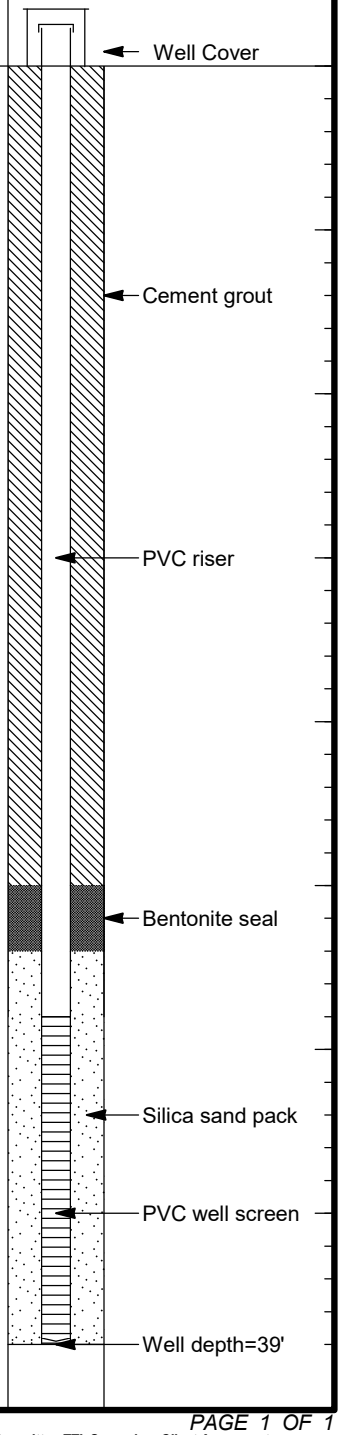
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-43 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/13/2012 - 12/13/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	259.33 Ft. AMSL
REMARKS		**GROUND ELEVATION**	256.46 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	42		CLAYEY SAND, (~15% clay), dark yellowish brown (10YR 4/2), coarse grained; dry	
						SANDY CLAY, (~25% sand), light brown (5YR 5/6); dry	
5			4-9	100			
						SAND with clay (~15% clay), light brown (5YR 5/6), with dark yellowish orange mottles (10YR 6/6), coarse grained; dry	
10			9-14	53			
						SAND, light brown (5YR 5/6), coarse grained; moist	
15			14-19	30		SAND, dark yellowish orange (10YR 6/6) to moderate orange pink (5YR 8/4), very fine grained, thinly laminated, occasional clay beds <0.25" thick; dry	
		SC					
20			19-24	40			
25			24-29	43		SAND as in 14-19': coarse grained; dry	
						Ironstone fragments	
30			29-34	50		SAND, alternating colors moderate orange pink (10YR 7/4), moderate orange pink (5YR 8/4), and pale yellowish orange (10YR 8/6), very thin clay laminae as in 14-19'; moist	
35			34-39	58		SAND as in 29-34'; saturated	
		CL				CLAY, sandy clay crossbeds, light gray (N7) to light brownish gray (5YR 6/1); dry	
						BORING TERMINATED AT 39 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

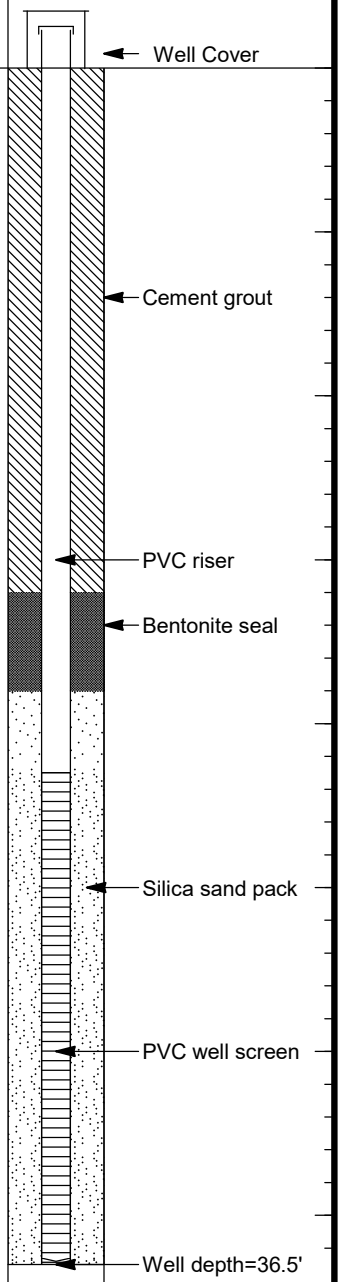
LOG OF BORING PZ-44 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/12/2012 - 12/12/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	244.25 Ft. AMSL
REMARKS		**GROUND ELEVATION**	241.41 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
			0-4	45		SAND (topsoil), dark yellowish brown (10YR 4/2) to dark yellowish orange (10YR 6/6); moist
5			4-9	100		CLAYEY SAND interbedded with CLAY in 6" beds, light brown (5YR 5/6) to dark yellowish orange (10YR 6/6), coarse grained; Clay beds are pale yellowish brown (10YR 6/2); dry
10			9-14	100		
15		SP	14-19	55		SAND, pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), fine grained crossbedded, occasional thin clay laminae; dry
20			19-24	100		SAND, very pale orange (10YR 8/2) to moderate pink orange (5YR 8/4), fine to very fine grained, lignite traces, clay crossbeds as in 14'; very saturated
						SAND, very light gray (N8), very saturated, micaceous
25			24-29	75		SAND, grayish orange pink (5YR 7/2) to pale yellowish orange (10YR 8/6), two four inch clay beds pale yellowish brown; very saturated
30			29-34	100		SAND, dark yellowish orange (10YR 6/6), fine grained, very micaceous; very saturated
						SANDY CLAY (~35% sand), lignite crossbeds, dark yellowish orange (10YR 6/6)
						SAND as in 29-31.5'
35		CL	34-36.5	0		CLAY, medium dark gray, plastic, (<10% sand) was retrieved from bottom of auger when pulled from 36.5' NO SAMPLE TAKEN (sand locked auger)
						BORING TERMINATED AT 36.5 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010\103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

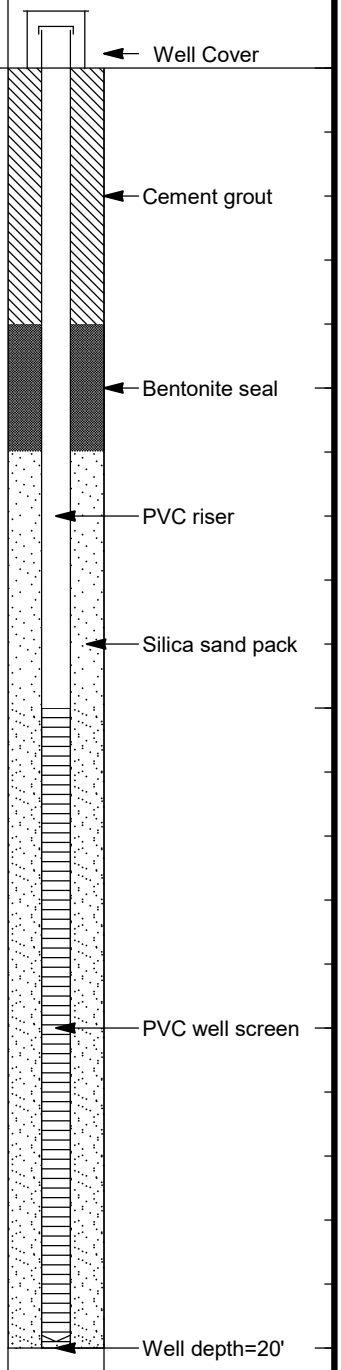
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-45 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W.Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2012 - 12/11/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	228.07 Ft. AMSL
REMARKS		**GROUND ELEVATION**	226.38 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
			0-4	33		SAND (topsoil), dark yellowish orange (10YR 6/6), fine grained, organic material; wet	
			4-9	100		SANDY CLAY, (~30% sand), light brown (5YR 5/6), with gray mottles, micaceous; dry	
5		SP				CLAYEY SAND, grayish orange pink (5YR 7/2) with dark yellowish orange (10YR 6/6) mottles,	
						SAND, light brown (5YR 5/6), coarse grained	
			9-14	100			
10						INTERBEDDED SAND AND CLAY; SAND: dark yellowish orange (10 YR 6/6), coarse grained; dry; CLAY: yellowish gray (5YR 7/2); lignite bed	
			14-20	100		CLAY (<10% sand), pale brown (5YR 5/2) to grayish orange pink (5YR 7/2), crossbedded, plastic	
15		SP/CL				INTERBEDDED SAND AND CLAY pale yellowish brown (10YR 6/2) to dark orange (10YR 6/6), fine grained, micaceous; moist	
						SANDY CLAY (~3-% sand), medium to dark gray (N3-N5), sand crossbeds <1" thick; dry	
20						BORING TERMINATED AT 20 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

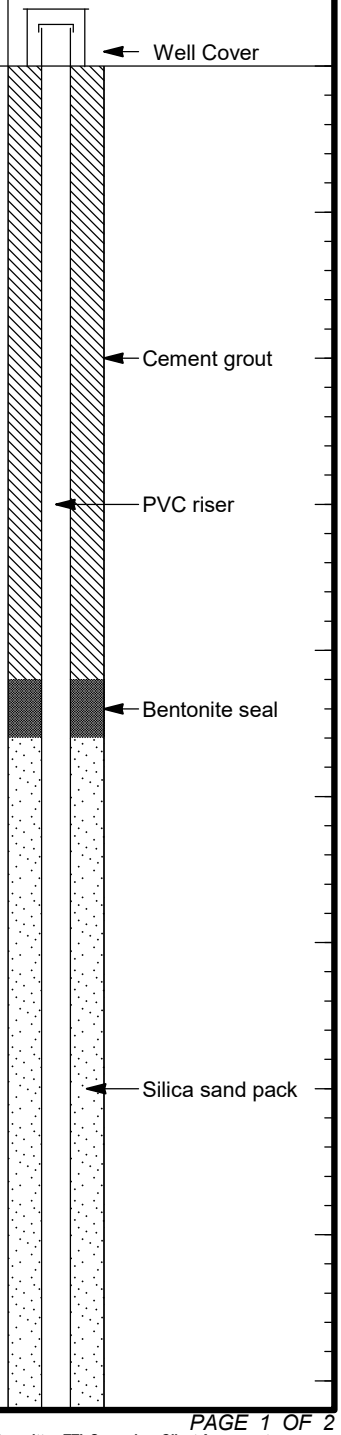
LOG OF BORING PZ-46 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/14/2012 - 12/14/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	287.86 Ft. AMSL
REMARKS		**GROUND ELEVATION**	284.94 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL/SP	0-4	79		SANDY CLAY to CLAYEY SAND, light brown (5YR 5/6), moist	
5			4-9	50		SAND, light brown (5YR 5/6) to pale yellowish orange (10YR 8/6), coarse to medium grained, moist	
10		SP	9-14	55			
						SAND as in 4' with Sandy Clay beds 4" thick, pale yellowish brown (10YR 6/2)	
15			14-19	80		SAND as in 12': moderate red (5R 5/4), fine grained; saturated; ironstone layer ~4" thick	
						CLAY, pale yellowish brown (10YR 6/2) with sand beds <1" thick	
20			19-24	100		CLAY as above and interbedded SAND (~2" thick beds), micaceous; dry	
25			24-29	80		Interbedded SAND as in 4-12' and CLAY as in 17-19'; dry	
30			29-34	45			
						SAND, pale yellowish orange (10YR 8/6) to moderate pink (5R 7/4), fine grained, crossbedded; moist	
35			34-39	40			
40		CL/SP	39-44	58		INTERBEDDED SAND as in 32' and CLAY beds <0.25" thick every 1", micaceous; moist	
						moist	
45			44-49	74			

Continued Next Page

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-46 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/14/2012 - 12/14/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
50			49-54	74		dry		
55			54-59	80				
60			59-64	65		saturated		PVC well screen
65		SP	64-69	60		SAND, dark gray (N3), coarse grained, iron staining SAND, light brown (5YR 5/6) to moderate brown (5YR 3/4), coarse grained; moist dry		
70		CL/SP	69-74	30		INTERBEDDED SAND and CLAY; SAND: dark yellowish orange (10YR 6/6), crossbedded; CLAY (0.5" beds), pale yellowish orange (10YR 6/2)		
75		CL	74-79	25		ironstone and cemented sand, lignite bed ~2" thick; moist CLAY, (~10% sand) dark gray (N3)		Well depth=79'
						BORING TERMINATED AT 79 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

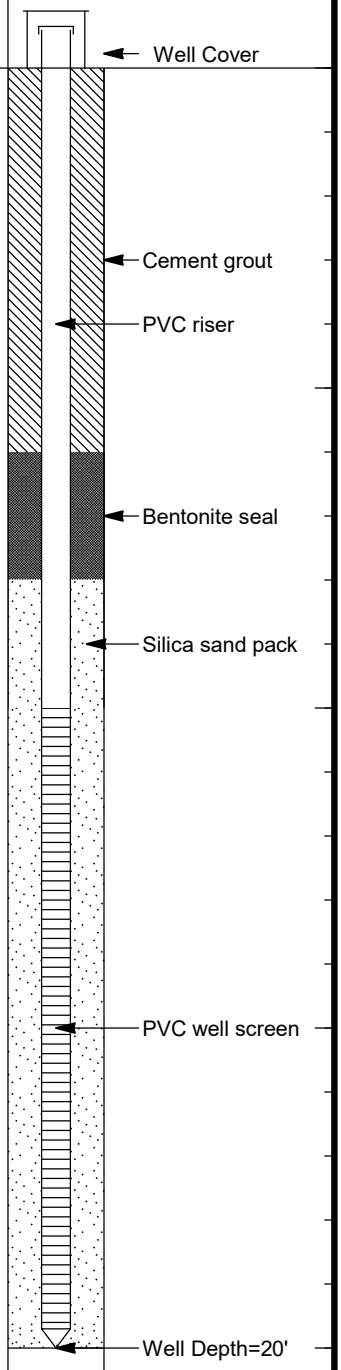
LOG OF BORING PZ-46 SS & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/15/2012 - 12/15/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	287.74 Ft. AMSL
REMARKS		**GROUND ELEVATION**	284.67 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL/SP	0-4			SANDY CLAY to CLAYEY SAND, light brown (5YR 5/6), moist	
5		SP	4-9			SAND, light brown (5YR 5/6) to pale yellowish orange (10YR 8/6), coarse to medium grained, moist	
10			9-14				
						SAND as in 4' with Sandy Clay beds 4" thick, pale yellowish brown (10YR 6/2)	
15			14-19			SAND as in 12': moderate red (5R 5/4), fine grained; saturated; ironstone layer ~4" thick	
		CL/SP				CLAY, pale yellowish brown (10YR 6/2) with sand beds <1" thick	
20			19-24			BORING TERMINATED AT 20 FEET.	

Continued Next Page

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019\0019103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-46 SS & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 600112019 **PROFESSIONAL** W. Holmes

LOCATION Coker, Tuscaloosa Co, Alabama **DATE(S) DRILLED** 12/15/2012 - 12/15/2012

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE			LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM	
			INTERVAL (feet)	% RECOVERY	PID (ppm)				

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARTLOW EXPANSION PROPERTY

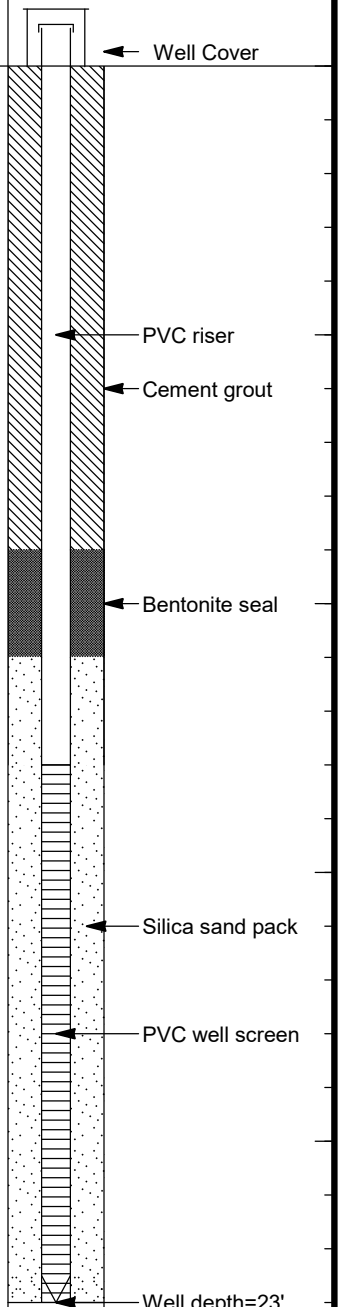
LOG OF BORING PZ-47 S(R) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/11/2019 - 12/11/2019
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	Ft. AMSL
REMARKS		**GROUND ELEVATION**	NM Ft. AMSL
		DEPTH TO WATER	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL/CH				lean sandy CLAY, light brown (SYR 5/6). moist, low plasticity	
5		CL/CH				fat CLAY, high plasticity, slightly moist, mottled medium gray (N5), light brown (SYR 5/6), and medium redish brown (10R 4/6)	
10		CH				CLAY, fat, stiff, average plasticity, slightly moist, mottled medium gray (N5), light brown (SYR 5/6), and medium redish brown (10R 4/6), colors evenly split 30/30/30	
15		SC				sandy CLAY, dense, 70/30 clay to sand, gradational contact to dense, hard, hat clay, light olive gray 5Y5/2 to dark gray (N3), (outside of spoon wet and saturated)	
20		CH/SC					
		CH/SP				fat CLAY, dense, high plasticity, medium dark gray (N4) to 25.5, last 6" is well sorted DRY, fine grained qtz sand, subrounded, start of second aquifer	

BORING TERMINATED AT 23 FEET

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\GINT\BWSWA EXPANSION LOGS (PZ01-PZ51).GPJ 5/21/21 Report:2010 ENV WELL LOG (UPDATED WATER)

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

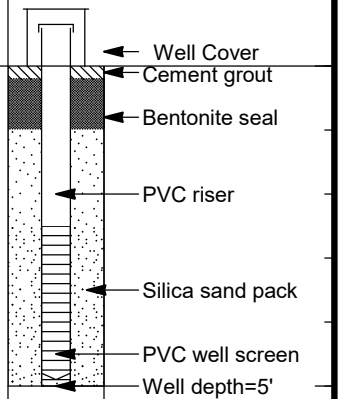
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-47 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	12/17/2012 - 12/17/2012
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hand Auger	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	187.88 Ft. AMSL
REMARKS		**GROUND ELEVATION**	185.02 Ft. AMSL
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP	0-1	100		SAND (topsoil), alluvial deposits, moderate yellowish brown (10YR 5/4), fine grained, organic materials; saturated	
			1-2	100			
			2-3	100		SAND, light brown (5YR 5/6) to light gray (N7), very saturated (water table)	
			3-4	100			
		CL-ML	4-5	100		SANDY CLAY, (~40% sand), medium dark gray (N4); saturated	
5			5-6	100		BORING TERMINATED AT 5 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010310033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-48 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	1/24/2013 - 1/24/2013
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hand Auger	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	
REMARKS		**GROUND ELEVATION**	
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
5		SP				Silty SAND, dark yellowish brown (10YR 4/2), topsoil, moist saturated		Well Cover Cement grout PVC riser Bentonite seal Silica sand pack PVC well screen Well depth=10.5'
10		SC				CLAY, sandy, medium light gray (N6), with orange and red mottles, plastic, ~35 % sand BORING TERMINATED AT 10.5 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

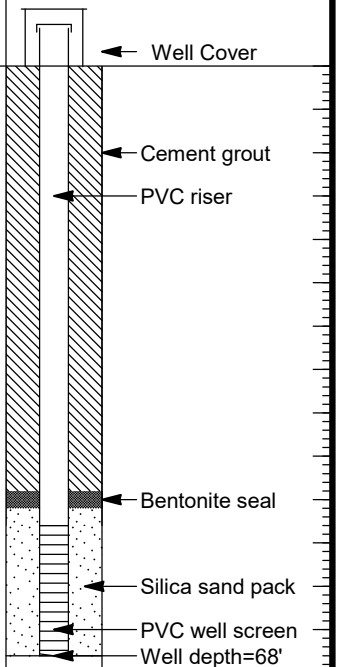
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-49 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	1/24/2013 - 1/24/2013
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	
REMARKS		**GROUND ELEVATION**	
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						SILTY CLAY, grayish brown (5YR 3/2) to moderate brown (5YR 4/4), occasional clay beds, moist	
5		CL-ML					
10							
15						SAND, grayish orange (10 YR 7/4), fine grained, crossbedded, occasional clay bed, damp	
20							
25							
30							
35		SP				ironstone	
40							
45							
50							
55						Interbedded SAND and CLAY, pale yellowish brown (10YR 6/2), very saturated	
60		CL/SC					
65						SAND, medium to fine grained, dark yellowish orange (10YR 6/6) and ironstained; very saturated	
						6" ironstone	
						SANDY CLAY, ~40% sand, medium dark gray (N4), micaceous	
						BORING TERMINATED AT 69 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

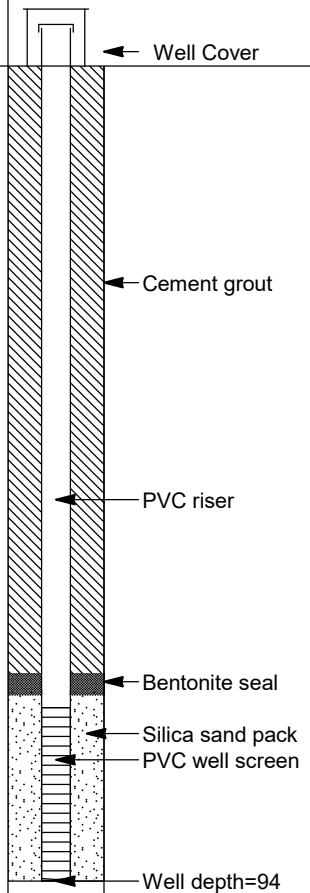
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-50 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	1/22/2013 - 1/22/2013
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	
REMARKS		**GROUND ELEVATION**	
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		SC-SM				CLAYEY SAND ~30% clay, moderate brown (5YR 3/4) to sandy clay ~30% sand; dry	
5						SAND, light brown (5YR 5/6) to dark yellowish orange (10YR 6/6) and some dark brown mottles, very fine grained ~15% clay, some roots, dry	
10						moist	
15		SP				dry	
20							
25		SC				SAND, grayish orange (10 YR 7/4), fine to medium grain	
30		SP				SANDY CLAY, light gray (N7) with brownish red mottes, ~40% sand, dry	
35		SP				SAND as in 24-24.5'	
40						SAND, very pale orange (10YR 8/2) to light gray (N7), very fine grained, laminae of red, orange clayey sand and lignite traces; dry	
45						SAND, grayish orange pink (5YR 7/2), laminae as at 29' and clay crossbedding ~1.5" thick light gray (N7) in color ~30% sand; dry	
50						Interbedded SAND and CLAY, as in 39-44'	
55							
60		SC/CL					
65						CLAYEY SAND, light gray (N7) with some dark yellowish orange (10YR 6/6), occasional clay bed less than 0.5", fine grained, micaceous, some lignite traces	
70						Interbedded CLAY and SAND, light gray (N7), fine grained, micaceous; dry	
75							
80						SAND, dark yellowish orange (10YR 6/6), very fine grained, crossbedded; saturated	
85		SP				SAND, light brown (5YR 6/4) to light gray (N7), micaceous, interbedded sandy clay light gray, very saturated	
90						SAND, dark yellowish orange (10YR 6/6) to pale yellowish orange (10YR 8/6), crossbedded with very sandy clay lined with lignite, very saturated	
		CL				SAND, light gray (N6) to light olive gray (5Y 6/1), very saturated	
						CLAY, medium dark gray (N4), lignite interbedded, stiff; dry	
						BORING TERMINATED AT 94 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
BWSWA - PARLOW EXPANSION

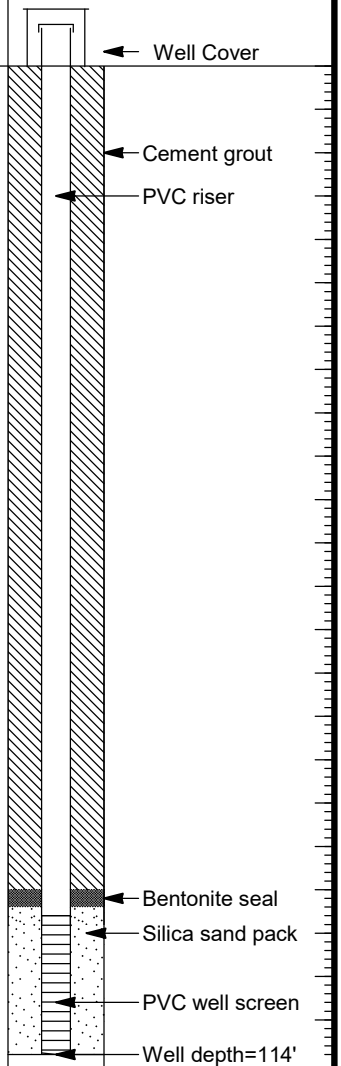
COKER, TUSCALOOSA CO, ALABAMA

LOG OF BORING PZ-51 S & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	600112019	**PROFESSIONAL**	W. Holmes
LOCATION	Coker, Tuscaloosa Co, Alabama	**DATE(S) DRILLED**	1/23/2013 - 1/23/2013
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	4¼" Hollow Stem Auger w/5' Continuous Sampler	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	
REMARKS		**GROUND ELEVATION**	
		DEPTH TO WATER	
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE: INTERVAL (feet)	SAMPLE: % RECOVERY	SAMPLE: PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0						CLAYEY SAND, moderate yellowish brown (10YR 5/4), to moderate brown (5YR 4/4), medium grained, organic material (topsoil)	
5		SC					
10		CL-ML				SILTY CLAY, light brown (5YR 5/6); dry	
15						SAND, dark yellowish orange (10YR 6/6) to pale yellowish orange (10YR 8/6), very fine to coarse grained, crossbedded, compacted, cemented, dry	
20		SP					
25							
30							
35							
40						~1" ironstone	
45						CLAY, pale yellowish brown (10YR 6/2) some orange mottles, <10% sand, plastic	
50						CLAY. medium gray (N5) to Medium dark gray (N4), 20%-30% sand content, plastic	
55						4" ironstone bed, moist	
60		CL				CLAY as @ 40', sand content increasing, moist	
65						CLAY interbedded with lignite and ironstone	
70						CLAY, medium gray (N5), micaceous, ~25% sand, lignite bedding	
75							
80		SP				sand and ironstone bed	
		CL-ML				SAND, grayish orange (10YR 7/4), coarse grained; dry	
85						SILTY CLAY, pale yellowish brown (10YR 6/2), very saturated	
90						<1" thick ironstone bed	
95		SP				SAND, very pale orange (10YR 8/2), coarse grained; dry	
100						SAND, grayish yellow (5Y 8/4) to yellowish gray (5Y 8/1), medium grained, occassional clay and ironstone bed	
105						SAND, grayish orange (10YR 7/4), coarse grained, crossbedded, occasional clay bed <0.5", lignite traces; dry	
110						saturation	
		CL				SAND, moderate yellow (5Y 7/6) to very light gray (N8), medium to fine grained, crossbedded, very saturated	
						3" ironstone bed	
						SANDY CLAY and lignite interbedded, medium gray (N5) to gray black (N2), ~30% sand	
						BORING TERMINATED AT 114 FEET.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\00019010103033.00 BWSWA PARTLOW PROPERTY\BORING LOGS\BWSWA EXPANSION LOGS.GPJ 4/27/20 Report:ENV LOG - WELL

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

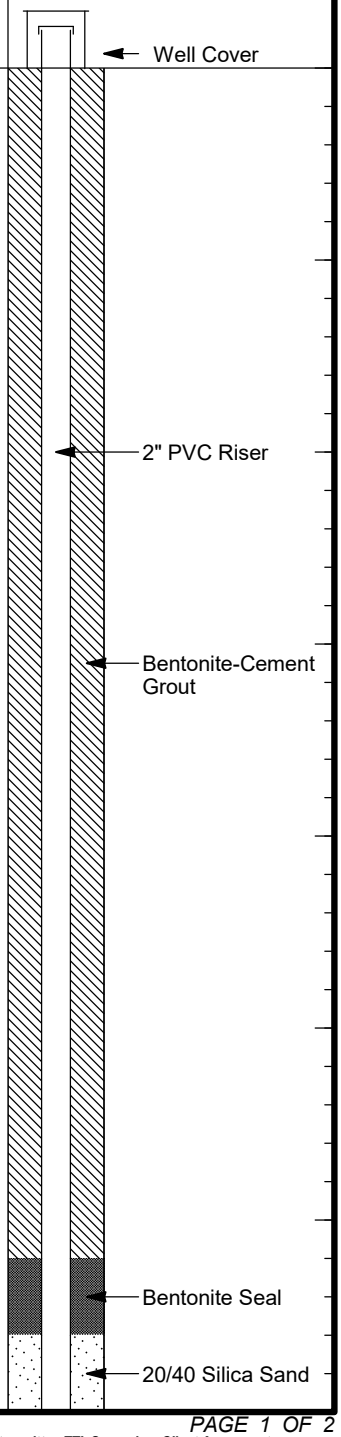
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-52(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/11/2020 - 5/11/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	274.85 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	270.07 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	47.6 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	227.25 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	75	NM	silty CLAY: moderate brown (5YR 4/4) with light brown (5YR 6/4) mottling, some organics at top of sample, moist.	
		SC	3-5	75	NM	clayey SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2) mottling, ~15% clay, ~85% fine-grained quartz sand, moist to saturated.	
5		SC	8-10	75	NM	sandy CLAY: medium light gray (N6) with light brown (5YR 6/4) mottling, ~25% fine-grained quartz sand, mostly clay matrix, saturated.	
10		SP	13-15	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, some interbedding of thing (2-3 mm) lean clay, saturated.	
15		SP	18-20	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, clean, saturated.	
20		SP	23-25	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, saturated.	
25		SP	28-30	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, saturated.	
30		SP	33-35	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, saturated.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-52(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/11/2020 - 5/11/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
40		SP	38-40	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) banding, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, saturated.		
45		SP	43-45	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) banding, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, saturated.	▼ 05/14/2020	0.01" PVC Slotted Screen
50		SP	48-50	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) banding, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, some small laminae (1/2") layers of light gray (N7) clay @ 49-50', saturated.		
55		SP CL/CH	53-55	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) banding, well sorted, fine-grained quartz sand, mostly clean, trace micaceous fines, trace ironstone fragments, saturated. CLAY: dark gray (N3), dense, high plasticity, moist. BORING TERMINATED AT 55 FEET.		Well Tip

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

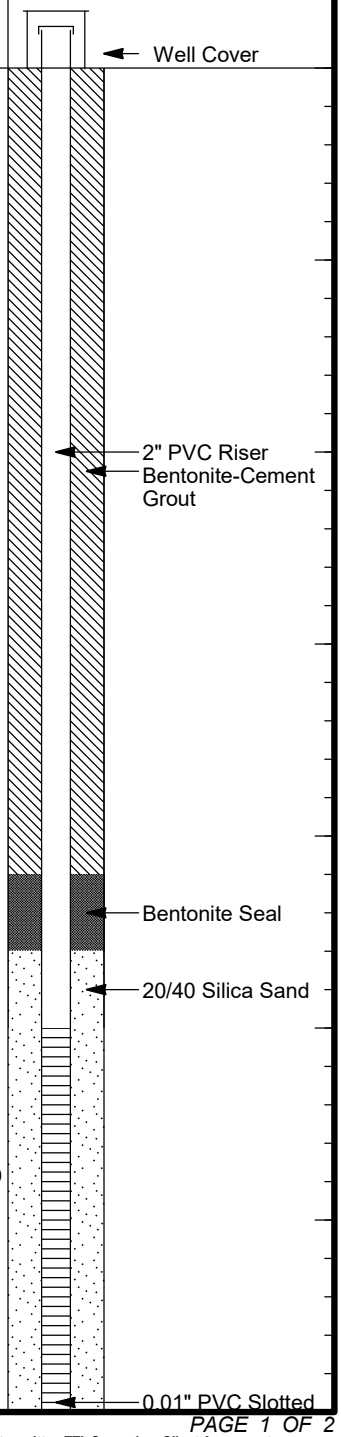
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-53(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/12/2020 - 5/12/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	261.06 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	256.53 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	33.21 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	227.85 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	75	NM	silty CLAY: light brown (5YR 5/6), low plasticity, ~10% fines, upper 2" organics, slightly moist.	
		SC	3-5	75	NM	clayey SAND: light brown (5YR 5/6) to moderate reddish brown (10R 4/6) at base, well sorted, fine-grained quartz sand that grades to clayey sand at base, moist.	
5							
		SP	8-10	75	NM	SAND: light brown (5YR 5/6) with minor very pale orange (10YR 3/2), well sorted, fine-grained quartz sand, <5% fines, clean, saturated.	
10							
		SP	13-15	75	NM	SAND: light brown (5YR 5/6) with minor very pale orange (10YR 3/2), well sorted, fine-grained quartz sand, <5% fines, small layers (3-5 mm) thourout sample, ~15% clay, saturated.	
15							
		SP-SC	18-20	75	NM	clayey SAND: light brown (5YR 5/6) with light gray (N7) and trace moderate pink (5R 7/4) mottling, very fine-grained quartz sand, ~25% clay/fines, saturated.	
20							
		SP	23-25	75	NM	SAND: very pale orange (10YR 8/2) with light brown (5YR 5/6) mottling, well sorted, fine-grained quartz sand, clean, moist.	
25							
		SP	28-30	75	NM	SAND: very pale orange (10YR 8/2) with light brown (5YR 5/6) and trace modderate red (5R 4/6) mottling, well sorted, fine-grained quartz sand, clean, moist.	▼ 05/14/2020
30							
		SP	33-35	75	NM	SAND: light brown (5YR 5/6) with very pale orange (10YR 8/2) mottling, well sorted, fine-grained quartz sand, clean, saturated.	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-53(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/12/2020 - 5/12/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
40		SP	38-40	75	NM	SAND: light brown (5YR 5/6) with very pale orange (10YR 8/2) mottling, well sorted, fine-grained quartz sand, clean, saturated.		Screen
45		CL/CH	43-45	75	NM	CLAY: dark gray (N3), dense, some trace coal, moist.		Well Tip
						BORING TERMINATED AT 45 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-54(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/4/2020 - 5/4/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	302.00 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	298.58 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	67.23 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	234.77 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL	0-2	75	NM	silty CLAY: moderate reddish brown (10R 3/4), upper 2" organics, 15-20% silt, traces of very fine to fine-grained quartz sand, moist.		Well Cover
		SP	3-5	75	NM	SAND: light brown (5YR 6/4), soft, fine-grained quartz sand, 5-10% fines, slighlty argillaceous, moist.		
5								
		SP	8-10	75	NM	SAND: light brown (5YR 6/4), soft, very well sorted, medium-grained quartz sand, 5-10% fines, slighlty argillaceous, moist.		
10								2" PVC Riser
		SP	13-15	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) alternating banding, well sorted, fine to medium-grained quartz sand, saturated.		
15								
		SP	18-20	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) alternating banding, well sorted, fine grading to medium-grained quartz sand, saturated.		
20								
		SP	23-25	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) alternating banding, well sorted, fine to medium-grained quartz sand, saturated.		
		SP/CL				interbedded SAND and CLAY: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and moderate reddish brown (10R 3/4) alternating banding, well sorted, fine grading to medium-grained quartz sand, with dense, slightly silty lean clay, saturated.		
25								Bentonite-Cement Grout
			28-30	75	NM	NO RECOVERY		
30								
		SC/CL	33-35	75	NM	interbedded clayey SAND and lean CLAY: light brown (5YR 6/4) with very pale orange (10YR 8/2), and moderate reddish brown (10R 3/4) alternating banding, thin laminae, ~50% clay,		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

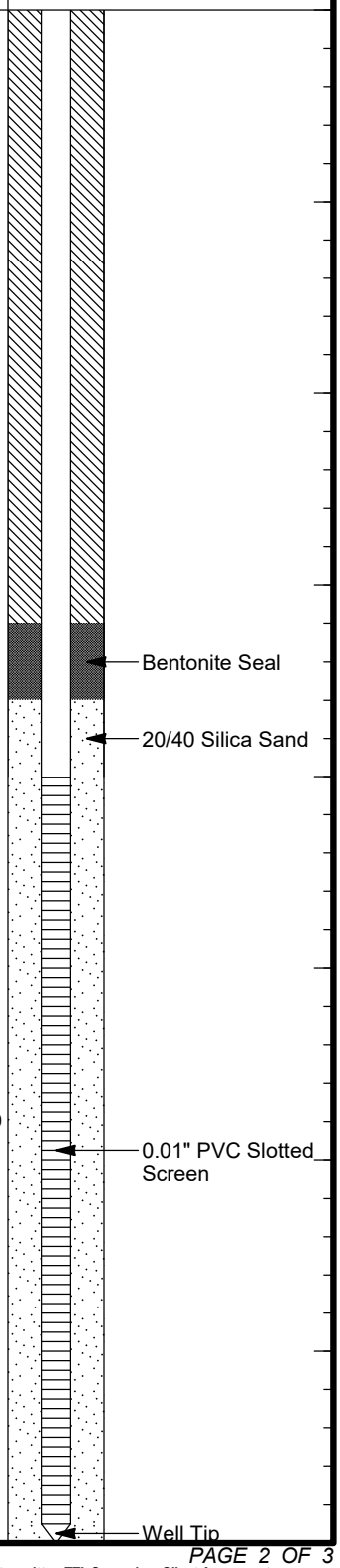
PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/4/2020 - 5/4/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						~50% very fine to fine-grained clayey sand, traces of coal (1-2%) @ 34-35', saturated.	
40		SC/CL	38-40	75	NM	interbedded clayey SAND and lean CLAY: light brown (5YR 6/4) with very pale orange (10YR 8/2), and moderate reddish brown (10R 3/4) alternating banding, thin laminae, ~65-70% clay, ~30-35% very fine to fine-grained clayey sand, traces of coal (1-2%) @ 34-35', saturated.	
45		SC	43-45	75	NM	clayey SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2), and moderate reddish brown (10R 3/4) alternating banding, ~60% lean clay, 40% very fine to fine-grained quartz sand, saturated.	
50		SC	48-50	75	NM	clayey SAND: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, dense, ~40% clay, ~60 very fine to fine-grained quartz sand, traces of coal, saturated.	
55		SC	53-55	75	NM	clayey SAND: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, dense, ~40% clay, ~60 very fine to fine-grained quartz sand, traces of coal, bottom 2" show traces of ironstone, indurated, saturated.	
60		SC	58-60	75	NM	clayey SAND: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, dense, ~40% clay, ~60 very fine to fine-grained quartz sand, traces of coal, saturated	
65		SC	63-65	75	NM	clayey SAND: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, 40% clay, ~60 very fine to fine-grained quartz sand, with thin interbedded layers of medium gray (N5) lean clay at base of sample (2-5 mm thick), saturated.	▼ 05/14/2020
70		SC	68-70	75	NM	clayey SAND: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, 40% clay, ~60 very fine to fine-grained quartz sand, with thin interbedded layers of medium gray (N5) lean clay at base of sample (2-5 mm thick), saturated.	
		SC/CL	73-75	75	NM	interbedded clayey SAND and CLAY: pale yellowish orange (10YR 8/6) with very pale orange (10YR 8/2) and moderate reddish brown (10R 3/4) mottling, 40% clay, ~60 very fine to	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-54(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton
LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/4/2020 - 5/4/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						fine-grained quartz sand, with thin interbedded and alternating layers of medium gray (N5) lean clay at base of sample (2-5 mm thick), saturated.		
						BORING TERMINATED AT 75 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

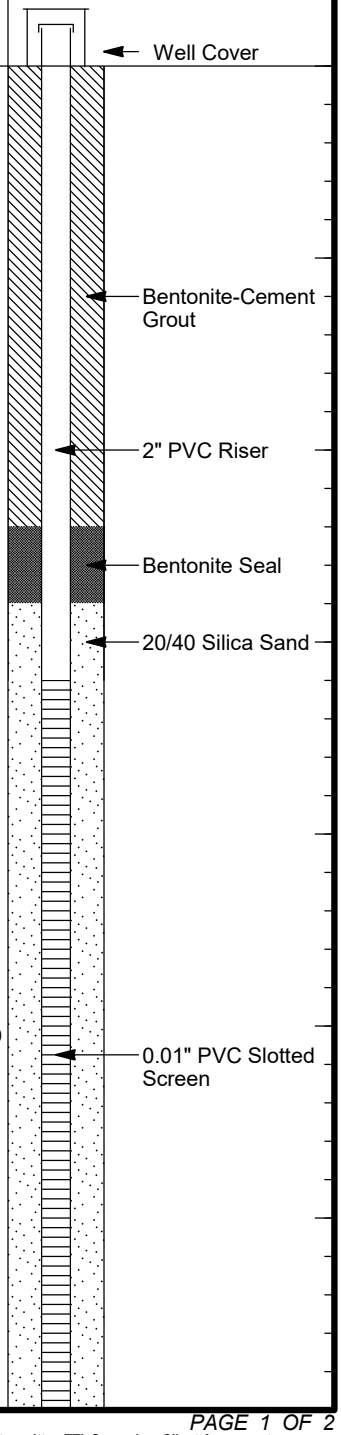
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-55(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/5/2020 - 5/5/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	259.44 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	255.64 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	28.89 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	230.55 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	75	NM	CLAY: moderate brown (5R 4/4), silty, upper 3-4" mostly organics, dry.	
		SM/CL	3-5	75	NM	silty CLAY: moderate brown (5YR 4/4) with minor light brown (5YR 6/4) mottling, ~15% silt at base of sample, soft, moist.	
5							
		SP	8-10	75	NM	SAND, light brown (5YR 6/4), well sorted, fine-grained quartz sand, clean, moist.	
10							
		SC	13-15	75	NM	clayey SAND: light brown (5YR 6/4), well sorted, medium-grained quartz sand, ~20% fines/clay matrix, trace interbedding of clay, slightly saturated.	
15							
		SP	18-20	75	NM	SAND: light brown (5YR 6/4) with dark yellowish orange (10YR 6/6) mottling, well sorted, fine-grained quartz sand, trace laminae (3-5 mm) of medium gray (N5) lean clay, saturated.	
20							
		SP	23-25	75	NM	SAND: light brown (5YR 6/4) with dark yellowish orange (10YR 6/6) mottling, well sorted, fine-grained quartz sand, slightly argillaceous matrix, 5-10% interbedded fines and (3-5 mm) of medium gray (N5) lean clay, saturated.	▼ 05/14/2020
25							
		SP	28-30	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) mottling, well sorted, medium-grained quartz sand, slightly argillaceous matrix, 5-10% interbedded fines and (3-5 mm) of medium gray (N5) lean clay. saturated.	
		CL				CLAY: medium gray (N5) with moderate orange pink (10R 7/4), slightly plastic, moist.	
30							
		CL	33-35	75	NM	CLAY: medium gray (N5) with moderate orange pink (10R 7/4), slightly plastic, moist.	
		CL				CLAY: medium gray (N5), lean clay, with intermittent zones of	

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-55(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/5/2020 - 5/5/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						fine-grained quartz sand, trace micaceous fines, dry.		Well Tip
						BORING TERMINATED AT 36 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

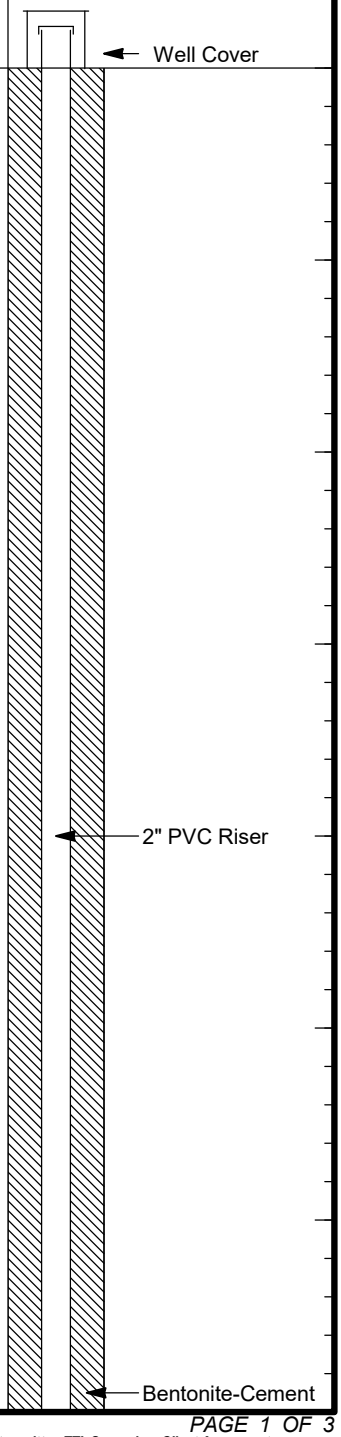
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-56(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/13/2020 - 5/13/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	315.56 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	310.81 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	81.43 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	234.13 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	75	NM	CLAY: modderate reddish brown (10R 4/6), slightly plastic, no fines or sand, lean, upper 2" organic top soi, moist.	
		SP	3-5	75	NM	SAND: light brown (5YR 5/6), well sorted, fine-grained quartz sand, <5% fines, moist.	
5		SP	8-10	75	NM	SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, <5% fines, moist.	
10		SP	13-15	75	NM	SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, ~5-8% fines, slightly argillaceous matrix, moist.	
15		SP	18-20	75	NM	SAND: light brown (5YR 5/6) with moderate orange pink (10R 7/4), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2) mottling, well sorted, medium-grained quartz sand, trace micaceous fines, saturated.	
20		SP	23-25	75	NM	SAND: light brown (5YR 5/6) with moderate orange pink (10R 7/4), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2) mottling, well sorted, medium-grained quartz sand, some micaceous fines, saturated.	
25		SP	28-30	75	NM	SAND: light brown (5YR 5/6) with moderate orange pink (10R 7/4), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2) mottling, well sorted, medium-grained quartz sand, some micaceous fines, saturated.	
30		SC-SM	33-35	75	NM	silty clayey SAND: light brown (5YR 5/6), with light gray (N7), moderate red (5R 5/4), and dusky red (5R3/4) mottling, ~15-20% fines, ~40% clay, ~40% fine grained quartz sand,	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-56(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton
LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/13/2020 - 5/13/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						saturated.		Grout
40		SP/CL	38-40	75	NM	interbedded SAND and CLAY: light brown (5YR 5/6), with light gray (N7), moderate red (5R 5/4), and dusky red (5R3/4) mottling, well sorted, medium-grained quartz sand, with 1/2" clay layers, some thin coal seams (1-2 mm thick), saturated.		
45		SP/CL	43-45	75	NM	interbedded SAND and CLAY: light brown (5YR 5/6), with light gray (N7), moderate red (5R 5/4), and dusky red (5R3/4) banding, well sorted, medium-grained quartz sand, with 1/2" clay layers, some thin coal seams (1-2 mm thick), saturated.		
50		SP	48-50	75	NM	SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and light gray (N7) banding, well sorted, fine-grained quartz sand, <10% fines, dry.		
55		SM	53-55	75	NM	silty SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and light gray (N7) banding, well sorted, fine-grained quartz sand, ~30% fines, some micaceous fines, saturated.		
60		SM	58-60	75	NM	silty SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and light gray (N7) banding, well sorted, fine-grained quartz sand, ~30% fines, some micaceous fines, saturated.		
65		SM	63-65	75	NM	silty SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and light gray (N7) banding, well sorted, fine-grained quartz sand, ~30% fines, some micaceous fines, saturated.		
70		SM	68-70	75	NM	silty SAND: light brown (5YR 5/6) with pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and light gray (N7) banding, well sorted, fine-grained quartz sand, ~30% fines, some micaceous fines, saturated.		Bentonite Seal
		SC/CL	73-75	75	NM	interbedded clayey SAND and CLAY: light gray (N7), 30-40% clayey fines, high percentage of black (N1) fissile layers, some micaceous fines, moist.		20/40 Silica Sand

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-56(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/13/2020 - 5/13/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
80		SM	78-80	75	NM	silty SAND: light brown (5YR 5/6) with light gray (N7), pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), and moderate oragne pink (10R 7/4), 30-35% fines, fine-grained quartz sand, some micaceous fines, saturated.	▼ 05/14/2020	0.01" PVC Slotted Screen
85		SP	83-85	75	NM	SAND: very pale orange (10YR 8/2), well sorted, clean, fine-grained quartz sand, saturated.		
90		SP	88-90	75	NM	SAND: very pale orange (10YR 8/2) to moderate orange pink (10R 7/4) with light gray (N7) mottling at base of sample, well sorted, clean, fine-grained quartz sand, saturated.		
		SP	93-95	75	NM	SAND: very pale orange (10 YR 8/2), well sorted, very clean, fine-grained quartz sand, <5% fines, saturated.		Well Tip
						BORING TERMINATED AT 93 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

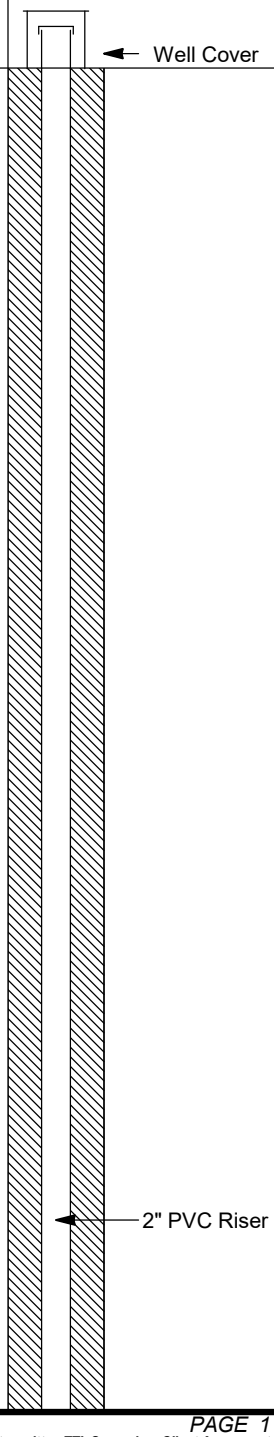
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-57(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/12/2020 - 5/12/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	314.56 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	310.00 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	82.43 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	232.13 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SC	0-2	75	NM	clayey SAND: light brown (5YR 6/4) with moderate reddish brown (10R 4/6) mottling, well sorted, fine-grained quartz sand, ~15-20% fines/clays, moist.	
		SP	3-5	75	NM	SAND: very pale orange (10YR 8/2) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, very soft, dry to slightly moist.	
5		SP	8-10	75	NM	SAND: very pale orange (10YR 8/2) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained quartz sand, clean, very soft, dry.	
10		SP	13-15	75	NM	SAND: pale yellowish orange (10YR 8/6), well sorted, fine-grained quartz sand, fairly clean, <5% fines, soft, dry.	
15		SP	18-20	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, fairly clean, <5% fines, soft, moist.	
20		SP	23-25	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained grading to medium-grained quartz sand, clean, soft, saturated.	
25		SP	28-30	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) banding, well sorted, fine-grained grading to medium-grained quartz sand, clean, soft, saturated.	
30		SP	33-35	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) banding, well sorted, medium-grained quartz sand, clean, soft, saturated.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-57(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/12/2020 - 5/12/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
40		SC	38-40	75	NM	clayey SAND: light brown (5YR 6/4) with moderate red (5R 4/6) and very pale orange (10YR 8/2) banding, fine to medium-grained quartz sand, ~20-25% lean clay, some black organics, dry.		Bentonite-Cement Grout
45		SC-SM	43-45	75	NM	clayey silty SAND: light brown (5YR 6/4) with moderate red (5R 4/6), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2) banding, ~35-40% silt, ~15% fine-grained quartz sand, ~50% clean clay matrix, moist.		
50		SC-SM	48-50	75	NM	clayey silty SAND: light brown (5YR 6/4) with moderate red (5R 4/6), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2) banding, ~35-40% silt, ~15% fine-grained quartz sand, ~50% clean clay matrix, moist.		
55		SC-SM	53-55	75	NM	clayey silty SAND: light brown (5YR 6/4) with moderate pink (5R 7/4), pale red (5R 6/2), and very pale orange (10YR 8/2) mottling, ~35-40% silt, ~15% fine-grained quartz sand, ~50% clean clay matrix, moist.		
60		SC-SM	58-60	75	NM	clayey silty SAND: light brown (5YR 6/4) with moderate pink (5R 7/4), pale red (5R 6/2), and very pale orange (10YR 8/2) mottling, ~35-40% silt, ~15% fine-grained quartz sand, ~50% clean clay matrix, with thin layers of light gray (N7) clay layers (3-5 mm), moist.		
65		SC-SM	63-65	75	NM	clayey silty SAND: light brown (5YR 6/4) with moderate red (5R 4/6), light gray (N7), and pale yellowish orange (10YR 8/6) banding, ~35-40% silt, ~15% fine-grained quartz sand, ~50% clean clay matrix, with thin layers of light gray (N7) clay layers (3-5 mm), moist		
70		SM	68-70	75	NM	silty SAND: light brown (5YR 6/4) with moderate red (5R 4/6), light gray (N7), and pale yellowish orange (10YR 8/6) banding, very fine-grained quartz sand, ~25-30% silt, moist.		
		SM	73-75	75	NM	silty SAND: moderate red (5R 4/6) with light brown (5YR 6/4) and light gray (N7) mottling, ~40-50% silt, very fine-grained quartz sand, some micaceous fines, moist.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-57(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/12/2020 - 5/12/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
80		SC-SM	78-80	75	NM	clayey silty SAND: moderate red (5R 4/6) with light brown (5YR 6/4) and light gray (N7) mottling, ~15% clay matrix, ~25% silt, ~65% very fine-grained quartz sand, micaceous fines at base of sample, moist.	▼ 05/14/2020	Bentonite Seal
85		SP	83-85	75	NM	SAND: moderate red (5R 4/6) with light brown (5YR 6/4) and light gray (N7) mottling, well sorted, fine-grained quartz sand, farily clean, thin (3-5 mm) layers of lean clay at base of sample, moist.		20/40 Silica Sand
90		SM	88-90	75	NM	silty SAND: moderate red (5R 4/6) with light brown (5YR 6/4) and light gray (N7) mottling, well sorted, fine-grained quartz sand, thin (3-5 mm) layers of lean clay at base of sample, saturated.		0.01" PVC Slotted Screen
95		SM	93-95	75	NM	silty SAND: light brown (5YR 6/4), ~25-30% silt, very fine-grained quartz sand, medium dark gray (N4) clay at base of sample, saturated.		
100		SM	98-100	75	NM	silty SAND: light brown (5YR 6/4), ~25-30% silt, very fine-grained quartz sand, medium dark gray (N4) clay at base of sample with ironstone fragments, indurated, saturated.		Well Tip
						BORING TERMINATED AT 100 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

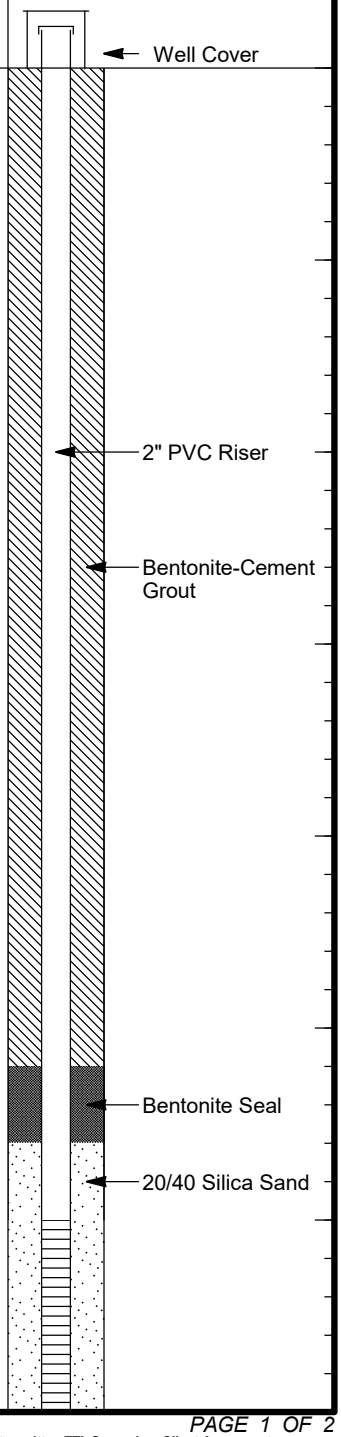
LOG OF BORING PZ-58(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/6/2020 - 5/6/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	277.25 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	272.63 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	40.73 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	236.52 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
0		SP	0-2	75	NM	SAND: light brown (5YR 6/4), soft, well sorted fine-grained quartz sand, micaceous, dry.
		SP	3-5	75	NM	SAND: light brown (5YR 6/4), soft, well sorted fine-grained quartz sand, micaceous, dry.
		CL				silty CLAY: modderate reddish brown (10R 4/6), ~10-15% silt, moist.
5		CL	8-10	75	NM	CLAY: modderate reddish brown (10R 4/6), moist.
		SP				SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, slightly argillecous, dense.
10		SC	13-15	75	NM	clayey SAND: modderate reddish brown (10R 4/6), ~15-20% clays, ~80-85% medium-grained quartz sand, well sorted, moist.
15		SC	18-20	75	NM	clayey SAND: modderate reddish brown (10R 4/6) with light brown (5YR 6/4) and pale yellowish orange (10YR 8/6) mottling, ~15-20% clays, ~80-85% medium-grained quartz sand, well sorted, micaceous fines at base of sample, moist.
20		SP/CL	23-25	75	NM	interbedded SAND and CLAY: light brown (5YR 6/4), fine-grained quartz sand, with medium gray (N5), 1/2" thick lean clay, moist.
25		SP	28-30	75	NM	SAND: light brown (5YR 6/4) with pale yellowish orange (10YR 8/6) and very pale orange (10YR 8/2) mottling, well sorted, very fine-grained quartz sand, moist.
30		SP	33-35	75	NM	SAND: very dark red (5R 2/6) with light brown (5YR 6/4) and very pale orange (10YR 8/2) mottling, fine-grained quartz sand.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-58(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/6/2020 - 5/6/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
40		SP	38-40	75	NM	SAND: modderate reddish brown (10R 4/6), well sorted, fine-grained quartz sand, <5% fines, moist.	▼ 05/14/2020	0.01" PVC Slotted Screen
45		SP	43-45	75	NM	SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2) mottling, well sorted, fine-grained quartz sand, ironstone fragments at bottom 1" of sample, moist to saturated.		
50		SP / CH	48-50	75	NM	SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2) mottling, well sorted, fine-grained quartz sand, some ironstone fragments, saturated. CLAY: dark gray (N3), high plasticity, very dense, trace sands (<5%). BORING TERMINATED AT 50 FEET.		Well Tip

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-59(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/6/2020 - 5/6/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	318.12 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	314.25 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	66.83 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	251.29 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL	0-2	75	NM	sitly CLAY: moderate brown (5YR 4/4) graded to moderate reddish brown (10R 4/6), top 6" organics, trace amount of sand , moist.		Well Cover
		CL/SP	3-5	75	NM	silty CLAY: moderate reddish brown (10R 4/6), grades to light brown (5YR 6/4), well sorted, fine-grained quartz sand, moist.		
5		SP	8-10	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, moist.		
		CH				CLAY: pale purple (5P 6/2) with pale blue (5PB 7/2) mottling, high plasticity, dense, moist		
10		SP	13-15	75	NM	SAND: very pale orange (10YR 5/2), well sorted, fine-grained quartz sand, sub-rounded, fairly clean, moist.		
15		SP	18-20	75	NM	SAND: very pale orange (10YR 5/2), well sorted, fine-grained quartz sand, sub-rounded, fairly clean, moist.		2" PVC Riser
20		SP	23-25	75	NM	SAND: very pale orange (10YR 5/2) with light brown (5YR 6/4) mottling, slightly argillaceous, <5% fines, fairly clean, moist.		
25		SC/CL	28-30	75	NM	sandy CLAY with interbedded CLAY: light brown (5YR 6/4) with grayish brown (5YR 3/2), very pale orange (10YR 5/2), and pale (5PB 7/2) mottling, ~30-35% sand, clay appears interbedded and alternating, saturated.		Bentonite-Cement Grout
30		CL-ML	33-35	75	NM	silty CLAY: moderate reddish brown (10R 3/4) with light brown (5YR 6/4), moderate orange pink (10R 7/4), and pale yellowish orange (10YR 8/6) mottling, very dense, moist.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-59(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/6/2020 - 5/6/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
40		CL	38-40	75	NM	silty CLAY: moderate reddish brown (10R 3/4) with light brown (5YR 6/4), moderate orange pink (10R 7/4), and pale yellowish orange (10YR 8/6) mottling, interbedded with lean clay laminae, 3-5 mm thick, ~40% silt, very dense, saturated.	
45		SC-SM	43-45	75	NM	silty sandy CLAY: pale yellowish orange (10YR 8/6) with light brown (5YR 6/4), moderate orange pink (10R 7/4), and pale yellowish orange (10YR 8/6) mottling, interbedded, well sorted, medium-grained quartz sand, with silty, dense clay, saturated.	
50		SP	48-50	75	NM	SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2), and pale yellowish orange (10YR 8/6) mottling, fine-grained quartz sand, fairly dense, trace coal seams (1-2 mm thick), saturated	
55		SP	53-55	75	NM	SAND: light brown (5YR 6/4) with very pale orange (10YR 8/2), and pale yellowish orange (10YR 8/6) mottling, well sorted, fine-grained grading to medium-grained quartz sand, saturated.	
60		SP	58-60	75	NM	SAND: very pale orange (10YR 8/2) with pale yellowish orange (10YR 8/6) mottling, well sorted, fine to medium-grained quartz sand, saturated.	
65		SP	63-65	75	NM	SAND: moderate yellowish brown (10YR 5/4), well sorted, medium-grained quartz sand, with a 1" layer of medium gray (N5) lean clay at base of sample, saturated.	▼ 05/14/2020
70		SP CL	68-70	75	NM	SAND: moderate yellowish brown (10YR 5/4), well sorted, medium-grained quartz sand, with a 1" layer of medium gray (N5) lean clay at base of sample, saturated. CLAY: medium gray (N5) with medium dark gray (N4) mottling, dense, moist.	
		SP	73-75	75	NM	SAND: dark yellowish brown (10YR 6/2), well sorted, fine-grained quartz sand, with med gray (N5) lean clay at bottom 3" of sample, saturated.	

PIEZOMETER DIAGRAM

Bentonite Seal

20/40 Silica Sand

0.01" PVC Slotted

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-59(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A.Patton

LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 5/6/2020 - 5/6/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
80		SP	78-80	75	NM	SAND: dark yellowish brown (10YR 6/2), well sorted, fine-grained quartz sand, slightly argillaceous, <5% fines, saturated.		Screen
		SP	83-85	75	NM	SAND: dark yellowish brown (10YR 6/2), well sorted, fine-grained quartz sand, slightly argillaceous, <5% fines, saturated.		
85		CL				CLAY: dark gray (N3), very dense, moist.		Well Tip
						BORING TERMINATED AT 85 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

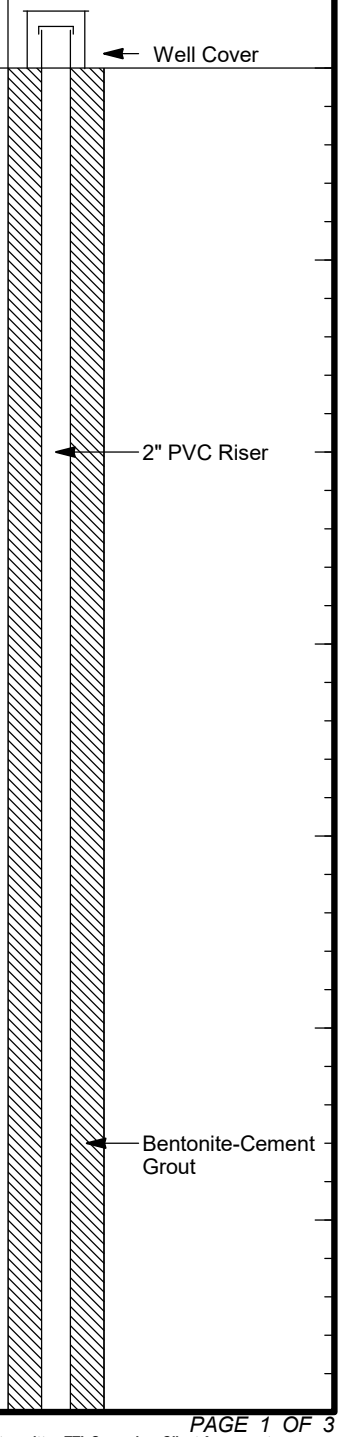
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-60(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/7/2020 - 5/7/2020
DRILLING COMPANY	Betts Environmental, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	C. Lackey	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	315.77 Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	311.00 Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	71.67 Ft. BMP
	HSAs charged with water during drilling	**WATER ELEVATION**	244.10 Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP	0-2	75	NM	SAND: light brown (5YR 6/4), well sorted, fine grained quartz sand.	
		SP	3-5	75	NM	SAND: light brown (5YR 6/4), well sorted, fine grained quartz sand.	
5		SM				silty SAND: dark gray (N3), some organics and decayed tree limbs, moist.	
		SC	8-10	75	NM	clayey SAND: light brown (5YR 6/4), moderate brown (5YR 4/4), ~80-85% fine-grained, well sorted quartz sand, ~15-20% fines, moist.	
10		SP	13-15	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, 5-8% micaceous (muscovite), moist.	
15		SP	18-20	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, moist.	
20		SP	23-25	75	NM	SAND: light brown (5YR 6/4), well sorted, fine-grained quartz sand, moist.	
25		SP	28-30	75	NM	SAND: light brown (5YR 6/4), well sorted, medium-grained quatrz sand, moist.	
30		SP/CL	33-35	75	NM	interbedded SAND and CLAY: light brown (5YR 6/4), well sorted, medium grained quartz sand, with pale purple (5P 6/2), and medium gray (N5), low plasticity, lean clay.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

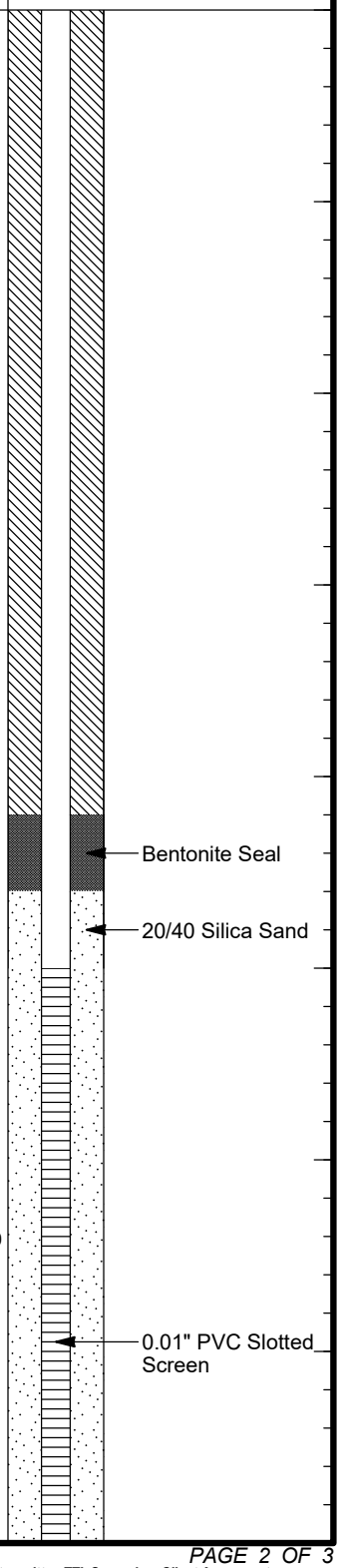
LOG OF BORING PZ-60(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/7/2020 - 5/7/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
40		CL/CH	38-40	75	NM	CLAY: light brown (5YR 6/4) with dark gray (N3) mottling at the top of the sample and grades to dark gray (N3) at the base of the sample, very dense, high plasticity, predominately fat clay.	
45		CL	43-45	75	NM	CLAY: dark gray (N3), very dense, low plasticity, silty clay.	
50		CL	48-50	75	NM	CLAY: dark gray (N3), very dense, low plasticity, silty clay.	
55		CL	53-55	75	NM	CLAY: dark gray (N3), very dense, low plasticity, silty clay.	
60		CL	58-60	75	NM	CLAY: dark gray (N3), very dense, low plasticity, silty clay.	
65		CL/CH	63-65	75	NM	CLAY: dark gray (N3), bottom 2"dark yellowish brown (10YR 4/2) with light brown (5YR 6/4) mottling, very dense, low plasticity, silty clay.	
70		CL SP	68-70	75	NM	CLAY: dark yellowish brown (10YR 4/2) with light brown (5YR 6/4) mottling, very dense, low plasticity, silty clay. SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 6/4), well sorted, very fine-grained quartz sand, dry.	▼ 05/14/2020
		SP-SC	73-75	75	NM	SAND: light brown (10YR 8/6), well sorted, fine-grained quartz sand, with some interbedded clayey sand, ~15% clay, moist to saturated.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-60(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A.Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	5/7/2020 - 5/7/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL	78-80	75	NM	CLAY: dark gray (N3), low plasticity, slightly silty.		
80						BORING TERMINATED AT 80 FEET.		Well Tip

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 5/19/20 Report:2010 ENV WELL LOG (UPDATED WATER)

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

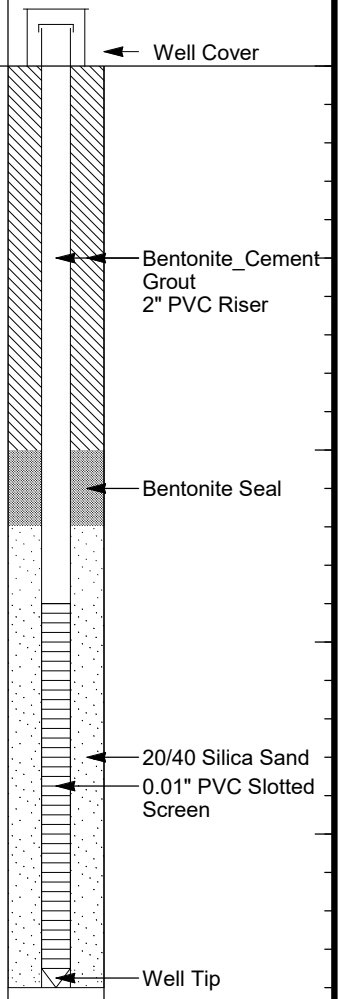
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-61(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	13.83 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
5		SC	3.5-5.5	100	NM	clayey SAND: light brown (5YR 5/6), ~85% fine-grained sand, top 2" silty loam with organics, dry.	
10		SC-CL	8.5-10.5	100	NM	sandy CLAY: mottled moderate reddish brown (10R 4/6), medium light gray (N6), and light brown (5YR 5/6), lean, slightly plastic, moderately dense, top 2" clayey sand, moist.	
15		SC-SM	13.5-15.5	100	NM	silty, sandy CLAY: pale yellowish brown (10YR 6/2), light brown (5YR 5/6), moderate reddish brown (10R 4/6), and medium light gray (N6), ~70% clay, ~20% silt, ~10% quartz sand, moist; clayey sand resembling ironstone present in bottom 2".	
20		SC/SM	18.5-20.5	100	NM	interbedded silty, sandy CLAY: light brown (5YR 5/6), pale yellowish brown (10YR 6/2, moderate reddish brown (10R 4/6), light gray (N6), grades to higher content of silt then silty, micaceous, lean clay, medium dark gray (N4).	▽ 9/9/20
25		CL	23.5-25.5	100	NM	CLAY: medium dark gray (N4), slightly silty, lean, very dense, low plasticity.	
						BORING TERMINATED AT 25.5 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

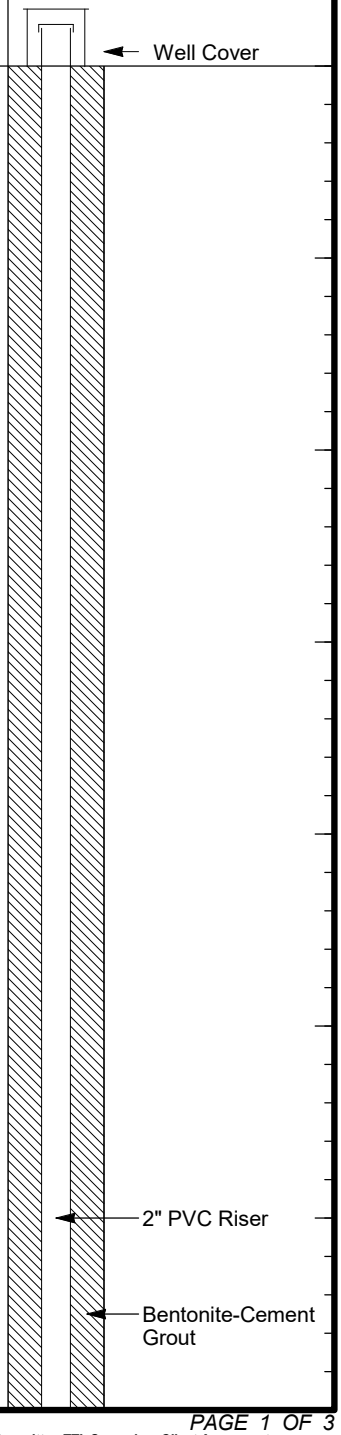
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-62(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	67.92 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		ML	3.5-5.5	100	NM	silty LOAM: moderate brown (5YR 3/4), organics.	
		SP				SAND: moderate reddish brown (10R 4/6), ~10% argillaceous, fine-grained, well sorted quartz sand, dry to moist.	
5		SP	8.5-10.5	100	NM	SAND: moderate reddish brown (10R 4/6), fine-grained, well sorted quartz sand, ~5-7% argillaceous; bottom 2" grayish orange (10YR 7/4).	
10		SP	13.5-15.5	100	NM	SAND: mottled very pale orange (10YR 8/2) and grayish orange (10YR 7/4), fine-grained, well sorted quartz sand, dry.	
15		SP	18.5-20.5	100	NM	SAND: mottled very pale orange (10YR 8/2) and grayish orange (10YR 7/4), fine-grained, well sorted quartz sand, dry.	
20		SC/CL	23.5-25.5	100	NM	sandy CLAY: light brown (5YR 5/6), moderate reddish brown (10R 4/6), and light brownish gray (5YR 6/1), interbedded layers of clay and clayey sand with silt, ~65% clay, ~30% quartz sand, and ~5% silt, moist.	
25		SC	28.5-30.5	100	NM	clayey SAND: medium light gray (N6), light brown (5YR 5/6), and dark yellowish orange (10YR 6/6), ~50% lean clay, ~50% fine-grained, well sorted sand, dry.	
30		CL	33.5-35.5	100	NM	silty, sandy, CLAY: medium dark gray (N4), ~10% silt and sand, low plasticity, lean, dry.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

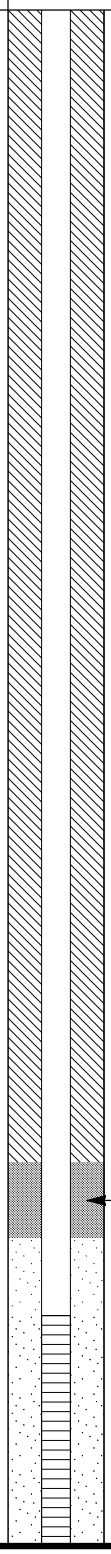
LOG OF BORING PZ-62(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
40		SC/CL	38.5-40.5	100	NM	interbedded clayey SAND and CLAY: medium dark gray (N4), ~50% quartz sand and 50% lean clay, very dense, dry.	
45		SC/CL	43.5-45.5	100	NM	silty, sandy CLAY: medium dark gray (N4), ~70% clay, ~20% fine-grained sand, ~10% silt, bottom foot comprised of interbedded oxidized sand that resembles ironstone at ~15% and 85% lean clay.	
50		SP	48.5-50.5	100	NM	SAND: very pale orange (10YR 8/2), light gray (N7), yellowish gray (5Y 8/1), dark yellowish orange (10YR 8/6), ~85% clean quartz sand, dry.	
55		SP-SM	53.5-55.5	100	NM	silty SAND: pale yellowish orange (10YR 8/6), yellowish gray (5Y 8/1), and dark yellowish orange (10YR 8/6), fine-grained, well sorted quartz sand with thin laminae of lean clay and 2" lean, dense clay layers, dry.	
60		SP	58.5-60.5	100	NM	SAND: light brown (5YR 5/6), pale yellowish orange (10YR 8/6), light gray (N7), fine-grained, well sorted quartz sand with minor lean, dense clay layers 1-2" thick, ~5-7% silt, moist at the base.	
65		SP	63.5-65.5	100	NM	SAND: moderate reddish brown (10R 4/6), light brown (5YR 5/6), pale yellowish orange (10YR 8/6), and light gray (N7), fine- to medium-grained, well sorted quartz sand, thin clay lenses, moist.	
70		SP-SM	68.5-70.5	100	NM	silty SAND: very pale orange (10YR 8/6), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), clean sand, 5-10% silt, saturated.	▽ 9/9/20
		SP-SM	73.5-75.5	100	NM	silty SAND: pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), light gray (N7), fine-grained, well sorted	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-62(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						quartz sand, ~10-15% silt, thin lenses of lean clay, saturated.		
80		SP-SM	78.5-80.5	100	NM	silty SAND: pale yellowish orange (10YR 8/6), very pale orange (10YR 8/2), light gray (N7), fine-grained, well sorted quartz sand, ~10-15% silt, thin lenses of lean clay, saturated.		20/40 Silica Sand 0.01" PVC Slotted Screen
85		SP-SM	83.5-85.5	100	NM	silty SAND: dark yellowish orange (10YR 8/6), grayish orange (10YR 7/4), medium light gray (N6), medium- to coase-grained sand, ~10% micaceous, ~10% silt, thin clay lenses.		
90		SP-SM	88.5-90.5	100	NM	silty SAND: dark yellowish orange (10YR 8/6), grayish orange (10YR 7/4), medium light gray (N6), medium- to coase-grained sand, ~10% micaceous, ~10% silt, thin clay lenses in top 3"; 5" of iron-stained SAND: mODERATE reddish brown (10R 4/6) and dark yellowish brown (10YR 4/2), medium- to coarse-grained, ~10% silt; remainder is comprised of sandy CLAY with gravel: (N4), ~25% sand, 15% gravel.		Well Tip

BORING TERMINATED AT 90.5 FEET

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

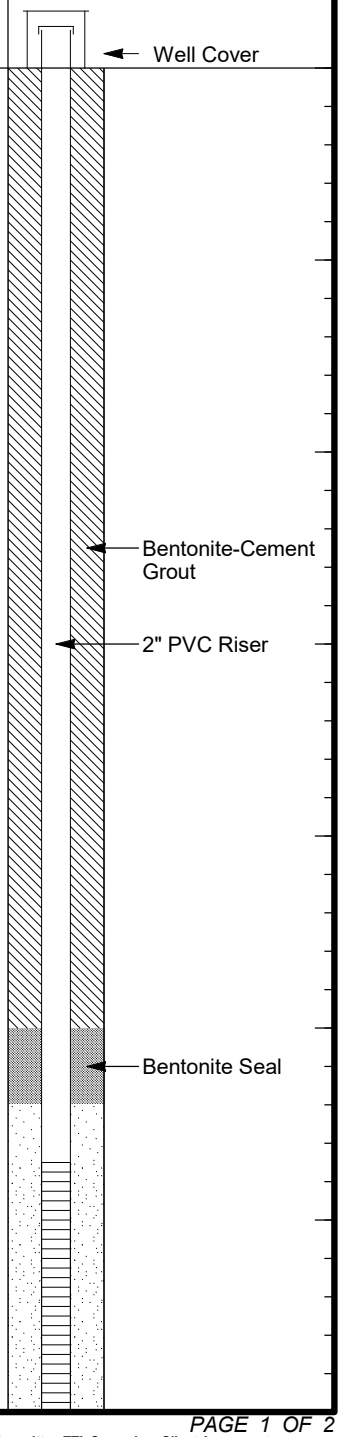
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-63(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	34 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	50	NM	silty SAND: dark yellowish orange (10YR 6/6) mottled with moderate reddish brown (10R 4/6), ~ 60% fine-grained quartz sand, ~40% fines, micaceous, trace organics, dry.	
5		SP	4-6	75	NM	poorly graded SAND: very pale orange (10YR 8/2), subangular fine-grained quartz sand, slightly micaceous, dry.	
10		SM	9-11	75	NM	silty SAND: very pale orange (10YR 8/2) inner bedded with dark yellowish orange (10YR 6/6), moderate reddish brown (10R 4/6) and light gray (N7), ~75% fine-grained quartz sand, ~20-25% fines, micaceous, trace lens of argillaceous matrix at bottom 2" of sample, dry.	
15		SP	14-16	100	NM	poorly graded SAND: very pale orange (10YR 8/2) inner bedded with dark yellowish orange (10YR 6/6), moderate reddish brown (10R 4/6) and light gray (N7), ~90% fine-grained quartz sand, with lens of light gray (N7) lean CLAY thoughout sample, moist.	
20		SP	19-21	75	NM	poorly graded SAND: very pale orange (10YR 8/2) inner bedded with dark yellowish orange (10YR 6/6) and light gray (N7), ~90% fine-grained quartz sand, with lens of light gray (N7) lean CLAY thoughout sample, moist.	
25		SP	24-26	100	NM	poorly graded SAND: very pale orange (10YR 8/2) inner bedded with dark yellowish orange (10YR 6/6) and light gray (N7), ~90% fine-grained quartz sand, with lens of light gray (N7) lean CLAY thoughout sample, moist.	
30		SP	29-31	75	NM	poorly graded SAND: very pale orange (10YR 8/2) inner bedded with dark yellowish orange (10YR 6/6) and light gray (N7), ~90% fine-grained quartz sand, with lens of light gray (N7) lean CLAY thoughout sample, moist.	
			34-36	100	NM	poorly graded SAND: light gray (N7) inner bedded with dark	▽ 9/9/20

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-63(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP				yellowish orange and medium gray (N5), ~80 fine-grained quartz sand, some coal inclusions and ironstone fragments,		
		SP	36-38	100	NM	lens of light gray (N7) lean CLAY, a thick hard, dense, high plasticity medium gray (N5) fat CLAY at bottom 4" of sample, saturated.		
		SP	38-40	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) graded to light gray (N7) graded to inner bedded dark yellowish orange (10YR 6/6) and light gray (N7), subangular, ~90% fine-grained quartz sand, inner bedded with light gray (N7)		
40		SP	40-42	100	NM	lens (~2 to 6mm) of lean CLAY, saturated. poorly graded SAND: inner bedded dark yellowish orange (10YR 6/6) and light gray (N7), subangular, ~90% fine-grained		20/40 Silica Sand
		SP	42-44	80	NM	quartz sand, slightly aggillaceous matrix, inner bedded with light gray (N7) lens (~2 to 6mm) of lean CLAY, saturated.		0.01" PVC Slotted Screen
		SP	44-46	100	NM	poorly graded SAND: inner bedded dark yellowish orange (10YR 6/6) and light gray (N7), subangular, ~90% fine-grained quartz sand, slightly aggillaceous matrix, saturated.		
45		SP-SC	46-48	100	NM	poorly graded Sand with clayey SAND: light gray (N7) graded into moderate reddish brown mottled with light gray (N7), subangular, medium-grained quartz sand, micaceous, fragments of coal and lens of medium gray (N5) lean CLAY, saturated.		
		SP	48-50	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and light brown (5YR 5/6),		
50		SP	50-52	100	NM	subangular, micaceous, trace coal and lens of layered/laminated dark yellowish orange (10YR 6/6), light gray (N7), medium gray (N5) and light brown (5YR 5/6) silt CLAY, saturated.		
		SP	52-54	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and light brown (5YR 5/6), subangular, micaceous, trace coal and lens of layered medium dark gray (N4) and light brown (5YR 5/6), hard silt CLAY, saturated.		Well Tip
		CL						
55		CL	54-56	100	NM	poorly graded SAND; light brown (5YR 5/6), subangular, micaceous, slightly argillaceous matrix, some coal fragments, saturated. BORING TERMINATED AT 56 FEET. silty CLAY: moderate brown (5YR 4/4) mottled with light brown (5YR 5/6) graded to medium dark gray (N4), micaceous, dense, hard, trace of fine-grained quartz sand, moist. silty CLAY: dark gray (N3) hard, dense, micaceous, moist.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

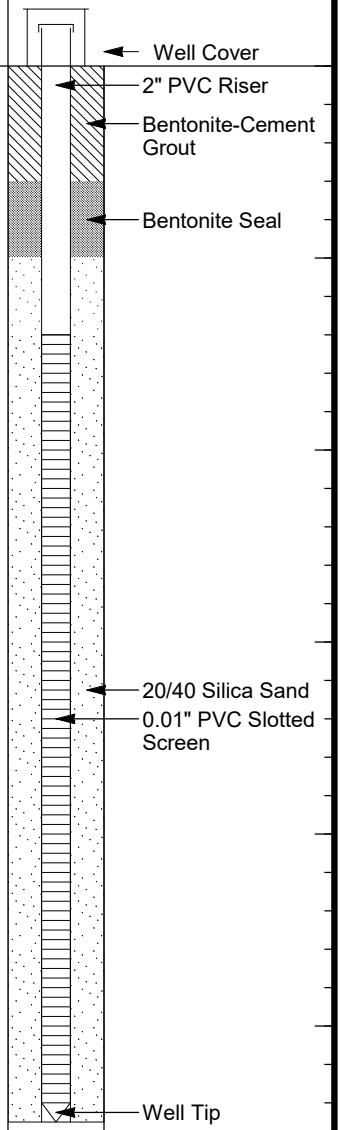
LOG OF BORING PZ-64(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	8.5 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP	0-2	40	NM	poorly graded SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6), >10% fines, micaceous, trace coal fragments, dry.	
5		SP	3.5-5.5	80	NM	poorly graded SAND: light brown (5YR 5/6), subangular, fairly hard, slightly micaceous, >5% fines, inner bedded light gray (N7) lean clay at bottom of sample, dry.	
10		SP	8.5-10.5	100	NM	poorly graded SAND: light brown (5YR 5/6) to moderate brown (5YR 4/4), subangular, >5% fines, micaceous, saturated.	▽ 9/9/20
15		SP	13.5-15.5	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6), subangular, micaceous, trace coal, inner bedded lens of light gray (N7) silty CLAY, slightly argillaceous matrix at base of sample, saturated.	
20		SP-SM	18.5-20.5	100	NM	poorly graded SAND graded to silty SAND: light brown (5YR 5/6) mottled with light gray (N7), ~70% fine-grained quartz sand graded to ~30% fine-grained quartz sand, micaceous, inner bedded lens/lamination of light gray (N7) lean CLAY at bottom 1" of sample, saturated.	
25		SM/CL	23.5-25.5	100	NM	inner bedded silty SAND and silty CLAY: dark yellowish orange (10YR 6/6) banded with light gray (N7), medium gray (N5), and dark reddish brown (10R 3/4), micaceous, hard, dense, cross-bedded, some lamination, saturated.	
		SM	25.5-27.5	100	NM	silty SAND: light brown (5YR 5/6), slight argillaceous matrix, micaceous, ~60% fine-grained quartz sand, ~30% fines, saturated.	
		CL				silty CLAY: medium dark gray (N4), hard, dense, moderate to low plasticity, micaceous, moist.	

BORING TERMINATED AT 27.5 FEET.

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

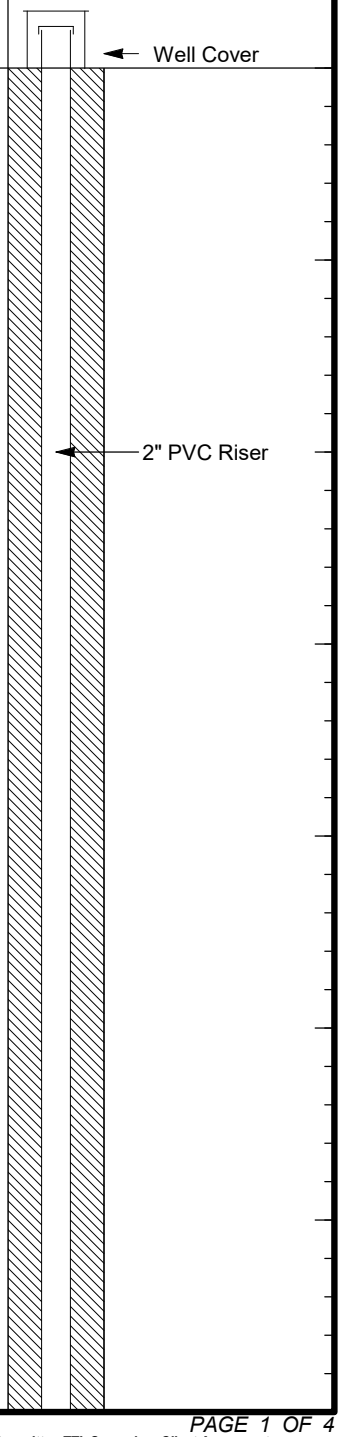
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-65(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	100.7 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
0		MH	3.5-5.5	100	NM	silty clay LOAM: upper 2" comprised of roots and organics, dry.	
5		SP				SAND: moderate reddish brown (10R 4/6), pale yellowish brown (10YR 6/2), fine-grained, well sorted quartz sand, dry.	
10		SP	8.5-10.5	100	NM	SAND: mottled light brown (5YR 5/6) and moderate reddish brown (10R 4/6), fine-grained, well sorted quartz sand, slightly micaceous, <5% fines, dry.	
15		SP	13.5-15.5	100	NM	SAND: mottled light brown (5YR 5/6) and moderate reddish brown (10R 4/6), medium-grained, well sorted quartz sand, slightly micaceous, <5% fines, dry.	
20		SP	18.5-20.5	100	NM	SAND: mottled moderate reddish brown (10R 4/6) and pale yellowish orange (10YR 8/6), fine-grained, well sorted quartz sand, moderately micaceous, <5% fines, dry.	
25		SP	23.5-25.5	100	NM	SAND: pale yellowish orange (10 YR 8/6) and dark yellowish orange (10YR 6/6), fine-grained, well sorted quartz sand, micaceous, slightly silty, dry.	
30		SP	28.5-30.5	100	NM	SAND: pale yellowish orange (10 YR 8/6) and dark yellowish orange (10YR 6/6), fine-grained, well sorted quartz sand, micaceous, slightly silty, dry.	
		SP	33.5-35.5	100	NM	SAND: light brown (5YR 5/6) and dark yellowish orange (10YR 6/6), fine-grained, well sorted quartz sand, micaceous, slightly	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-65(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						silty, dry.		
40		SP	38.5-40.5	100	NM	SAND: light brown (5YR 5/6) and dark yellowish orange (10YR 6/6), medium-grained, well sorted quartz sand, micaceous with mica lenses, slightly silty, dry.		
45		SP-SC	43.5-45.5	100	NM	SAND: top 1' light brown (5YR 5/6) and dark yellowish orange (10YR 6/6), medium-grained, well sorted quartz sand, micaceous, slightly silty, dry; grades to sandy CLAY: moderate reddish brown, light brown, and gray (N7), medium- to coarse-grained, well sorted quartz sand, micaceous, dry.		Bentonite-Cement Grout
50		SP-SC	48.5-50.5	100	NM	SAND: top 1' sandy CLAY: moderate reddish brown (10R 4/6), light brown (5YR 5/6), and light gray (N7), medium- to coarse-grained, well sorted quartz sand, micaceous, dry; remainder is SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and moderate orangish pink (10R 7/4), fine-grained, well sorted quartz sand, slightly silty, dry.		
55		SC/CL	53.5-55.5	100	NM	silty, sandy, CLAY: very pale orange (10YR 8/2), pale yellowish orange (10YR 6/6), moderate orangish pink (10R 7/4), and moderate red (5R 4/6), interbedded clay lenses, micaceous, moist.		
60		SC/SM	58.5-60.5	100	NM	silty, sandy, CLAY: mottled moderate red (5R 4/6), light red (5R 6/6), grayish brown (5YR 3/2), and pale yellowish orange (10 YR 6/6), micaceous, dry.		
65		SP-SM	63.5-65.5	100	NM	silty SAND: very pale orange (10YR 8/2) and yellowish gray (5Y 8/1), fine-grained, well sorted quartz sand, ~15% silt, micaceous, clay lenses, dry.		
70		SP-SM	68.5-70.5	100	NM	silty SAND: very pale orange (10YR 8/2) and yellowish gray (5Y 8/1), fine-grained, well sorted quartz sand, ~15% silt, micaceous, dry.		
		SP-SM	73.5-75.5	100	NM	silty SAND: very pale orange (10YR 8/2) and yellowish gray (5Y 8/1), fine-grained, well sorted quartz sand, ~15% silt,		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

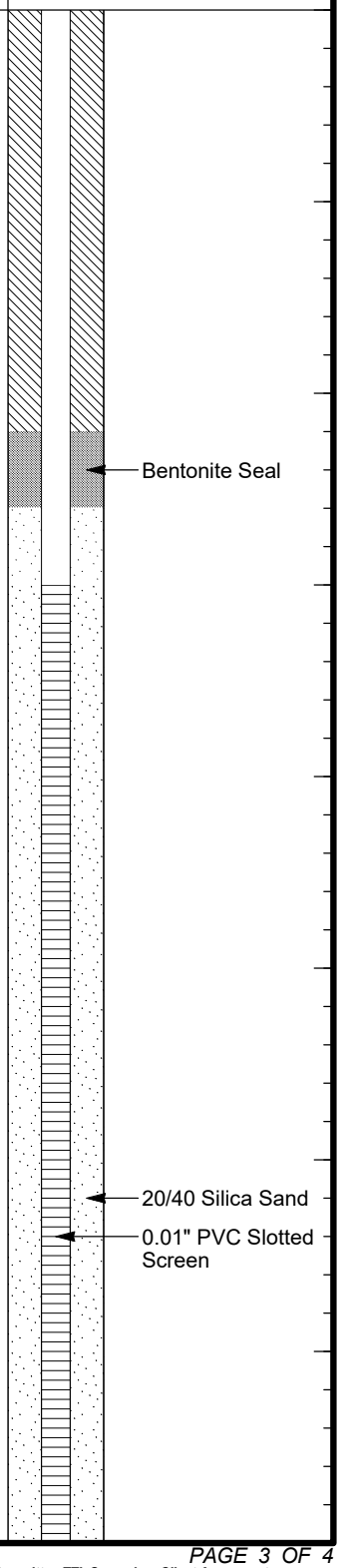
LOG OF BORING PZ-65(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
						micaceous, dry.	
80		SP-SM	78.5-80.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 6/6), and light brown (5YR 5/6), 15-20% silt, ~85% fine-grained quartz sand, ~5% micaceous, dry.	
85		SP-SM	83.5-85.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 6/6), and light brown (5YR 5/6), 15-20% silt, ~85% fine-grained quartz sand, ~5% micaceous, dry.	
90		SP-SM	88.5-90.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 6/6), and light brown (5YR 5/6), 15-20% silt, ~85% fine-grained quartz sand, <5% clay lenses, ~5% micaceous, moist.	
95		SP-SM	93.5-95.5	100	NM	silty SAND: moderate reddish brown (10R 4/6), light brown (5YR 5/6), pale yellowish orange (10YR 8/6), and very pale orange (10YR 8/2), 15-20% silt, 85% fine-grained quartz sand, <5% clay lenses, moist.	
100		SP-SM	98.5-100.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), 30-40% silt, 40-50% sand, <5% clay, 5% micaceous, saturated.	▽ 9/11/20
105		SP-SM	103.5-105.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), 30-40% silt, 40-50% sand, <5% clay, 5% micaceous, saturated.	
110		SP-SM	108.5-110.5	100	NM	silty SAND: top 1' very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), ~30-40% silt, ~40-50% sand, <5% clay, ~5% micaceous, saturated; 6" sandy CLAY: light gray (N7) and black (N1), ~40% sand, ~60% clay; bottom 6" silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), ~30-40% silt, ~40-50% sand, <5% clay, ~5% micaceous, saturated.	
		SP-SM	113.5-115.5	100	NM	silty SAND: very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), ~30-40% silt,	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-65(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						~40-50% sand, <5% clay, ~5% micaceous, saturated.		
120		SC/CL	118.5-120.5	100	NM	silty SAND: top 6" very pale orange (10YR 8/2), pale yellowish orange (10YR 8/6), and light brown (5YR 5/6), ~30-40% silt, ~40-50% sand, <5% clay, ~5% micaceous, saturated; remainder is sandy CLAY: medium dark gray (N4), ~30% sand, ~70% clay, grades to clean, dense, clay medium dark clay (N4) and dark gray (N3), coal lenses.		
125		CL	123.5-125.5	100	NM	CLAY: medium dark gray (N4) and dark gray (N3), very lean, very dense, 1" charcoal seams.		Well Tip
						BORING TERMINATED AT 125.5 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

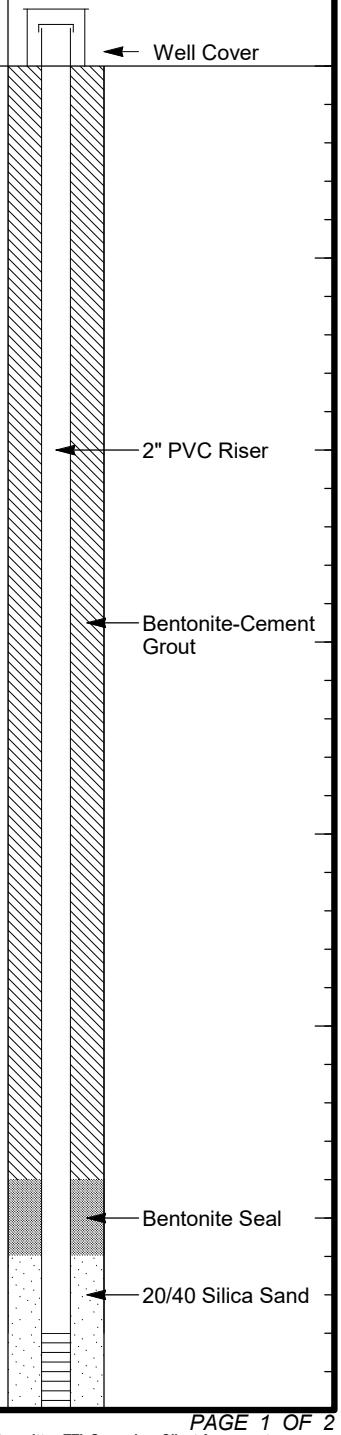
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-66(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	38.5 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	50	NM	silty SAND: very pale orange (10YR 8/2), ~60% fine-grained quartz sand, micaceous, dry.	
		SM	3.5-5.5	50	NM	silty SAND: very pale orange (10YR 8/2), ~60% fine-grained quartz sand, micaceous, dry.	
10		SP	8.5-10.5	50	NM	poorly graded SAND: dark yellowish orange (10YR 6/6), ~80% medium-grained quartz sand, ~20% fines, subangular, micaceous, dry.	
15		SP	13.5-15.5	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6), ~80% medium-grained quartz sand, ~20% fines, subangular, micaceous, moist.	
20		SP	18.5-20.5	50	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and moderate reddish brown (10R 4/6), ~80% medium-grained quartz sand, ~20% fines, subangular, micaceous, moist.	
25		SP	23.5-25.5	90	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and moderate reddish brown (10R 4/6), ~70% medium-grained quartz sand, ~20% fines, subangular, micaceous, lens of light gray (N7) lean CLAY, moist.	
30		SP	28.5-30.5	75	NM	poorly graded SAND: light brown (5YR 5/6), subangular, micaceous, trace fines, lens of light gray (N7) lean CLAY, slightly argillaceous matrix at base of sample, moist.	
		SM	33.5-35.5	100	NM	silty SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6) and moderate reddish brown (10R 4/6), ~60-70%	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-66(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
						fine-grained quartz sand, ~30-40% fines, micaceous, lens of light gray (N7) lean CLAY, moist.		
		SM	38.5-40.5	100	NM	silty SAND: light brown (5YR 5/6) inner bedded with dark yellowish orange (10YR 6/6) and moderate brown (5YR 4/4), ~60-70% fine-grained quartz sand, ~30-40% fines, micaceous, trace coal, lens of light gray (N7) lean CLAY, saturated.	▽ 9/10/20	
40		SC	43.5-45.5	100	NM	clayey SAND: light brown (5YR 5/6) subangular, ~60% fine-grained quartz sand, ~40% clay, saturated.		0.01" PVC Slotted Screen
45		SP/OH				inner bedded poorly graded SAND and COAL: dark yellowish orange (10YR 6/6) banded with black (N1) and moderate brown (5YR 4/4), micaceous, lens of dark yellowish orange (10YR 6/6) lean CLAY, saturated.		
		CL	48.5-50.5	100	NM	silty CLAY, moderate brown (5YR 4/4), micaceous, hard, some lens of coal, saturated.		
50		CL				silty CLAY, light gray (N7), micaceous, hard, low to moderate plasticity, some lamination, moist.		
		GP				poorly graded GRAVEL: dark reddish brown (10R 3/4), subangular, ~2mm to 1/2" in size, highly oxidized (appearance of iron stone), trace argillaceous matrix, saturated.		Well Tip
		CL	53.5-55.5	100	NM	lean CLAY, dark gray (N3), moderate plasticity, micaceous, trace fine-grained quartz sand, hard, dense, moist.		
55						BORING TERMINATED AT 55.5 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

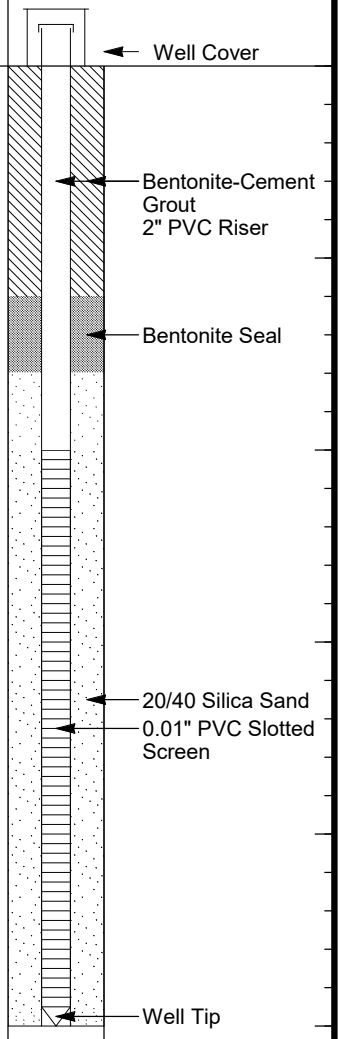
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-67(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/15/2020 - 9/15/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	23.42 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP-SM	0-2	100	NM	silty SAND: mottled pale yellowish orange (10YR 8/6), light brown (5YR 5/6), moderate orangish pink (10R 7/4), fine-grained, well sorted quartz sand, ~8-10% silty, dry.	
5		SP-SM	4-6	100	NM	silty SAND: mottled pale yellowish orange (10YR 8/6), light brown (5YR 5/6), very pale orange (10YR 8/2), ~80-90% gine-grained, well sorted sand, 1-20% silt, dry.	
10		SP-SM	9-11	100	NM	silty SAND: mottled pale yellowish orange (10YR 8/6), light brown (5YR 5/6), very pale orange (10YR 8/2), ~80-90% gine-grained, well sorted sand, 1-20% silt, dry.	
15		SP-SM	14-16	100	NM	silty SAND: mottled pale yellowish orange (10YR 8/6), light brown (5YR 5/6), very pale orange (10YR 8/2), ~80-90% gine-grained, well sorted sand, 1-20% silt, dry.	
20		SM/SC	19-21	100	NM	silty, clayey SAND: light brown (5YR 5/6), moderate reddish brown (10R 4/6), black (N), ~75% sand, ~20% clay, ~5% silt, ironstone fragments from 20-20'.	
25		SP	24-26	100	NM	SAND: medium-grained, poorly sorted, argillaceous.	▽ 9/15/20
		CL				CLAY: medium dark gry (N4), dark gray (N3), lean, dense.	
						BORING TERMINATED AT 26 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

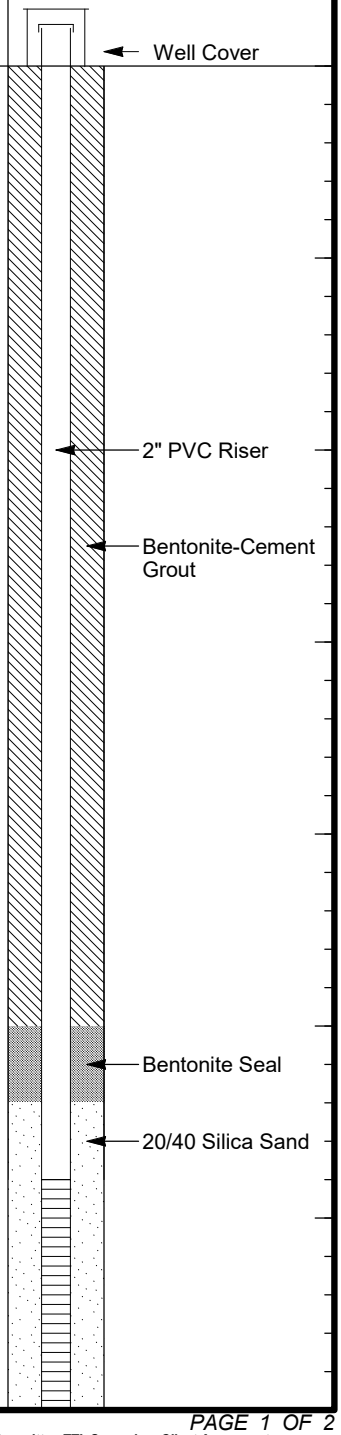
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-68(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	34 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	100	NM	silty SAND: very pale orange (10YR 8/2) graded to moderate brown (5YR 4/4), micaceous, ~70% fine-grained quartz sand, ~30% fines, dry.	
5		SM	4-6	50	NM	silty SAND: very pale orange (10YR 8/2) mottled with moderate brown (5YR 4/4) and dark yellowish orange (10YR 6/6), ~60% fine-grained quartz sand, ~40% fines, lens of moderate brown (5YR 3/4) silty CLAY ~2" thick at base of sample, dry.	
10		SM	9-11	100	NM	silty SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7), light brown (5YR 5/6) and moderated reddish orange (10R 6/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, dry.	
15		SM	14-16	100	NM	silty SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7), light brown (5YR 5/6) and moderated reddish orange (10R 6/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace fragments of coal and lens of light gray (N7) lean CLAY, dry.	
20		SM	19-21	100	NM	silty SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7), moderate reddish orange (10R 6/6) and light brown (5YR 5/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, coal seam @ 20' bgs (~2" thick), dry.	
25		SM	24-26	100	NM	silty SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7), moderate reddish orange (10R 6/6) and light brown (5YR 5/6), ~60% fine-grained quartz sand, ~40% fines, trace coal, micaceous, lens of light gray (N7) lean CLAY, dry.	
30		SM	29-31	100	NM	silty SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7), moderate reddish orange (10R 6/6) and light brown (5YR 5/6), ~60% fine-grained quartz sand, ~40% fines, trace coal, micaceous, lens of light gray (N7) lean CLAY, moist.	
			34-36	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6)	▽ 9/10/20

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-68(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SP				banded with light gray (N7), moderate reddish orange (10R 6/6) and light brown (5YR 5/6) graded to moderate brown (5YR 4/4) banded with dark yellowish orange (10YR 6/6), light gray (N7) and black (N1), ~90% fine-grained quartz sand, micaceous, some coal, saturated.		
40		SP	39-41	100	NM	poorly graded SAND: moderate reddish brown (10R 4/6), subangular, ~90% fine-grained quartz sand, micaceous, some coal, lens of light gray (N7) lean CLAY, saturated.		0.01" PVC Slotted Screen
45		SM	44-46	100	NM	silty SAND: moderate reddish brown (10R 4/6) mottled with dark yellowish orange (10YR 6/6) and light gray (N7), ~60% fine-grained quartz sand, ~40% fines, micaceous, hard, lens of light gray (N7) lean CLAY, some coal, saturated.		
50		CL	49-51	50	NM	silty CLAY: light gray (N7) to grayish black (N2), micaceous, hard, dense, low to moderate plasticity, moist.		Well Tip
						BORING TERMINATED AT 51 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

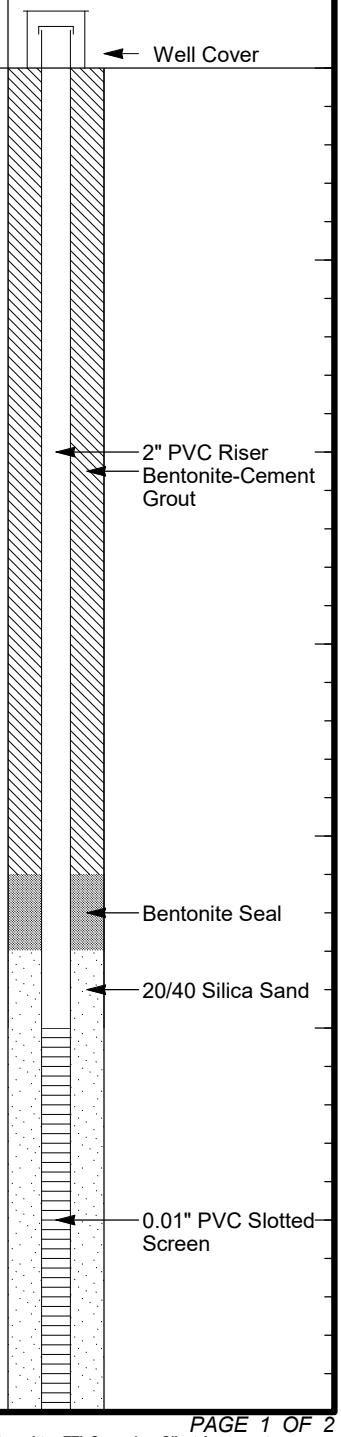
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-69(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	33 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	100	NM	silty SAND: light brown (5YR 5/6) to moderate reddish brown (10R 6/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace coal, dry.	
		SM	3-5	75	NM	silty SAND: moderate reddish brown (10R 4/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace coal, dry.	
5		SM	8-10	90	NM	silty SAND: moderate reddish brown (10R 4/6) to dark yellowish orange (10YR 6/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace coal, dry.	
10		SM	13-15	90	NM	silty SAND: dark yellowish orange (10YR 6/6) to moderate reddish brown (10R 4/6), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace coal, dry.	
15		SM	18-20	100	NM	silty SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7) and moderate reddish brown (10R 4/6), ~70% fine-grained quartz sand, ~30% fines, micaceous, lens of light gray (N7) lean CLAY, dry.	
20		SM	23-25	50	NM	silty SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7) and moderate reddish brown (10R 4/6), ~70% fine-grained quartz sand, ~30% fines, micaceous, lens of light gray (N7) lean CLAY, black (N1) poorly graded fine-grained quartz sand located at top 2" of sample, dry.	
25		SP	28-30	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) banded with light gray (N7) and moderate reddish brown (10R 4/6), ~90% fine-grained quartz sand, >10% fines, micaceous, trace coal, lens of light gray (N7) lean CLAY, moist.	
30		SC	33-35	100	NM	clayey SAND, dark gray (N3), ~60% fine-grained quartz sand, ~40% lean clay, micaceous, contact with hard, dense, silty dark gray (N3)lean clay at bottom 3" of sample, saturated.	▽ 9/11/20

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-69(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** Z. Lepchitz
LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 9/11/2020 - 9/11/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL	35-37	100	NM	lean CLAY: dark gray (N3), micaceous, some lamination, hard, dense, moist.		Well Tip
						BORING TERMINATED AT 37 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

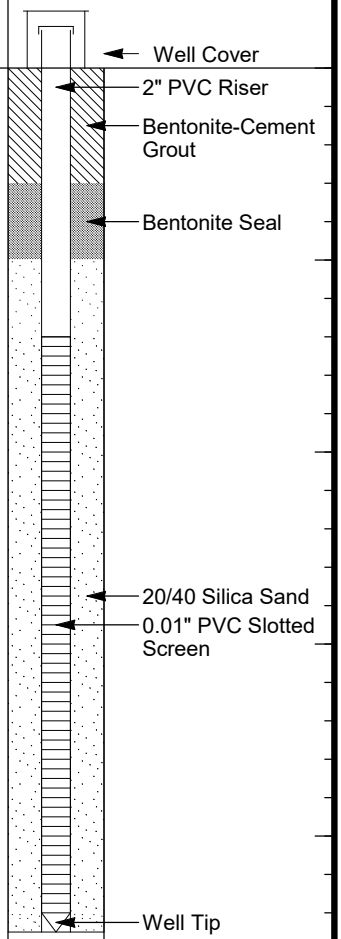
LOG OF BORING PZ-70(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	18 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	25	NM	silty CLAY: moderate brown (5YR 3/4), ~35% fines, ~10% fine-grained quartz sand, ~55% lean clay, micaceous, trace coal, some organics, dry.	
5		SM	3.5-5.5	40	NM	silty SAND: very pale orange (10YR 8/2), ~60% fine-grained quartz sand, ~40% fines, slight argillaceous matrix at top of sample, trace coal, dry.	
10		SM	8.5-10.5	80	NM	silty SAND: moderate reddish brown (10YR 4/6), ~70% fine-grained quartz sand, ~30% fines, micaceous, dry.	
15		SM	13.5-15.5	90	NM	silty SAND: moderate reddish brown (10YR 4/6), ~70% fine-grained quartz sand, ~30% fines, micaceous, some coal, dry.	
		SP	18.5-20.5	100	NM	poorly graded SAND: dark yellowish orange (10YR 6/6) mottled with moderate reddish brown (10R 4/6) and light gray (N7), ~80 fine-grained quartz sand, ~10% fines, micaceous, coal fragments, saturated.	▽ 9/10/20
20		CL				lean CLAY: light gray (N7) mottled with dark yellowish orange (10YR 6/6) and moderate reddish brown (10R 4/6), low to moderate plasticity, dense, wet to moist.	
		CL	20.5-22.5	100	NM	lean CLAY: light gray mottled with dark yellowish orange (10YR 6/6) and moderate reddish brown (10R 4/6) graded to medium gray (N5), moderate plasticity, very dense, hard, moist.	

BORING TERMINATED AT 22.5 FEET

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

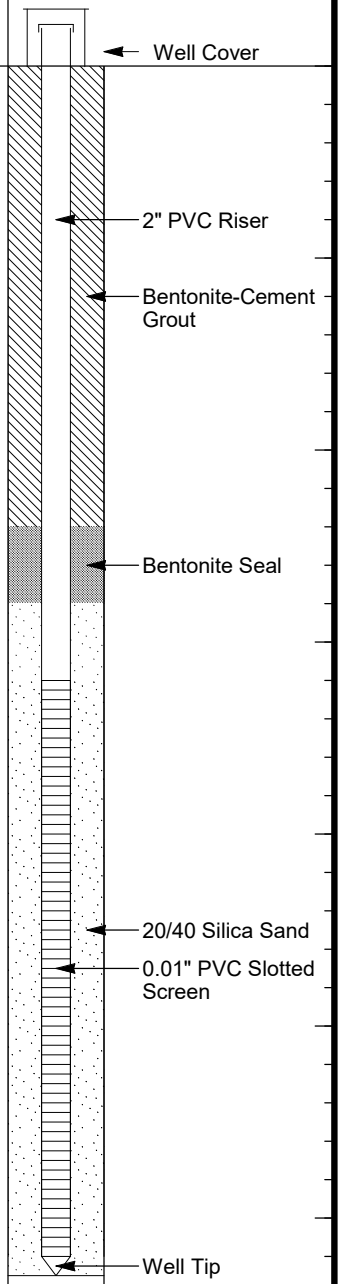
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-71(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/11/2020 - 9/11/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	50	NM	silty SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7), micaceous, lens of light gray (N7) mottled with light brown (5YR 5/6) lean CLAY, dry.	
5		CL	4-6	50	NM	silty CLAY: dark yellowish orange (10YR 6/6), low to moderate plasticity, soft, micaceous, lens of light gray (N7) lean CLAY, moist.	
10		SM/CL	9-11	50	NM	silty clayey SAND: dark yellowish orange (10YR 6/6), ~50% fine-grained quartz sand, ~30% fines, ~20 clay, micaceous, low plasticity, soft, moist.	
15		SM	14-16	80	NM	silty SAND: light gray (N7) to medium gray (N5), ~60% fine-grained quartz sand, ~30-35% fines, some coal, matrix is slightly argillaceous, moist.	
		SM	16-18	50	NM	silty SAND: medium gray (N5), ~60% fine-grained quartz sand, ~30-35% fines, some coal, matrix is slightly argillaceous, moist.	
20		CL	18-20	100	NM	silty SAND: dark yellowish orange (10YR 6/6) moderate plasticity, trace fine-grained quartz sand, micaceous, soft, moist.	
		CL	20-22	75	NM	silty CLAY: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and moderate reddish brown (10R 4/6), moderate plasticity, trace fine-grained quartz sand, trace coal, micaceous, soft, moist.	
25		CL	24-26	100	NM	silty CLAY: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and moderate reddish brown (10R 4/6), moderate plasticity, trace fine-grained quartz sand, micaceous, soft, moist.	
30		CL	29-31	100	NM	silty CLAY: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and moderate reddish brown (10R 4/6), moderate plasticity, trace fine-grained quartz sand, micaceous, soft, moist.	
		CL					
		CL	31-33	100	NM	silty CLAY: dark yellowish orange (10YR 6/6) mottled with light gray (N7) and medium gray (N5), low plasticity to moderate plasticity at base, hard, slight lamination, trace coal, micaceous, dry to moist.	
						BORING TERMINATED AT 33 FEET	
						silty CLAY: medium gray (N5), micaceous, hard, dense, moderately dense, moist.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

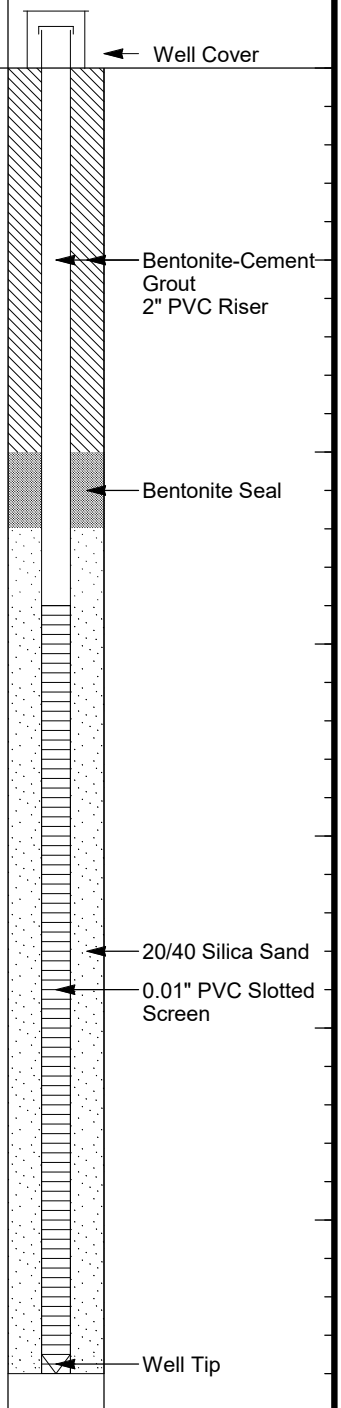
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-72(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/15/2020 - 9/15/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	33.46 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SC	0-2	100	NM	clayey SAND: moderate reddish brown (10R 4/6), ~80-85% fine-grained quartz sand, 15% fines, slightly micaceous, dry.	
5		SC	4-6	100	NM	clayey SAND: moderate reddish brown (10R 4/6), ~80% fine-grained quartz sand, 20% fines, slightly micaceous, dry.	
10		SP	9-11	100	NM	SAND: moderate yellowish brown (10YR 5/4), fine-grained, well sorted, fairly clean quartz sand, <10% fines, moist to dry.	
15		SM/CL	14-16	100	NM	silty CLAY: mottled moderate yellowish brown (10YR 5/4) and pale brown (5YR 5/2), ~10-15% silt, no sand, organics, possibly an old soil horizon, moist.	
20		SP	19-21	100	NM	SAND: pale brown (5YR 5/2), fine-grained, well sorted quartz sand, <5% fines, saturated.	▽ 9/15/20
25		SM/CL	24-26	100	NM	silty CLAY: mottled light brown (5YR 5/6), light gray (N7), and moderate reddish brown (10R 4/6), ~15-18% silt to ~85% lean clay, no sand, soft, moist.	
30		CL	29-31	100	NM	CLAY: medium gray (N5), lean, very dense clay, <5% silt.	
			34-36	100	NM	CLAY: medium dark gray (N4) and dark gray (N3), lean clay.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-72(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER 000190103033.00 **PROFESSIONAL** A. Patton
LOCATION Coker, Tuscaloosa County, Alabama **DATE(S) DRILLED** 9/15/2020 - 9/15/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		CL						
						BORING TERMINATED AT 36 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

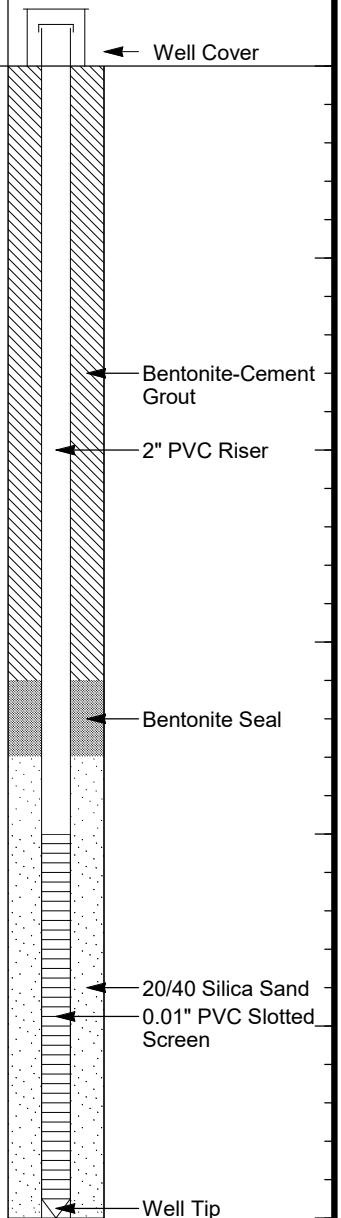
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-73(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	29.52 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
5		CL	3.5-5.5	100	NM	silty CLAY: mottled light brown (5YR 5/6) and pale brown (5YR 5/2), 5% silt, top 4" organics, moist.	
10		CL	8.5-10.5	100	NM	CLAY: mottled light brown (5YR 5/6) and pale brown (5YR 5/2) with 15% medium light gray (N6), <5% silt, moist to dry.	
15		CL	13.5-15.5	100	NM	silty CLAY: mottled light brown (5YR 5/6), pale brown (5YR 5/2), and increasing medium light gray (N6) with depth, moderate plasticity, dry to slightly moist.	
20		CL/SC	18.5-20.5	100	NM	silty, sandy CLAY: mottled light brown (5YR 5/6), pale brown (5YR 5/2), and medium light gray (N6), 10-15% silt, 5-10% very fine-grained quartz sand, slightly moist.	
25		SM/SC	23.5-25.5	100	NM	argillaceous silty SAND: light brown (5YR 5/6), medium light gray (N6), and moderate brown (5YR 3/4), mostly very fine-grained sand and silt, low plasticity, fairly compacy, moist at the base.	
30		SM/SC CL	28.5-30.5	100	NM	clayey silty SAND: light brown (5YR 5/6), medium light gray (N6), moderate brown (5YR 3/4), and grayish brown (5YR 3/2), mostly very fine-grained sand and silt, low plasticity, fairly compacy, saturated. CLAY: medium dark gray (N4) and dark gray (N3), slightly silty along surface planes, low plasticity, lean clay, very dense. BORING TERMINATED AT 30.5 FEET	▽ 9/9/20

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

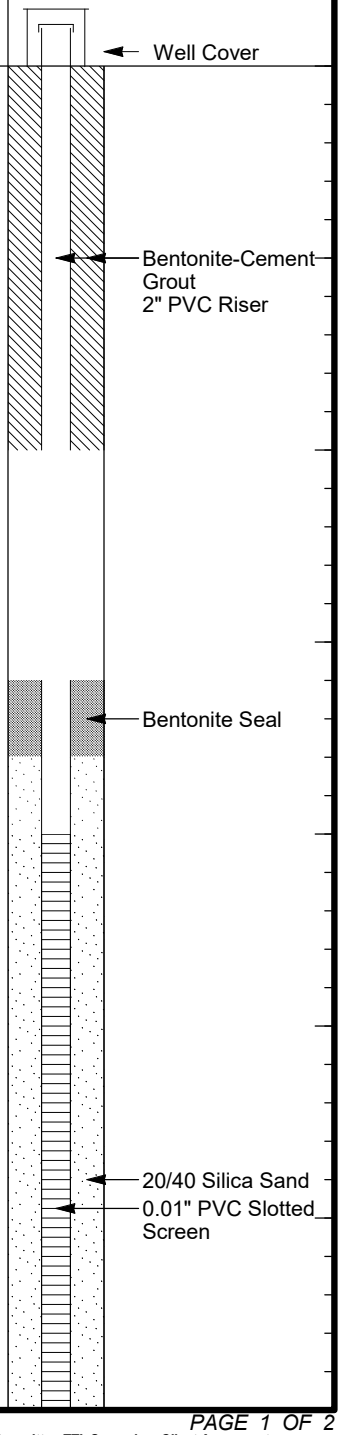
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-74(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/15/2020 - 9/15/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	30.84 Ft. BMP
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SP	0-2	100	NM	SAND: light brown (5YR 5/6), fine-grained, well sorted quartz sand, subangular, dry.	
5		SC	4-6	100	NM	sandy CLAY: light brown (5YR 5/6) sand with medium light gray (N6) lean clay, grades to higher clay content towards the base.	
10		SP	9-11	100	NM	SAND: light brown (5YR 5/6), slightly silty and argillaceous, fine-grained, well sorted quartz sand, <5-10% fines, dry.	
15		SC	14-16	100	NM	clayey SAND: moderate reddish brown (10R /) and light brown (5YR 5/6), ~10-15% fines, ~85% fine-grained, well sorted quartz sand, moist at the base.	
20		SC	19-21	100	NM	clayey SAND: moderate reddish brown (), ~20% clay, ~80% fine-grained, well sorted quartz sand, moist.	
25		SC	24-26	100	NM	clayey SAND: moderate reddish brown (), ~20% clay, ~80% fine-grained, well sorted quartz sand, saturated.	▽ 9/15/20
30		SC-CL	29-31	100	NM	sandy CLAY: moderate reddish brown, fine-grained, well sorted quartz sand, grades to lean CLAY: medium gray (N5).	
			34-36	100	NM	interbedded sandy, silty CLAY and clayey SAND with lean	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-74(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/15/2020 - 9/15/2020

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	PIEZOMETER DIAGRAM
		SC/CL				CLAY: light brown (5YR 5/6), light gray (N7), moderate reddish brown (), pale brown (), and black (N).		
		SP	39-41	100	NM	SAND: light brown (5YR 5/6), fine- to medium-grained, well sorted quartz sand, 2" layer of fragmented/oxidized ironstone, saturated.		
40		CL				CLAY: dark gray (N4), very dense.		Well Tip
						BORING TERMINATED AT 41 FEET.		

This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

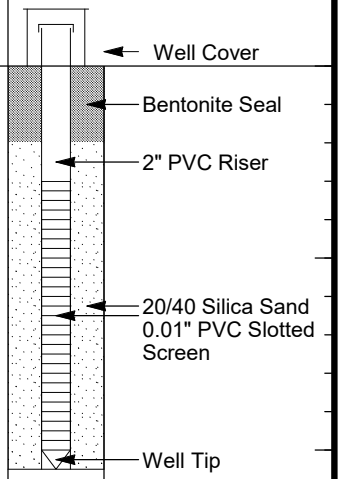
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-75(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	5 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	100	NM	silty CLAY: medium gray (N5) mottled with light gray (N7), moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 5/4), trace fine-grained quartz sand, roots/grass in upper 2" of sample, lens of moderate yellowish brown (10YR 5/4) poorly graded sand at base of sample, moist.	
5		SC	3.5-5.5	40	NM	clayey SAND: medium dark gray (N4), ~70% fine-grained quartz sand, ~30% clay, saturated.	▽ 9/8/20
			5.5-7.5	0	NM	NO RECOVERY	
		CL	7.5-9.5	10	NM	lean CLAY: light gray (N7) mottled with moderate reddish brown (10R4/6) and dark yellowish orange (10YR 6/6), moderate plasticity, moderately dense, trace fines, micaceous, moist.	
10		CL	9.5-11.5	50	NM	lean CLAY: medium gray (N5) slightly mottled with moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6), moderate plasticity, dense, moist.	
						BORING TERMINATED AT 11.5 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

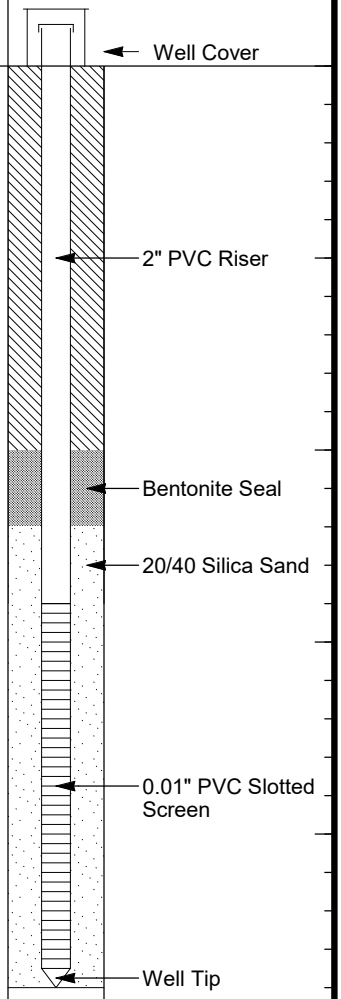
LOG OF BORING PZ-76(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
	HSAs charged with water during drilling	**WATER ELEVATION**	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
5		SP	3.5-5.5	100	NM	SAND: strong brown (7.5YR 5/8) transitions to gray (7.5YR 6/1), micaceous, transitions to clayey sand at base of split spoon, moist.
10		SC	8.5-10.5	100	NM	sandy CLAY: strong brown (7.5YR 5/8) with interbedded strong brown (7.5YR 5/8), pink (5YR 7/4), and yellowish red (5YR 5/6), micaceous sandy clay, transitions to fine-grained, poorly graded sand.
15		SP-SC	13.5-15.5	100	NM	clayey SAND: yellow (5YR 6/6), light reddish yellow (2.5YR 6/3), micaceous, fine-grained, dry.
20		SP	18.5-20.5	100	NM	SAND: reddish yellow (5YR 6/6), light reddish brown (2.5YR 6/3), pinkish gray (7.5YR 7/2), micaceous, fine-grained, saturated.
25		CL	24-26	100	NM	CLAY: dark gray (5Y 4/1), laminated, dry.
						BORING TERMINATED AT 26 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

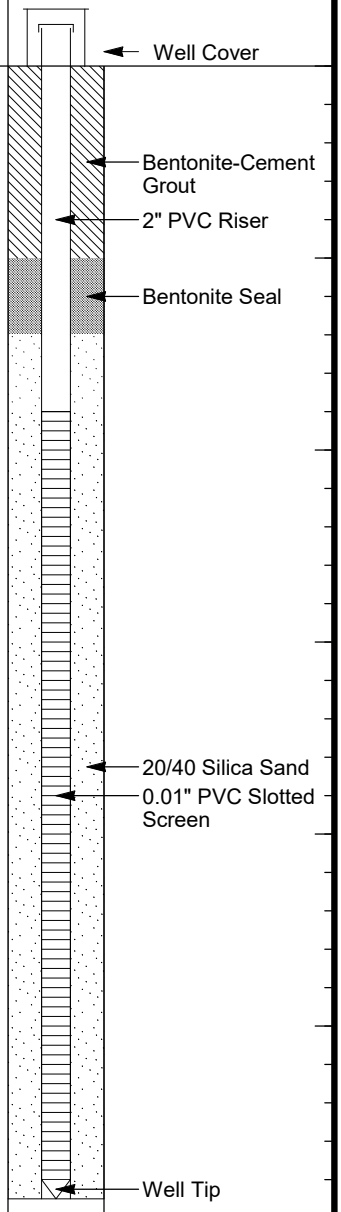
LOG OF BORING PZ-77(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		CL	0-2	75	NM	silty sandy CLAY: moderate yellowish brown (10YR 5/4) mottled with dusky brown (5YR 2/2) grading to dark yellowish brown (10YR 4/2), ~60 clay, ~20% fines, ~20% fine-grained sand, micaceous, dry.
		SM	3.5-5.5	100	NM	silty SAND: dark yellowish orange (10YR 6/6), ~60% fine-grained sand, ~40% fines, micaceous, dry.
5		SP	8.5-10.5	100	NM	poorly graded SAND: moderate reddish brown (10YR 4/6) mottled with dark yellowish orange (10YR 6/6) and light gray (N7), <90% fine-grained quartz sand, subangular, slightly argillaceous, dry.
10		CL	13.5-15.5	100	NM	lean CLAY: medium gray (N5), trace fines, micaceous, dense, low to moderate plasticity, trace iron stone, dry.
15		CL	18.5-20.5	100	NM	lean CLAY: medium gray (N5), dense , low to moderate plasticity, dry.
20		CL	23.5-25.5	100	NM	lean CLAY: medium gray (N5), mottled with moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6) dense, low to moderate plasticity, dry.
25		CL	28.5-30.5	100	NM	lean CLAY: medium gray (N5), very dense, low to moderate plasticity, dry.
30						BORING TERMINATED AT 30.5 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

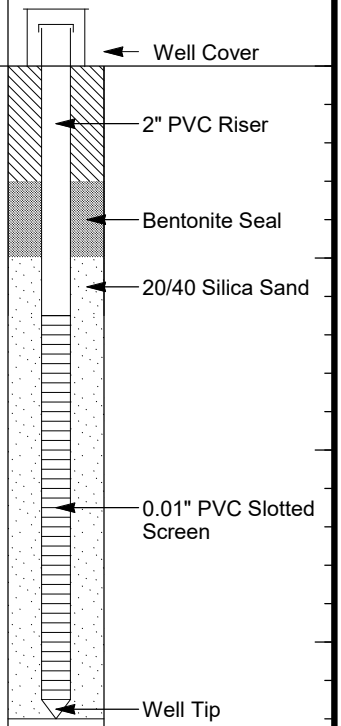
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-78(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	D. Campbell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
	HSAs charged with water during drilling	**WATER ELEVATION**	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
5		CL	3.5-5.5	100	NM	sandy CLAY: red (2.5YR 5/6), light reddish brown (2.5YR 6/3), visable mica, ~70/30% clay to sand.	
10		CL	8.5-10.5	100	NM	CLAY: transitions reddish brown (2.5YR 6/3), light reddish brown (2.5YR 5/6), dark reddish brown (2.5YR 2.5/4), visable mica, silt composition increases with depth, dry.	
		SC-SM	10.5-12.5	100	NM	sily, clayey, SAND: reddish brown (2.5YR 6/3), light reddish brown (2.5YR 5/6), dark reddish brown (2.5YR 2.5/4), micaceous, mottled, dry.	
		SP/CL	12.5-14.5	100	NM	interbedded SAND and CLAY: reddish yellow (7.5YR 6/6), fine-grained, poorly graded sand, gray (7.5YR 6/1), micaceous clay, moist at base of spoon.	
15		SP/CL	14.5-16.5	100	NM	interbedded SAND and CLAY: reddish yellow (7.5YR 6/6), fine-grained, poorly graded sand, gray (7.5YR 6/1), highly micaceous clay increasing with depth, moist.	
		SP/CL	16.5-18.5	100	NM	interbedded SAND and CLAY: brown (7.5YR 5/4), highly micaceous, transitions to lean clay, dark gray (5Y 4/1) at base of spoon.	
						BORING TERMINATED AT 18.5 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

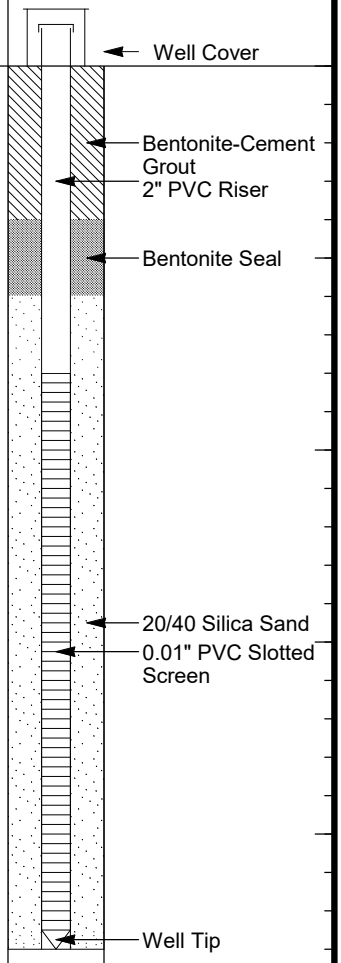
LOG OF BORING PZ-79(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	A. Patton
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/10/2020 - 9/10/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing 24-inch split spoon	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
		DEPTH TO WATER	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SM/CL	0-2	100	NM	silty clay LOAM: moderate reddish brown (10R 4/6), ~10-15% silty, ~5% black Mg traces, top 2" organics, low plasticity.
		SM/CL	3-5	100	NM	silty CLAY: mottled light gray (N7), light brown (5YR 5/6), and pale yellowish orange (10YR 8/6), ~15-20% silt, low plasticity, dense, dry.
5		CL	8-10	100	NM	CLAY: mottled light gray (N7), light brown (5YR 5/6), and pale yellowish orange (10YR 8/6), moderate plasticity, lean, no sand or silt, dry.
10		CL	13-15	100	NM	CLAY: mottled light gray (N7) and light brown (5YR 5/6), lean; grades to medium light gray (N6) and medium gray (N5), moderate plasticity, very dense.
15		CL	18-20	100	NM	CLAY: mottled light brown (5YR 5/6), moderate reddish brown (10R 4/6), medium gray (N5) and medium dark gray (N4), high plasticity, very dense.
20		CL	23-25	100	NM	CLAY: mottled light brown (5YR 5/6), moderate reddish brown (10R 4/6), medium gray (N5) and medium dark gray (N4), high plasticity, very dense.
25						BORING TERMINATED AT 25 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

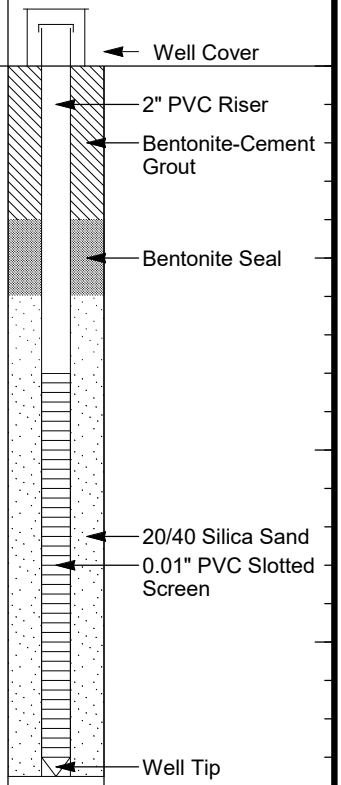
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-80(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	13.5 Ft. BLS
		WATER ELEVATION	Ft. AMSL

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		CL	0-2	80	NM	silty CLAY: dark yellowish orange (10YR 6/6) mottled with dark yellowish brown (10YR 4/2), some coal, trace organics and fine-grain quartz sand, dry.	
		CL	3.5-5.5	50	NM	silty CLAY: dark yellowish orange (10YR 6/6), micaceous, dry.	
5		SM	5.5-7.5	80	NM	silty SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6), ~70% fine-grained quartz sand, ~30% fines, dry.	
		SM	7.5-9.5	80	NM	silty SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6) graded to dark yellowish orange (10YR 6/6), ~70% fine-grained quartz sand, ~30% fines, moist.	
10		SM	9.5-11.5	100	NM	silty SAND: dark yellowish orange (10YR 6/6) mottled with light gray (N7), ~80% fine-grained quartz sand, ~20% fines, micaceous, trace lens of argillaceous matrix, saturated.	
		SM	11.5-13.5	80	NM	silty SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6), ~80% fine-grained quartz sand, ~20% fines, micaceous, trace lens of argillaceous matrix, saturated.	
		SC	13.5-15.5	100	NM	clayey SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6), ~60% fine-grained quartz sand, ~40% clay, saturated.	▽ 9/8/20
15		SC	15.5-17.5	100	NM	clayey SAND: light gray (N7) mottled with dark yellowish orange (10YR 6/6), ~60% fine-grained quartz sand, ~40% clay, with lens of dark yellowish orange (10YR 6/6) SAND and light gray (N7) lean CLAY, saturated.	
		CL	17.5-19.5	100	NM	lean CLAY: medium gray (N5), low to moderate plasticity , dense, moist.	
						BORING TERMINATED AT 19.5 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

\\10.1.1.9\TUSCALOOSA PROJECTS\2019\000190103033.00 BWSWA PARTLOW PROPERTY\2020 ADDITIONAL PZ INSTALLATION\PARTLOW PROPERTY ADDTIONAL PZ INSTALLATION (05-2020)\BORING LOGS\BWSWA PARTLOW BORING LOGS.1.GPJ 1/25/21

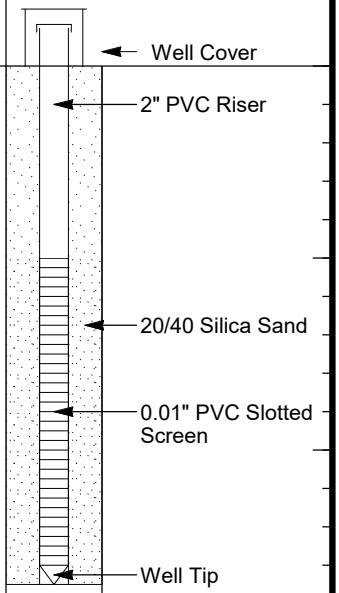
BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

LOG OF BORING PZ-81(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/9/2020 - 9/9/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE
		SM	0-2	20	NM	silty SAND: dark yellowish orange (10R 6/6), ~60% fine-grained quartz sand, ~40% fines, dry.	
5		CL	3.5-5.5	20	NM	lean CLAY: light gray (N7) mottled with moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6), dense, moderate plasticity, trace fines, dry.	
		CL	5.5-7.5	20	NM	lean CLAY: light gray (N7) mottled with moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6), dense, moderate plasticity, trace fines and trace micacation, dry.	
		CL	7.5-9.5	80	NM	lean CLAY: light gray (N7) mottled with moderate reddish brown (10R 4/6), brown(5YR 3/4), and dark yellowish orange (10YR 6/6), dense, moderate plasticity, trace fines and trace micacation, dry.	
10		CL	9.5-11.5	100	NM	silty CLAY: light gray (N7) mottled with dark yellowish orange (10YR 6/6), micaceous, dense, low plasticity, dry.	
		CL	11.5-13.5	100	NM	silty CLAY: medium gray (N5), dense, low to moderate plasticity, micaceous, dry.	
						BORING TERMINATED AT 13.5 FEET.	

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

BLACK WARRIOR SOLID WASTE AUTHORITY
PARTLOW PROPERTY

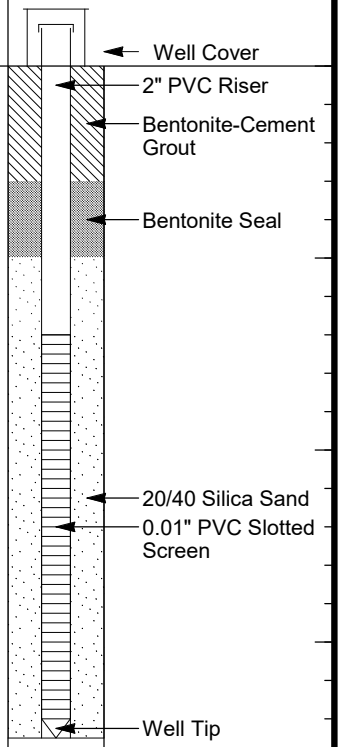
LOG OF BORING PZ-82(S) & PIEZOMETER CONSTRUCTION

PROJECT NUMBER	000190103033.00	**PROFESSIONAL**	Z. Lepchitz
LOCATION	Coker, Tuscaloosa County, Alabama	**DATE(S) DRILLED**	9/8/2020 - 9/8/2020
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	R. Bell	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Sand
		TOP OF CASING	Ft. AMSL
REMARKS	Soil samples collected in 5-foot intervals utilizing	**GROUND ELEVATION**	Not Surveyed Ft. AMSL
	24-inch split spoon	**DEPTH TO WATER**	Ft. BLS
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION
		SM	0-2		NM	silty SAND: moderate brown (5YR 4/4), ~60% fine-grained quartz sand, ~40% fines, micaceous, trace coal, dry.
		CL	3.5-5.5		NM	silty CLAY: light gray (N7) mottled with moderate reddish brown (10R4/6) and dark yellowish orange (10YR 6/6), dense, micaceous, dry.
5		CL	5.5-7.5		NM	silty CLAY: light gray (N7) mottled with moderate reddish brown (10R4/6) and dark yellowish orange (10YR 6/6), dense, micaceous, dry.
		CL	7.5-9.5		NM	lean CLAY: dark reddish brown (10R 3/4) mottled with dark yellowish orange (10YR 6/6) and medium gray (N5), dense, dry.
10		SM	9.5-11.5		NM	silty SAND: dark reddish brown (10R 3/4) mottled with dark yellowish orange (10YR 6/6) and medium gray (N5), ~60% fine-grained quartz sand, ~40% fines, hard, some cross bedding, lens of medium gray (N5) lean CLAY, dry.
		SM	11.5-13.5		NM	silty SAND, medium dark gray (N4), ~60% fine-grained quartz sand, ~40 fines, micaceous, hard, dry.
		SM	13.5-15.5		NM	silty SAND, medium dark gray (N4), ~60% fine-grained quartz sand, ~40 fines, micaceous, hard, lens of dark gray (N3) lean CLAY in bottom half of the sample, dry.
15		SM OH CL	15.5-17.5		NM	silty SAND, medium dark gray (N4), ~60% fine-grained quartz sand, ~40 fines, micaceous, hard, lens of dark gray (N3) lean CLAY, dry. COAL: black (N1) lean CLAY: grayish black (N2), dense, hard, dry
						BORING TERMINATED AT 17.5 FEET.

WATER LEVEL & DATE

PIEZOMETER DIAGRAM



This well log shall not be separated from the corresponding Instrument of Service; no third party may rely upon this well logor the corresponding Instrument of Service absent a written TTL Secondary Client Agreement.

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-1
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-3-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *24 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *242.19 Feet AMSL*	COORDINATE NORTH: 118102[illegible]
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921928*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		SM	LIGHT BROWN SILTY FINE SAND		
			REDDISH TAN SILTY MEDIUM SAND		
5			WHITE SILTY MEDIUM SAND (MOIST)		
		CL	RED AND GRAY SILTY CLAY		
10			BROWN SILTY CLAY		
			DARK GRAY SILTY CLAY		
15			WITH LIGHT GRAY FINE SAND LENSES		
20		SP	LIGHT GRAY, MICACEOUS, SILTY FINE TO MEDIUM SAND WITH GRAVEL (SATURATED)		
25			BORING TERMINATED AT 24 FEET		
30					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-2
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-3-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *19 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *289.12 Feet AMSL*	COORDINATE NORTH: 1181179
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921577*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	BROWN SILTY FINE SAND WITH ORGANICS		
		SC	RED CLAYEY FINE TO MEDIUM SAND		
			WITH PURPLE CLAY LAYERS		
5			WITH OCCASIONAL PURPLE AND GRAY SILTY CLAY LAYERS		
		SM	REDDISH BROWN SILTY FINE SAND		
10			TAN VERY FINE SAND		
			(MOIST)		
15			WITH WHITE SILTY FINE SAND AND REDDISH BROWN SILT (SATURATED)		
			BORING TERMINATED AT 19 FEET		
20					
25					
30					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-5
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *29 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *208.94 Feet AMSL*	COORDINATE NORTH: 1178386
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921796*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	SILTY FINE SAND WITH ORGANICS		
		SC	RED CLAYEY FINE SAND		
5					
			RED AND TAN MOTTLED SILTY CLAY		
		CL			
10					
			WITH FINE SAND LAYERS		
15					
			REDDISH BROWN SILTY FINE SAND		
			TAN AND GRAY SILTY CLAY		
			GRAY SILTY CLAY WITH LIGHT GRAY FINE SAND		
20			WITH LIGHT BROWN SILT LAMINAE		
		SM	ALTERNATING LIGHT BROWN, TAN AND BROWN SILTY FINE SAND WITH IRONSTONE AND GRAY CLAYEY SILT LAYERS		
25					
			BROWN FERRUGINOUS SILTY FINE SAND		
			SATURATED BROWN FERRUGINOUS SILTY FINE SAND		
30			BORING TERMINATED AT 29 FEET		

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-6
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *8-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *39 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *241.98 Feet AMSL*	COORDINATE NORTH: 1178515
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: 1922115

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		CL	GRAY, RED AND TAN MOTTLED SILTY CLAY		
			GRAY AND TAN MOTTLED SILTY CLAY		
5			TAN MICACEOUS FINE SANDY SILTY CLAY		
			GRAY AND TAN FINE SANDY SILTY CLAY		
10					
15			GRAY FINE SANDY SILTY CLAY LAMINATED		
20					
			WITH OCCASIONAL FINE SAND LAYERS		
25			2" TAN SILTY FINE SAND GRAY FINE SANDY SILTY CLAY		
30					

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 04-6

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL			
		SM	TAN AND GRAY SILTY FINE SAND WITH SILT LAYERS AND FERROGINOUS		
			(MOIST)		
35			TAN MICACEOUS SILTY FINE SAND		
			BORING TERMINATED AT 39 FEET		
40					
45					
50					
55					
60					

TTL, Inc

JOB NUMBER: 45-479

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-7
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *8-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *42.5 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *187.48 Feet AMSL*	COORDINATE NORTH: 1178334
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921615*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	BROWN CLAYEY SAND WITH ORGANICS		
		CL	RED FINE SANDY CLAY		
			TAN AND RED MOTTLED		
5					
10		SM	TAN AND GRAY MOTTLED SILTY FINE SAND		
			(MOIST		
15					
		CH	GRAY CLAYEY SILT WITH IRON STAINING		
			DARK GRAY CLAYEY SILT		
20			OLIVE GREEN AND DARK GRAY SILTY CLAY		
25					
30					

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 04-7

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CH	OLIVE GREEN, DARK GRAY AND RED SILTY CLAY		
35					
40			LIGHT TAN AND GRAY SILTY CLAY		
			BORING TERMINATED AT 42.5 FEET DUE TO HARDNESS OF CLAY		
45					
50					
55					
60					

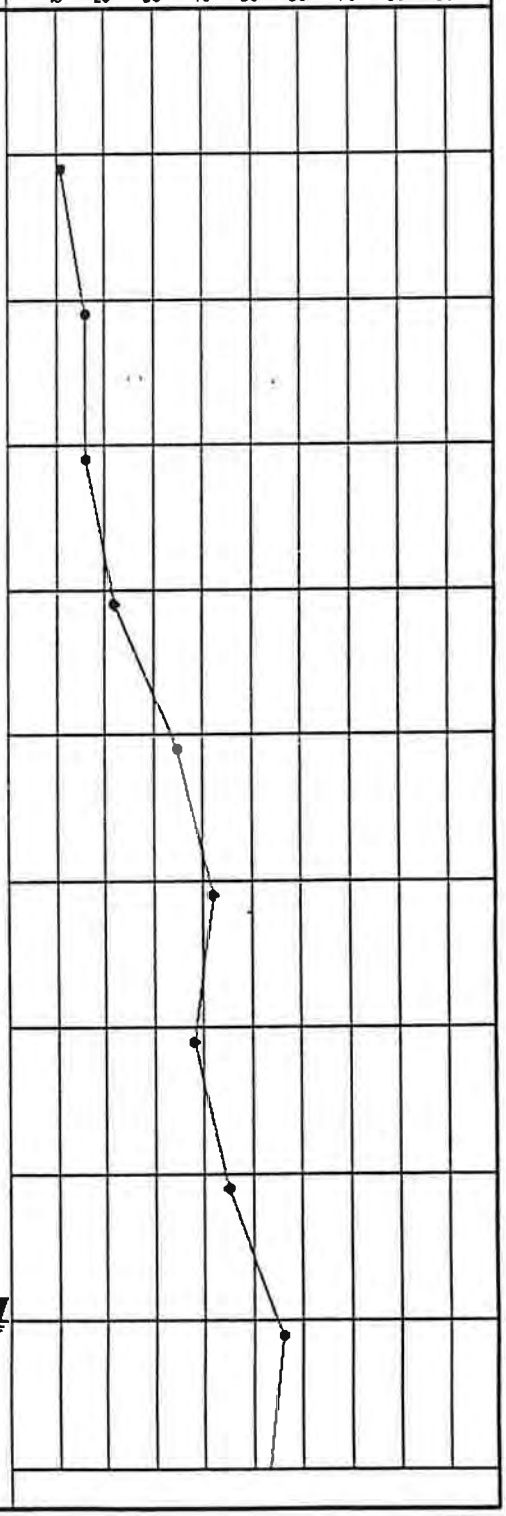
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-1
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-26-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *96.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *285.66 Feet AMSL*	WATER LEVEL: *45.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75 W/SS & ST*		NO. OF SAMPLES: *19*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
5	SC	SAND, Moderate brown (5YR 3/4) to light brown (5YR 5/6), silty to clayey, grading down to dark yellowish orange (10YR 6/6)	8
	CL	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6), silty, stiff	12
10	CH	CLAY, Pale yellowish brown (10YR 6/2), silty, laminated with fine sand, stiff, dry	25
15	CL	CLAY, Dark yellowish orange (10YR 6/6) to pale yellowish brown (10YR 6/2) with limonite concretions along fractures, very moist	31
	CH	CLAY, Olive gray (5Y 4/1), laminated with very fine-grained, very pale orange (10YR 8/2) sand and silt, moist	
20			
25	CL/SC	As Above, but thickness of sand/silt layers increases to very thin beds (1 cm - 3 cm).	20
30		As Above; grain size of sand beds increases to fine, number of sand beds increases downward	21
35		Dry	22
40		As Above, with 2 - 3 inch thick, very moist sand beds	23
45			22 ▼
50			

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-1
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-26-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *98.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *285.66 Feet AMSL*	WATER LEVEL: *45.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75 W/SS & ST*		NO. OF SAMPLES: *19*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
55		CL		20
		SC/CL	SAND, Light olive gray (5Y 6/1), interbedded with stiff, olive gray (5Y 4/1) CLAY laminated with fine sand, moist	22
60			As Above, wet	25
65				
70		CH	CLAY, Olive gray (5Y 4/1), laminated to interbedded with silt and fine sand, very stiff, moist	27
75		CL	Dry	23
		SM/CL	SAND, Light olive gray (5Y 6/1), medium to fine-grained, rounded, wet, interbedded with CLAY	24
80			As Above, with pieces of rounded gravel	
85		CH	CLAY, Olive black (5Y 2/1), silty, very stiff, no distinct laminations, interbedded with olive gray (5Y 4/1) silty clay laminated with silt.	21
90				22
95			As above, but without interbedded olive gray clay	18
100			BORING TERMINATED AT 98.0 FEET BLS WATER LEVEL MEASURED 10/27/92	

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-2
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-27-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *21.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *275.93 Feet AMSL*	WATER LEVEL: *7.2*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *8*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Dark yellowish orange (10YR 6/6), clayey	14
5		SC	SAND, Dark yellowish orange to very pale orange (10YR 8/2) (5YR 5/8), grades downward from fine- to medium-grained, loose, moist	
			Saturated	24
10				
15		CH	CLAY, Pale yellowish brown (10YR 6/2), silty, stiff, sticky	28
		CH	CLAY, Olive gray (5Y 4/1), laminated with yellowish gray (5Y 8/1) silt, very stiff vertically but friable along silt laminae	23
20				23
25			BORING TERMINATED AT 21.0 FEET BLS WATER LEVEL MEASURED 10/27/92	
30				
35				
40				
45				
50				

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-3
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *54.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *320.65 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *7*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
5		SC	SAND, Light brown (5YR 5/8), fine- grained, very silty, clayey, slightly dense, dry	13
10		SM	SAND, Dark yellowish orange (10YR 8/8) to grayish orange (10YR 7/4) fine- to medium- grained, micaceous, very friable, dry	9
15			As Above, laminated with light brown (5YR 5/8) staining, very moist	8
20			SAND, Greyish orange (10YR 7/4) mottled with light brown (5YR 5/8) oxidized zones, medium- grained	
25		SC	SAND, As above, but interbedded with CLAY	11
30			SAND, Grayish orange (10YR 7/4) to light brown (5YR 8/4), very clayey, poorly sorted, laminated to interbedded with CLAY	
		CL	CLAY, Dark yellowish orange (10YR 8/8), silty, stiff	22
35		SC	SAND, Grayish orange (10YR 7/4) to light brown (5YR 8/4), very clayey, poorly sorted	
40			SAND, Grayish orange (10YR 7/4) to very pale orange (10YR 8/2) fine- to medium- grained, very friable	9
45		CL	CLAY, Dark yellowish orange (10YR 8/8) mottled with very pale orange (10YR 8/2), silty, very stickey	27
50		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff, parts along laminae, difficult to part perpendicular to laminae, slightly moist	

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-3
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *54.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *320.65 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *7*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)	STANDARD PENETRATION TEST DATA (blows per foot) 10 20 30 40 50 60 70 80 90
		CH			
55			BORING TERMINATED AT 54.0 FEET BLS		
60					
65					
70					
75					
80					
85					
90					
95					
100					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-4
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *322.32 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *30*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Moderate reddish brown (10R 4/6) to light brown (5YR 5/6), very clayey, fine-grained sand, slightly stiff, dry	14
10			SAND, Moderate reddish brown (10R 4/6) to light brown (5YR 5/6), fine- to medium- grained, friable, dry	12
15				10
20			SAND, Light brown (5YR 5/6), fine- grained, clayey, dry to slightly moist, cohesive	
25		CL	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6) and dark yellowish orange (10YR 6/6), silty, sticky, stiff, moist	20
30		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff, parts along laminae, difficult to part perpendicular to laminae, slightly moist	21
35		CL	CLAY, Pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/6), mottled with zones of limonitic concretions along iron-stained laminae, moist	20
40		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff	
45				20
50				

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

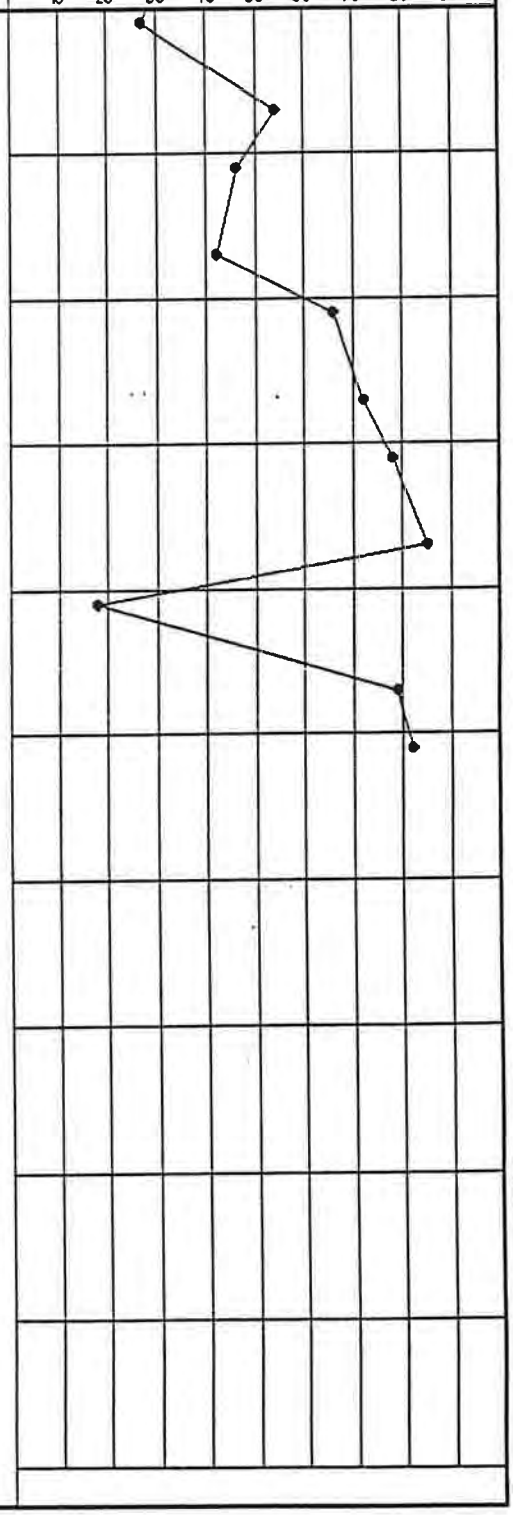
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-4
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *322.32 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *30*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
	CH		
55	CH	CLAY, Pale yellowish brown (10YR 8/2) to light brown (5YR 5/6), mottled with limonitic concretions, fractures at 45 degree angle	17
60			18
	SM	SAND, Very pale orange (10YR 8/2), medium grained, well sorted, laminated, friable to loose, dry	
65			4
70			
	CL	CLAY, Pale yellowish brown (10YR 8/2) interbedded with SAND, very pale orange (10YR 8/2) to grayish orange (10YR 7/4)	17
75	SM	SAND, Grayish orange (10YR 7/4), fine- to medium- grained, laminated, dry	5
		BORING TERMINATED AT 76.0 FEET BLS	
80			
85			
90			
95			
100			

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90



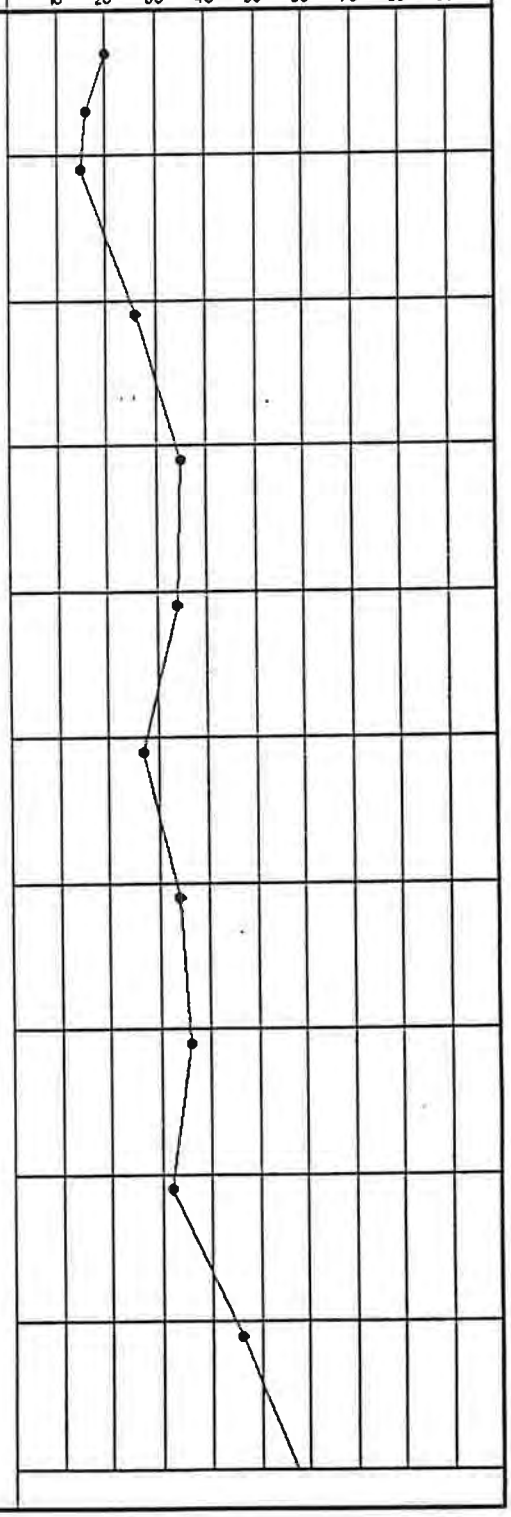
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	GONER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-5
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-29-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-184*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *369.01 Feet AMSL*	WATER LEVEL: *62.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *17*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Moderate reddish brown (10R 4/8), fine- grained, clay and hematite or limonite cemented, stiff, dry to slightly moist	16
5				
10				11
15			SAND, Light brown (5YR 5/8), medium- to fine- grained, clayey, slightly friable, moist	18
20			Limonitic concretions	15
25		SM	SAND, Very pale orange (10YR 8/2), medium-grained, laminated with clay partings, very loose, dry	7
30				8
35				10
40				9
45				8
50				

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-5
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-29-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *369.01 Feet AMSL*	WATER LEVEL: *62.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *17*

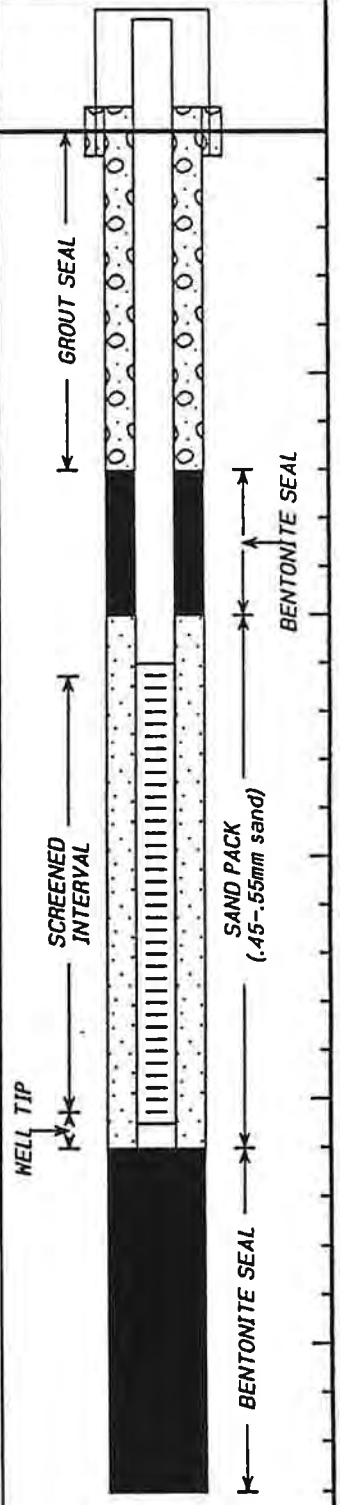
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
55		SM		16
				8
60		SC	SAND, Dark yellowish orange (10YR 6/6), fine- to medium-grained, clayey, moist	
				7
65			Wet	
				13
70		CH	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6), stickey, stiff	
				32
75		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff	
				22
80			BORING TERMINATED AT 76.0 FEET BLS WATER LEVEL MEASURED 10/29/92	
85				
90				
95				
100				

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *LAURA E. WHITAKER*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *28 Feet*
DRILLER: *JEFF LOWERY & CREW*	ELEV. L.S.: *208.76 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *20.23 Feet BLS*

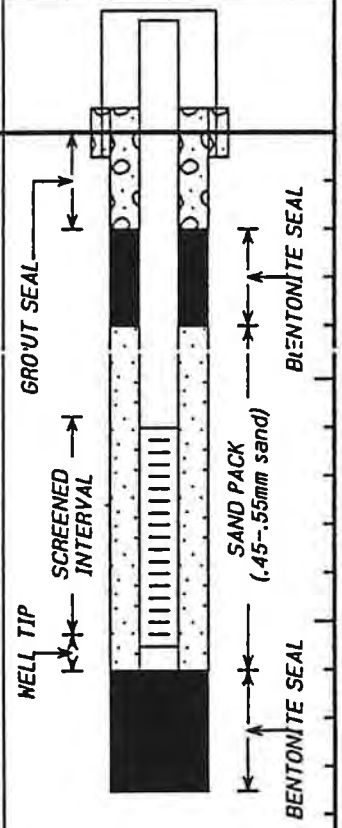
DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY
		NO SAMPLE 0-1 FOOT	
	SD	SAND, light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4), fine- to medium-grained	67%
	CL	CLAY, light brown (5YR 5/6), firm, with some fine- to medium-grained sand	
5	SC	CLAYEY SAND, light brown (5YR 5/6), fine-grained, with few mica flakes, moist	100%
	CL	CLAY, light gray (N7) with dark yellowish orange mottling, silty (iron stained), firm, occasional thin mica laminations	
10			100%
	SC	INTERBEDDED SAND AND CLAY, sand very iron-stained, clay light gray.	
	SD	sharp contact @ 12 ft. BLS	
		SAND, iron-stained, silty, occasional clay lenses up to 1.5 inches thick	
15		moist	100%
20			90%
	COAL	COAL, black (N1), firm	
	CL	CLAY, olive gray (5Y 4/1), very firm	
25			100%
	COAL	COAL, black (N1), firm	
	CL	CLAY, olive gray (5Y 4/1), very firm	
30		BORING TERMINATED AT 28 FEET BLS BORING BACKFILLED WITH BENTONITE TO 21 FEET BLS WATER LEVEL MEASURED 5/11/92	



TTL, Inc

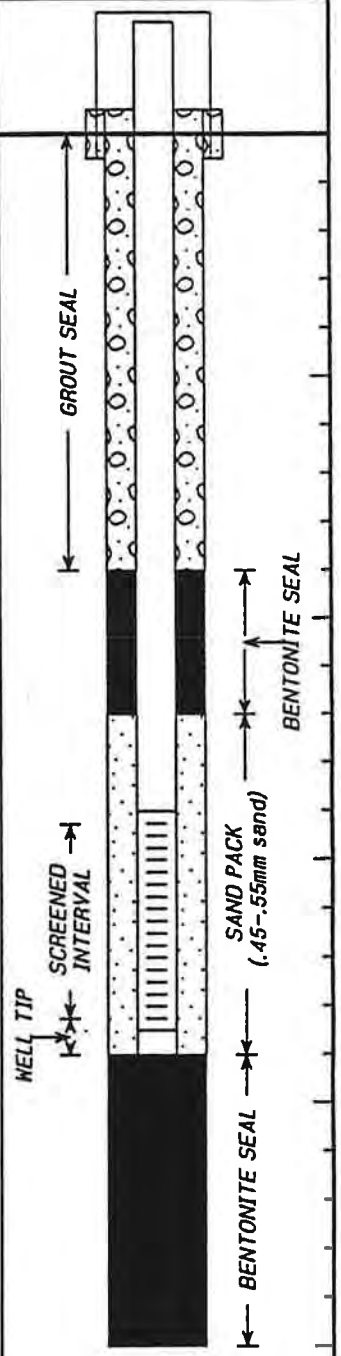
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-2 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *13.5 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *191.35 Feet AMSL*	BORING DIAMETER *9.0 inches*
DRILLING METHOD: *4 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *9.53 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
0		CL	CLAY, Moderate reddish brown (10R 4/6) to light brown (5YR 5/6), very sandy, moist, sticky	100%	
10		SC	SAND, Dark yellowish orange (10YR 6/6), fine-grained, silty interbedded with clay, wet		
		CL	CLAY, pale yellowish brown (10YR 6/2), stiff, sticky grading down to dark black clay at 13.5 feet BLS		
15			BORING TERMINATED AT 13.5 FEET BLS BORING BACKFILLED WITH BENTONITE TO 11 FEET BLS WATER LEVEL MEASURED 5/11/92		



TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-3 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *LAURA E. WHITAKER*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *25 Feet*
DRILLER: *JEFF LOWERY & CREW*	ELEV. L.S.: *198.92 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *15.92 Feet BLS*

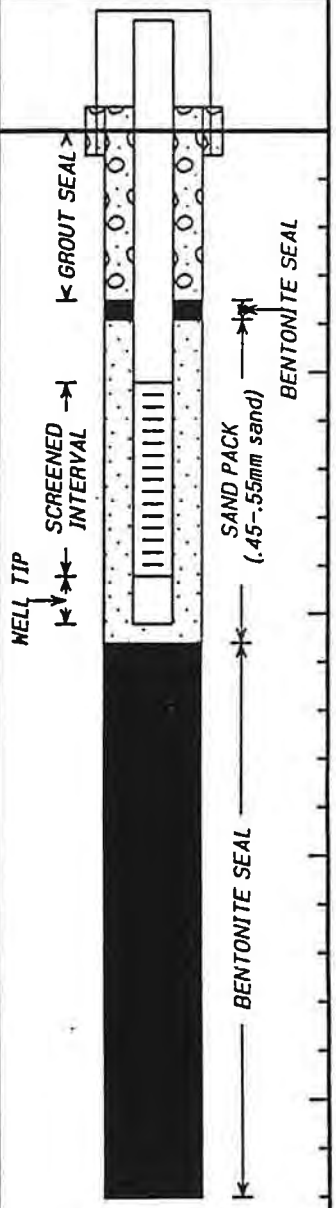
DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY
	SD	SAND, dark yellowish orange (10YR 6/6), medium- to coarse-grained, loose, and moist	40%
5	SC	3" clay lense 3" clay lense dark iron stains	50%
	CL	CLAY, light gray (N7) and dark yellowish orange (10YR 6/6), firm, with some silt, fine sand, and mica laminations	
10			100%
15			100%
	SM	SAND, silty, iron-stained, medium-grained, clayey, wet friable	
20	CL	CLAY, grayish olive green (5GY 3/2), light gray (N7) silty laminations, grades down to stiff silty clay Shelby-tube sample 22.5-25 feet BLS	100%
25		BORING TERMINATED AT 25 FEET BLS BORING BACKFILLED WITH BENTONITE TO 19 FEET BLS WATER LEVEL MEASURED 5/11/92	
30			



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-4 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *7/2/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *22.0 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *185.51 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *9.65 Feet BLS*

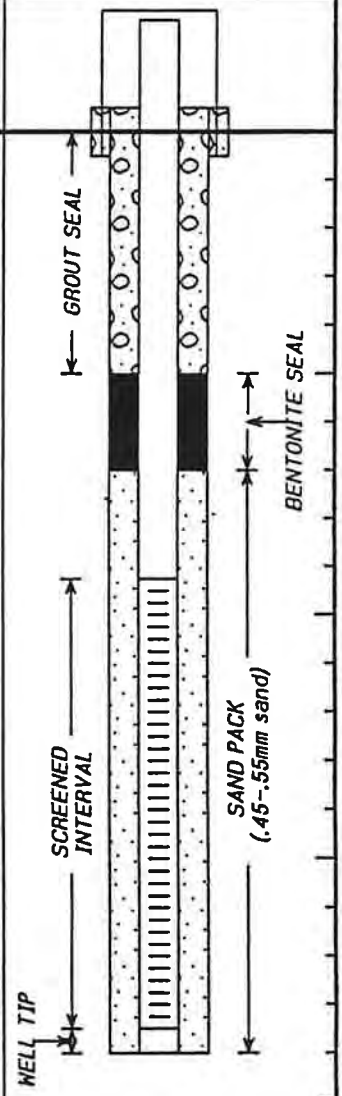
DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY
0	CL	CLAY, Light brown (5YR 5/6), silty, sandy, stiff, moist	
5		CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6) clay, slightly moist, crumbly	100%
	SC CL	SAND, Pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/8), very silty, laminated, damp to wet	
10		CLAY, Pale yellowish brown (10YR 6/2) grading down to olive gray (5GY 4/1), very stiff. Fractures present to about 19 feet BLS. Fractures are stained dark yellowish orange (10YR 6/8).	
15			
20		SHELBY TUBE (19.5 - 22.0 FEET BLS)	
25		BORING TERMINATED AT 22.0 FEET BLS BORING BACKFILLED WITH BENTONITE TO 10.6 FEET BLS WATER LEVEL MEASURED 7/16/92	
30			



TTL, Inc

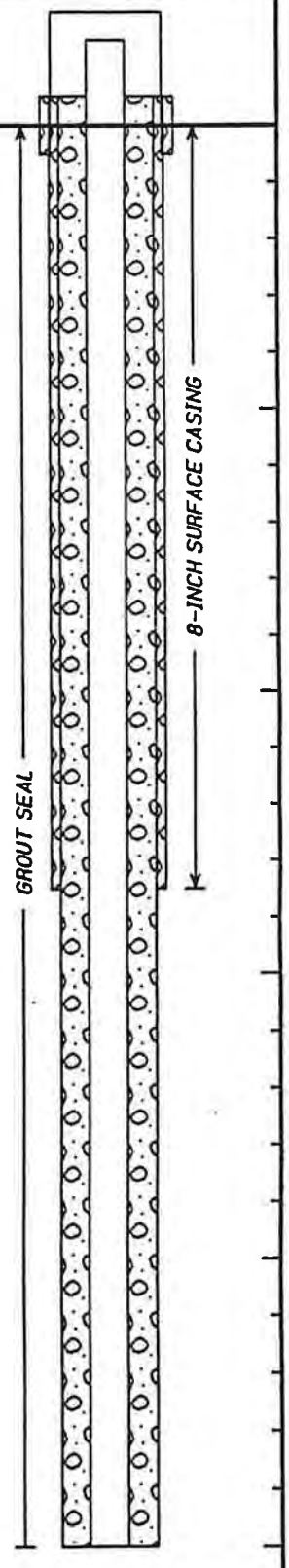
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING E-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *C.S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *7/2/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *19.0 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *229.20 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *0.41 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
5		CL	CLAY, Dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4), very sandy, grading down to sticky, silty CLAY	100%	
10		SC	CLAY, Light olive gray (5Y 5/2), stiff, moist, interbedded to laminated with fine-to medium-grained SAND every 1 to 4 inches. SAND lenses are very moist, increase downward. Wet at about 14 feet BLS.		
15			SAND, Light olive gray (5Y 5/2), fine grained, interbedded with silty CLAY. Sand is cross-laminated and wet. wet		
20			BORING TERMINATED AT 19.0 FEET BLS WATER LEVEL MEASURED 7/16/92		
25					
30					



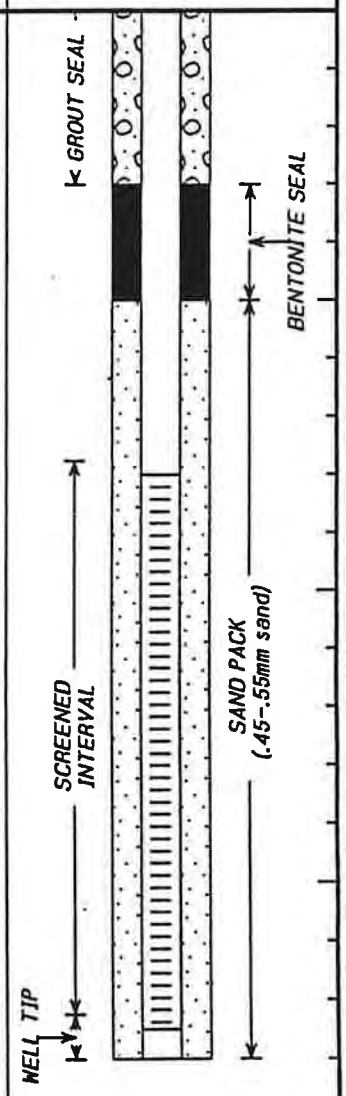
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING DW-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92 & 5/11/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *43 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *187.7 Feet AMSL*	BORING DIAMETER *12 & 7.25 inches*
DRILLING METHOD: *10 1/4" & 3 1/4" I.D. HSA W/STS*		WATER LEVEL: *22.66 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
5		CL	CLAY, Light brown (5YR 5/6), very sandy, moist, sticky	100%	
		SC	SAND, Dark yellowish orange (10YR 6/6), fine-grained, very silty, interbedded with clay, wet.		
10		CL	CLAY, Pale yellowish brown (10YR 6/2), stiff, sticky grading down to dark black clay at 9.0 feet BLS CLAY, Olive gray (5Y 4/1), very stiff, dry, with local zones of silty, reddish, mottled lenses 8" SURFACE CASING SET TO 13.5 FEET BLS SHELBY TUBE FROM 14.0 TO 16.5 FEET BLS		
15					
20					
25					



TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING DW-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92 & 5/11/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *43 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *187.7 Feet AMSL*	BORING DIAMETER *12 & 7.25 inches*
DRILLING METHOD: *10 1/4" & 3 1/4" I.D. HSA W/STS*		WATER LEVEL: *22.66 Feet BLS*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY
30	CL		
	ML	SILT, Yellowish gray (5Y 7/2), laminated, sandy, dry, friable	100%
35			
40	SC	SAND, Light olive gray (5Y 5/2), interbedded with silty CLAY, moist	
		BORING TERMINATED AT 43 FEET BLS WATER LEVEL MEASURED 5/15/92	
45			
50			



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-1
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-4-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *104 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *338.2 Feet AMSL*	COORDINATE NORTH: 1179481
DRILLING METHOD: *CME 75 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923098*

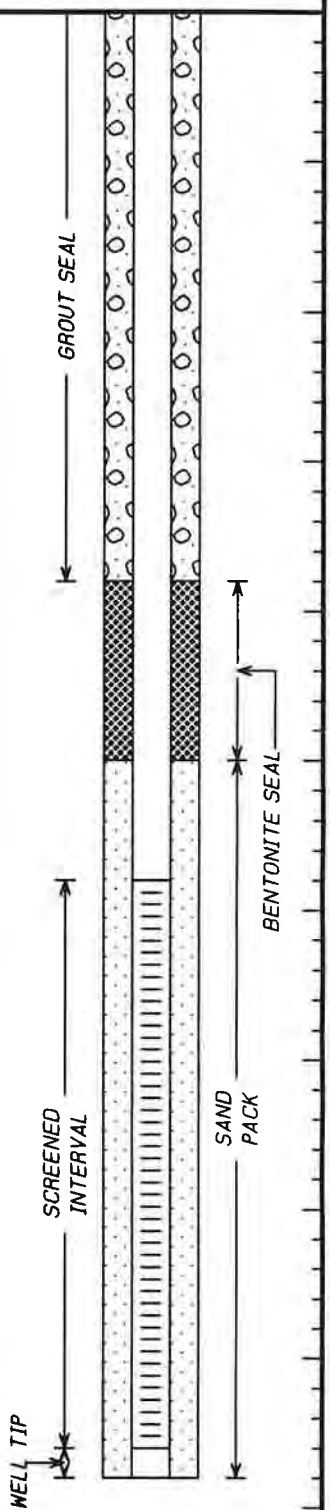
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED	11	GROUT SEAL
				16	
10				25	
				32	
15				17	
				13	
20			SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	7	
			SAND, GRAYISH-ORANGE (10 YR 7/4) AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA	10	
25			SAND, GRAYISH-ORANGE AND MODERATE ORANGE PINK (5 YR 8/4), FINE-GRAINED, WITH MICA	10	
				13	
30				20	
				18	
			SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	26	
35			SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA	20	
				36	
40				17	
				28	
45				17	
				19	
50				25	
55					

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-1

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)
60	SM		33
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED, WITH MICA	32
65			36
70		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	45
75			34
80	SC	SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	26
		SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
85		SAND, MODERATE ORANGE PINK (10 R 7/4), DARK YELLOWISH ORANGE, AND LIGHT GRAY (N7), SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	35
90		SAND, LIGHT RED (5 R 6/6), DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, VERY FINE-GRAINED WITH MICA AND OCCASIONAL CLAY LENSES	40
95		SAND, MODERATE RED (5 R 5/4), DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY TO FINE-GRAINED WITH MICA AND OCCASIONAL CLAY LENSES	46
100		SAND, MODERATE RED AND LIGHT RED, SILTY, FINE-GRAINED, SATURATED	64
		SAND, MODERATE RED AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
105		BORING TERMINATED AT 104 FEET BELOW LAND SURFACE	
110			

PIEZOMETER CONSTRUCTION

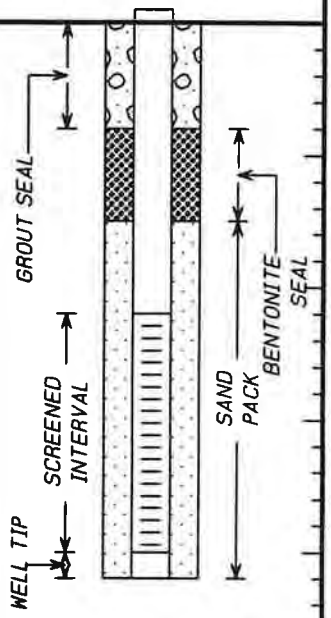


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-2
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-9-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *21 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *296.1 Feet AMSL*	COORDINATE NORTH: 1179866
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923154*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0	CL	CLAY, LIGHT BROWN (5 YR 5/6), SANDY	6
5	SM	SAND, LIGHT BROWN, SILTY, VERY FINE-GRAINED	8
			6
			20
10		SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10YR 8/6), VERY FINE GRAINED, WITH MICA	12
		SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA, MOIST	15
15		SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA, SATURATED	12
	SC	SAND, VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED WITH MICA	20
20		SAND, MODERATE ORANGE PINK (5 YR 8/4) AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	14
		BORING TERMINATED AT 21 FEET BELOW LAND SURFACE	
25			
30			
35			
40			
45			
50			
55			

PIEZOMETER CONSTRUCTION

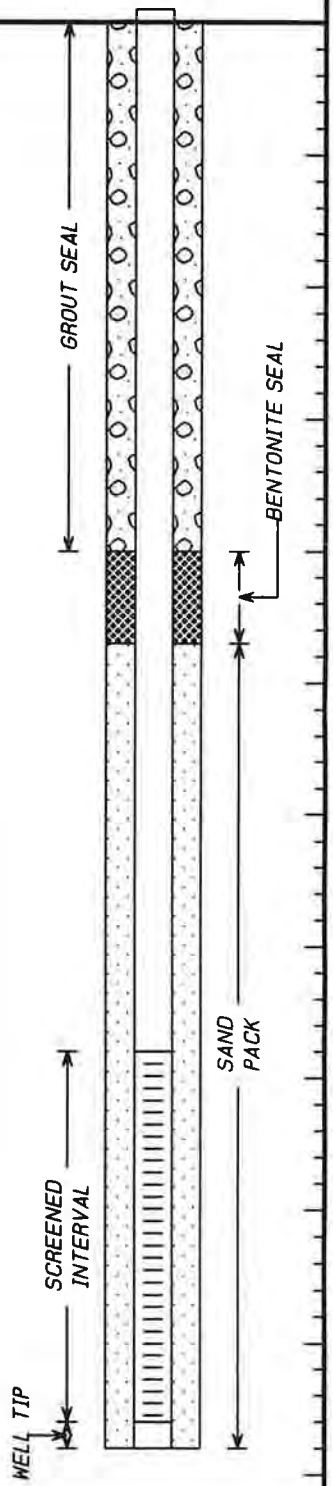


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-3
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-8-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *263.5 Feet AMSL*	COORDINATE NORTH: 1178959
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922549*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SM	SAND, PALE YELLOWISH-BROWN (10 YR 8/6), FINE-GRAINED	4
		SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED WITH IRONSTONE FRAGMENTS	9
		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED	10
10	SC	SAND, PALE REDDISH-BROWN (10 R 5/4), FINE-GRAINED WITH LIGHT GRAY (N7) SILT LENSES	14
			9
15		SAND, MODERATE PINK (5 R 7/4) AND MODERATE ORANGE PINK (10 R 7/4), FINE-GRAINED WITH OCCASIONAL CLAY AND SILT LENSES	14
			15
20			20
			19
25	CL	CLAY, LIGHT BROWN (5 R 5/6) AND LIGHT GRAY, SILTY	16
			17
30		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY, SILTY AND SANDY	23
			26
35			28
			27
40			59
		CLAY, MEDIUM DARK GRAY AND LIGHT GRAY, SILTY AND SANDY WITH COAL FRAGMENTS	46
45	SC SM	SAND, MODERATE YELLOWISH-BROWN (10 YR 5/4) AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, CLAYEY WITH MICA, VERY MOIST	+50 45
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED WITH MICA, SATURATED	83
50	CL	SAND, GRAYISH-ORANGE (10 YR 7/4), FINE-GRAINED WITH MICA	
		CLAY, MEDIUM DARK GRAY, SILTY AND STIFF WITH OCCASIONAL SILTY AND VERY FINE-GRAINED SAND LENSES.	
		CLAY, OLIVE-GRAY (5 Y 4/1), SILTY AND STIFF	
55		BORING TERMINATED AT 54 FEET BELOW LAND SURFACE	

PIEZOMETER CONSTRUCTION

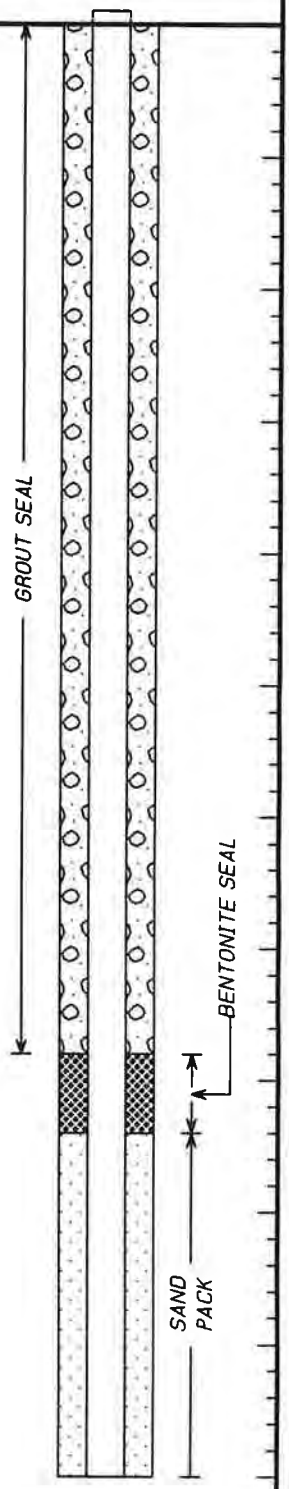


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-4
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-8-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *71 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *270.5 Feet AMSL*	COORDINATE NORTH: 1178530
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923051*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SC	SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED, CLAYEY	12 22 15
	SM	SAND, VERY PALE ORANGE (10 YR 8/2) AND LIGHT BROWN (5 YR 6/4), FINE-GRAINED	23
10	SC	SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	25
15			23 15
	SM	SAND, DARK YELLOWISH-ORANGE, FINE-GRAINED	13 16
20			
25		SAND, DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH IRONSTONE FRAGMENTS	11
		SAND, MODERATE ORANGE PINK (5 YR 8/4) AND LIGHT BROWN, FINE-GRAINED, WITH MICA	10
30		SAND, MODERATE ORANGE PINK AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA	17 24
35		SAND, MODERATE ORANGE PINK, DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	21 18
40	SC	SAND, MODERATE ORANGE PINK AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	24 24
45			25 29
50		SAND, MODERATE PINK (5 R 7/4), MODERATE RED (5 R 5/4), DARK YELLOWISH-ORANGE, AND LIGHT RED (5 R 6/6), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	39
		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	52
55			

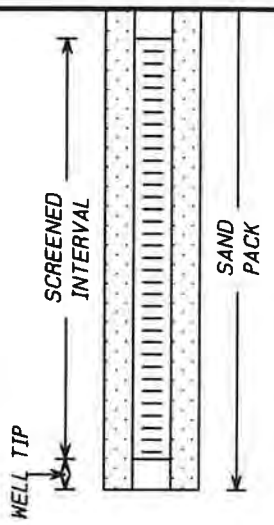
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-4

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		SC	SAND, VERY PALE ORANGE, DARK YELLOWISH-ORANGE, AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES,	66	
			SAND, LIGHT BROWN AND MODERATE BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	18	
65				20	
70		CL	CLAY, MEDIUM GRAY (N5) AND LIGHT GRAY (N7), SILTY AND SANDY	58	
			BORING TERMINATED AT 71 FEET BELOW LAND SURFACE		
75					
80					
85					
90					
95					
100					
105					
110					

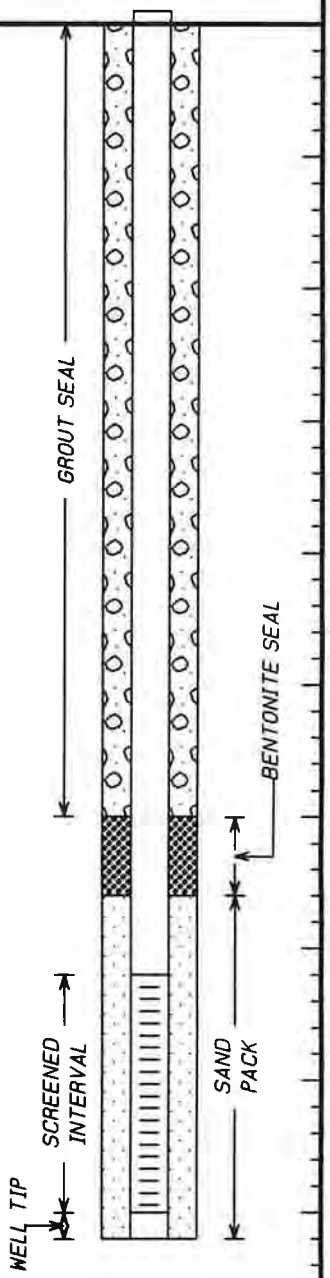


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-5
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-11-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *46 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *249.3 Feet AMSL*	COORDINATE NORTH: 1178060
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921965*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	SM	SAND, MODERATE BROWN (5 YR 4/4) AND DUSKY YELLOWISH-BROWN (10 YR 2/2), SILTY, FINE-GRAINED	4
	ML	SILT, LIGHT BROWN (5 YR 5/6), SANDY	27
5			41
10			25
			9
	SM	SAND, LIGHT BROWN, SILTY, FINE-GRAINED, WITH MICA	10
15		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	9
	CL	CLAY, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10 YR 8/6), SANDY	14
20		CLAY, LIGHT BROWN, VERY PALE ORANGE (10 YR 8/2), AND DARK YELLOWISH-ORANGE, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	13
		CLAY, DARK YELLOWISH-ORANGE, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	31
25		CLAY, LIGHT BROWN AND LIGHT GRAY (N7), SILTY, WITH MICA	16
		CLAY, LIGHT BROWN, PALE REDDISH-BROWN (10 R 5/4), AND LIGHT GRAY, SILTY, WITH MICA	24
30		CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, SILTY, WITH MICA	29
		CLAY, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA, VERY MOIST	18
35		CLAY, VERY PALE ORANGE AND PALE YELLOWISH-BROWN, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	26
	SC	SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, WITH MICA AND OCCASIONAL CLAY LENSES	23
40		SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	31
			32
45	CL	CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	13
50		BORING TERMINATED AT 46 FEET BELOW LAND SURFACE	
55			

PIEZOMETER CONSTRUCTION

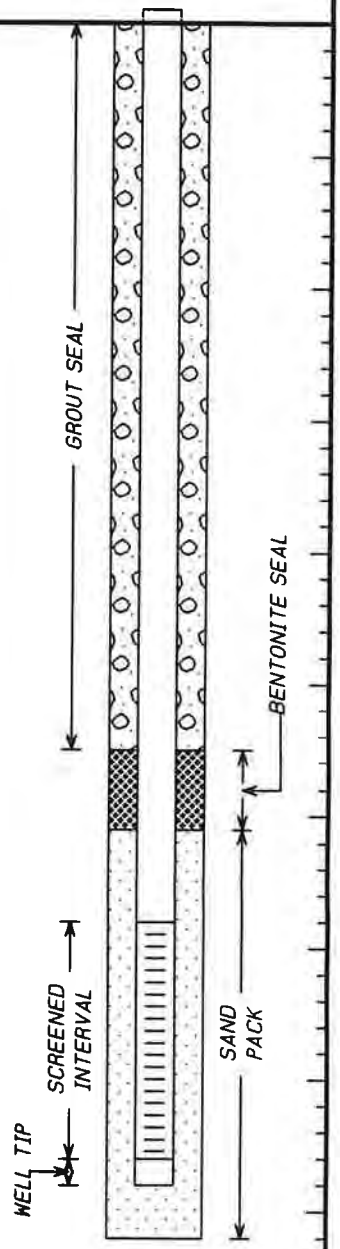


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-6
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-11-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *46 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *245.0 Feet AMSL*	COORDINATE NORTH: 1177705
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922084*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	SM	SAND, LIGHT BROWN (5 YR 5/6) AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED	7
	ML	SILT, LIGHT BROWN, SANDY, WITH MICA	15
5			22
		SILT, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), SANDY, WITH MICA	13
	SM	SAND, PALE YELLOWISH-ORANGE (10 YR 8/6) AND VERY PALE ORANGE (10 YR 8/2), SILTY, WITH MICA	13
10			12
15			13
			19
20			15
			21
25	SC	SAND, PALE YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	15
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	12
30			16
35			25
			16
40			30
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, MOIST	22
	CL	SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	24
45		CLAY, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY	32
		CLAY, OLIVE GRAY (5 Y 4/1) AND DARK GREENISH-GRAY (5 GY 4/1), WITH SILT AND VERY FINE-GRAINED SAND	
50		BORING TERMINATED AT 46 FEET BELOW LAND SURFACE	
55			

PIEZOMETER CONSTRUCTION

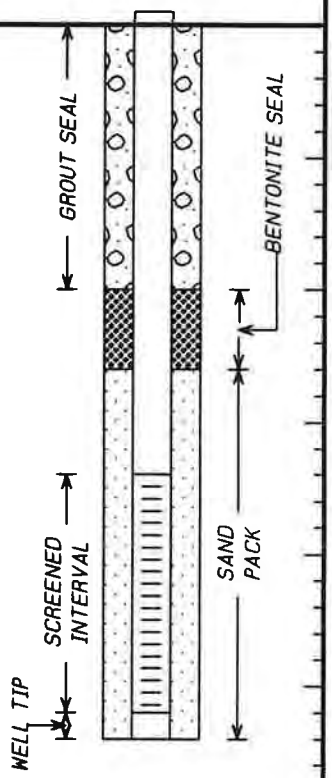


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-7
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO. AL.*	DATE DRILLED: *3-9-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *27 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *214.7 Feet AMSL*	COORDINATE NORTH: 1178121
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922755*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0	SC	SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED AND CLAYEY	10
	SM	SAND, LIGHT BROWN, SILTY AND VERY FINE-GRAINED	10
5	SC	SAND, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED AND CLAYEY	11
	SM	SAND, LIGHT BROWN, FINE-GRAINED	9
10		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	10
		SAND, LIGHT BROWN, FINE-GRAINED, WITH MICA	12
15		SAND, DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, WITH MICA AND IRONSTONE FRAGMENTS	17
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED, WITH MICA, SATURATED	30
20	SC	SAND, GRAYISH-ORANGE (10 YR 7/4), SILTY AND VERY FINE-GRAINED	27
	CL	SAND, LIGHT BROWN, VERY PALE ORANGE, AND LIGHT GRAY (N7), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	24
25	SC	CLAY, LIGHT GRAY (N7), STIFF	
		SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
30		BORING TERMINATED AT 27 FEET BELOW LAND SURFACE	
35			
40			
45			
50			
55			

PIEZOMETER CONSTRUCTION

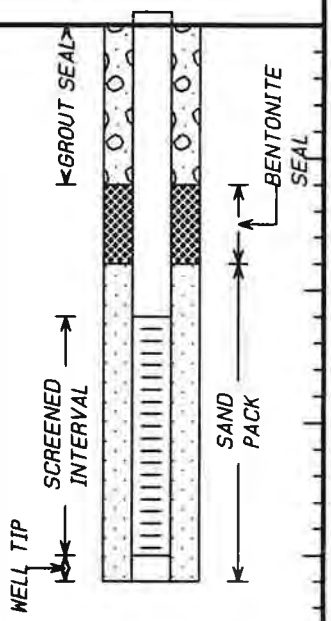


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-8
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-10-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *21 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *218.3 Feet AMSL*	COORDINATE NORTH: 1177839
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921725*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0	ML	SILT, LIGHT BROWN (5 YR 5/6), CLAYEY	12
		SILT, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10YR 6/6), CLAYEY, WITH MICA	17
5		SILT, LIGHT BROWN AND PALE YELLOWISH-BROWN (10 YR 6/2), CLAYEY, WITH MICA	19
		SILT, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), SANDY, WITH MICA	16
10	SM	SAND, PALE YELLOWISH-ORANGE (10 YR 8/6) AND VERY PALE ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA	14
			12
15		SAND, PALE YELLOWISH-ORANGE, DARK YELLOWISH-ORANGE, AND LIGHT BROWN, FINE-GRAINED, WITH MICA, MOIST	13
		SAND, LIGHT BROWN, FINE-TO MEDIUM-GRAINED, WITH MICA	
	CL		40
20	ML	CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, SILTY, WITH MICA	
	CL		31
		SILT, LIGHT BROWN, SANDY, WITH MICA	
25		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY (N7), WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	
		BORING TERMINATED AT 21 FEET BELOW LAND SURFACE	
30			
35			
40			
45			
50			
55			

PIEZOMETER CONSTRUCTION

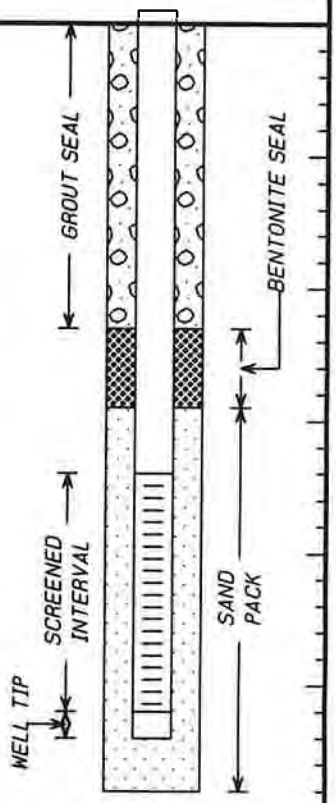


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-9
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-10-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *29 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *204.0 Feet AMSL*	COORDINATE NORTH: 1178807
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921759*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0	CL	CLAY, LIGHT BROWN (5 YR 5/6), SILTY	11
5		CLAY, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), SANDY AND SILTY	18
		CLAY, LIGHT BROWN AND LIGHT GRAY (N7), SILTY AND STIFF	19
10		CLAY, LIGHT BROWN AND LIGHT GRAY, SILTY	28
	SC	SAND, DARK YELLOWISH-ORANGE (10 YR 6/6) AND LIGHT GRAY, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	29
15	ML		33
	SC	SILT, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE (10 YR 8/2), CLAYEY, VERY MOIST	29
		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	40
20		SAND, LIGHT BROWN, DARK YELLOWISH-ORANGE, AND LIGHT GRAY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	40
	ML	SAND, MODERATE BROWN (5 YR 3/4), SILTY, FINE-GRAINED, AND CLAYEY	36
25	CL	SAND, MODERATE BROWN, SILTY, FINE-GRAINED, AND CLAYEY, SATURATED	29
		SAND, LIGHT BROWN AND DARK YELLOWISH-BROWN (10 YR 4/2) FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	42
30		SILT, LIGHT BROWN, DARK YELLOWISH ORANGE, AND VERY PALE ORANGE, CLAYEY	
		SILT, DARK GREENISH-GRAY (5 GY 4/1), CLAYEY	
35		CLAY, OLIVE GRAY (5 Y 3/2), SILTY AND STIFF	
		CLAY, DARK GRAY (N3) AND LIGHT GRAY (N7), STIFF WITH SILT AND VERY FINE-GRAINED SAND	
40		BORING TERMINATED AT 29 FEET BELOW LAND SURFACE	
45			
50			
55			

PIEZOMETER CONSTRUCTION

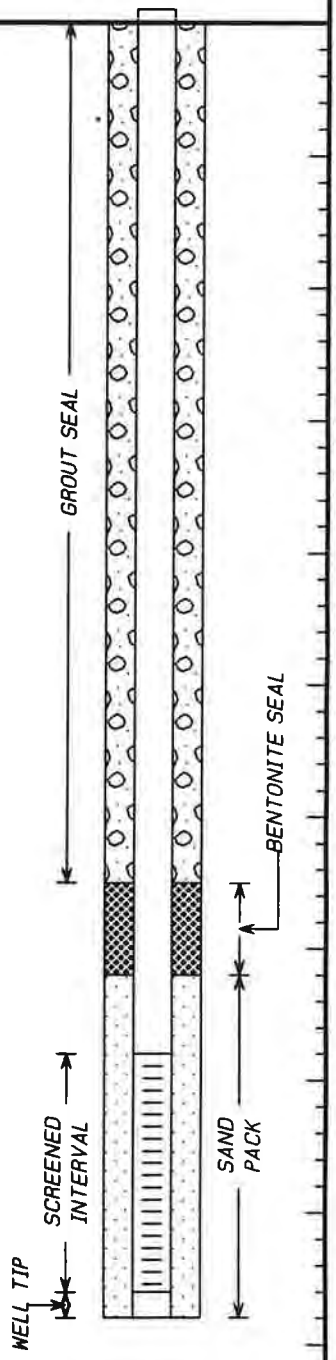


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-10
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-14-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *237.0 Feet AMSL*	COORDINATE NORTH: 1179076
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921223*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	CL	CLAY, LIGHT BROWN (5 YR 5/6), SILTY	4
		CLAY, MODERATE ORANGE PINK (5 YR 8/4) AND VERY PALE ORANGE (10 YR 8/2), SILTY	8
5		CLAY, MODERATE ORANGE PINK, VERY PALE ORANGE, AND MODERATE RED (5 R 4/6), SILTY AND SANDY	29
		CLAY, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE, WITH SILT AND VERY FINE SAND AND MICA	21
10			23
		CLAY, PALE YELLOWISH-BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE (10 YR 6/6), WITH SILT AND VERY FINE SAND AND MICA	40
15	ML		38
	SM	SILT, LIGHT BROWN, PALE YELLOWISH BROWN, AND VERY PALE ORANGE, CLAYEY	
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA	38
20	SC	SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	25
		SAND, GRAYISH-ORANGE (10 YR 7/4) AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	33
25			27
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	46
30			37
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	42
35			38
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	53
40			22
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES, VERY MOIST	45
45		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	27
	CL	CLAY, OLIVE GRAY (5 Y 4/1) AND LIGHT GRAY (N7), SILTY, WITH MICA AND VERY FINE-GRAINED SAND	+50
50		BORING TERMINATED AT 49 FEET BELOW LAND SURFACE	
55			

PIEZOMETER CONSTRUCTION

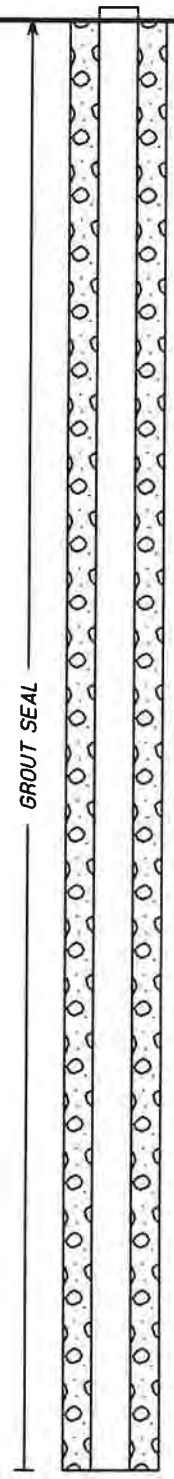


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-11
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO. AL.*	DATE DRILLED: *3-14-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *84 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *276.3 Feet AMSL*	COORDINATE NORTH: 1179592
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921362*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	ML	SILT, LIGHT BROWN (5 YR 5/6), SANDY	7 23 27
	SM	SAND, LIGHT BROWN, SILTY, VERY FINE-GRAINED, WITH MICA	30
10		SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10 YR 6/2), SILTY, VERY FINE-GRAINED, WITH MICA	23
15		SAND, PALE YELLOWISH ORANGE (10 YR 8/6) AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA	21 23
20			21 28
25			28 34
30		SAND, MODERATE BROWN (5 YR 4/4), VERY PALE ORANGE, AND PALE YELLOWISH-BROWN (10 YR 6/2), FINE-GRAINED, WITH MICA	24 28
35		SAND, MODERATE BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND IRONSTONE FRAGMENTS	50 84
40		SAND, VERY PALE ORANGE, FINE-GRAINED, WITH MICA, MOIST	58
45	CL	CLAY, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, SANDY AND SILTY, WITH MICA	53 33 27
50		CLAY, LIGHT BROWN, PALE YELLOWISH-BROWN, AND VERY PALE ORANGE, SILTY WITH VERY FINE SAND AND MICA	29 35
55		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY (N7), WITH SILT AND VERY FINE SAND AND MICA	44

PIEZOMETER CONSTRUCTION

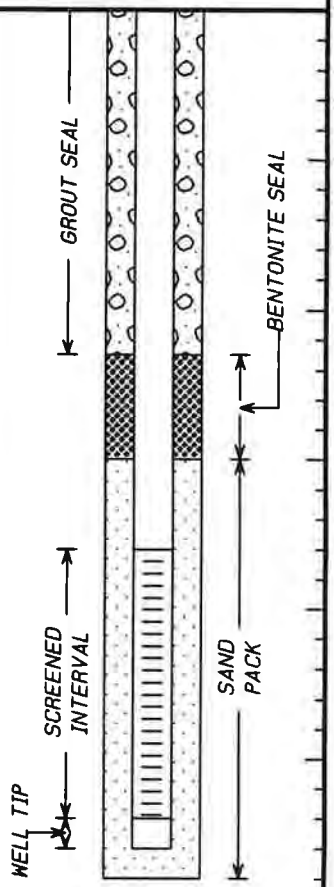


TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-11

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)
60	CL	CLAY, PALE YELLOWISH-BROWN, VERY PALE ORANGE, AND DARK YELLOWISH ORANGE (10 YR 6/6), SILTY WITH VERY FINE SAND AND MICA	51
			42
		CLAY, DARK YELLOWISH-ORANGE, PALE YELLOWISH-BROWN, AND VERY PALE ORANGE, SILTY WITH VERY FINE SAND AND MICA	44
65			36
			75
70	SC	SAND, DARK YELLOWISH-BROWN (10 YR 4/2), LIGHT BROWN, AND DARK YELLOWISH-ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	86
			74
75		SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, SILTY, WITH MICA	80
			87
80	CL	SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	73
		SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH--ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	48
85		CLAY, MEDIUM DARK GRAY AND LIGHT GRAY, WITH SILT AND VERY FINE-GRAINED SAND AND MICA	
		CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	
		BORING TERMINATED AT 84 FEET BELOW LAND SURFACE	
90			
95			
100			
105			
110			

PIEZOMETER CONSTRUCTION

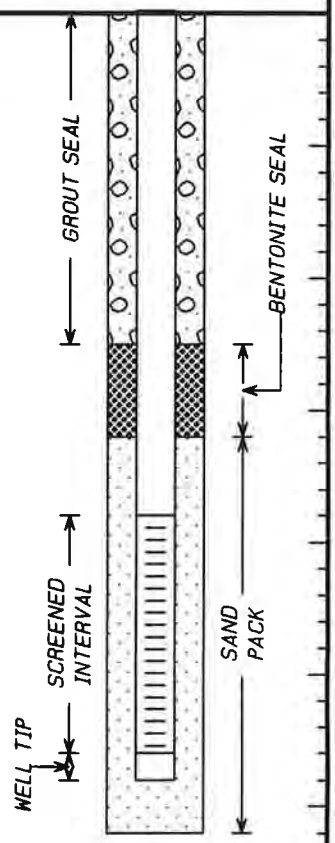


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-12
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-12-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *31 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *265.0 Feet AMSL*	COORDINATE NORTH: 1180386
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921603*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0–5		CL	CLAY, LIGHT BROWN (5 YR 5/6) AND VERY PALE ORANGE (10 YR 8/2), SANDY	6 13 15
5–10			CLAY, DARK YELLOWISH-ORANGE (10 YR 6/6) AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE SAND AND MICA	20 21
10–15			CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	44 44
15–20				56 51
20–25				51 40
25–30				65 55
30–35			BORING TERMINATED AT 31 FEET BELOW LAND SURFACE	
35–40				
40–45				
45–50				
50–55				

PIEZOMETER CONSTRUCTION

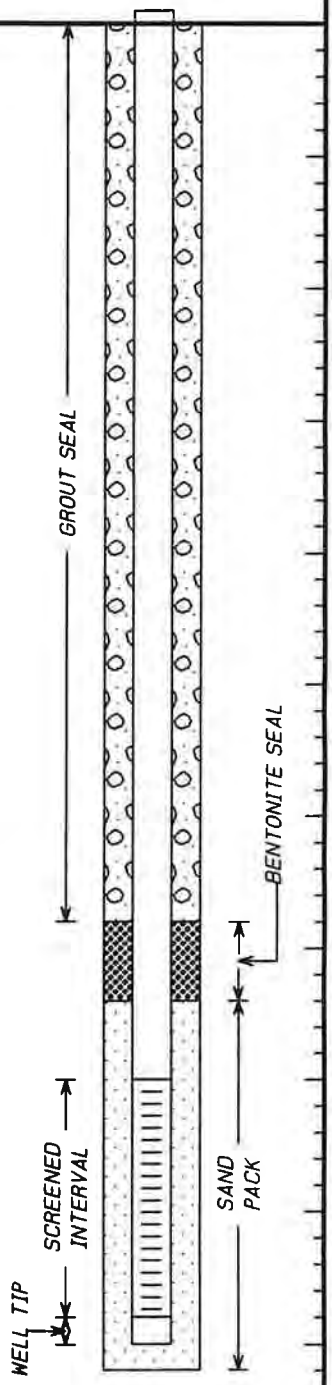


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-13
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-12-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *51 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *287.5 Feet AMSL*	COORDINATE NORTH: 1181160
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922296*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SC	SAND, LIGHT BROWN (5 YR 5/6), CLAYEY	4
		SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), WITH SILT AND VERY FINE SAND WITH MICA	17
		SAND, LIGHT BROWN, DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	18
10	CL	CLAY, DARK YELLOWISH-ORANGE AND LIGHT GRAY (N7), SILTY WITH IRONSTONE FRAGMENTS	28 16
15		CLAY, DARK YELLOWISH-ORANGE AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE SAND AND MICA	22
		CLAY, DARK GRAY (N3) AND PALE YELLOWISH BROWN, WITH SILT AND VERY FINE SAND AND MICA	31
20		CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	31 22
25			61 42
30		CLAY, OLIVE GRAY, SILTY, WITH VERY FINE SAND AND MICA, STIFF	44 59
35			73 +50
40			+50 +50
45		CLAY, OLIVE GRAY, SILTY, WITH VERY FINE SAND AND MICA, SATURATED	+50 +50
50			+50 +50
55		BORING TERMINATED AT 51 FEET BELOW LAND SURFACE	

PIEZOMETER CONSTRUCTION

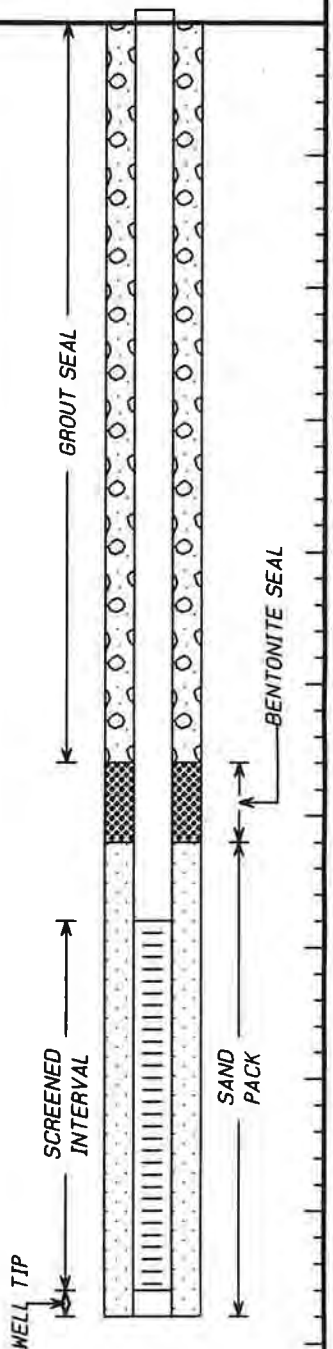


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-14
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-15-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *280.1 Feet AMSL*	COORDINATE NORTH: 1181183
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922749*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SC	SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED, CLAYEY	
			SAND, LIGHT BROWN, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE (10 YR 8/2), CLAYEY, WITH MICA	
10		CL	CLAY, GRAYISH-ORANGE (10 YR 7/4) AND LIGHT GRAY (N7), SILTY, WITH MICA	
			CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN (10 YR 6/2), SILTY, WITH MICA	
15			CLAY, OLIVE GRAY (5 Y 4/1), SILTY, WITH MICA	
20			CLAY, OLIVE GRAY, WITH SILT AND VERY FINE SAND AND MICA	
25			CLAY, OLIVE GRAY, SILTY, WITH MICA	
30			CLAY, OLIVE GRAY, SILTY WITH VERY FINE SAND AND MICA	
35				
40			CLAY, OLIVE GRAY, WITH SILT AND VERY FINE SAND AND MICA, SATURATED	
45		SC	SAND, LIGHT BROWN, PALE YELLOWISH-BROWN, SILTY, FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	
		ML	SILT, OLIVE GRAY, CLAYEY, WITH MICA	
		SM	SAND, LIGHT BROWN AND PALE YELLOWISH BROWN, SILTY, FINE-GRAINED, WITH MICA AND GLAUCONITE	
50		ML	SILT, OLIVE GRAY, CLAYEY	
			BORING TERMINATED AT 49 FEET BELOW LAND SURFACE	
55				

PIEZOMETER CONSTRUCTION

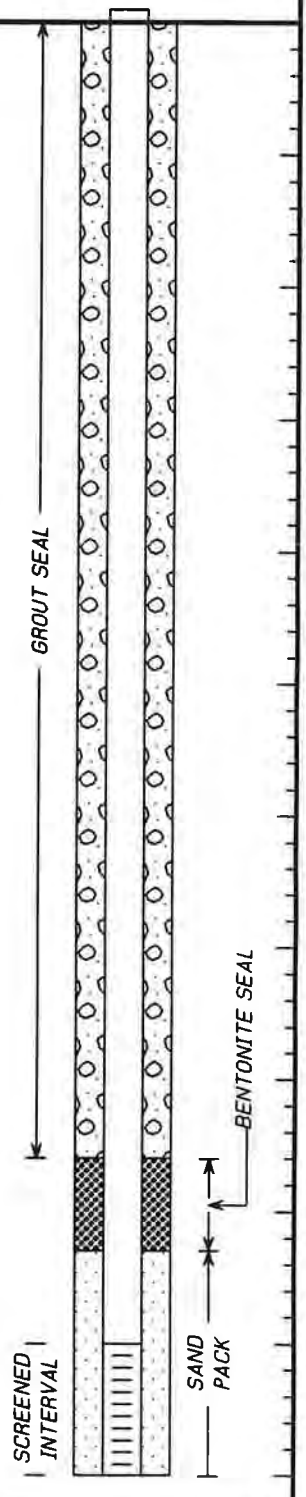


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-15
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-16-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *66 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *286.4 Feet AMSL*	COORDINATE NORTH: 1181025
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923070*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SM	SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED, WITH MICA	4
			8
		SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED	12
10		SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), SILTY, FINE-GRAINED, WITH MICA	13
		SAND LIGHT BROWN, SILTY, FINE-GRAINED, WITH MICA	13
15	CL	CLAY, PALE YELLOWISH-BROWN (10 YR 6/2), DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE (10 YR 8/2), SILTY, WITH MICA AND COAL FRAGMENTS	16
			46
	SC	SAND, DARK YELLOWISH-BROWN (10 YR 4/2), LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	54
20			40
		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	25
25			49
		SAND, VERY PALE ORANGE, DARK YELLOWISH-ORANGE, PALE YELLOWISH-BROWN, AND LIGHT BROWN, FINE-GRAINED, WITH MICA AND CLAY LENSES	+50
30			75
			65
35			45
			35
40			57
		SAND, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	68
45			19
			32
50			79
			61
55			

PIEZOMETER CONSTRUCTION

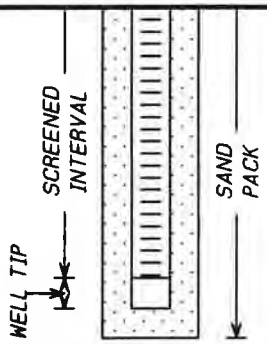


TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-15

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)
60	SC	SAND, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	68
	ML	SILT, LIGHT BROWN, PALE YELLOWISH BROWN, AND DARK YELLOWISH ORANGE, WITH CLAY LENSES AND MICA	58
	SM	SAND, PALE YELLOWISH-BROWN AND VERY PALE ORANGE, SILTY, AND VERY FINE-GRAINED, WITH MICA AND GLAUCONITE	+50
65		SAND, DUSKY BROWN (5 YR 2/2), LIGHT BROWN, AND PALE YELLOWISH-BROWN, FINE-TO MEDIUM-GRAINED, WITH MICA AND GLAUCONITE	+50
	CL	SAND, MODERATE BROWN AND DUSKY BROWN, SILTY, FINE-GRAINED, WITH IRONSTONE FRAGMENTS AND MICA	+50
		CLAY, OLIVE GRAY (5 Y 4/1), SILTY AND STIFF	
70		BORING TERMINATED AT 66 FEET BELOW LAND SURFACE	
75			
80			
85			
90			
95			
100			
105			
110			

PIEZOMETER CONSTRUCTION



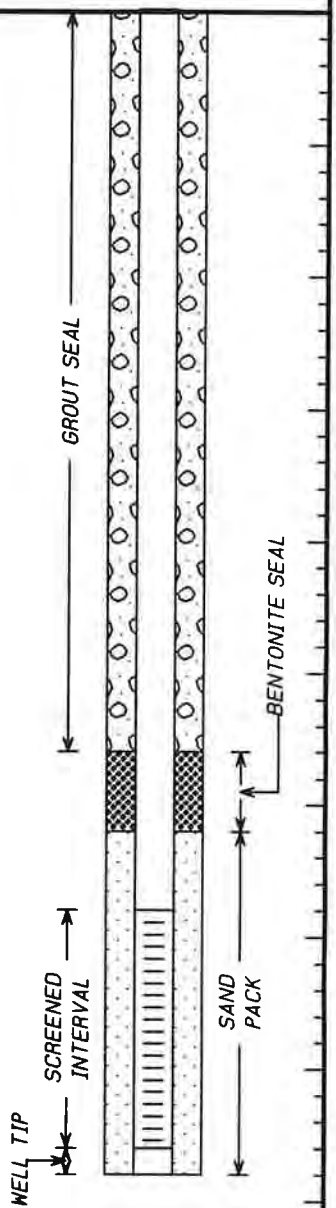
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-16
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-16-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *44 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *260.8 Feet AMSL*	COORDINATE NORTH: 1179465
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922653*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	ML	SILT, MODERATE BROWN (5YR 3/4), SANDY
5		SILT, MODERATE BROWN, SANDY AND CLAYEY
10	CL	CLAY, PALE YELLOWISH-BROWN (10 YR 6/2) AND LIGHT BROWN (5 YR 5/6), SILTY
15		
20		CLAY, OLIVE GRAY (5 Y 4/1), SILTY, WITH MICA
25		
30		CLAY, LIGHT BROWN AND MODERATE BROWN, SILTY
35	ML	SILT, LIGHT BROWN, VERY PALE ORANGE (10 YR 8/2), AND PALE YELLOWISH-BROWN, SANDY, WITH OCCASIONAL CLAY LENSES
	SM	SAND, LIGHT BROWN AND PALE YELLOWISH-BROWN, FINE- TO MEDIUM-GRAINED, SATURATED
	ML	
	SM	SILT, LIGHT BROWN AND PALE YELLOWISH-BROWN, CLAYEY
40	ML	SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND GLAUCONITE
	SM	SILTY, OLIVE GRAY, SANDY, WITH MICA
	CL	SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND GLAUCONITE
45		CLAY, OLIVE GRAY, SILTY, WITH MICA
50		BORING TERMINATED AT 44 FEET BELOW LAND SURFACE
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION



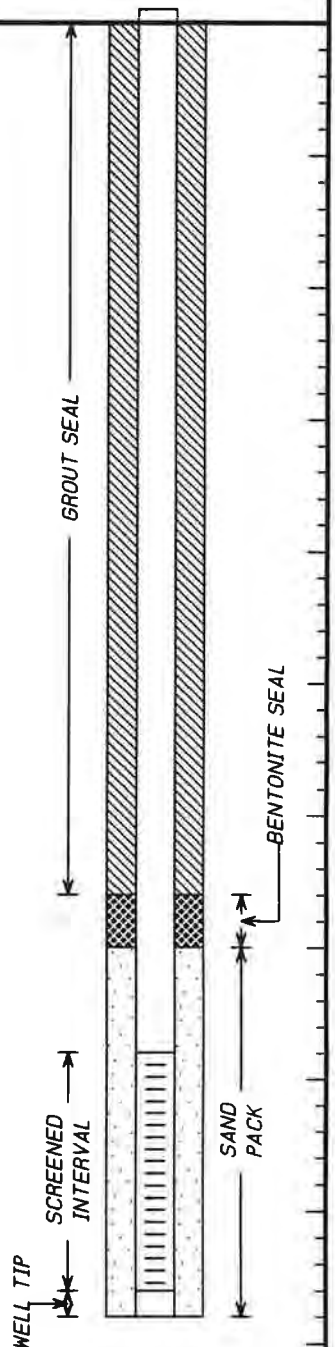
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-17
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/12/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *49 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *181.4 Feet AMSL*	COORDINATE NORTH: 1177830
DRILLING METHOD: *CME 75 w/4-1/4-inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922538*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SM	SAND, dark yellowish brown (10YR 4/2), fine-grained
5	SC	SAND, very pale orange (10YR 8/2) & pale yellowish orange (10YR 8/6), clayey
10	CL	CLAY, light olive gray (5Y 5/2), pinkish gray (5YR 8/1) w/mod. red (5R 5/4) streaks, silty and stiff
15		
20		CLAY, pale red purple (5RP 6/2) & light brownish gray (5YR 6/1), silty and stiff
25		CLAY, light brownish gray (5YR 6/1) & pale red purple, silty and stiff
30		CLAY, olive gray (5Y 3/2), silty and stiff
		CLAY, light olive gray, silty and stiff
35	ML	SILT, grayish green (10GY 5/2) clayey with mica
40		SILT, grayish green clayey and sandy with mica, moist
45		WET
50		BORING TERMINATED AT 49 FEET BELOW LAND SURFACE.
55		

PENETRATION (blows per ft.)

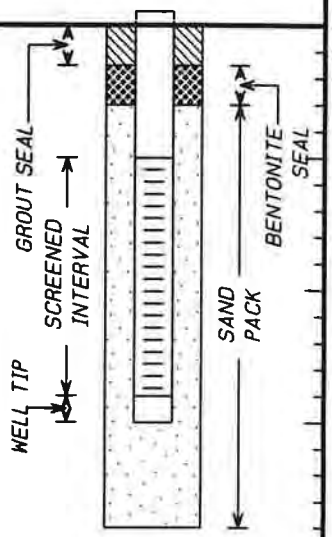
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-17A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/11/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *19 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *181.0 Feet AMSL*	COORDINATE NORTH: 1177822
DRILLING METHOD: *CME 75 w/4-1/4-inch HSA*		COORDINATE EAST: *1922542*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	FINE SAND, dark yellowish brown (10YR 4/2)		
5		SC	CLAYEY SAND, very pale orange (10YR 8/2) & pale yellowish orange (10YR 8/6)		
10		CL	STIFF SILTY CLAY, light olive gray (5Y 5/2), pinkish gray (5YR 8/1) w/mod. red (5R 5/4) streaks		
15					
20			BORING TERMINATED AT 19 FEET BELOW LAND SURFACE.		
25					
30					
35					
40					
45					
50					
55					

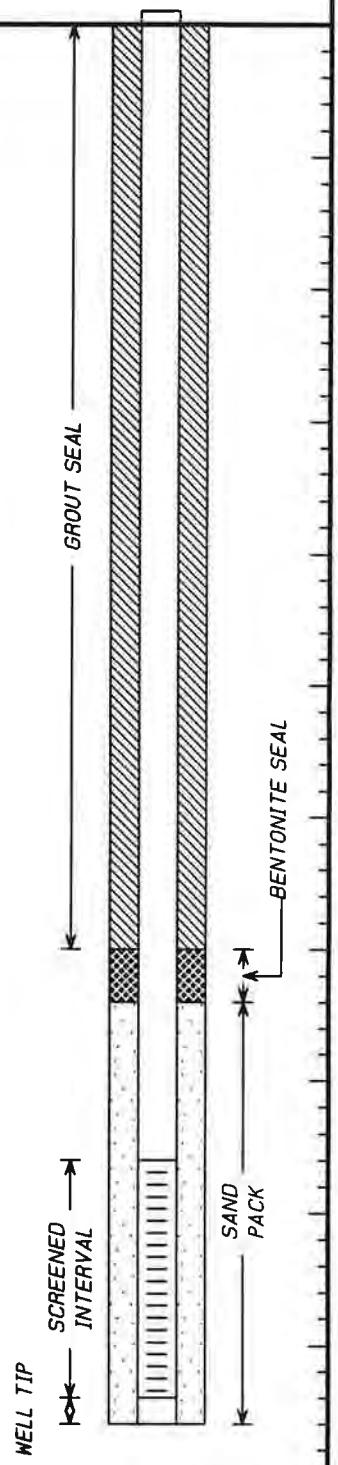


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-18
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *53 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *183.3 Feet AMSL*	COORDINATE NORTH: 1171822
DRILLING METHOD: *CME 75 WITH 4-1/4 in. HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921097*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		CL	CLAY, light brown (5YR 6/4), sandy	
		ML	SILT, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), clayey	
10		CL	CLAY, pale yellowish brown (10YR 6/2) & dark yellowish orange, silty	
15			CLAY, silty and stiff	
20			CLAY, medium light gray (N6) with dark yellowish orange & moderate red (5R 4/6) streaks, silty and stiff	
25				
30				
35			CLAY, light bluish gray (5B 7/1) & olive gray (5Y 3/2), silty and stiff	
40				
45			CLAY, light bluish gray & olive gray w/moderate red streaks, silty and stiff	
50			CLAY, olive black (5Y 2/1) stiff w/silt and very fine sand laminae and mica	
55			BORING TERMINATED AT 53 FEET BELOW LAND SURFACE.	

PIEZOMETER CONSTRUCTION

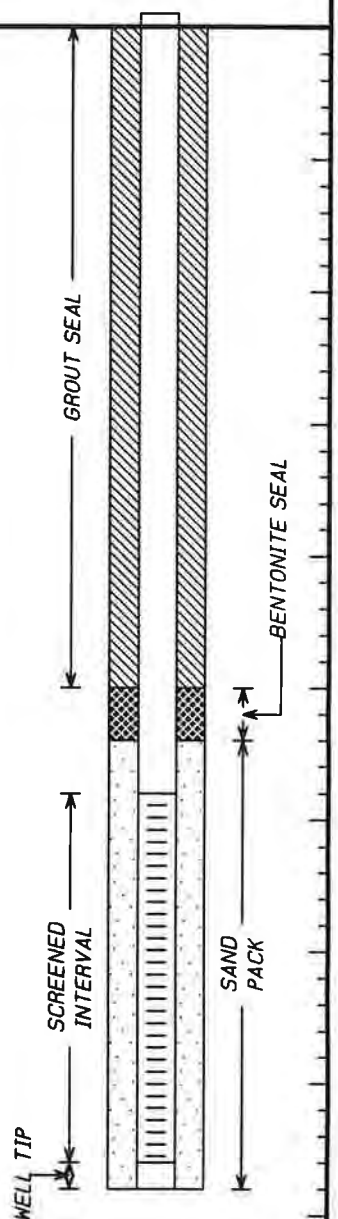


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-19
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *44 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *231.3 Feet AMSL*	COORDINATE NORTH: 1178742
DRILLING METHOD: *CME 75 w/4-1/4 inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921044*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		ML	SILT, light brown (5YR 6/4) silty w/mica	
5			SILT, dark yellowish orange (10YR 6/6) w/occasional light gray (N7) clay laminae	
10			SILT, sandy w/ occasional clay laminae	
15		SM	SAND, very pale orange (10YR 8/2) very fine grained w/mica	
20		SC	SAND, dark yellowish orange very fine grained w/occasional clay laminae & mica	
25			SAND, dark yellowish orange & very pale orange (10YR 8/2) very fine grained w/occ. clay laminae & mica Moist	
30		CL	Ironstone fragments	
35			CLAY, dark gray (N3) & dark greenish gray (5G 4/1) silty & stiff w/very fine sand laminae, mica & gloucamite Wet	
40			BORING TERMINATED AT 44 FEET BELOW LAND SURFACE.	
45				
50				
55				

PIEZOMETER CONSTRUCTION



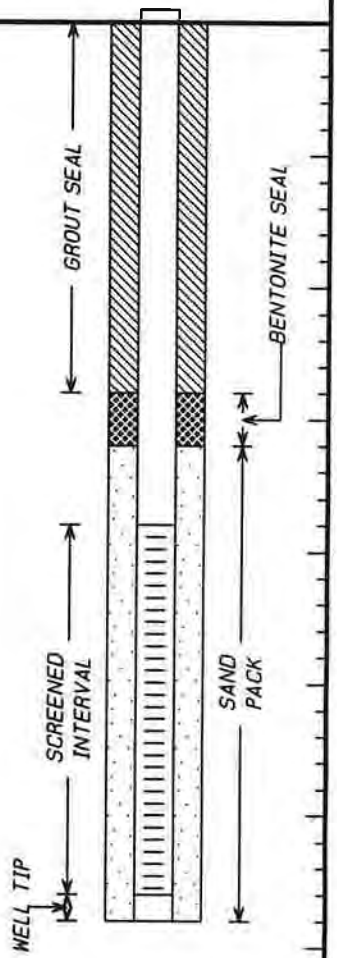
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-20
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *COKER, ALABAMA*	DATE DRILLED: *8/11/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *34 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *211.30 Feet AMSL*	COORDINATE NORTH: 1179765
DRILLING METHOD: *CME 75 with 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921067*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
5	SM	SAND, light brown (5YR 6/4) & dark yellowish orange (10YR 6/6), fine-grained, w/mica
10	SC	SAND, dark yellowish orange & very pale orange (10YR 8/2), fine-grained, w/occasional clay laminae & mica
15	SM	SAND, dark yellowish orange, fine-grained, w/mica
		SAND, very pale orange, fine-grained, w/mica (Wet)
20	SC	SAND, dark yellowish orange, fine-grained, w/thin ironstone layers
		SAND, dark yellowish orange & moderate yellowish brown (10YR 5/4), fine-grained, w/occasional clay laminae & mica
25	ML	SILT, dark yellowish orange & grayish orange pink (10R 8/2), clayey, w/mica
	CL	
	SM	CLAY, pale yellowish brown (10YR 6/2) & grayish orange pink, silty & stiff
30	CL	SAND, dark yellowish & pale yellowish orange (10YR 8/6), fine-grained, w/mica & thin ironstone fragments
		CLAY, medium dark gray (N4), w/very fine sand laminae & mica
35		BORING TERMINATED AT 34 FEET BELOW LAND SURFACE.
40		
45		
50		
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION

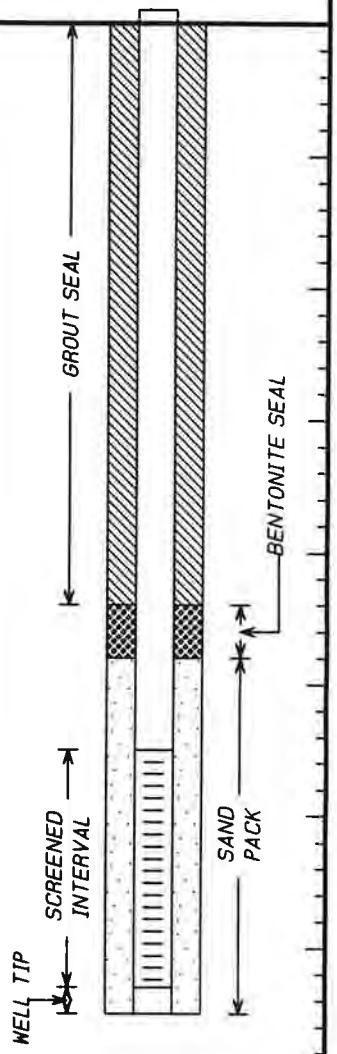


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-21
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/16/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *37.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *241.0 Feet AMSL*	COORDINATE NORTH: 1180596
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921073*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		SC	SAND, light brown (5YR 6/4), clayey	
		CL	CLAY, light brown, sandy	
5				
			CLAY, light brown & light olive gray (5Y 5/2), silty	
10				
15			CLAY, light brown & light olive gray, silty, w/very fine sand laminae & mica	
			CLAY, medium dark gray (N4), silty, w/very fine sand laminae & mica	
20				
25			1/8" thin very fine sand lense (moist) sand, very fine grained (moist)	
			CLAY, med. light gray (N6) silty, w/very fine sand laminae & mica	
30		SM	SAND, light brown & light olive gray (5Y 6/1), fine grained, clayey	
		CL	CLAY, medium dark gray silty, w/very fine sand laminae & mica	
35			very fine sand lense (very moist)	
			BORING TERMINATED AT 37.5 FEET BELOW LAND SURFACE.	
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION



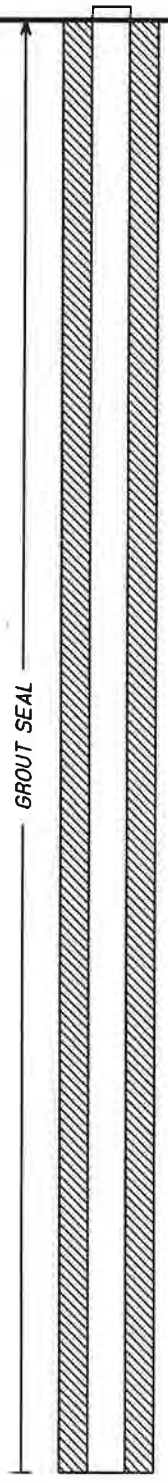
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-22
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/15/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *109 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *308.7 Feet AMSL*	COORDINATE NORTH: 1181175
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921059*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	ML	SILT, grayish orange (10YR 7/4) & light brown (5YR 6/4), sandy
5	SM	SAND, light brown (5YR 6/4), very fine grained
10		SAND, light brown & very pale orange (10YR 8/2), very fine grained w/mica
20		
25	CL	CLAY, light olive gray (5Y 5/2) & moderate red (5R 5/4), silty & stiff
		CLAY, light brown & very light gray (N8), silty & sandy
30		CLAY, light brown & very light gray, silty & sandy w/ironstone fragments
		CLAY, medium dark gray (N4), silty, w/very fine sand laminae & mica
35		
40		
45		
50		
55		

PENETRATION (blows per ft.)

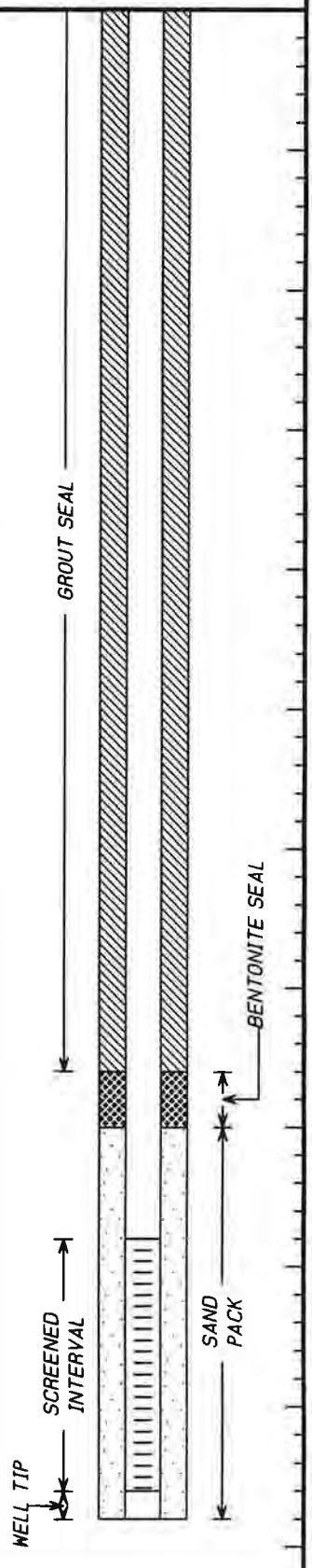
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-22

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	SILTY CLAY, medium dark gray, w/very fine sand laminae		
65					
70					
75					
80					
85					
90					
95					
100					
		SC	SAND, medium light gray (N6), very fine grained, w/occasional clay laminae		
			SAND w/GRAVEL, medium light gray (N6), very fine grained, w/occasional clay laminae		
105		CL	CLAY, medium dark gray, silty, w/very fine sand laminae & mica		
			Small coal fragments @ 108.5 ft.		
110			BORING TERMINATED AT 109 FEET BELOW LAND SURFACE.		

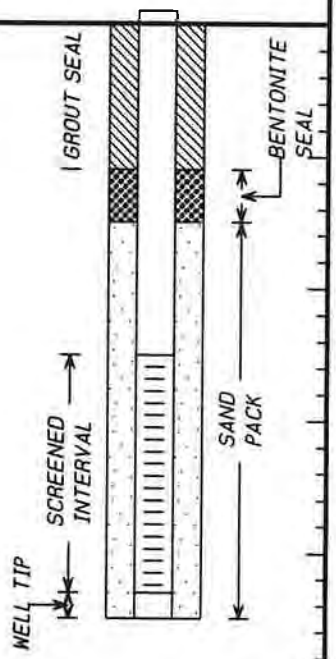


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-23
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *COKER, ALABAMA*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *22.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *278.1 Feet AMSL*	COORDINATE NORTH: 1181813
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921511*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		SM	SAND, moderate brown (5YR 4/4)	
5		SC	SAND, light brown (5YR 6/4), clayey	
10				
15			SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2), clayey, w/mica & glauconite, very moist Saturated	
20		CL	CLAY, medium dark gray (N4), silty, w/very fine-grained sand laminae & mica	
25			BORING TERMINATED AT 22.5 FEET BELOW LAND SURFACE.	
30				
35				
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION



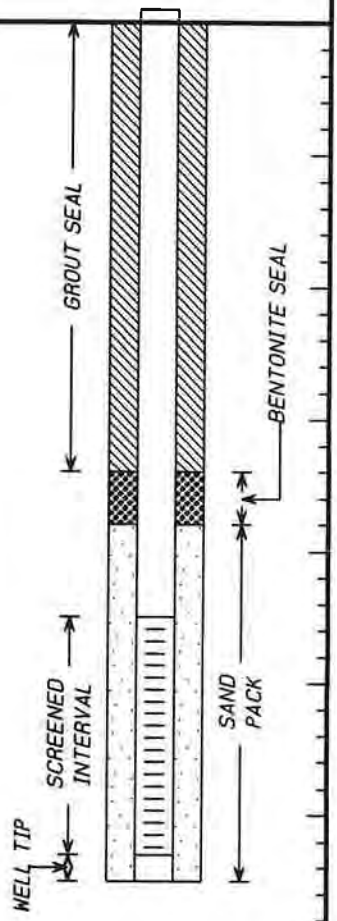
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-24
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *32.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *275.0 Feet AMSL*	COORDINATE NORTH: 1181698
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922206*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SM	SAND, light brown (5YR 6/4), silty
		SC	SAND, light brown, clayey
5		CL	CLAY, very pale orange (10YR 8/2) & light brown, silty & sandy
10			CLAY, light olive gray (5Y 5/2) & light brown, silty, w/very fine grained sand laminae & mica
15			CLAY, medium dark gray (N4), silty, w/very fine grained sand laminae & mica
			CLAY, light brown, silty, w/very fine grained sand laminae & ironstone fragments
20			CLAY, medium dark gray, silty, w/very fine sand laminae & mica
25			2-3" sand lense (Moist)
		SM	Approx. 3" sand lense
30		CL	SAND, medium dark gray, very fine grained, Wet
			CLAY, medium dark gray, silty, w/very fine grained sand laminae & mica
			BORING TERMINATED AT 32.5 FEET BELOW LAND SURFACE.
35			
40			
45			
50			
55			

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-25
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *72.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *346.3 Feet AMSL*	COORDINATE NORTH: 1181928
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922759*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, dark reddish brown (10R 3/4), silty, fine grained		
10					
15			SAND, very pale orange (10YR 8/2) & light brown (5YR 6/4) very fine-grained, w/mica & glauconite		
20					
25					
30			moist		
35					
40					
45					
50			Thin layer of ironstone (1/16")		
		CL	CLAY, pale yellowish brown (10YR 6/2) & very pale orange, silty, w/very fine sand laminae mica		
55		SM CL	SAND, light brown, fine-grained w/mica		

GROUT SEAL

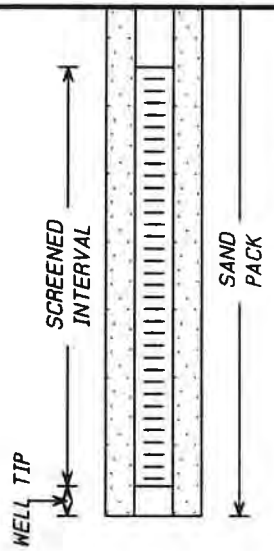
BENTONITE SEAL

SAND PACK

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-25

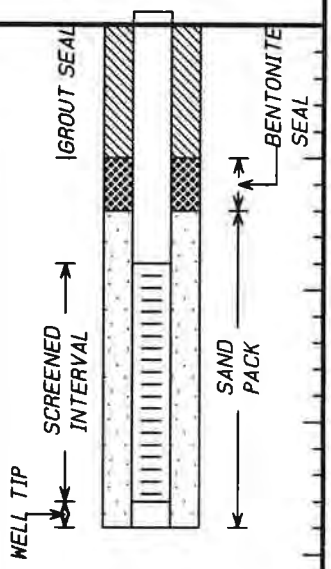
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL	CLAY, pale yellowish brown, silty, w/very fine sand laminae		
		SM	SAND, very pale orange & light brown, fine-grained, w/mica, wet		
60					
			SAND, pinkish gray (5YR 8/1), fine-grained, w/occasional clay laminae (Wet)		
65					
70					
			BORING TERMINATED AT 72.0 FEET BELOW LAND SURFACE.		
75					
80					
85					
90					
95					
100					
105					
110					



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-26
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *19.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *291.2 Feet AMSL*	COORDINATE NORTH: 1181211
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922656*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, light brown (5YR 6/4), very fine-grained		
5					
		SC	SAND, light olive gray (5Y 6/1) & brown (5YR 6/4), clayey		
10			SAND, very pale orange (10YR 8/2) & light brown, (Very moist)		
			wet		
15		CL	CLAY, light brown, silty		
			CLAY, medium dark gray (5YR 6/4) silty, w/very fine sand laminae		
20			BORING TERMINATED AT 19.0 FEET BELOW LAND SURFACE.		
25					
30					
35					
40					
45					
50					
55					

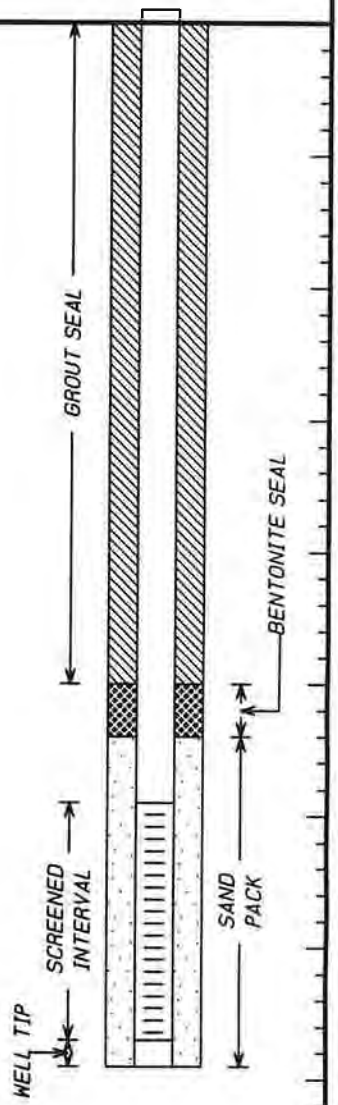


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-27
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/15/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *39.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *243.3 Feet AMSL*	COORDINATE NORTH: 1181016
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922013*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		CL	CLAY, light brown (5YR 6/4) & light olive gray (5Y 6/1), silty, w/mica	
10			CLAY, medium gray (N5), silty, w/very fine sand laminae & mica	
30			CLAY, medium gray, silty, w/abundant very fine sand laminae & mica	
35		SM	SAND, dark greenish-gray (5GY 4/1), very fine-grained w/gravel, w/mica & glauconite, (moist)	
		CL	CLAY, dark gray (N3), w/sparse very fine sand laminae	
40			BORING TERMINATED AT 39.5 FEET BELOW LAND SURFACE.	

PIEZOMETER CONSTRUCTION

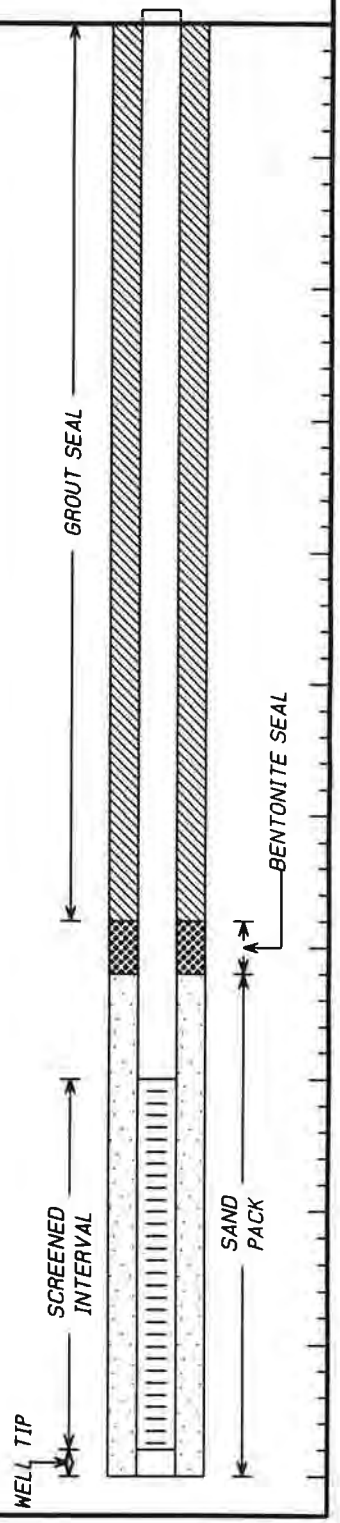


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-28
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/18/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *55.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *260.7 Feet AMSL*	COORDINATE NORTH: 1180296
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1923113*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		CL	CLAY, medium dark gray (N4), with very fine sand laminae & mica	
5		SM	SAND, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), fine-grained, with mica	
10		SC	with occasional clay laminae	
15				
20				
25				
30				
35			moist	
40			wet	
45				
50		SW	SAND, medium brown (5YR 4/4), fine- to medium-grained with ironstone	
55			BORING TERMINATED AT 55.0 FEET BELOW LAND SURFACE.	

PIEZOMETER CONSTRUCTION

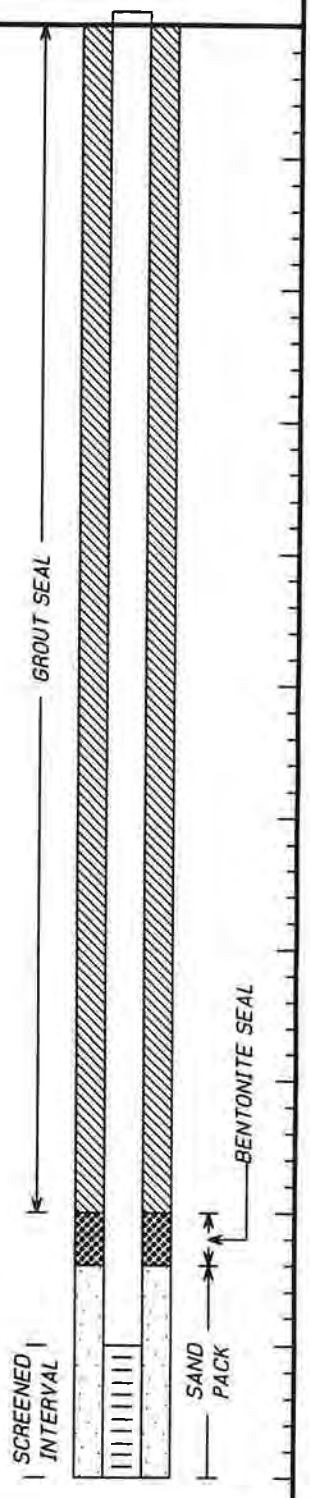


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-29
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *84.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *251.2 Feet AMSL*	COORDINATE NORTH: 1180093
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921524*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		CL	CLAY, light brown (5YR 6/4) & pale brown (5YR 5/2), silty	
			Coal fragments 4 to 6'	
5			CLAY, very pale orange (10YR 8/2) pale yellowish brown (10YR 6/2) & light brown, silty	
10			CLAY, medium dark gray (N4), w/very fine sand laminae & mica	
15				
20				
25				
30				
35				
40			CLAY, dark greenish gray (5GY 4/1), silty, w/fine-grained sand laminae & mica (Wet)	
45				
50		SC	SAND, light brown, fine-grained, w/occasional clay & ironstone fragments, mica, glauconite	
		CL	CLAY, dark greenish gray, silty, w/fine-grained sand laminae	
		SM	SAND, dark greenish gray, fine-grained, glauconitic, w/mica w/gravel (wet)	
55		CL	CLAY, dark greenish gray, silty, w/fine-grained sand laminae & mica	

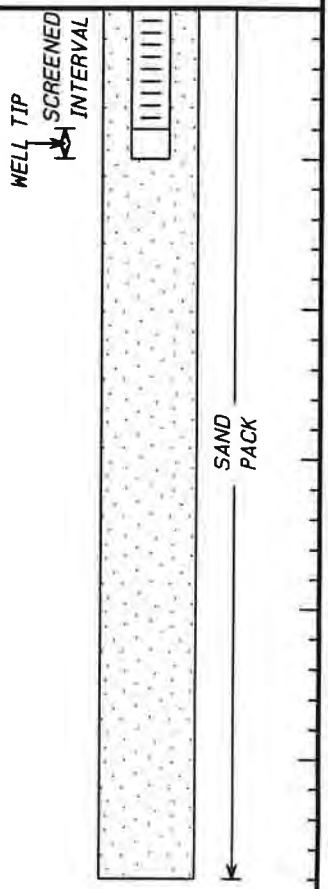
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-29

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	2" to 3" layer of fine sand w/mica (Wet)		
		Coal	COAL, grayish-black (N2), (lignite)		
		CL	CLAY, dark gray (N3) & dark greenish gray, silty & stiff		
65			CLAY, dark greenish gray, silty, w/occasional very fine sand laminae		
			STIFF CLAY, greenish black (5GY 2/1)		
			3" coal seam (lignite)		
70			CLAY, greenish black, silty, w/very fine sand laminae & mica		
		Coal	COAL, grayish black, (lignite)		
75		CL	CLAY, dark gray (N3), silty & stiff		
80					
85			BORING TERMINATED AT 84.0 FEET BELOW LAND SURFACE.		
90					
95					
100					
105					
110					

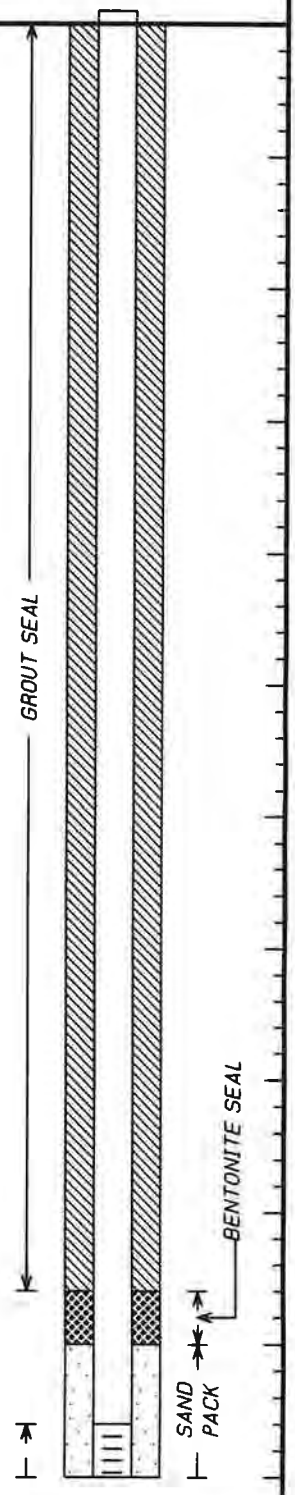


TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-30
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/28/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *63 Feet BLS*
DRILLER: *KEITH McKAPHAN*	L.S.ELEVATION: *261.7 Feet AMSL*	COORDINATE NORTH: 1180361
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL w/3-1/4" ID HSA*		COORDINATE EAST: *1921590*

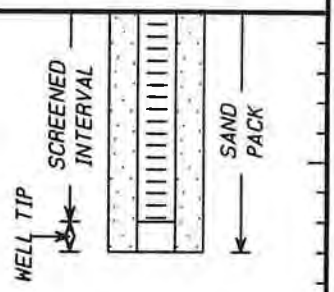
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		CL	CLAY, dark yellowish-orange (10 YR 6/6) and pale yellowish-brown (10 YR 6/2), silty		
5			CLAY, pale yellowish-brown & dark yellowish-orange, silty with very fine-grained laminae		
			CLAY, pale yellowish brown & dark yellowish orange, silty w/very fine-grained sand laminae & mica		
10			CLAY, dark gray (N3), silty w/very fine-grained laminae and mica		
15					
20		SM	SAND, medium dark gray (N5), very fine-grained, silty,		
		CL	CLAY, dark gray, silty w/very fine-grained sand laminae and mica		
25					
			CLAY, dark gray, silty w/very fine-grained sand laminae		
30					
35					
40					
			Very moist thin (about two-inch) sand lense		
45					
50					
			One to two-inch sand, lense-moist		
			sand lense, four to five-inches thick w/clay laminae (moist but not wet)		
55					



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-30

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL			
		SM	SAND, medium-gray (N5), fine-grained w/gravel, mica and glauconite, saturated		
		CL	CLAY, dark gray, silty w/very fine-grained sand laminae and mica		
60			CLAY, dark gray, w/very fine-grained sand laminae and mica		
			BORING TERMINATED AT 63 FEET BELOW LAND SURFACE.		
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					



TTL, Inc

JOB NUMBER: 49-304

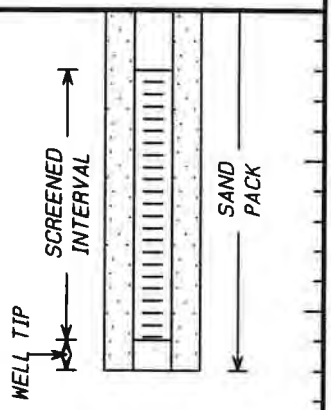
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-31
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/28/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *67 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *266.5 Feet AMSL*	COORDINATE NORTH: 1181215
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921667*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SC	SAND, dark yellowish-orange (10YR 6/6) & pale yellowish-brown (10YR 6/2), fine-grained and clayey		
		CL	CLAY, pale yellowish-brown & dark yellowish-orange, silty w/very fine-grained sand laminae		
10			CLAY, dark gray (N3), silty w/very fine-grained sand laminae and mica thin (about one-inch) layer of very fine-grained sand, moist		
15					
		SM	SAND, very fine-grained and silty, with mica, very moist		
20		CL	CLAY, dark gray, silty with very fine-grained sand laminae and mica thin (about one-inch) layer of very fine-grained sand, moist		
25					GROUT SEAL
30					
35					
40					
45			CLAY, dark gray w/very fine-grained sand laminae & mica with multiple very-fine grained thin (1/4 to 1/2-inch) moist sand lenses		BENTONITE SEAL
50					
55			CLAY, dark gray w/very fine-grained sand laminae & mica		

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-31

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL			
		SM	SAND, very fine to fine-grained with gravel		
65		CL	CLAY, dark gray with very fine-grained sand laminae and mica		
			BORING TERMINATED AT 67 FEET BELOW LAND SURFACE.		
70					
75					
80					
85					
90					
95					
100					
105					
110					



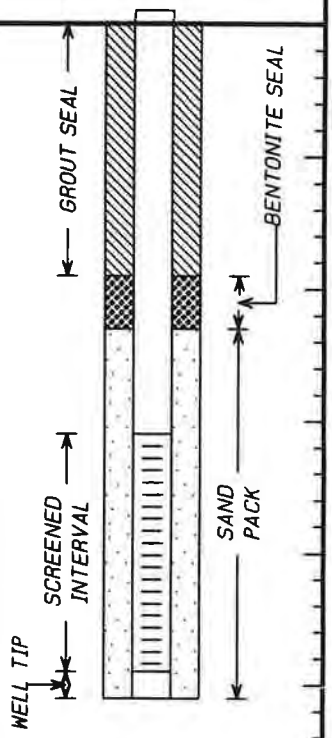
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-32
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *25.5 Feet BLS*
DRILLER: *KEITH McKAPHAN*	L.S.ELEVATION: *286.3 Feet AMSL*	COORDINATE NORTH: 1181189
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921581*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SM	SAND, moderate brown (5YR 5/4), very fine-grained with organics
		SAND, light brown (5YR 5/6), very fine-grained and clayey
5		fragments of ironstone
10		SAND, pale reddish-brown (10R 5/4) & very pale-orange (10YR 8/2), very fine-to fine-grained with mica
15		SAND, pale reddish-brown, very pale orange, and dark yellowish-orange (10YR 6/6), fine-grained with mica and fragments of ironstone
		Saturated
20		SAND, light brown, very pale orange, & dark yellowish-orange, very fine-grained, clayey with mica
25	CL	CLAY, dark yellowish-orange & light gray (N7), silty with very fine-grained sand laminae and mica
		CLAY, dark gray, silty w/very fine-grained sand laminae and mica
		BORING TERMINATED AT 25.5 FEET BELOW LAND SURFACE.
30		
35		
40		
45		
50		
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION

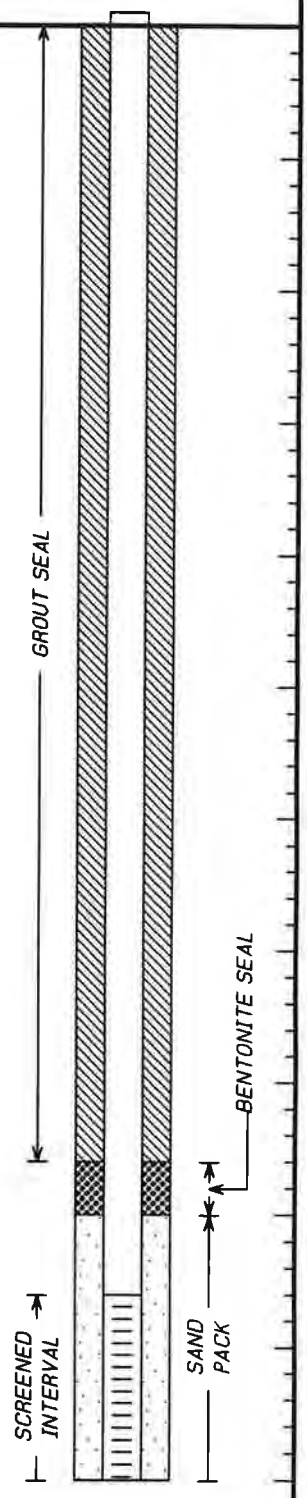


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-33
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *58.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *326.8 Feet AMSL*	COORDINATE NORTH: 1181520
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921385*

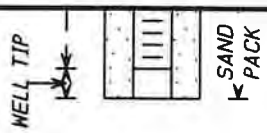
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		SM	SAND, dark reddish-brown (10R 3/4) fine-grained and clayey	
5				
10				
15				
			SAND, very pale orange (10YR 8/2), fine-grained	
20			SAND, dark reddish-brown, fine-grained and clayey	
			SAND, dark reddish-brown & dark yellowish orange (10YR 6/6) and light gray (N7), fine-grained and clayey	
25				
			SAND, light brown & dark yellowish-orange fine-grained, clayey with mica (moist)	
30			Less clayey, glauconitic (very moist)	
			Ironstone fragments	
35				
			SAND, dark yellowish-orange & very pale orange, fine-grained w/mica & glauconite	
40				
45				
			SAND, dark yellowish-orange, very pale orange, & dark reddish-brown, fine-grained w/mica	
50			Saturated	
		CL	CLAY, light brown, silty	
55				

PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-33

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL	CLAY, dark gray, silty, w/very fine-grained sand laminae and mica		
			BORING TERMINATED AT 58.0 FEET BELOW LAND SURFACE.		
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-34
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *75.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *334.5 Feet AMSL*	COORDINATE NORTH: 1181535
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922500*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, moderate reddish-brown (10R 4/6), fine-grained, clayey with mica		Borehole filled to land surface with cement grout on 10/3/94
10			SAND, moderate reddish-brown & dark yellowish-orange (10YR 6/6), fine-grained, clayey with mica		
15					
20					
25			SAND, dark yellowish-orange & very pale orange, fine-grained, clayey w/mica		
30			SAND, mod. reddish-brown, very pale & dark yellowish-orange, fine-grained clayey w/mica		
35					
40			Less clayey		
45		CL	CLAY, light brown, silty w/coal fragments laminated with very fine-grained sand, silty fragments of ironstone		
50			CLAY, dark gray (N3), silty, w/very fine-grained sand laminae and mica		
55		SM CL	SAND, very fine-grained w/mica (moist) CLAY, dark gray, silty w/very fine-grained sand laminae and mica		

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-34

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	CLAY, dark gray, silty, w/sfs laminae & mica		
65					
70		SM	SAND, very fine-grained, silty w/mica		
		CL	CLAY, dark gray, silty with very fine-grained sand laminae		
75			BORING TERMINATED AT 75.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

TTL, Inc

JOB NUMBER: 49-304

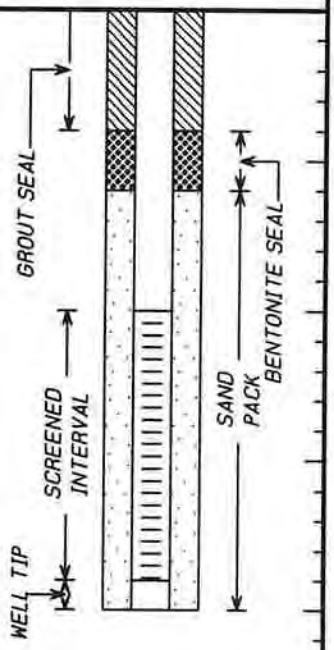
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-35
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/30/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *75.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *308.4 Feet AMSL*	COORDINATE NORTH: 1181655
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922434*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, very pale orange (10YR 8/2), very fine-grained with mica		
			SAND, moderate reddish-brown (10R 4/6), fine-grained, clayey with mica		
5			SAND, dark yellowish-orange (10YR 6/6) & moderate red ((5R 4/6), very fine-grained and clayey		
			SAND, very pale orange, dark yellowish-orange & mod. reddish-brown, very fine-grained w/mica		
10					
15			SAND, dark yellowish-orange, very pale orange & mod. reddish-brown, very fine-grained and clayey		
		CL	fragments of ironstone		
20			CLAY, dark yellowish-orange & light brown (5YR 5/6), silty		
			wtih very fine-grained sand laminae & mica		
			CLAY, dark gray (N3) with very fine-grained sand laminae and mica		
25		SM			
		CL	CLAY, dark yellowish-orange & light brown, silty w/very fine-grained sand laminae & mica		
			CLAY, dark gray with very fine-grained sand laminae & mica		
30			SAND, very fine-grained with mica		
			CLAY, dark gray, silty w/very fine-grained sand laminae & mica		
35					
40					
45					
50					
55		SM			GROUT SEAL

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-35

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		SM	SAND, very pale orange & pale yellowish-brown (10YR 6/2), very fine-grained with mica fragments of ironstone		
65		CL	CLAY, dark gray w/very fine-grained sand laminae & mica		
		SM	SAND, light gray (N7), very fine-grained, silty with mica		
70		CL	CLAY, dark gray, silty w/very fine-grained sand laminae & mica one-inch sandy seam (very moist)		
		SM	SAND, light gray, fine-grained, clayey with mica, saturated		
75		CL	CLAY, dark gray, w/very fine-grained sand laminae & mica		
		SM	SAND, light gray, very fine-grained, silty w/mica (moist)		
			BORING TERMINATED AT 75.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					



TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-36
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *10/2/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *26.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *304.3 Feet AMSL*	COORDINATE NORTH: 1181746
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922545*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, dark yellowish-orange (10YR 6/6) & light brown (5YR 5/6), fine-grained with mica		GROUT SEAL; BENTONITE SEAL
5			SAND, light brown, fine-grained and clayey w/mica		
10			----moist----		
15					SCREENED INTERVAL; SAND PACK
20			-----saturated-----		
25		CL	CLAY, dark yellowish orange & light brown, silty		WELL TIP
			CLAY, dark yellowish orange & pale yellowish brown (10YR 6/2), silty with very fine-grained sand laminae		
			BORING TERMINATED AT 26.0 FEET BELOW LAND SURFACE.		
30					
35					
40					
45					
50					
55					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER EXB3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/12/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *74.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *263.9 Feet AMSL*	COORDINATE NORTH: 1179558
DRILLING METHOD: *CME 75 W/4-1/4 inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922743*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		ML	SILT, light brown (5YR 6/4), with occasional clay laminae		No piezometer constructed in the borehole.
		CL	CLAY, medium gray (N5), silty, with very fine sand laminae		
5					
			CLAY, light brown, silty, with very fine sand laminae		
10			CLAY, moderate brown (5YR 6/6) & light brown, silty, with ironstone fragments		
		SC	SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2), very fine-grained, with clay laminae lenses 1/8" to 1/2" thick		
15					
20					
			SAND, dark yellowish orange & very pale orange, very fine-grained, with clay laminae & mica		
25					
30					
35					
			SAND, light brown, very fine-grained, with clay laminae		
40					
		CL	CLAY, pale yellowish brown (10YR 8/6), with light brown very fine-grained sand laminae		
45					
		SM	SAND, light brown, fine-grained, with mica and glauconite (Saturated)		
		SC	SAND, dark yellowish orange & very pale orange, with occasional clay laminae, mica, and glauconitic		
50					
55					

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER EXB3

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		SC			
60		SM	SAND, dark yellowish orange, fine-grained, with mica & glauconitic		
65			SAND, dark yellowish orange, fine-grained, with mica & glauconitic		
70		CL	CLAY, dark gray (N3), silty & stiff (Dry)		
			CLAY, dark gray, stiff, with sparse very fine sand laminae		
75			BORING TERMINATED AT 74.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER EXB4
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/18/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *74.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *261.3 Feet AMSL*	COORDINATE NORTH: 1180273
DRILLING METHOD: *CME 75 WITH 4-1/4" HSA*		COORDINATE EAST: *1923101*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		CL	CLAY, medium dark gray (N4), with very fine sand laminae & mica		Piezometer not constructed in this borehole.
		SM	FINE SAND, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), with mica		
10			With occasional clay laminae		
15					
20					
25			FINE SAND, very pale orange (10YR 8/2) & dark yellowish orange, with mica & occasional clay laminae		
30					
35			moist		
40					
45					
50			FINE TO MEDIUM SAND, medium brown (5YR 4/4) with ironstone		
55		CL			

TTL, Inc

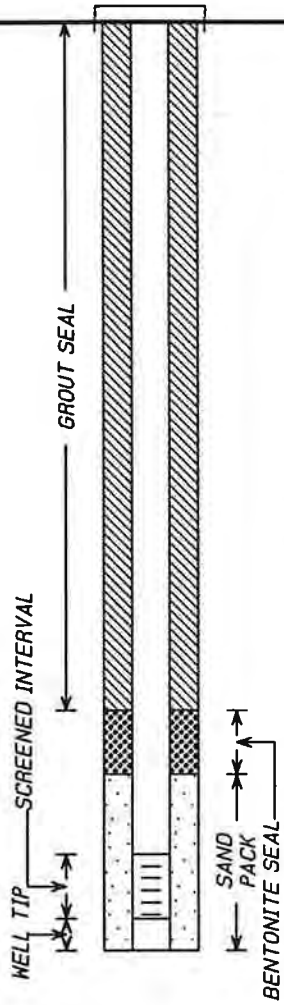
TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER EXB4

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	SILTY CLAY, medium dark gray, with very fine sand laminae & mica		
			Very little sand laminae		
			STIFF CLAY, with no fine sand laminae		
			STIFF CLAY, medium dark gray, (no sand laminae)		
65			with lignite lense		
70			coal lense		
			with occasional fine sand laminae		
75			BORING TERMINATED AT 74.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-1
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *29.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *196.3 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
		ML	SILT, dark yellowish brown (10YR 4/2), sandy	
		CL	CLAY, light brown (5YR 5/6), sandy & silty	
5				
10			CLAY, light brown & dark yellowish orange, sandy	
15			-----Moist----- Micaceous, very sandy	
20			CLAY, light gray (N7) and moderate red (5R 4/6), silty and stiff	
			CLAY, light gray & dark gray (N3) with very fine-grained sand laminae	
25		SC	SAND, light brown, fine-grained, micaceous, clayey	
		CL	CLAY, light olive gray (5Y 6/1) & medium gray (N5), stiff	
30			BORING TERMINATED AT 29.0 FEET BELOW LAND SURFACE.	
35				
40				
45				

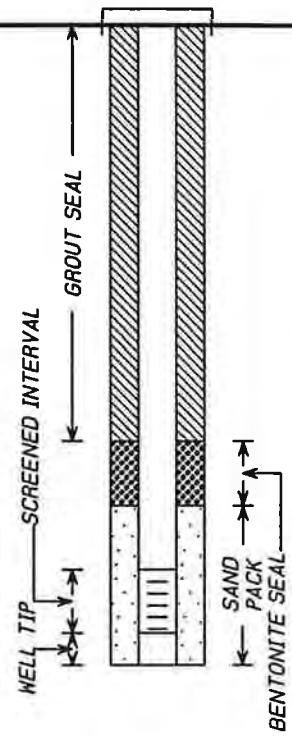
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-1A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *20.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *196.8 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		ML	SILT, dark yellowish brown (10YR 4/2), sandy		
		CL	CLAY, light brown (5YR 5/6), sandy & silty		
5					
10			CLAY, light brown & dark yellowish orange, sandy -----Moist----- Micaceous, very sandy		
15					
20			CLAY, light gray (N7) and moderate red (5R 4/6), silty and stiff BORING TERMINATED AT 20.0 FEET BELOW LAND SURFACE.		
25					
30					
35					
40					
45					

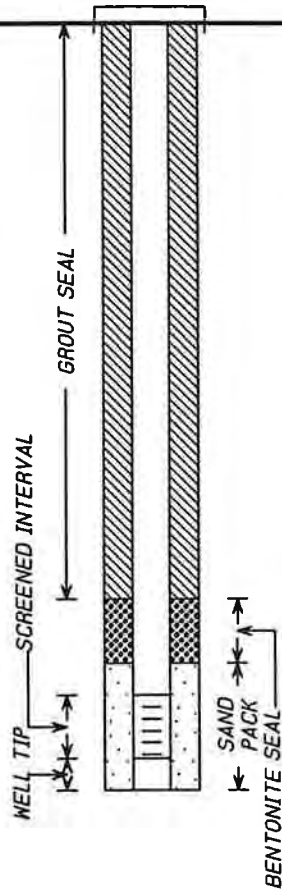


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-2
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *24.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *190.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
		ML	SILT, dark yellowish brown (10YR 4/2), sandy	
5		CL	CLAY, light brown (5YR 5/6), sandy	
10			CLAY, pale yellowish orange (10YR 8/6) & dark yellowish orange (10YR 6/6) & light brown, very sandy (moist)	
15			CLAY, very pale orange (10YR 8/2) & dark yellowish orange, very sandy, micaceous -----Very moist----- -----Very sandy-----	
20				
25			BORING TERMINATED AT 24.0 FEET BELOW LAND SURFACE.	
30				
35				
40				
45				

PIEZOMETER CONSTRUCTION



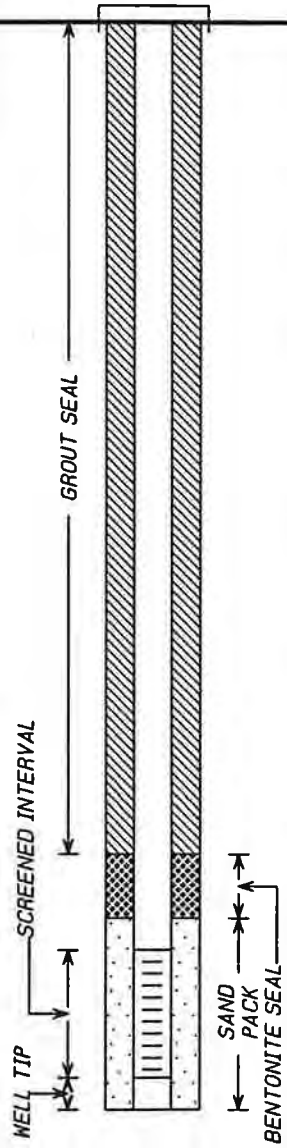
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *34.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *224.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	CL	CLAY, light brown (5YR 6/4), sandy
5	SM	SAND, dark (10YR 6/6) & pale yellowish (10YR 8/6) orange, fine-grained with mica
10		
15		With occ. clay lenses
20	SC	SAND, dark & pale yellowish orange, fine-grained w/mica and occ. clay lenses
25		SAND, dark & pale yellowish orange & lt. brown, fine-grained, w/mica & occ. clay lenses
		-----Very moist-----
30		Saturated
	CL	CLAY, pale brown (5YR 5/2), silty, stiff
		-----Ironstone (about 1/8" thick) & sand lense about 3" thick----- (wet)
		CLAY, light (N7) & dark (N3) gray w/very fine sand laminae & mica (Sand laminae are very moist)
35		BORING TERMINATED AT 34.0 FEET BELOW LAND SURFACE.
40		
45		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION



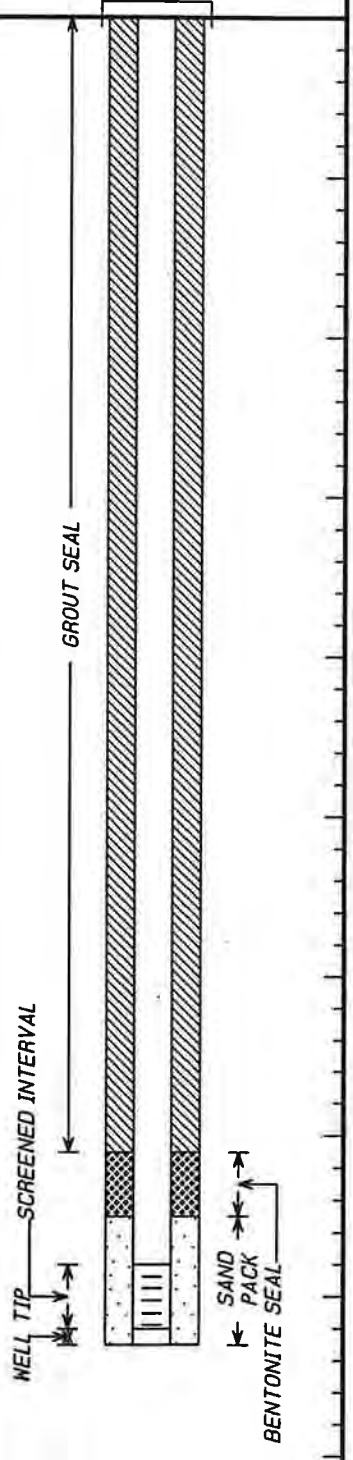
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-4
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *41.5 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *234.2 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SC	SAND, dark yellowish brown (10YR 4/2), clayey
	CL	CLAY, light brown (5YR 5/6), sandy, micaceous
5		CLAY, pale yellowish (10YR 6/2) brown, very pale orange (10YR 8/2) & dark yellowish orange w/very fine-grained sand laminae & mica
10		-----W/ironstone-----
15	SM	SAND, dark (10YR 6/6) & pale yellowish orange (10YR 8/6), fine-grained w/mica
	SC	SAND, dark & pale yellowish orange, fine-grained w/mica & occ. clay lenses
20		
25		
		SAND, dark & pale yellowish orange, fine-grained w/occ. clay lenses & mica
30		
		-----Ironstone fragments-----
35		
		SAND, very pale orange, fine-grained w/mica & occ. clay lenses
		-----Wet-----
40		SAND, fine to medium grained, clayey, w/mica
	CL	CLAY, olive gray (5Y 4/1) w/very fine-grained sand laminae & mica
		BORING TERMINATED AT 41.5 FEET BELOW LAND SURFACE.
45		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION

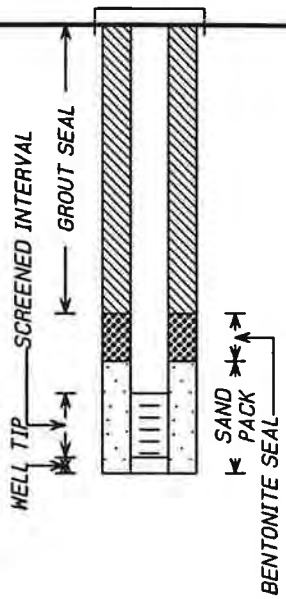


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER CI-5
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *14.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *211.3 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		CL	CLAY, light brown (5YR 5/6) & dark yellowish orange (10YR 6/6), sandy w/mica	
5			CLAY, light brown & very pale orange (10YR 8/2) w/very fine-grained sand laminae & mica & ironstone fragments	
		SC	SAND, light brown, fine-grained w/occ. clay lenses	
10			SAND, dusky yellow (5Y 6/4), fine-grained w/mica, clayey -----Very moist-----	
		CL	CLAY, light (N7) & dark gray (N3) w/very fine-grained sand laminae & mica	
15			BORING TERMINATED AT 14.0 FEET BELOW LAND SURFACE.	
20				
25				
30				
35				
40				
45				

PIEZOMETER CONSTRUCTION

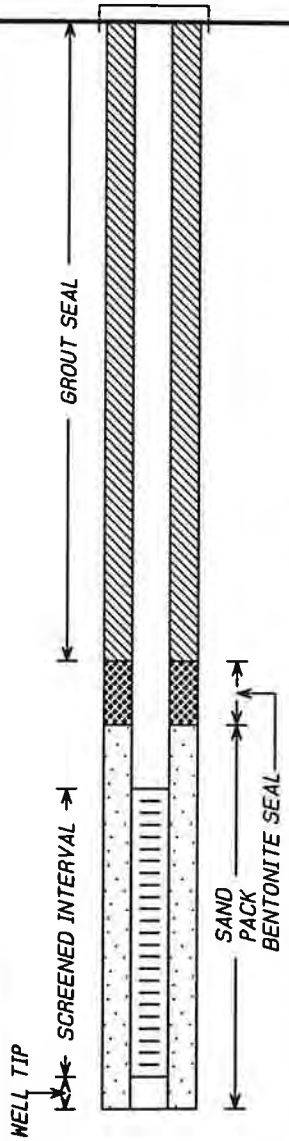


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 11A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *34.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *263.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SM	SAND, very pale orange (10YR 8/2) & moderate yellowish orange (10R 6/6), fine-grained w/mica	
10			SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2)	
15			W/occ. thin ironstone lenses (Iron-staining)	
20				
25			"Very moist"	
30		CL	Thin ironstone layer about 1/4" thick CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae & mica & ironstone fragments CLAY, light brownish gray (5YR 6/1) & dark yellowish orange w/very fine-grained sand laminae & mica -----Relatively stiff-----	
35			BORING TERMINATED AT 34.0 FEET BELOW LAND SURFACE.	
40				
45				

PIEZOMETER CONSTRUCTION

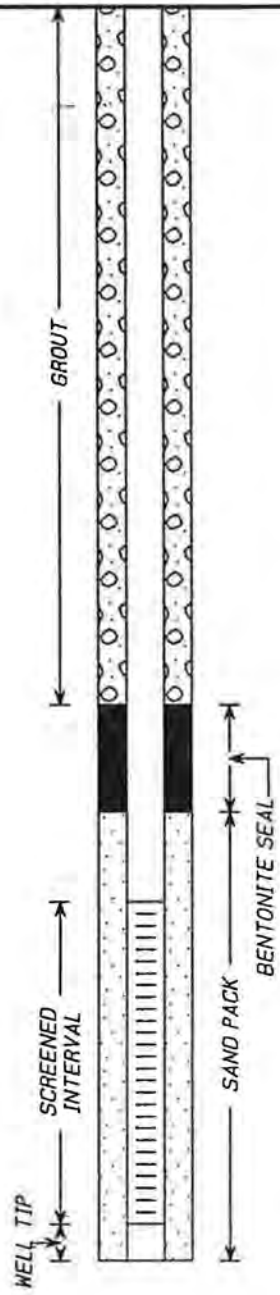


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW1 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/17/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *35 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *278.2 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, dark yellowish orange (10YR 6/6), sandy
5			CLAY, pale yellowish brown (10YR 6/2) & lt. brown (5YR 5/6) w/very fine-grained sand & mica
10			w/ironstone fragments
15			CLAY, medium dark gray (N4) with very fine-grained sand laminae & mica
20			
25			
30			sand laminae, more abundant, moist
		ML	SILT, w/very fine-grained sand & mica, very moist
		CL	CLAY, medium dark gray, relatively stiff, w/very fine-grained sand laminae, moist
35			BORING TERMINATED AT 35 FEET BELOW LAND SURFACE.
40			

MONITORING WELL CONSTRUCTION (4-inch diameter)

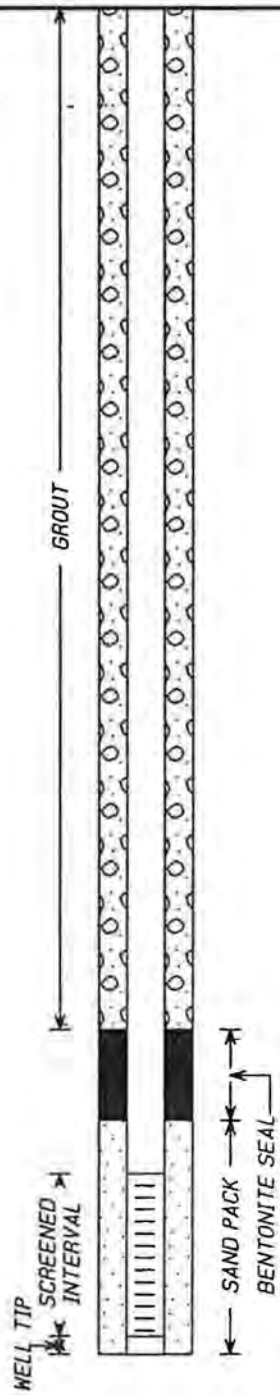


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW2 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/18/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *75 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *296.5 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		SM	SAND, dark yellowish orange (10YR 6/6), fine grained w/mica
10		SC	SAND, lt. brown (5YR 5/6), fine grained & clayey
			w/occasional ironstone
15		CL	CLAY, light brown & very lt. gray (N8), sandy
			Pale brown (5YR 5/2) & dark yellowish orange w/inter-fingering very fine-grained sand laminae & mica, very moist
20		SC	SAND, grayish orange (10YR 7/4) & pale yellowish brown (10YR 6/2), fine grained w/occ. clay lenses and ironstone, micaceous
25			
30			Very pale orange (10YR 8/2) & lt. brown, fine-grained, micaceous w/occ. thin clay lenses (1/8-1/2" thick)
35			
40			
45			
50			moist
55			
60			SAND, very pale orange & lt. brown, fine-grained w/occ. clay lenses, micaceous, glauconitic, very moist
65			wet
70			
75		SM	SAND, moderate brown (5YR 3/4) & dusky brown w/ironstone fragments, fine to medium grained, micaceous, glauconitic
			BORING TERMINATED AT 75 FEET BELOW LAND SURFACE.
80			

MONITORING WELL CONSTRUCTION (4-inch diameter)

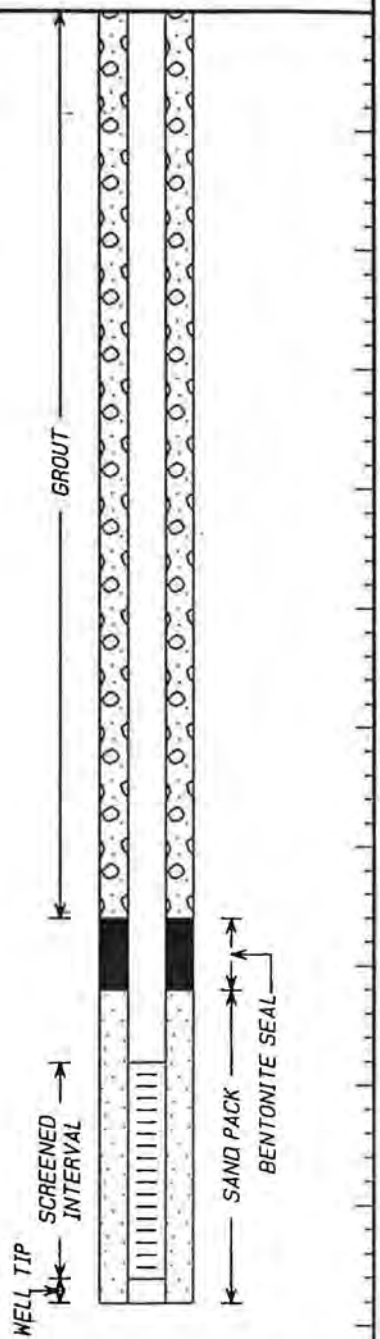


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW3 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/20/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54-Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *256.2 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		SC	SAND, lt. brown (5YR 6/4), fine grained, clayey
5		CL	CLAY, lt. brown & medium lt. gray (N6), sandy
			CLAY, lt. brown & medium lt. gray, silty, stiff
			w/very fine-grained sand laminae, micaceous
10			medium dark gray (N4) w/very fine-grained sand laminae, micaceous
15			
20			
25			
30			
35			
40			
		SC	SAND, medium lt. gray (N6), fine grained, micaceous, clayey (very moist)
45		CL	CLAY, medium dark gray, micaceous w/abundant sand laminae
50			less abundant sand laminae
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			

MONITORING WELL CONSTRUCTION
(4-Inch diameter)

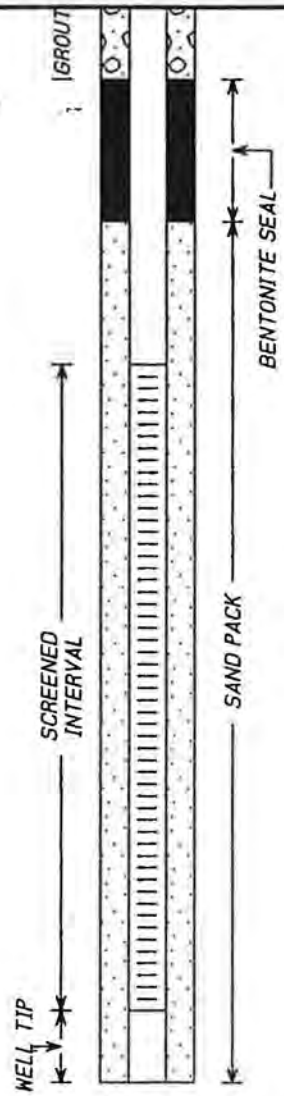


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW4 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/20/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *15 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *194.4 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		SM	SAND, dark yellowish orange (10YR 6/6), fine grained, micaceous
		SC	SAND, fine grained, pale yellowish brown (10YR 6/2) & lt. brown (5YR 5/6), micaceous, clayey (very moist)
			with occasional ironstone fragments
10		CL	CLAY, pale yellowish brown & lt. brown, micaceous, w/very fine-grained sand laminae
			medium dark gray (N4) w/very fine-grained sand laminae
			moist sand laminae
15			BORING TERMINATED AT 15 FEET BELOW LAND SURFACE.
20			

MONITORING WELL CONSTRUCTION
(4-inch diameter)

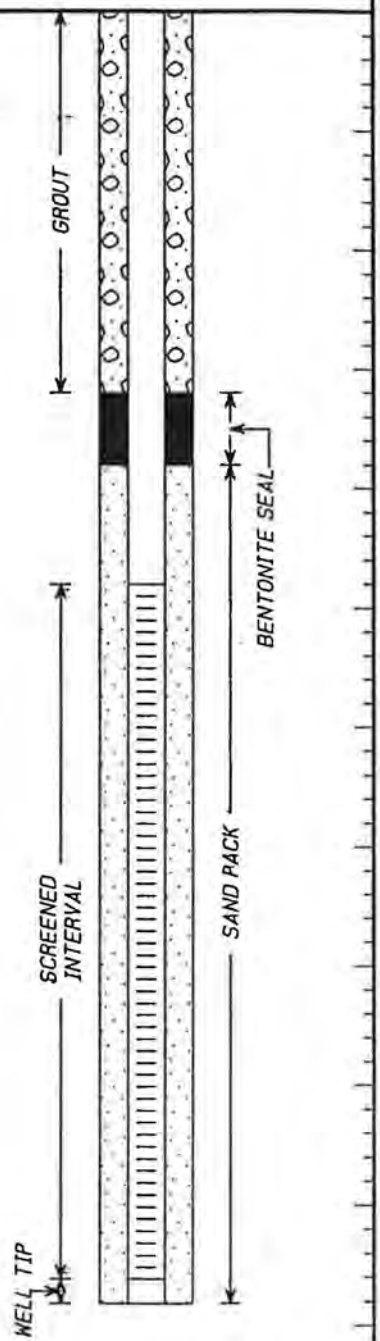


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW5 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/12/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *222.0 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, reddish brown (5/6), sandy
10		ML	SILT, olive brown (4/3), w/trace organics
		SM	SAND, yellow (7/6), very fine-grained, micaceous
20		SC	SAND, yellow (7/6) and dark yellowish brown (4/6), w/occ. brownish yellow, clay lenses (6/6), moist
25		CL	ironstone seam
		SM	CLAY, gray (5/1), w/very fine-grained sand laminae
			SAND, red (4/6) & yellowish red (5/6), fine-grained, micaceous, saturated
30		CL	CLAY, dark gray (4/), w/very fine-grained sand laminae, micaceous
40			3" very fine-grained sand lense, greenish-gray (6/1), saturated
50		SC	SAND, gray (5/1), very fine-grained, micaceous, w/occ. clay lenses, wet
		CL	CLAY, gray (5/1), w/occ. very fine-grained sand laminae, micaceous
			CLAY, gray (5/1), stiff, no sand laminae
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			

MONITORING WELL CONSTRUCTION (4-inch diameter)

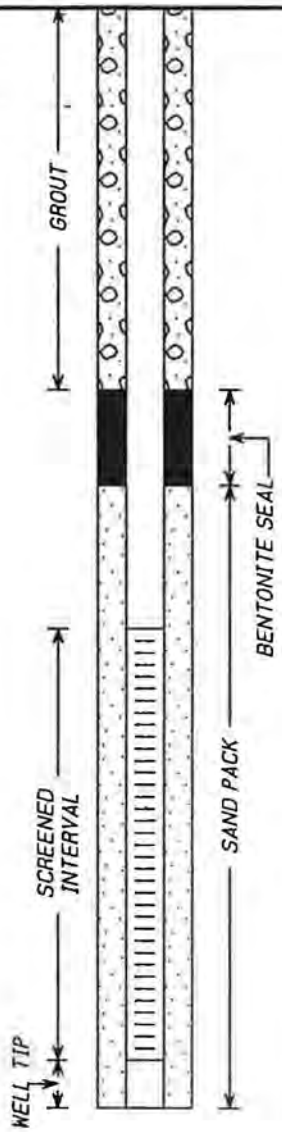


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW6 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/12/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *23 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *188.8 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, strong brown (5/6 & 5/8), sandy
			light gray (7/1) & light brown (6/4), sandy
10			light gray (7/1) & light brown (6/4), w/very fine-grained sand laminae, micaceous Iron staining moist sand lenses
15		SC	SAND, strong brown (4/6) & pale yellow (7/3), very fine-grained, micaceous w/occ. clay lenses, (saturated)
20		CL	CLAY, reddish gray (6/1) & brown (5/4), w/very fine-grained olive yellow, sand laminae (6/6), micaceous
			very dark gray w/very fine-grained sand laminae, gray (6/1), micaceous
			very dark gray (3/1), very stiff
			BORING TERMINATED AT 23 FEET BELOW LAND SURFACE.
25			
30			

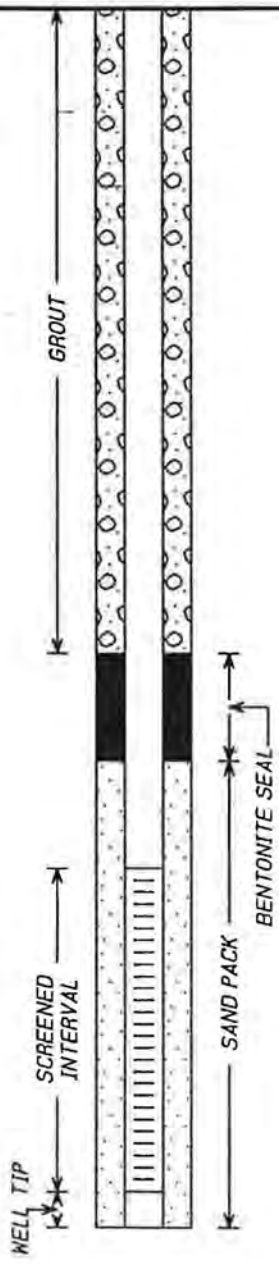
MONITORING WELL CONSTRUCTION (4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW7 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/13/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *39 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *196.7 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, strong brown (4/6), sandy
5			light brown (6/3), strong brown & occ. gray (5/1 & 6/1), sandy
10			
15			
20			
25			
30		SC	light brown (6/3) & gray (6/1), very sandy, moist
		CL	SAND, brownish yellow (6/6), clayey, micaceous, saturated
			gray (6/1) & yellowish brown (6/6), silty, stiff
			2" coal seam
35			gray (5/1) & weak red (4/3), very stiff, silty
40			BORING TERMINATED AT 39 FEET BELOW LAND SURFACE.

MONITORING WELL CONSTRUCTION
(4-inch diameter)

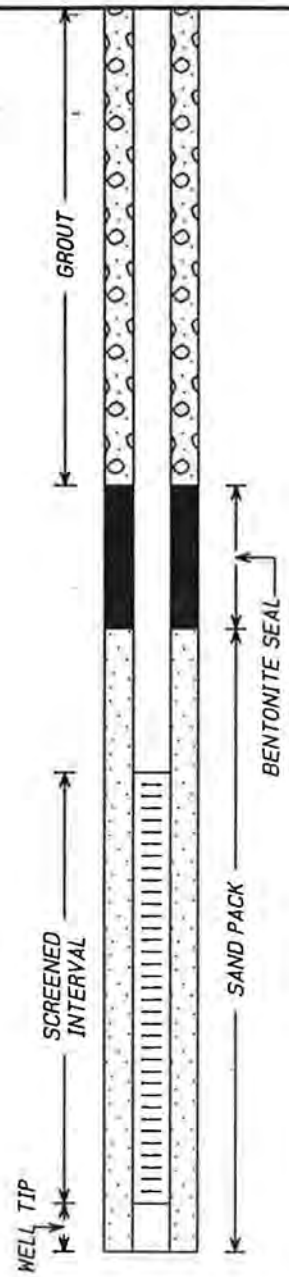


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW8 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/19/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *26 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *215.4 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		ML	SILT, dark yellowish brown (10YR 4/2), sandy
		SC	SAND, lt. brown (5YR 5/6), fine grained, clayey
5			moderate yellowish brown (10YR 5/4) & very pale orange (10YR 8/2), fine grained & clayey, micaceous
10			moist
15		SM	SAND, lt. brown & moderate brown (5YR 4/4)
			very moist
20			w/occasional ironstone
			saturated
			ferruginous
25		CL	CLAY, medium gray (N5), sandy
			BORING TERMINATED AT 26 FEET BELOW LAND SURFACE.
30			

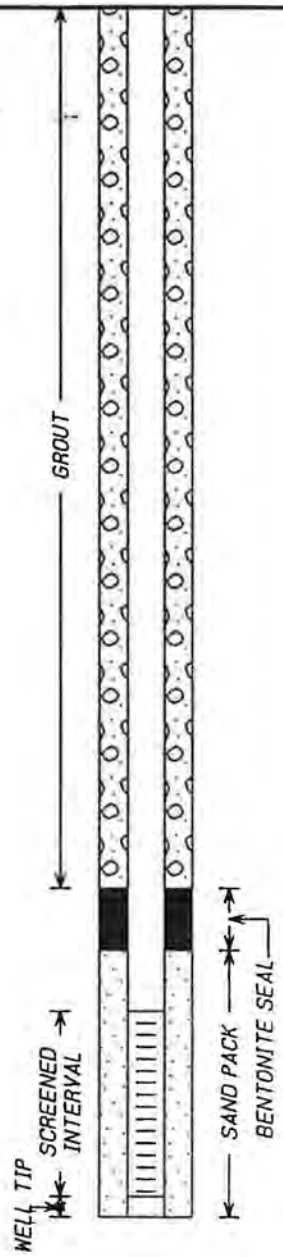
MONITORING WELL CONSTRUCTION (4-inch-diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW9 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/19/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *59 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *267.6 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		ML	SILT, dark yellowish brown (10YR 4/2), sandy
5		SC	SAND, dark yellowish orange (10YR 6/6) & lt. brown (5YR 5/6), fine grained, clayey, micaceous
10			
15			
20			light brownish gray (5YR 6/1) & pinkish gray (5YR 8/1)
25			moderate orange pink (5YR 8/4) & dark yellowish orange, fine grained, micaceous, w/occ. very lt. gray (N8) thin clay lenses
30			grayish orange (10YR 7/4) & dark yellowish orange, fine grained, micaceous, w/occ. thin (1/8") clay lenses (very lt. gray)
35			very pale orange (10YR 8/2), grayish orange & dark yellowish orange & moderate orange pink (5YR 8/4), micaceous, clayey
40			
45			moist
50			saturated
55			w/occasional ironstone
60		CL	CLAY, medium gray (N4), sandy
		SC	SAND, medium gray, fine to medium-grained, gray, clayey, micaceous
65			BORING TERMINATED AT 59 FEET BELOW LAND SURFACE.
70			

MONITORING WELL CONSTRUCTION (4-inch diameter)



BLACK WARRIOR SOLID WASTE AUTHORITY
LIMITED ALTERNATIVE SOURCE DETERMINATION
COKER, TUSCALOOSA COUNTY, AL

LOG OF WELL MW-3R & CONSTRUCTION

PROJECT NUMBER	000600107003.19	**GEOLOGIST**	A. Patton
LOCATION	Coker, Tuscaloosa County, AL	**DATE(S) DRILLED**	1/25/2019 1/28/2019
DRILLING COMPANY	TTL, Inc.	**CASING DIA./TYPE**	2" PVC
DRILLER	Curtis	**SCREEN SLOT/TYPE**	0.010-in. slotted PVC
DRILLING METHOD	Hollow Stem Auger w/SPT Sampling	**FILTER PACK TYPE**	20-40 Graded Filter Sand
ENTERED BY:	S. Tatom	**TOP OF CASING**	Not Surveyed
CHECKED BY:	A. Wiggins	**GROUND ELEVATION**	269.65 Ft. AMSL
REMARKS	Soil samples were collected and described in 5 feet intervals	**DEPTH TO WATER**	62.72 ft
		WATER ELEVATION	

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	DIAGRAM
5		CL	4-6	50	N/A	Top 1" organic layer/topsoils, some roots, fairly dry/loose/crumbly, not dense or compact, moderate brown (5YR 4/4), transitions to CLAY, ~20% SILT, lean, low plasticity, light brown (5YR 5/6).		Well Cover
10		CL	9-11	80	N/A	CLAY, ~20% SILT, lean, low plasticity, dry and crumbly, minor quartz sands, mottled light brown (5YR 5/6), moderate red brown (10R 4/6), and very pale orange (10YR 8/2).		
15		CL	14-16	90	N/A	CLAY, SILT, lean, slightly higher plasticity, mottled light brown (5YR 5/6), moderate red brown (10R 4/6), and very pale orange (10YR 8/2), slightly more moist, less crumbly, no saturation, DRY.		
20		CL	19-21	85	N/A	CLAY, SILT, very homogeneous, low plasticity, indurated/compacted/dense, small inclusion of iron manganese oxide nodules (~5%), clay very layered in cross-section, medium gray (N5) throughout, DRY.		
25		CL	24-26	100	N/A	CLAY, SILT, very homogeneous, low plasticity, indurated/compacted/dense, small inclusion of iron manganese oxide nodules (~5%), clay very layered in cross-section, medium gray (N5) throughout, DRY.		Cement/Bentonite Grout
30		CL	29-31	100	N/A	CLAY, SILT, very homogeneous, low plasticity, indurated/compacted/dense, small inclusion of iron manganese oxide nodules (~5%), clay very layered in cross-section, medium gray (N5) throughout, DRY.		

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\LANDFILL AND SPRAYFIELD PROJECTS\600107003 BLACK WARRIOR LF - GWM\WORK PLAN FOR MW-3 AND MW-8\GINT\009 GINT LOGS.GPJ 12/10/19 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
LIMITED ALTERNATIVE SOURCE DETERMINATION

COKER, TUSCALOOSA COUNTY, AL

LOG OF WELL MW-3R & CONSTRUCTION

PROJECT NUMBER 000600107003.19 **GEOLOGIST** A. Patton

LOCATION Coker, Tuscaloosa County, AL **DATE(S) DRILLED**

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	DIAGRAM
35		CL	34-36	100	N/A	CLAY, SILT, very homogeneous, low plasticity, indurated/compacted/dense, small inclusion of iron manganese oxide nodules (~5%), clay very layered in cross-section, medium gray (N5) throughout, DRY.		
40		CL	39-41	100	N/A	CLAY, SILT, very homogeneous, low plasticity, more indurated/compacted/dense, small inclusion of iron manganese oxide nodules (~5%), clay very layered in cross-section, medium gray (N5) throughout, DRY.		
45		CL	44-46	100	N/A	CLAY, SILT, very homogeneous, low plasticity, more indurated/compacted/dense, clay very layered in cross-section, medium gray (N5), upper 2" mottled with light brown nad trace moderate reds (5R 4/6) (~5%), DRY.		
50		CL	49-51	100	N/A	~80% CLAY and ~20%SILT, very homogeneous, low plasticity, more indurated/compacted/dense, clay very layered in cross-section, medium gray (N5) to medium light gray (N6), upper 2" mottled with light brown nad trace moderate reds (5R 4/6) (~5%), DRY.		
55		CL	54-56	100	N/A	~70-80% CLAY, ~20-30% SILT, very homogeneous, lean, low plasticity, medium light gray (N6) throughout, DRY.		Bentonite Seal
60		SP	59-61	70	N/A	~70-80% CLAY, ~20-30% SILT, lean, low plasticity, very homogeneous, medium light gray (N6) throughout, DRY, transitions to SAND, poorly graded, medium to coarse-grained quartz, ~20% angular to subagular GRAVEL (chert), 0.5-1.0" in diameter, medium to light meidum gray (N6), SATURATED.		20-40 Filter Sand Pack
65		CL	64-66	85	N/A	~70-80% CLAY, ~20-30% SILT, very homogeneous, lean, low plasticity, medium light gray (N6) throughout, DRY.		

Continued Next Page

\\10.1.1.9\TUSCALOOSA PROJECTS\LANDFILL AND SPRAYFIELD PROJECTS\600107003 BLACK WARRIOR LF - GWM\WORK PLAN FOR MW-3 AND MW-8\GINT\009 GINT LOGS.GPJ 12/10/19 Report:ENV LOG - WELL

BLACK WARRIOR SOLID WASTE AUTHORITY
LIMITED ALTERNATIVE SOURCE DETERMINATION

COKER, TUSCALOOSA COUNTY, AL

LOG OF WELL MW-3R & CONSTRUCTION

PROJECT NUMBER 000600107003.19 **GEOLOGIST** A. Patton

LOCATION Coker, Tuscaloosa County, AL **DATE(S) DRILLED**

Continued from Previous Page

DEPTH (feet)	GRAPHIC LOG	U.S.C.S.	SAMPLE INTERVAL (feet)	SAMPLE % RECOVERY	SAMPLE PID (ppm)	LITHOLOGIC DESCRIPTION	WATER LEVEL & DATE	DIAGRAM
70		CL	69-71	95	N/A	CLAY, homogeneous, very little silt (5%), solid, very dense, very compact, low plasticity, chalk like, medium dark gray (N4) to dark gray (N3)DRY.		0.01 in diameter Slotted PVC
75		CL	74-76	90	N/A	CLAY, homogenous, very little silt (5%), solid, very dense, very compact, low plasticity, chalk like, dark gray (N3) throughout, DRY.		
80		CL	79-81	100	N/A	CLAY, very little silt (5%), very dense/compact, low plasticity, dark gray (N3), SLIGHTLY MOIST.		
85		CL	84-86	90	N/A	~60% CLAY, ~40% SILT, very soft, dark gray (N3), lower 6" SATURATED.		Well Cap
						BORING TERMINATED AT 88 FEET.		

\\10.1.1.9\TUSCALOOSA PROJECTS\LANDFILL AND SPRAYFIELD PROJECTS\600107003 BLACK WARRIOR LF - GWM\WORK PLAN FOR MW-3 AND MW-8\GINT\009 GINT LOGS.GPJ 12/10/19 Report:ENV LOG - WELL

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-1
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/7/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *69 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *309.00 Feet AMSL*	COORDINATE NORTH: 1179696
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923307*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, moderate brown (5YR 4/4), sandy
5		SM	SAND, light brown (5YR 5/6), very fine-grained, silty
10		ML	SILT, light brown (5YR 5/6), sandy, micaceous
15		SM	SAND, light brown and dark yellowish orange (10YR 6/6), very fine-grained, silty, glauconitic, micaceous
20			
25			SAND, light brown and dark yellowish orange, micaceous, glauconitic, w/ironstone fragments --------Very moist--------
30		SC	SAND, dark yellowish orange, fine-grained w/thin light gray clay lenses
		CL	CLAY, light gray and moderate orange pink (5YR 8/4), sandy
35		SC	SAND, moderate orange pink and very pale orange (10YR 8/2), very fine-grained, silty, micaceous, w/occasional thin clay lenses --------Moist--------
40			

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

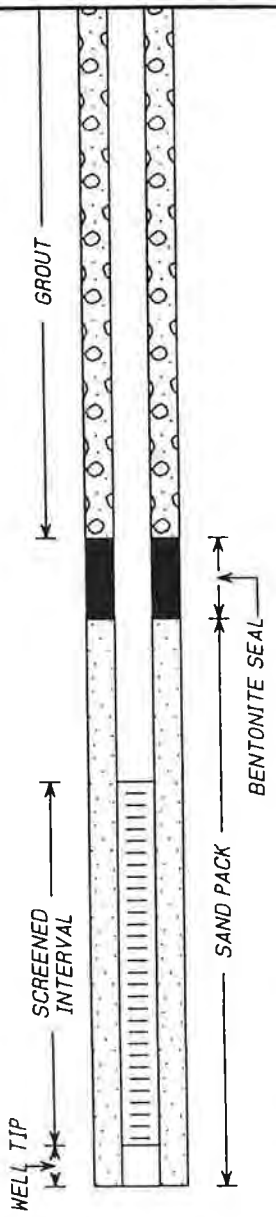
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-1 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		SC	--------Very moist--------
50			SAND, light brown and moderate orange pink, very fine-grained, silty, micaceous w/thin light gray clay lenses, silty --------Very moist--------
55			
60			SAND, moderate orange pink, moderate reddish orange (10R 6/6), very fine-grained, silty, micaceous, w/thin clay lenses --------Saturated--------
65			
70			BORING TERMINATED AT 69 FEET BELOW LAND SURFACE.
75			
80			

PIEZOMETER CONSTRUCTION



TTL, Inc

JOB NUMBER: 79-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/7/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *95 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *312.60 Feet AMSL*	COORDINATE NORTH: 1179203
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923397*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
	CL	CLAY, light brown (5YR 5/4), sandy
5	SC	SAND, light brown and grayish orange (10YR 7/4), fine-grained, clayey
10		
15		SAND, light brown, fine-grained, silty
20		SAND, dark yellowish orange (10YR 6/6), fine-grained, silty --------Moist--------
25		SAND, light brown, fine-to medium-grained, silty w/mica --------Very moist--------
30		Ironstone nodule
35	CL SC	CLAY, moderate red (5R 5/4), and light gray (N7), sandy SAND, dark yellowish orange (10YR 6/6) and moderate pink (5R 7/4), very fine-grained w/light gray (N7) thin clay lenses
40		

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

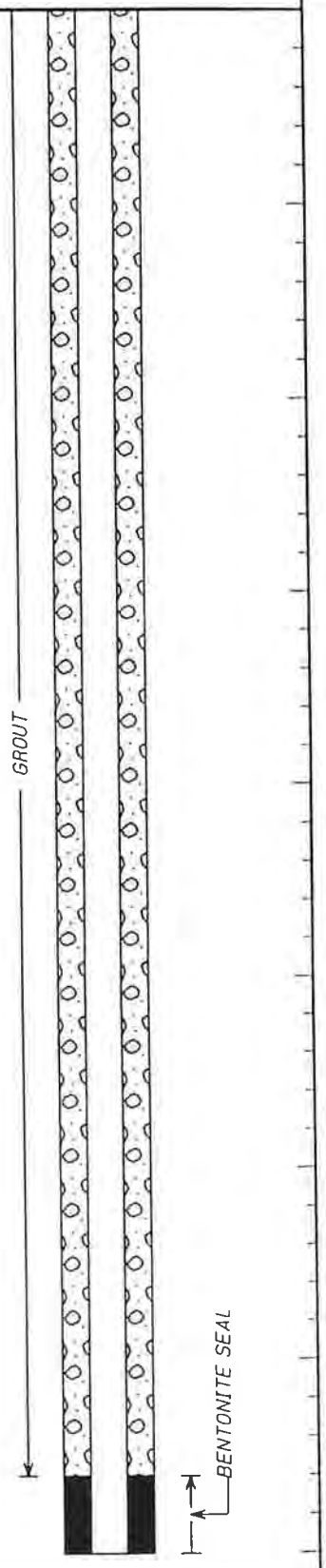
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-3 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SC	
		CL	CLAY, light gray w/moderate red (5R 5/4) streaks, sandy
		SC	SAND, moderate reddish orange (10R 6/6), very fine-grained, micaceous w/occasional thin light gray lenses
45			--------Saturated--------
		CL	CLAY, dark yellowish brown (10YR 4/2), silty w/mica
		SC	SAND, dark yellowish orange, very fine-grained w/occasional light gray clay lenses, micaceous
50			--------Moist--------
55			
60			SAND, dark yellowish orange and very pale orange (10YR 8/2), moderate reddish orange, very fine-grained, micaceous, w/occasional very light gray thin clay lenses
65			
70			
75			
80			

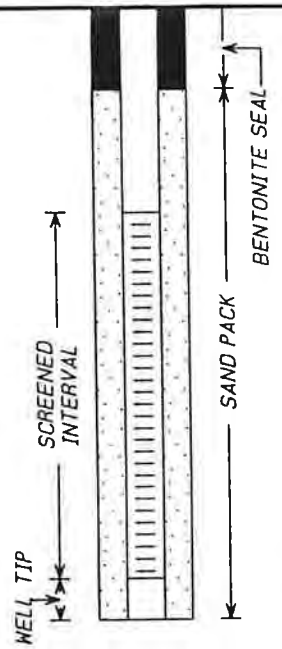
PIEZOMETER CONSTRUCTION



JOB NUMBER: 79-304

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-3 (Continued)

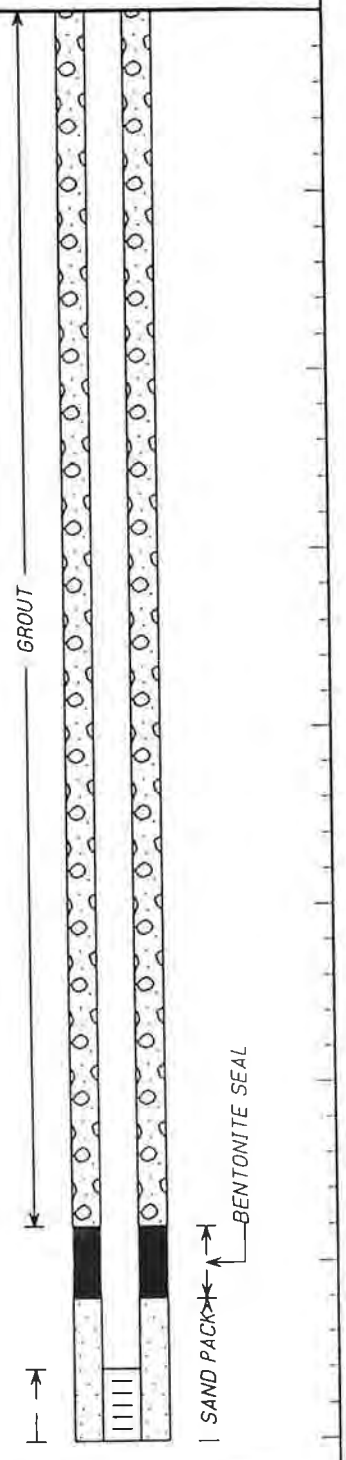
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
85		SC		
90			--------Saturated--------	
95		CL	CLAY, pale yellowish brown, stiff w/very fine-grained sand laminae	
			BORING TERMINATED AT 95 FEET BELOW LAND SURFACE.	
100				
105				
110				
115				
120				



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-8
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/13/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *48 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *279.20 Feet AMSL*	COORDINATE NORTH: 1180552
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923227*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, light brown w/organics, sandy
10			
15			CLAY, light gray (N7) w/thin (1/8"-1/4") lenses of silt, micaceous, very moist --------Very moist--------
			CLAY, light gray and moderate pink (5R 7/4) w/numerous thin (1/8"-1/4") wet lenses of very fine-grained sand, pale yellowish orange (10YR 8/6)
20			CLAY, medium dark dray (N4) w/very fine-grained sand laminae, micaceous
25			CLAY, medium dark gray (N4) w/very fine-grained sand laminae, micaceous
			CLAY, medium dark gray w/very fine-grained sand laminae
30			With 1/4" very fine-grained sand lenses --------Very moist--------
			CLAY, light brownish gray (5YR 6/1), w/very fine-grained sand laminae, thin lenses of fine-grained sand light brown
35		SC	SAND, light brown and very pale orange, fine-grained, micaceous w/thin clay lenses pale yellowish brown
40			

PIEZOMETER CONSTRUCTION



TTL, INC.

PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

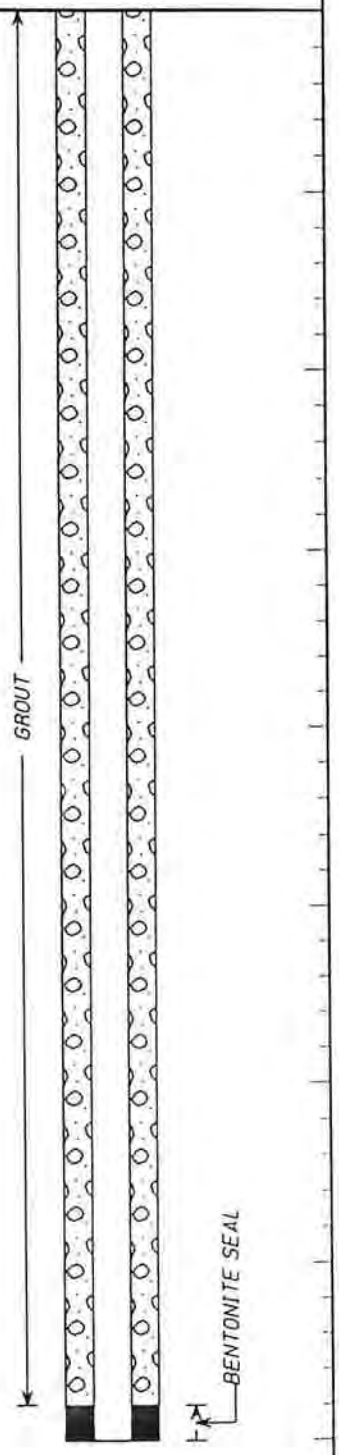
LOG FOR TEMPORARY PIEZOMETER 97-8 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
45		SC	Fewer clay lenses, sand is moist --------Very moist--------	WELL TIP, SCREENED INTERVAL, SAND PACK
		CL	CLAY, dark yellowish brown (10YR 4/2), very stiff w/occasional very fine-grained sand laminae BORING TERMINATED AT 48 FEET BELOW LAND SURFACE.	
50				
55				
60				
65				
70				
75				
80				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-15
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/16/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *53 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *283.70 Feet AMSL*	COORDINATE NORTH: 1180633
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923117*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, light brown (5YR 5/6), sandy
		SC	SAND, light brown, fine-grained, clayey --------Very moist--------
10			SAND, light red (5R 6/6) w/light gray with thin clay lenses, micaceous --------Very moist--------
15			
20			SAND, light red and dark yellowish orange (10YR 6/6), w/thin light gray clay lenses --------Wet--------
25		CL	SAND, medium-grained sand w/ironstone layer approximate 1/4" CLAY, medium dark gray (N4), w/very fine-grained sand laminae
30			
35			Approximate 1/4" very fine-grained sand lense --------Very moist-------- CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae Approximate 1/8" ironstone layer --------Wet---------
40		SM	CLAY, pale yellowish brown and medium dark gray w/very fine-grained sand laminae Ironstone layer approximate 1/8" --------Wet--------

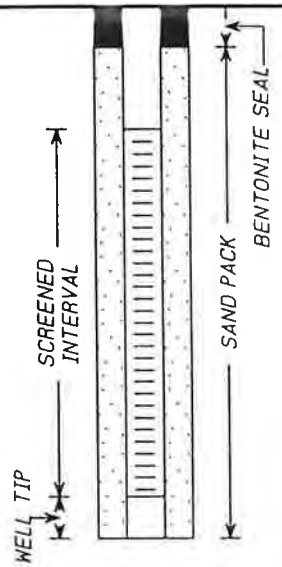
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-15 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
45		SM	SAND, dark yellowish orange and light brown, fine-grained w/occasional thin clay lenses, micaceous	
50			SAND, very pale orange (10YR 8/2) and light brown, fine-grained, micaceous w/occasional thin clay lenses	
		CL	CLAY, pale yellowish brown w/very fine-grained sand laminae	
55			BORING TERMINATED AT 53 FEET BELOW LAND SURFACE.	
60				
65				
70				
75				
80				



APPENDIX C

Soil Sample Laboratory Test Results for Hydraulic Conductivity

TTL
3516 Greensboro Avenue
Tuscaloosa, AL 35401
205.345.0816
www.ttlusa.com

HYDRAULIC CONDUCTIVITY ANALYSIS
ASTM D 5084

BWSWA
Coker Landfill Addition
Coker, Alabama
TTL Project No. 600112-019

January 2013

Material Description:	Gray Fat Clay
Location:	PZ-22 (57.0' - 58.0')
Sample Date:	October 2012
Sampled By:	**TTL, Inc.**

In Situ Dry Density:	99.7 pcf
In Situ Moisture:	22.3 %
Hydraulic Conductivity "k":	2.7×10^{-8} cm/sec

HYDRAULIC CONDUCTIVITY ANALYSIS WORKSHEET

CLIENT:	BWSWA	LAB START DATE:	
PROJECT:	Coker Mark Tanner	LAB REP DATE:	
LOCATION:	Machine 7	TECHNICIAN:	Mitch
MATERIAL:	Gray	PROCTOR #:	
BORING/SAMPLE:	PZ-22 (57-58)	DEPTH/LIFT:	
		PERM FLUID USED:	
SAMPLE ORIENTATION	H ____ V x ____	Gs OF SOIL	11/13/2012
	REMOLD ____		

a. HEIGHT:	2.00 in.	b. AVG. DIAMETER:	2.88 in.
c. VOLUME: (0.7854*b^2*a):	12.98 cu. in.	d. WET UNIT WEIGHT: [(e*3.8095)/c]:	121.9 pcf

INITIAL CONDITIONS		FINAL CONDITIONS	
e. Wet Weight Soil:	415.4 gms.	k. Wet Weight Soil +Tare:	gms.
f. Wet Weight Soil +Tare:	415.4 gms.	l. Dry Weight Soil +Tare:	gms.
g. Dry Weight Soil +Tare:	339.7 gms.	m. Tare Weight:	gms.
h. Tare Weight:	gms.	n. Moisture Content '[(k-l)/(l-m)]*100	#DIV/0! %
i. Moisture Content [(f-g)/(g-h)]*100	22.3 %	o. Change in vol. during saturation	cc
j. Dry Unit Wt. [d/(1+(i/100))]	99.7 pcf	p. Dry Unit Wt. [d/(1+(n/100))]	#DIV/0! pcf
		q. Saturation	#DIV/0! %
Maximum Dry Density (ASTM D-698):	pcf		
Optimum Moisture Content (ASTM D-698):	%		
Remolded Compactive Effort:	#DIV/0! %		

B COEFFICIENT DETERMINATION

DATE	CELL PRESSURE	DELTA PRESSURE	BACK PRESSURE	PORE PRESSURE	B COEFF.
1-1B	66.8	5.0	63.7	67.5	.74

PRESSURE

TRIAL	CELL PRESSURE	INFLOW PRESSURE	OUTFLOW PRESSURE
1-1B	70.0	67.0	65.0

DATE	CLOCK	TIME,sec	INFLOW	OUTFLOW	IN DEL Q	OUT DEL Q	k-Hydraulic Conductivity , cm/sec
1-1B	1135		0.0	24.0			
	219	9840	0.0	23.0			3.8 x 10-8
1-21	10,0	244260	7.5	14.9			2.5 x 10-8
1.22	411	102060	10.7	11.4			6.6 x 10-8
1.23	843	84720	13.3	8.8			2.7 x 10-8
1.24	456	90420	16.0	6.0			2.3 x 10-8
1.30	95.		16.1	6.1			2.7 x 10-8
1.31	957	88020	18.6	3.5			2.6 x 10-8
	307	19600	19.1	2.0			

AVERAGE OF LAST 4 CALCULATIONS: 2.7 x 10-8

TEST METHOD : ASTM D-5084-90

AMBIENT TEMPERATURE ____ F

SAMPLE DIAMETER :	2.88 in.	CLIENT:	BWSWA
SAMPLE AREA :	41.88 cm2	PROJECT:	Coker
SAMPLE LENGTH :	2.00 in.	SAMPLE ID:	PZ-22 (57-58)
SAMPLE LENGTH :	5.08 cm.		

SAMPLE DESCRIPTION:

UNDISTURBED:	X	DRY UNIT WEIGHT :	99.7
REMOLDED:		% MOISTURE :	22.3
		% COMPACTION :	
		% ABOVE OPTIMUM :	

TRIAL	TEST 1	TEST 2	TEST 3	TEST 4	
FLOW "Q" :	0.5	7.8	3.4	2.6	
TIME :	9840.0	244260.0	108060.0	84720.0	
BURRETT READINGS					
INITIAL IN :	0.0	0.0	7.5	10.7	
INITIAL OUT :	24.0	23.0	14.9	11.4	
FINAL IN :	0.0	7.5	10.7	13.3	
FINAL OUT :	23.0	14.9	11.4	8.8	
FORWARD PRESSURE:	67.0	67.0	67.0	67.0	
BACK PRESSURE:	65.0	65.0	65.0	65.0	
h1 :	164.8	163.8	148.2	141.5	
h2 :	163.8	148.2	141.5	136.3	
h :	164.3	156.0	144.9	138.9	
CONSTANT HEAD - k :	3.8E-08	2.5E-08	2.6E-08	2.7E-08	
FALLING HEAD - k :	3.8E-08	2.5E-08	2.6E-08	2.7E-08	2.9E-08
(FALLING HEAD-RISING TAILWATER)					
INITIAL DIFFERENCE :	0.00	7.50	3.20	2.60	
FINAL DIFFERENCE :	1.00	8.10	3.50	2.60	
HYDRAULIC GRADIANT :	27.72	27.72	27.72	27.72	

SAMPLE DIAMETER :	2.88 in.	CLIENT:	BWSWA
SAMPLE AREA :	41.88 cm2	PROJECT:	Coker
SAMPLE LENGTH :	2.00 in.	SAMPLE ID:	PZ-22 (57-58)
SAMPLE LENGTH :	5.08 cm.		

SAMPLE DESCRIPTION:

UNDISTURBED:	X	DRY UNIT WEIGHT :	99.7
REMOLDED:		% MOISTURE :	22.3
		% COMPACTION :	
		% ABOVE OPTIMUM :	

TRIAL	TEST 1	TEST 2	TEST 3	TEST 4	
FLOW "Q" :	2.8	2.6	0.5	2.6	
TIME :	90420.0	88020.0	18600.0		
BURRETT READINGS					
INITIAL IN :	13.3	16.1	18.6	10.7	
INITIAL OUT :	8.8	6.1	3.5	11.4	
FINAL IN :	16.0	18.6	19.1	13.3	
FINAL OUT :	6.0	3.5	3.0	8.8	
FORWARD PRESSURE:	67.0	67.0	67.0	67.0	
BACK PRESSURE:	65.0	65.0	65.0	65.0	
h1 :	136.3	130.8	125.7	141.5	
h2 :	130.8	125.7	124.7	136.3	
h :	133.6	128.3	125.2	138.9	
CONSTANT HEAD - k :	2.8E-08	2.7E-08	2.6E-08	#DIV/0!	
FALLING HEAD - k :	2.8E-08	2.7E-08	2.6E-08	#DIV/0!	#DIV/0!
(FALLING HEAD-RISING TAILWATER)					
INITIAL DIFFERENCE :	2.70	2.50	0.50	2.60	
FINAL DIFFERENCE :	2.80	2.60	0.50	2.60	
HYDRAULIC GRADIANT :	27.72	27.72	27.72	27.72	

TTL
3516 Greensboro Avenue
Tuscaloosa, AL 35401
205.345.0816
www.ttlusa.com

HYDRAULIC CONDUCTIVITY ANALYSIS
ASTM D 5084

BWSWA
Coker Landfill Addition
Coker, Alabama
TTL Project No. 600112-019

January 2013

Material Description:	Gray Fat Clay
Location:	PZ-9 (103.0' - 104.0')
Sample Date:	October 2012
Sampled By:	**TTL, Inc.**

In Situ Dry Density:	107.9 pcf
In Situ Moisture:	18.4 %
Hydraulic Conductivity "k":	9.4×10^{-8} cm/sec

HYDRAULIC CONDUCTIVITY ANALYSIS WORKSHEET

CLIENT:	BWSWA	LAB START DATE:	
PROJECT:	Coker Mark Tanner	LAB REP DATE:	
LOCATION:	Machine 8	TECHNICIAN:	Mitch
MATERIAL:	Gray	PROCTOR #:	
BORING/SAMPLE:	PZ-9 (103-104)	DEPTH/LIFT:	
		PERM FLUID USED:	
SAMPLE ORIENTATION	H ____ V x ____	Gs OF SOIL	11/13/2012
	REMOLD ____		

a. HEIGHT:	2.00 in.	b. AVG. DIAMETER:	2.88 in.
c. VOLUME: (0.7854*b^2*a):	12.98 cu. in.	d. WET UNIT WEIGHT: [(e*3.8095)/c]:	127.8 pcf

INITIAL CONDITIONS		FINAL CONDITIONS	
e. Wet Weight Soil:	435.6 gms.	k. Wet Weight Soil +Tare:	gms.
f. Wet Weight Soil +Tare:	435.6 gms.	l. Dry Weight Soil +Tare:	gms.
g. Dry Weight Soil +Tare:	367.9 gms.	m. Tare Weight:	gms.
h. Tare Weight:	gms.	n. Moisture Content [(k-l)/(l-m)]*100	#DIV/0! %
i. Moisture Content [(f-g)/(g-h)]*100	18.4 %	o. Change in vol. during saturation	cc
j. Dry Unit Wt. [d/(1+(i/100))]	107.9 pcf	p. Dry Unit Wt. [d/(1+(n/100))]	#DIV/0! pcf
		q. Saturation	#DIV/0! %
Maximum Dry Density (ASTM D-698):	pcf		
Optimum Moisture Content (ASTM D-698):	%		
Remolded Compactive Effort:	#DIV/0! %		

B COEFFICIENT DETERMINATION

DATE	CELL PRESSURE	DELTA PRESSURE	BACK PRESSURE	PORE PRESSURE	B COEFF.
1-18	69.0	5.0	65.1	69.9	.84

PRESSURE

TRIAL	CELL PRESSURE	INFLOW PRESSURE	OUTFLOW PRESSURE
1-18	70.0	67.0	65.0

DATE	CLOCK	TIME,sec	INFLOW	OUTFLOW	IN DEL Q	OUT DEL Q	k-Hydraulic Conductivity , cm/sec
1-18	1135		0.0	24.0			
	219	9840	1.5	21.2			1.6 x 10-7
1-21	935		1.9	20.7			
1-22	411	23760	12.9	9.7			3.8 x 10-7
1-23	343	24720	19.7	3.2			7.3 x 10-8
1-23	344		0.0	24.0			
1-24	450	90480	12.6	11.4			1.1 x 10-7
1-30	930		12.6	11.5			
1-31	957	88020	21.4	2.9			9.2 x 10-8
	307	18600	23.2	1.1			9.7 x 10-8

AVERAGE OF LAST 4 CALCULATIONS: 9.4 x 10-8

TEST METHOD : ASTM D-5084-90

AMBIENT TEMPERATURE ____ F

SAMPLE DIAMETER :	2.88 in.	CLIENT:	BWSWA
SAMPLE AREA :	41.88 cm2	PROJECT:	Coker
SAMPLE LENGTH :	2.00 in.	SAMPLE ID:	PZ-9 (103-104)
SAMPLE LENGTH :	5.08 cm.		

SAMPLE DESCRIPTION:

UNDISTURBED:	X	DRY UNIT WEIGHT :	107.9
REMOLDED:		% MOISTURE :	18.4
		% COMPACTION :	
		% ABOVE OPTIMUM :	

TRIAL	TEST 1	TEST 2	TEST 3	TEST 4	
FLOW "Q" :	2.2	11.0	6.7	12.6	
TIME :	9840.0	23760.0	84720.0	90480.0	
BURRETT READINGS					
INITIAL IN :	0.0	1.9	12.9	0.0	
INITIAL OUT :	24.0	20.7	9.7	24.0	
FINAL IN :	1.5	12.9	19.7	12.6	
FINAL OUT :	21.2	9.7	3.2	11.4	
FORWARD PRESSURE:	67.0	67.0	67.0	67.0	
BACK PRESSURE:	65.0	65.0	65.0	65.0	
h1 :	164.8	159.6	137.6	164.8	
h2 :	160.5	137.6	124.3	139.6	
h :	162.7	148.6	131.0	152.2	
CONSTANT HEAD - k :	1.6E-07	3.8E-07	7.3E-08	1.1E-07	
FALLING HEAD - k :	1.6E-07	3.8E-07	7.3E-08	1.1E-07	1.8E-07
(FALLING HEAD-RISING TAILWATER)					
INITIAL DIFFERENCE :	1.50	11.00	6.80	12.60	
FINAL DIFFERENCE :	2.80	11.00	6.50	12.60	
HYDRAULIC GRADIANT :	27.72	27.72	27.72	27.72	

SAMPLE DIAMETER :	2.88 in.	CLIENT:	BWSWA
SAMPLE AREA :	41.88 cm2	PROJECT:	Coker
SAMPLE LENGTH :	2.00 in.	SAMPLE ID:	PZ-9 (103-104)
SAMPLE LENGTH :	5.08 cm.		

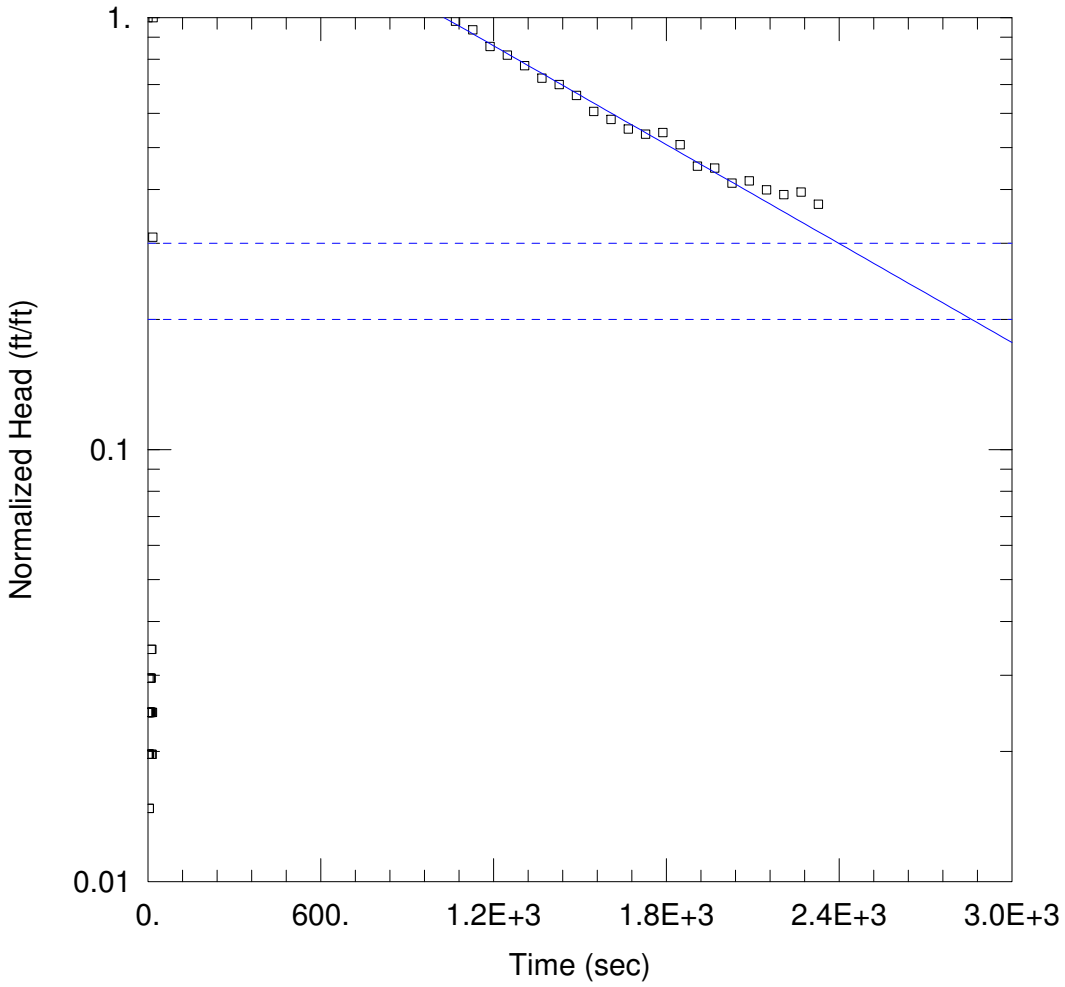
SAMPLE DESCRIPTION:

UNDISTURBED:	X	DRY UNIT WEIGHT :	107.9
REMOLDED:		% MOISTURE :	18.4
		% COMPACTION :	
		% ABOVE OPTIMUM :	

TRIAL	TEST 1	TEST 2	TEST 3	TEST 4	
FLOW "Q" :	8.7	1.8	6.7	12.6	
TIME :	88020.0	18600.0			
BURRETT READINGS					
INITIAL IN :	12.6	21.4	12.9	0.0	
INITIAL OUT :	11.5	2.9	9.7	24.0	
FINAL IN :	21.4	23.2	19.7	12.6	
FINAL OUT :	2.9	1.1	3.2	11.4	
FORWARD PRESSURE:	67.0	67.0	67.0	67.0	
BACK PRESSURE:	65.0	65.0	65.0	65.0	
h1 :	139.7	122.3	137.6	164.8	
h2 :	122.3	118.7	124.3	139.6	
h :	131.0	120.5	131.0	152.2	
CONSTANT HEAD - k :	9.2E-08	9.7E-08	#DIV/0!	#DIV/0!	
FALLING HEAD - k :	9.2E-08	9.7E-08	#DIV/0!	#DIV/0!	#DIV/0!
(FALLING HEAD-RISING TAILWATER)					
INITIAL DIFFERENCE :	8.80	1.80	6.80	12.60	
FINAL DIFFERENCE :	8.60	1.80	6.50	12.60	
HYDRAULIC GRADIANT :	27.72	27.72	27.72	27.72	

APPENDIX D

Hydraulic Conductivity Values Derived from Slug & Bail Tests using AQTESOLV Software



PZ 97-15_SLUG

Data Set: \...\PZ 97-15_Slug.aqt
Date: 04/15/21 Time: 11:16:53

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ 97-15
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 5.15 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ 97-15)

Initial Displacement: 0.203 ft
Total Well Penetration Depth: 16.15 ft
Casing Radius: 0.082 ft
Static Water Column Height: 5.25 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 5.918E-5 cm/sec y0 = 0.5012 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ 97-15_Slug
Date: 04/15/21
Time: 11:16:53

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ 97-15

AQUIFER DATA

Saturated Thickness: 5.15 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ 97-15

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.203 ft
Static Water Column Height: 5.25 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 16.15 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 135

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	0.005	79.8	1.494
0.5	0.004	84.6	1.463
0.75	0.005	90.06	1.43
1.	0.005	94.8	1.401
1.25	0.004	100.8	1.369
1.5	0.005	106.8	1.338
1.75	0.005	112.9	1.303
2.	0.005	119.4	1.268
2.25	0.004	126.6	1.23
2.5	0.005	134.4	1.183
2.75	0.004	142.2	1.131
3.	0.004	150.6	1.071
3.25	0.005	159.6	1.025
3.5	0.006	169.2	0.985
3.75	0.004	178.8	0.938
4.	0.005	189.6	0.895
4.25	0.004	201.	0.855
4.5	0.005	213.	0.831
4.75	0.005	225.6	0.797
5.	0.004	238.8	0.765
5.25	0.003	253.2	0.735
5.5	0.003	268.2	0.709
5.75	0.004	283.8	0.686
6.	0.005	300.6	0.653
6.36	0.005	318.6	0.63
6.72	0.005	337.2	0.61
7.208	0.005	357.6	0.58
7.56	0.005	378.6	0.563

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.98	0.006	400.8	0.535
8.46	0.006	424.8	0.516
9.	0.005	450.	0.493
9.48	0.005	476.4	0.467
10.08	0.005	504.6	0.448
10.68	0.005	534.6	0.431
11.28	0.006	566.4	0.398
12.04	0.007	600.	0.378
12.66	0.004	636.	0.363
13.45	0.007	672.	0.336
14.24	0.005	714.	0.325
15.06	0.004	756.	0.293
16.05	0.005	798.	0.286
16.92	0.063	846.	0.267
17.88	0.203	900.	0.25
18.96	0.653	948.	0.232
20.16	3.008	1008.	0.219
21.34	2.08	1068.	0.199
22.65	2.088	1128.	0.19
23.88	2.065	1188.	0.174
25.32	2.041	1248.	0.166
26.82	2.018	1308.	0.157
28.42	1.996	1368.	0.147
30.06	1.97	1428.	0.142
31.86	1.942	1488.	0.134
33.72	1.918	1548.	0.123
35.76	1.884	1608.	0.118
37.94	1.868	1668.	0.112
40.15	1.843	1728.	0.109
42.48	1.817	1788.	0.11
45.	1.788	1848.	0.103
47.64	1.762	1908.	0.092
50.46	1.735	1968.	0.091
53.47	1.707	2028.	0.084
56.71	1.678	2088.	0.085
60.	1.647	2148.	0.081
63.6	1.618	2208.	0.079
67.2	1.587	2268.1	0.08
71.4	1.557	2328.	0.075
75.62	1.526		

SOLUTION

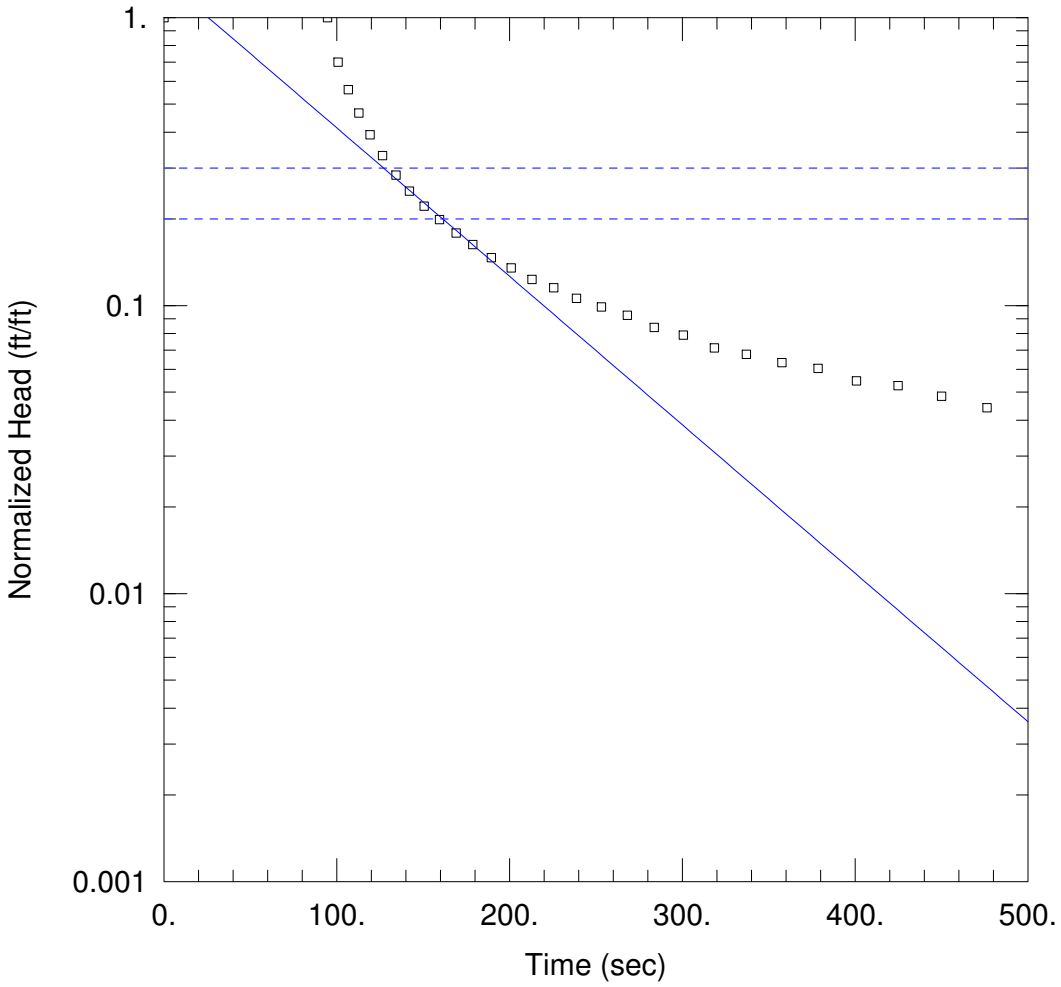
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.004

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	5.918E-5	cm/sec
y0	0.5012	ft

$T = K*b = 0.00929$ cm²/sec



PZ-04(S)_SLUG

Data Set: \...\PZ-04 S_Slug.aqt
Date: 04/15/21 Time: 11:16:53

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-04 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 10.94 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-04 S)

Initial Displacement: 1.405 ft
Total Well Penetration Depth: 16.94 ft
Casing Radius: 0.082 ft
Static Water Column Height: 12.02 ft
Screen Length: 15. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0003935 cm/sec y0 = 1.905 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ-04(s)_Slug
Date: 04/15/21
Time: 11:16:53

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-04 S

AQUIFER DATA

Saturated Thickness: 10.94 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-04 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.405 ft
Static Water Column Height: 12.02 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 15. ft
Total Well Penetration Depth: 16.94 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 100

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.002	28.38	-0.002
0.5	-0.001	30.06	-0.002
0.75	-0.001	31.86	-0.002
1.	-0.002	33.79	0.001
1.25	0.	35.76	-0.001
1.5	0.001	37.96	0.
1.75	0.	40.13	-0.001
2.	0.	42.48	0.
2.25	-0.001	45.01	-0.002
2.5	0.	47.64	-0.002
2.75	-0.002	50.46	-0.002
3.	0.	53.46	-0.002
3.25	-0.001	56.64	-0.002
3.5	-0.001	60.	-0.003
3.752	-0.002	63.6	-0.002
4.001	0.	67.2	-0.003
4.25	-0.002	71.4	0.
4.5	0.	75.6	-0.001
4.75	-0.002	79.88	0.001
5.	0.001	84.65	-0.002
5.25	0.	90.	-0.002
5.5	-0.001	94.8	1.405
5.75	0.	100.8	0.984
6.003	-0.002	106.8	0.79
6.36	-0.001	112.8	0.654
6.72	-0.001	119.4	0.55
7.14	0.	126.6	0.466
7.571	0.	134.4	0.399

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.98	0.001	142.2	0.351
8.546	0.001	150.6	0.311
9.	0.	159.6	0.279
9.58	0.001	169.2	0.251
10.09	-0.002	178.8	0.229
10.74	-0.001	189.6	0.206
11.28	0.	201.	0.19
11.94	-0.001	213.	0.173
12.71	0.	225.6	0.162
13.48	-0.002	238.8	0.149
14.22	-0.001	253.3	0.139
15.06	-0.002	268.2	0.13
15.96	-0.002	283.8	0.118
16.99	0.	300.6	0.111
17.88	-0.001	318.6	0.1
18.96	-0.002	337.2	0.095
20.14	-0.001	357.6	0.089
21.3	-0.001	378.6	0.085
22.56	0.	400.8	0.077
23.96	0.	424.9	0.074
25.32	-0.001	450.	0.068
26.86	-0.001	476.4	0.062

SOLUTION

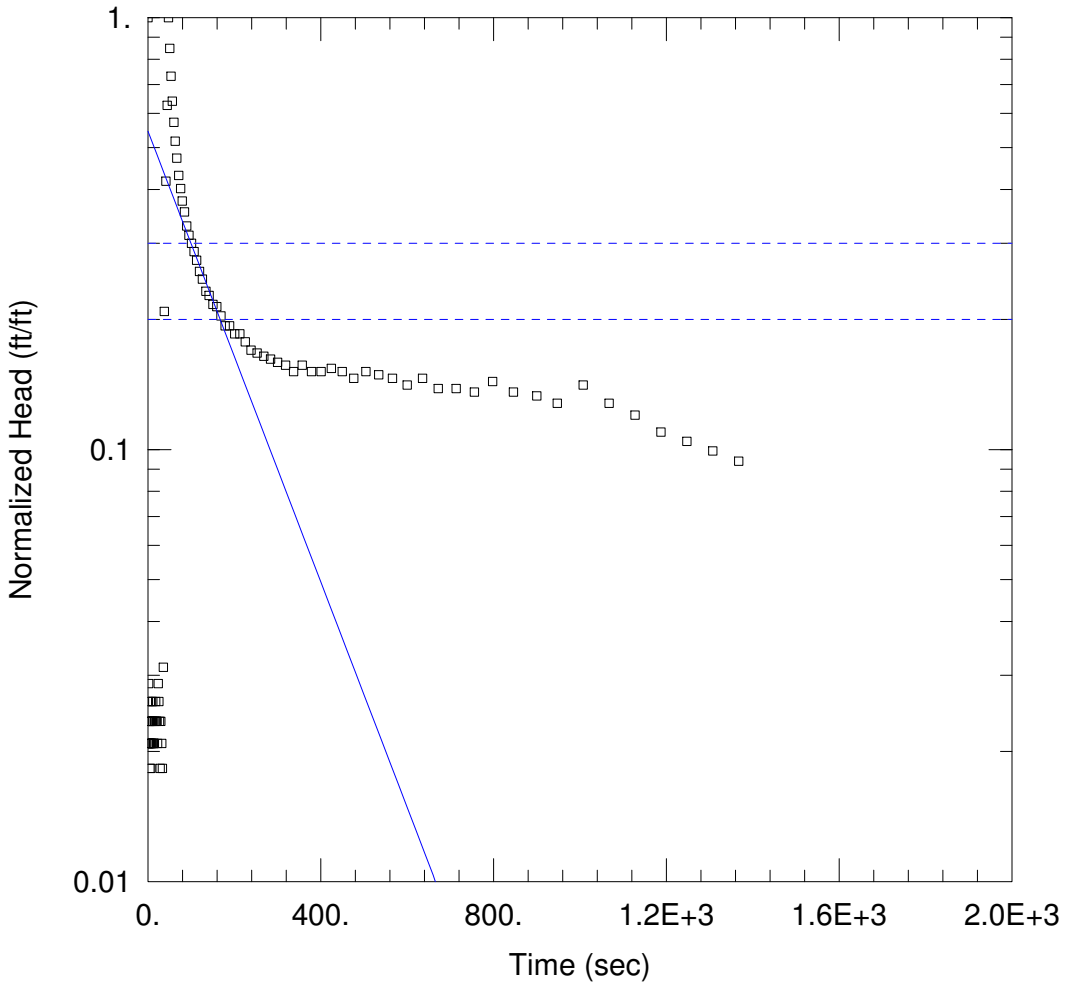
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.12

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0003935	cm/sec
y0	1.905	ft

$T = K*b = 0.1312$ cm²/sec



PZ-35(S)_SLUG

Data Set: \...\PZ-35 S_Slug.aqt
Date: 04/15/21 Time: 11:16:53

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-35 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-35 S)

Initial Displacement: 0.383 ft
Total Well Penetration Depth: 10.1 ft
Casing Radius: 0.082 ft
Static Water Column Height: 6.89 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001811 cm/sec y0 = 0.2089 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ-35(s)_Slug
Date: 04/15/21
Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-35 S

AQUIFER DATA

Saturated Thickness: 15. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-35 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.383 ft
Static Water Column Height: 6.89 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 10.1 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 118

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.008	50.46	0.325
0.501	0.008	53.46	0.28
0.751	0.009	56.66	0.245
1.001	0.008	60.05	0.219
1.251	0.01	63.62	0.198
1.501	0.011	67.2	0.181
1.751	0.008	71.4	0.165
2.001	0.009	75.7	0.154
2.251	0.008	79.85	0.144
2.501	0.009	84.62	0.136
2.751	0.008	90.1	0.126
3.001	0.008	94.82	0.12
3.251	0.008	100.8	0.115
3.501	0.008	106.8	0.11
3.751	0.009	112.9	0.105
4.001	0.009	119.4	0.099
4.251	0.009	126.6	0.095
4.501	0.008	134.4	0.089
4.751	0.007	142.2	0.087
5.001	0.009	150.6	0.083
5.251	0.008	159.6	0.082
5.501	0.01	169.2	0.078
5.751	0.008	178.8	0.074
6.001	0.009	189.6	0.074
6.361	0.009	201.	0.071
6.721	0.008	213.	0.071
7.141	0.007	225.6	0.068
7.561	0.008	238.8	0.065

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.981	0.009	253.2	0.064
8.461	0.01	268.2	0.063
9.001	0.009	283.8	0.062
9.481	0.008	300.6	0.061
10.08	0.008	318.7	0.06
10.68	0.009	337.2	0.058
11.28	0.01	357.6	0.06
11.94	0.009	378.6	0.058
12.66	0.008	400.9	0.058
13.44	0.008	424.8	0.059
14.22	0.008	450.1	0.058
15.06	0.008	476.4	0.056
15.96	0.009	504.7	0.058
16.95	0.009	534.6	0.057
17.91	0.01	566.4	0.056
18.97	0.009	600.	0.054
20.1	0.009	636.1	0.056
21.3	0.009	672.	0.053
22.56	0.008	714.	0.053
23.92	0.011	756.	0.052
25.32	0.01	798.1	0.055
26.82	0.009	846.	0.052
28.38	0.007	900.	0.051
30.06	0.009	948.	0.049
31.86	0.008	1008.1	0.054
33.72	0.007	1068.	0.049
35.76	0.012	1128.	0.046
38.	0.08	1188.	0.042
42.	0.16	1248.	0.04
45.	0.24	1308.	0.038
47.74	0.383	1368.	0.036

SOLUTION

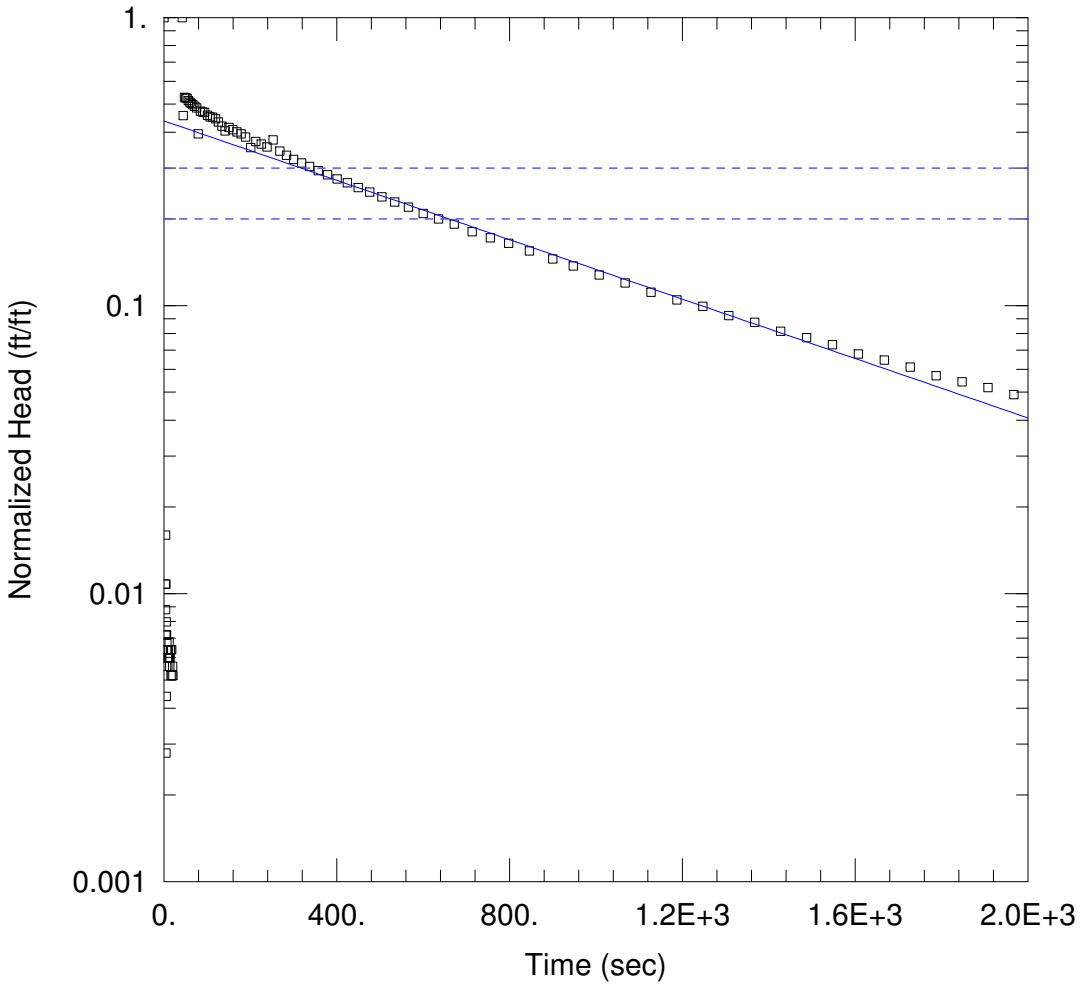
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.369

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0001811	cm/sec
y0	0.2089	ft

$T = K*b = 0.0828$ cm²/sec



PZ-47(SR)_SLUG

Data Set: \...\PZ-47 SR_Slug.aqt
Date: 04/15/21 Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-47 SR
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 10.66 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-47 SR)

Initial Displacement: 2.506 ft
Total Well Penetration Depth: 11.75 ft
Casing Radius: 0.082 ft
Static Water Column Height: 11.66 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 4.039E-5 cm/sec y0 = 1.096 ft

Data Set: \\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report
Title: PZ-47(sr)_Slug
Date: 04/15/21
Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-47 SR

AQUIFER DATA

Saturated Thickness: 10.66 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-47 SR

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.506 ft
Static Water Column Height: 11.66 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 11.75 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 129

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.011	67.2	1.249
0.5	-0.011	71.4	1.232
0.75	-0.011	75.6	1.218
1.	-0.011	79.8	0.988
1.25	-0.012	84.6	1.186
1.5	-0.012	90.	1.178
1.75	-0.011	94.8	1.174
2.	-0.01	100.8	1.147
2.25	-0.011	106.8	1.133
2.5	-0.01	112.8	1.129
2.75	-0.01	119.4	1.115
3.	-0.012	126.6	1.087
3.25	-0.011	134.4	1.051
3.5	0.027	142.2	1.012
3.75	0.04	150.6	1.041
4.	-0.002	159.6	1.023
4.25	0.022	169.2	1.004
4.5	0.027	178.8	0.988
4.75	0.007	189.6	0.964
5.	0.018	201.	0.885
5.252	0.02	213.	0.93
5.5	0.011	225.6	0.912
5.75	0.018	238.8	0.891
6.	0.018	253.3	0.943
6.36	0.014	268.3	0.861
6.72	0.017	283.9	0.832
7.14	0.016	300.6	0.806
7.56	0.016	318.6	0.783

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.98	0.016	337.2	0.761
8.46	0.015	357.6	0.736
9.	0.014	378.6	0.713
9.48	0.015	400.8	0.689
10.08	0.015	424.8	0.668
10.68	0.016	450.	0.644
11.28	0.015	476.4	0.621
11.94	0.017	504.6	0.597
12.66	0.015	534.6	0.574
13.44	0.014	566.4	0.551
14.22	0.015	600.	0.523
15.06	0.016	636.	0.501
15.97	0.016	672.	0.48
16.92	0.013	714.	0.452
17.92	0.016	756.	0.431
18.96	0.013	798.	0.412
20.1	0.014	846.	0.388
21.3	0.013	900.	0.364
22.56	-0.021	948.	0.344
23.95	-0.008	1008.	0.32
25.32	-0.012	1068.	0.3
26.89	-0.011	1128.	0.279
28.43	-0.012	1188.	0.262
30.06	-0.015	1248.1	0.249
31.86	-0.012	1308.	0.231
33.72	-0.014	1368.1	0.219
35.81	-0.013	1428.	0.204
37.86	-0.012	1488.	0.194
40.08	-0.013	1548.	0.183
42.48	2.506	1608.	0.17
45.	1.145	1668.	0.162
47.64	1.322	1728.	0.153
50.46	1.317	1788.	0.143
53.46	1.313	1848.	0.136
56.68	1.291	1908.1	0.13
60.	1.275	1968.	0.123
63.62	1.26		

SOLUTION

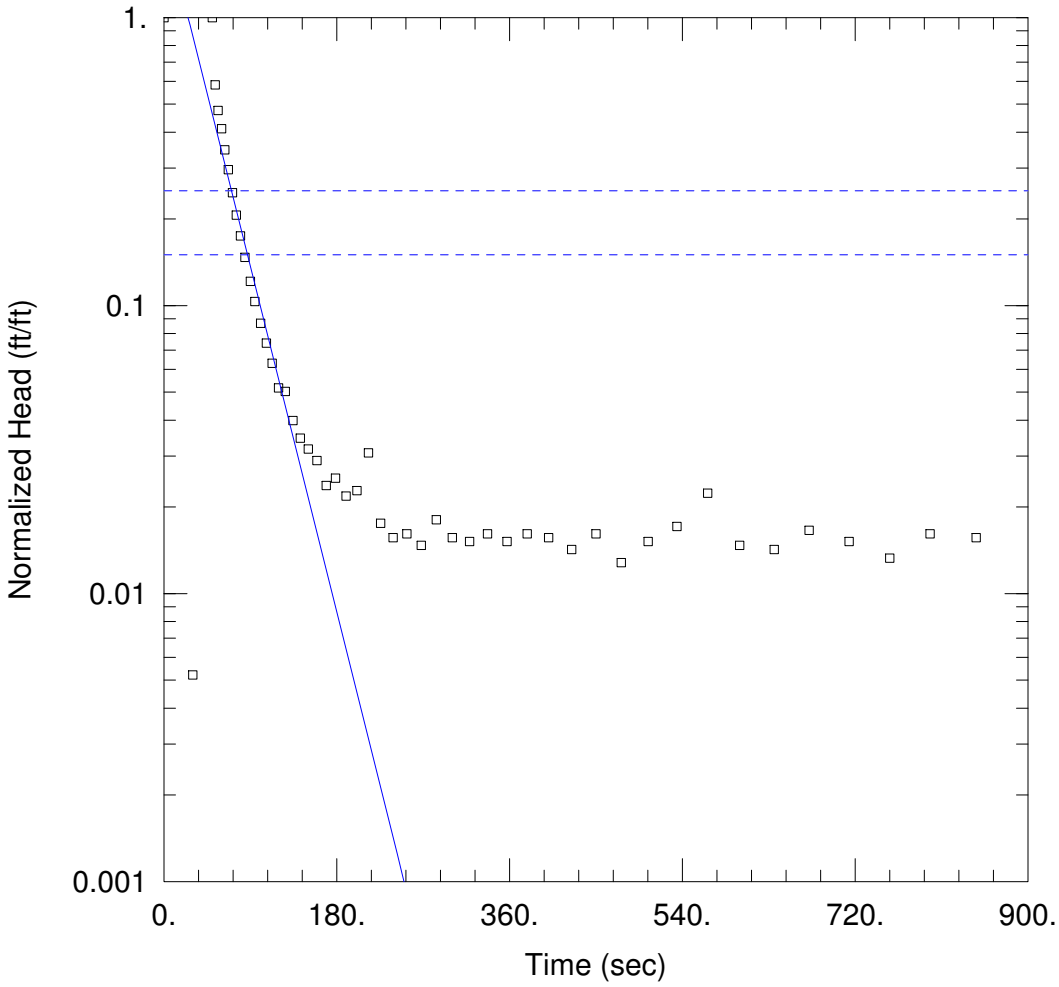
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.8

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.039E-5	cm/sec
y0	1.096	ft

$T = K*b = 0.01312$ cm²/sec



PZ-30(S)_SLUG

Data Set: \...\PZ-30 S_Slug.aqt
Date: 04/15/21 Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-30 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 12.92 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-30 S)

Initial Displacement: 2.109 ft
Total Well Penetration Depth: 13.26 ft
Casing Radius: 0.082 ft
Static Water Column Height: 12.92 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.001507 cm/sec y0 = 4.571 ft

Data Set: \\10.1.1.9\Tuscaloosa Projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report
Title: PZ-30(s)_Slug
Date: 04/15/21
Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-30 S

AQUIFER DATA

Saturated Thickness: 12.92 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-30 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.109 ft
Static Water Column Height: 12.92 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 13.26 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 110

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.009	37.86	-0.001
0.5	-0.018	40.08	-0.004
0.75	-0.012	42.48	-0.005
1.	-0.015	45.	-0.002
1.25	-0.009	47.64	-0.004
1.5	-0.015	50.46	2.109
1.75	-0.015	53.46	1.23
2.	-0.008	56.64	1.004
2.25	-0.011	60.	0.866
2.5	-0.022	63.6	0.733
2.75	-0.02	67.2	0.625
3.	-0.001	71.4	0.52
3.25	-0.019	75.6	0.435
3.5	-0.011	79.8	0.368
3.75	-0.015	84.6	0.31
4.	-0.013	90.08	0.256
4.25	-0.021	94.8	0.218
4.5	-0.007	100.8	0.183
4.75	-0.018	106.8	0.156
5.	-0.029	112.8	0.133
5.25	-0.009	119.4	0.109
5.5	-0.014	126.6	0.106
5.75	-0.007	134.4	0.084
6.	-0.009	142.2	0.073
6.36	-0.018	150.6	0.067
6.72	-0.01	159.6	0.061
7.14	-0.007	169.2	0.05
7.56	-0.014	178.8	0.053

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.98	-0.018	189.7	0.046
8.46	-0.006	201.	0.048
9.	-0.006	213.1	0.065
9.48	-0.004	225.7	0.037
10.08	-0.02	238.8	0.033
10.68	-0.016	253.2	0.034
11.28	-0.003	268.2	0.031
11.94	-0.013	283.8	0.038
12.66	-0.004	300.6	0.033
13.44	-0.013	318.6	0.032
14.22	-0.01	337.2	0.034
15.06	-0.006	357.6	0.032
15.96	-0.01	378.6	0.034
16.92	-0.011	400.9	0.033
17.88	-0.008	424.8	0.03
18.96	-0.012	450.	0.034
20.1	-0.008	476.4	0.027
21.3	-0.009	504.6	0.032
22.56	-0.011	534.6	0.036
23.88	-0.02	566.4	0.047
25.32	-0.01	600.	0.031
26.82	-0.004	636.	0.03
28.38	-0.008	672.	0.035
30.06	0.011	714.	0.032
31.86	-0.002	756.	0.028
33.72	-0.012	798.	0.034
35.76	-0.007	846.	0.033

SOLUTION

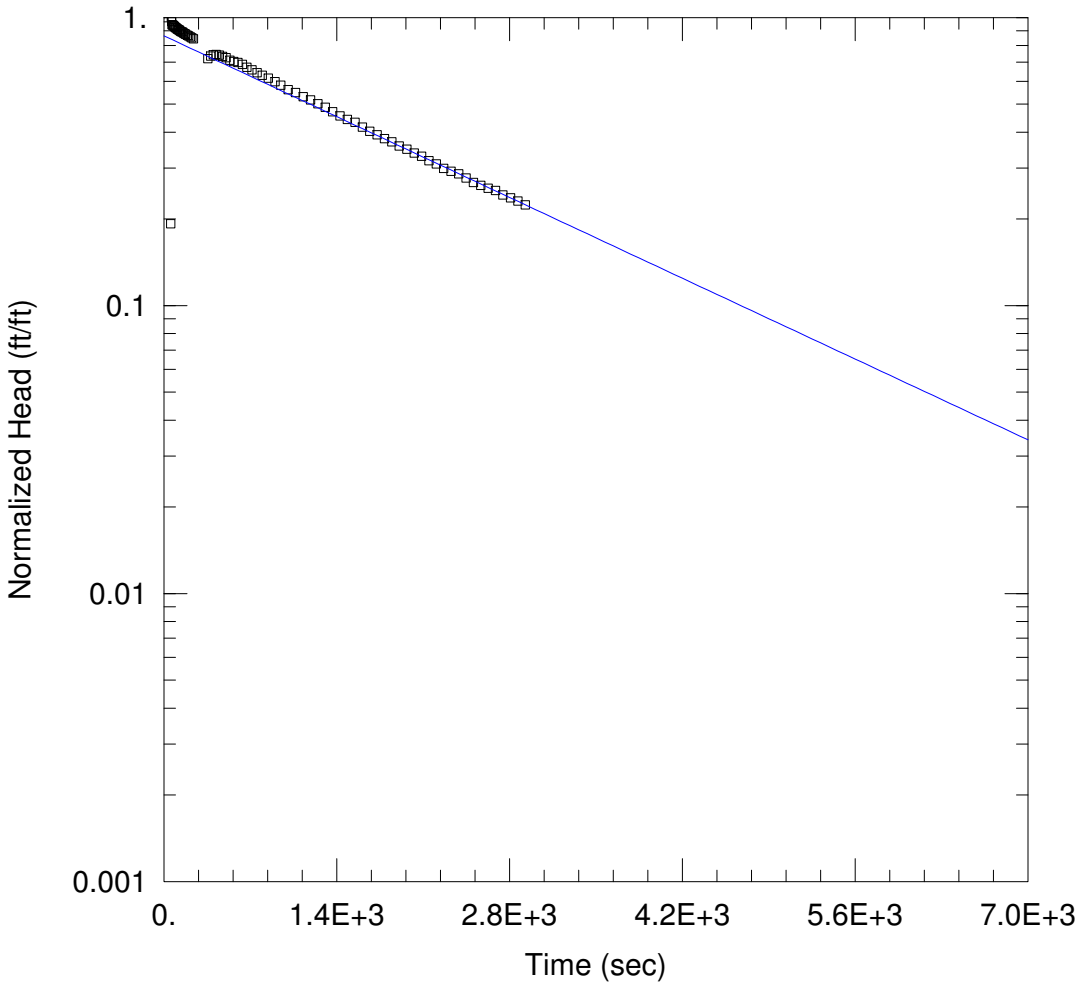
Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.1823

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.001507	cm/sec
y0	4.571	ft

$T = K*b = 0.5935$ cm²/sec



PZ-56(S)_SLUG

Data Set: \...\PZ-56 S_Slug.aqt
Date: 04/15/21 Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-56 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-56 S)

Initial Displacement: 2.238 ft
Total Well Penetration Depth: 34.55 ft
Casing Radius: 0.082 ft
Static Water Column Height: 6.33 ft
Screen Length: 20. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.261E-5 cm/sec y0 = 1.933 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ-56(s)_Slug
Date: 04/15/21
Time: 11:16:54

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-56 S

AQUIFER DATA

Saturated Thickness: 15. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-56 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.238 ft
Static Water Column Height: 6.33 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 20. ft
Total Well Penetration Depth: 34.55 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.07664 ft
Gravel Pack Porosity: 0.3

No. of Observations: 193

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.006	600.	1.562
0.5	-0.005	636.	1.538
0.75	-0.006	672.	1.505
1.	-0.005	714.	1.473
1.25	-0.005	756.	1.44
1.5	-0.005	798.	1.409
1.75	-0.006	846.	1.377
2.	-0.006	900.	1.339
2.25	-0.005	948.	1.302
2.5	-0.005	1008.	1.258
2.75	-0.006	1068.	1.227
3.	-0.005	1128.	1.188
3.25	-0.007	1188.	1.157
3.5	-0.006	1248.	1.124
3.75	-0.008	1308.	1.092
4.	-0.005	1368.	1.054
4.25	-0.006	1428.	1.019
4.5	-0.007	1488.	0.991
4.75	-0.005	1548.	0.967
5.001	-0.005	1608.	0.932
5.25	-0.004	1668.	0.902
5.5	-0.008	1728.	0.876
5.75	-0.004	1788.	0.85
6.	-0.006	1848.	0.829
6.36	-0.006	1908.	0.802
6.721	-0.004	1968.	0.78
7.14	-0.006	2028.	0.757
7.56	-0.006	2088.	0.739

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
7.98	-0.006	2148.	0.713
8.46	-0.005	2208.	0.694
9.	-0.006	2268.	0.67
9.48	-0.005	2328.	0.654
10.08	-0.005	2388.	0.641
10.68	-0.006	2448.	0.62
11.28	-0.004	2508.	0.599
11.94	-0.005	2568.	0.585
12.71	-0.003	2628.	0.572
13.5	-0.005	2688.	0.561
14.22	-0.006	2748.	0.542
15.06	-0.006	2808.	0.529
15.96	-0.007	2868.	0.516
16.92	-0.005	2928.	0.5
17.91	-0.004	2988.	-0.182
18.96	-0.005	3048.	-0.163
20.1	-0.006	3108.	-0.144
21.3	-0.006	3168.	-0.129
22.66	-0.005	3228.	-0.12
23.88	-0.007	3288.	-0.108
25.32	-0.007	3348.	-0.096
26.89	-0.005	3408.	-0.091
28.38	-0.007	3468.	-0.087
30.06	-0.004	3528.	-0.084
31.86	-0.007	3588.	-0.08
33.8	-0.005	3648.	-0.078
35.78	-0.006	3708.	-0.073
37.91	-0.007	3768.	-0.076
40.08	-0.008	3828.	-0.074
42.56	-0.007	3888.	-0.074
45.	-0.008	3948.	-0.064
47.73	-0.008	4008.	-0.068
50.46	-0.007	4068.	-0.074
53.46	-0.008	4128.	-0.079
56.64	0.43	4188.	-0.08
60.	2.238	4248.	-0.08
63.6	2.167	4308.	-0.078
67.2	2.115	4368.	-0.087
71.42	2.107	4428.	-0.097
75.6	2.1	4488.	-0.09
79.87	2.094	4548.	-0.103
84.6	2.084	4608.	-0.113
90.08	2.073	4668.	-0.111
94.82	2.066	4728.	-0.108
100.8	2.058	4788.	-0.106
106.8	2.046	4848.	-0.122
112.8	2.041	4908.	-0.123
119.4	2.029	4968.	-0.119
126.6	2.021	5028.	-0.127
134.4	2.009	5088.	-0.115
142.2	1.998	5148.	-0.112
150.6	1.99	5208.	-0.12
159.6	1.978	5268.	-0.12
169.2	1.966	5328.	-0.12
178.8	1.955	5388.	-0.112
189.6	1.943	5448.	-0.106
201.	1.932	5508.	-0.1
213.	1.917	5568.	-0.098
225.6	1.904	5628.	-0.092
238.8	1.89	5688.	-0.09
357.6	1.612	5748.	-0.092
378.6	1.646	5808.	-0.091
400.8	1.663	5868.	-0.09
424.8	1.665	5928.	-0.089
450.	1.659	5988.	-0.082
476.4	1.642	6048.	-0.088
504.6	1.625	6108.	0.

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
534.6	1.591	6168.	-0.003
566.4	1.576		

SOLUTION

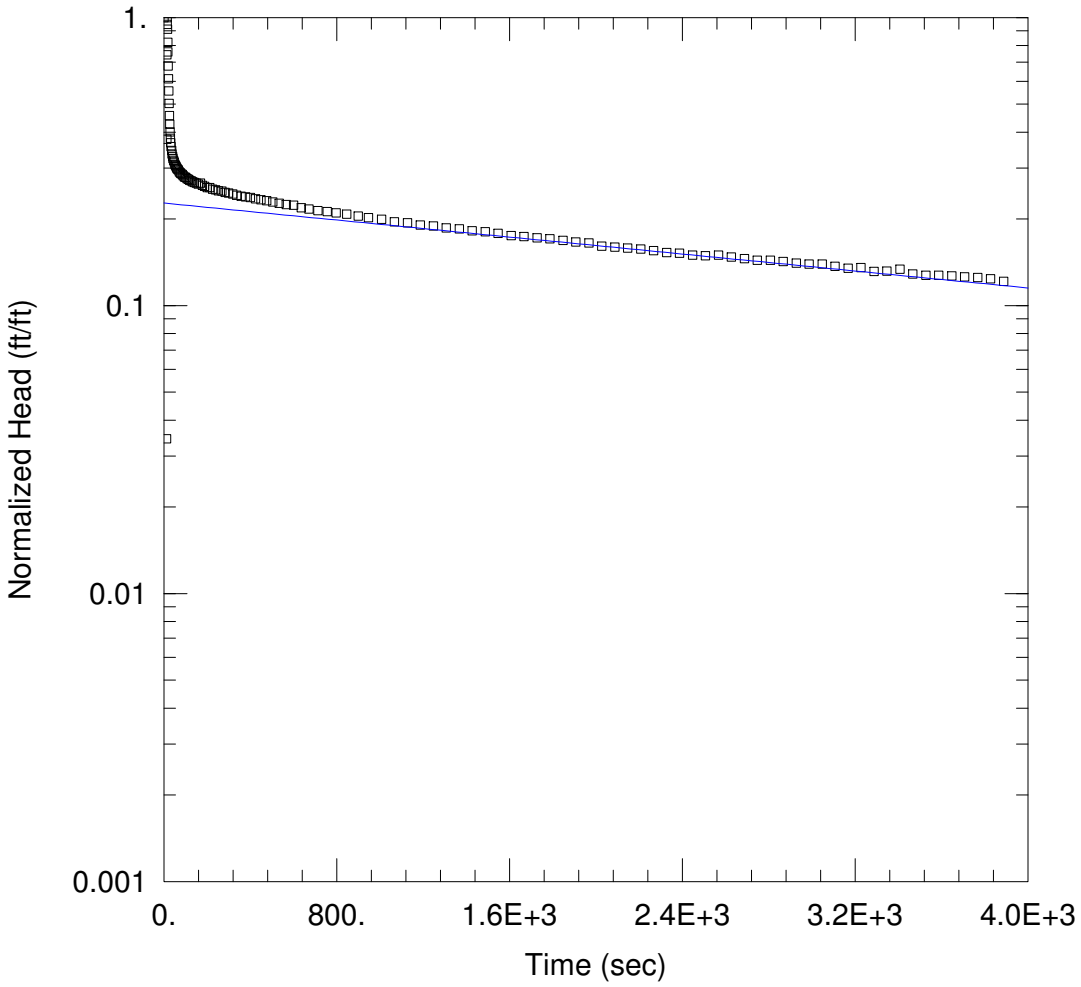
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.667

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.261E-5	cm/sec
y0	1.933	ft

T = K*b = 0.005767 cm²/sec



PZ-82(S) BAIL TEST

Data Set: \...\PZ-82 S_Bail.aqt
Date: 04/15/21 Time: 11:16:55

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-82 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 9.96 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-82 S)

Initial Displacement: 1.624 ft
Total Well Penetration Depth: 10.54 ft
Casing Radius: 0.082 ft
Static Water Column Height: 9.46 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 3.301E-6 cm/sec y0 = 0.3683 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ-82(s) Bail Test
Date: 04/15/21
Time: 11:16:55

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-82 S

AQUIFER DATA

Saturated Thickness: 9.96 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-82 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.624 ft
Static Water Column Height: 9.46 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 10.54 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.05839 ft
Gravel Pack Porosity: 0.3

No. of Observations: 161

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	-0.001	169.2	0.432
0.501	0.	178.8	0.424
0.751	0.001	189.6	0.421
1.001	-0.001	201.	0.417
1.251	-0.001	213.	0.417
1.501	-0.001	225.6	0.412
1.751	-0.001	238.8	0.41
2.001	0.	253.2	0.406
2.251	0.001	268.2	0.405
2.501	0.	283.8	0.401
2.751	0.	300.6	0.399
3.001	-0.001	318.6	0.396
3.251	-0.001	337.2	0.392
3.501	0.	357.6	0.389
3.751	-0.002	378.6	0.387
4.011	0.	400.8	0.385
4.251	0.001	424.8	0.381
4.501	-0.001	450.	0.378
4.751	0.	476.4	0.375
5.001	0.001	504.6	0.372
5.251	0.	534.6	0.368
5.501	-0.001	566.4	0.364
5.751	0.	600.	0.362
6.001	0.	636.1	0.355
6.36	0.	672.	0.351
6.721	0.	714.	0.347
7.193	-0.001	756.	0.344
7.56	-0.001	798.	0.341

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
8.006	-0.002	846.	0.337
8.461	-0.001	900.1	0.332
9.041	-0.001	948.	0.328
9.48	-0.003	1008.	0.324
10.08	-0.001	1068.	0.317
10.68	-0.001	1128.	0.315
11.28	-0.002	1188.	0.309
11.94	-0.002	1248.	0.307
12.66	0.056	1308.1	0.302
13.45	0.614	1368.	0.3
14.22	1.206	1428.	0.295
15.06	1.624	1488.1	0.293
15.96	1.539	1548.1	0.289
16.92	1.479	1608.	0.284
17.88	1.331	1668.	0.282
18.96	1.235	1728.	0.279
20.2	1.103	1788.	0.277
21.38	0.994	1848.	0.273
22.56	0.902	1908.	0.27
23.88	0.817	1968.	0.268
25.34	0.742	2028.1	0.261
26.82	0.691	2088.	0.259
28.38	0.651	2148.	0.257
30.14	0.618	2208.	0.255
31.86	0.597	2268.	0.252
33.72	0.578	2328.	0.248
35.76	0.561	2388.	0.247
37.86	0.546	2448.	0.243
40.08	0.535	2508.	0.242
42.55	0.526	2568.	0.243
45.	0.518	2628.	0.239
47.64	0.511	2688.	0.236
50.56	0.503	2748.	0.233
53.47	0.498	2808.	0.233
56.64	0.492	2868.	0.231
60.	0.487	2928.	0.228
63.6	0.483	2988.	0.226
67.2	0.48	3048.	0.226
71.4	0.473	3108.	0.222
75.62	0.469	3168.	0.219
79.9	0.466	3228.	0.22
84.6	0.463	3288.	0.213
90.	0.458	3348.	0.214
94.82	0.454	3408.	0.217
100.8	0.452	3468.	0.209
106.8	0.448	3528.	0.207
112.9	0.446	3588.	0.207
119.4	0.442	3648.	0.206
126.6	0.44	3708.	0.204
134.4	0.437	3768.	0.203
142.2	0.434	3828.	0.201
150.6	0.432	3888.	0.197
159.6	0.429		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.729

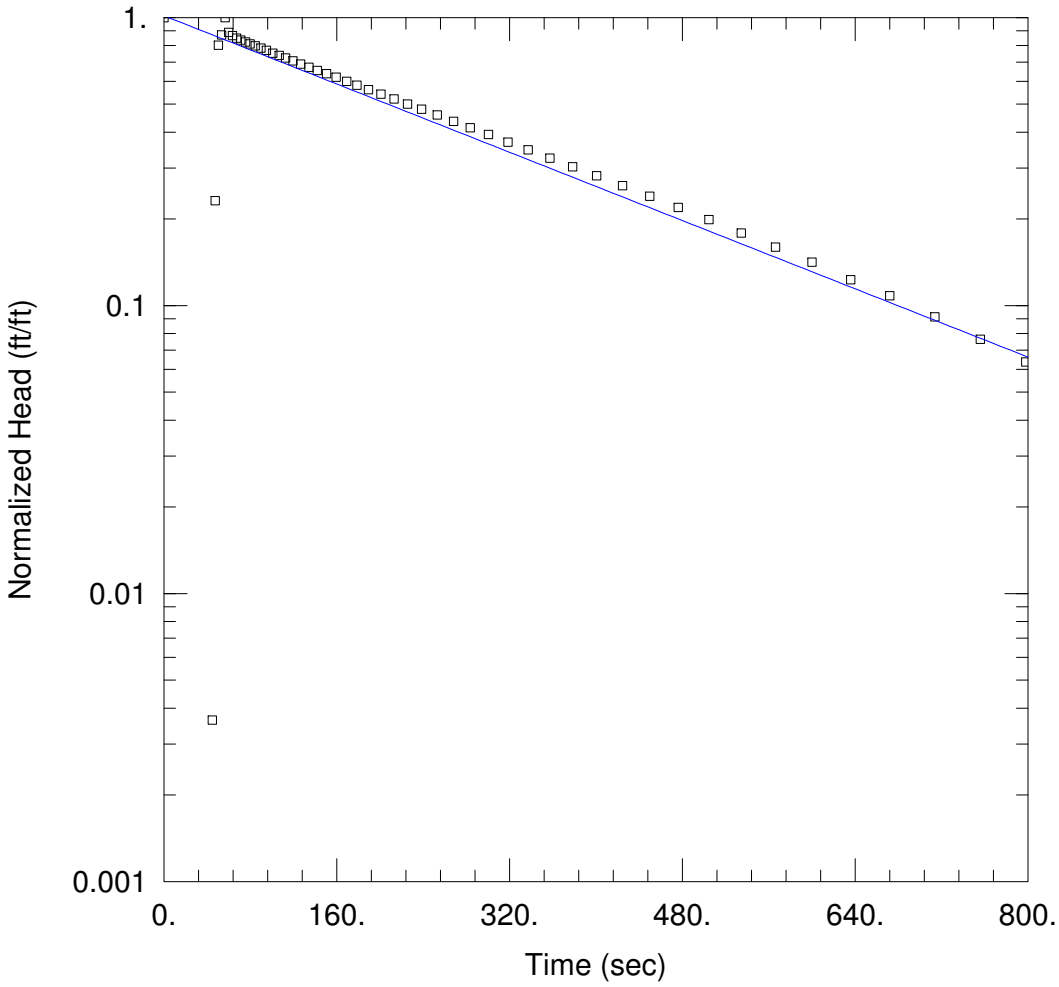
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	3.301E-6	cm/sec

y0	0.3683	ft

T = K*b = 0.001002 cm²/sec



PZ-02(S)_SLUG

Data Set: \...\PZ-02 S_Slug.aqt
Date: 04/15/21 Time: 11:16:55

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Well: PZ-02 S
Test Date: 04-14-21

AQUIFER DATA

Saturated Thickness: 13.89 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-02 S)

Initial Displacement: 2.2 ft
Total Well Penetration Depth: 14.89 ft
Casing Radius: 0.082 ft
Static Water Column Height: 15.36 ft
Screen Length: 10. ft
Well Radius: 0.083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 7.004E-5 cm/sec y0 = 2.231 ft

Data Set: \\10.1.1.9\tuscaloosa projects\2019\000190103033.00 BWSWA Partlow Property\2021 Hydrogeo Report\
Title: PZ-02(s)_Slug
Date: 04/15/21
Time: 11:16:55

PROJECT INFORMATION

Company: TTL, Inc
Client: BWSWA Area-A Expansion
Project: 000190103033.00
Location: Coker, Tuscaloosa County, AL
Test Date: 04-14-21
Test Well: PZ-02 S

AQUIFER DATA

Saturated Thickness: 13.89 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: PZ-02 S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.2 ft
Static Water Column Height: 15.36 ft
Casing Radius: 0.082 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.25 ft
Screen Length: 10. ft
Total Well Penetration Depth: 14.89 ft
Corrected Casing Radius (Bouwer-Rice Method): 0.05839 ft
Gravel Pack Porosity: 0.3

No. of Observations: 51

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
45.	0.008	201.1	1.192
47.64	0.508	213.1	1.148
50.46	1.762	225.6	1.1
53.46	1.916	238.8	1.056
56.64	2.2	253.2	1.009
60.	1.955	268.2	0.958
63.6	1.902	283.8	0.912
67.28	1.866	300.6	0.863
71.4	1.837	318.6	0.813
75.6	1.81	337.2	0.764
79.9	1.783	357.6	0.715
84.6	1.752	378.6	0.667
90.	1.721	400.8	0.621
94.86	1.692	424.8	0.573
100.8	1.655	450.	0.527
106.8	1.623	476.4	0.482
112.8	1.59	504.6	0.437
119.4	1.556	534.6	0.393
126.6	1.516	566.4	0.351
134.4	1.479	600.	0.311
142.2	1.441	636.	0.27
150.6	1.404	672.	0.238
159.6	1.364	714.	0.201
169.3	1.322	756.	0.168
178.8	1.281	798.	0.14
189.6	1.236		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.952

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	7.004E-5	cm/sec
y0	2.231	ft

$T = K*b = 0.02965$ cm²/sec

APPENDIX E

Resumes of Environmental Professionals

J. Mark Tanner, PG

Senior Project Geologist
Environmental Services

Mr. Tanner provides consulting and project management services related to asbestos and lead-based paint surveys, hazardous and solid waste, mineral resources evaluations, groundwater supply and water quality monitoring and assessment, and underground storage tank management. He performs Phase I and II Environmental Site Assessments. His investigations include design of sampling plan, collection of samples, data interpretation, report preparation, and review. He currently manages the groundwater monitoring, statistical analysis, and reporting for 20 solid waste landfills and 4 spray or drip fields [Underground Injection Control (UIC)] in Alabama.

EXPERIENCE
40 years

EDUCATION
BS, Geology
The University of Alabama

REGISTRATIONS & CERTIFICATIONS
Licensed Professional Geologist:
Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee

PROFESSIONAL MEMBERSHIPS
American Institute of Professional Geologists (AIPG)

Alabama Geological Society

Alabama Board of Licensure for Professional Geologists, Past Chair

KEY PROJECTS

- **City of Tuscaloosa Sampling and Analytical Testing of Windows for Asbestos and Lead-Based Paint, Old Tuscaloosa City Hall Building, Tuscaloosa, AL:** Senior Principal Geologist/Project Manager. In 2019, The City of Tuscaloosa implemented a plan to restore/replace some of the older windows in the old portion of Tuscaloosa City Hall. Of the 79 windows associated with the structure, TTL developed a sampling plan that included collecting samples from 29 of the windows. Laboratory analytical results from sampling performed by TTL indicated elevated concentrations of total lead in all 29 window samples. Total lead concentrations ranged from 517 mg/kg to 161,000 mg/kg. Subsequently, TCLP lead analyses were performed for 11 of samples and results of TCLP lead ranged from 96 mg/l to 341 mg/l. Each of the 11 samples analyzed for TCLP lead yielded concentrations well in excess of the hazardous concentration threshold for lead of 5 mg/l. As a result of our findings, TTL recommended that all windows in the structure that were earmarked for removal be treated as a hazardous waste and disposed accordingly, and that the contractor selected by the City have a Renovation, Repair, and Painting (RRP) certification or licensed supervisor on-site to supervise the window removal and disposal.
- **S.D. Allen Facility Lead-based Paint and Asbestos Surveys, Tuscaloosa, AL:** Senior Principal Geologist/Project Manager. TTL's services were requested relative to a potential demolition of on-site structures, the results of which were to be used by the selected demolition contractors to develop costs and a protocol for abatement of asbestos and lead-based paint, as well as determining proper disposal options for these waste streams. In 2015, TTL engaged a sub contractor (UA SafeState) to provide pre demolition sampling and testing for asbestos containing materials (ACM) and lead based paint (LBP). The results of the ACM and LBP surveys were used by the demolition contractor to prepare a cost estimate for abatement of "friable" ACM prior to demolition of 16 structures located on the site. TTL also collected samples of water from the basement of one of the building for analysis of selected constituents in order to determine a disposal option for the water. TTL provided a cost for Construction and Materials Testing (CMT) services associated with the backfilling of the partial basement of one of the buildings. Results confirmed that in 2015, lead-based paint was identified on one or more building components in six (6) of the surveyed structures.

- **Twin Pines, St. George, GA:** Served as one of three Project Geologists responsible for conducting a large-scale hydrogeologic investigation of an 11,378-acre site located in Charlton County, Georgia. This was a proposed site for heavy mineral (titanium, zircon, rutile, etc.). Services included developing a scope of services sufficient to fully characterize the hydrogeologic conditions of the site for the purpose of obtaining a U.S. Army Corps of Engineers permit, as well as other necessary state and local permits required to mine the property. This investigation included the review of 385 borings logs and installation of 86 piezometers, two pumping wells and 22 associated observation wells for the purpose of conducting two 48-hour aquifer pumping tests on the site to characterize the hydraulic properties of a shallow sand aquifer. A total of 26 hydrogeologic cross sections were also prepared and evaluated. Groundwater modeling, using the USGS Mod Flow model, was also conducted.
- **Robert Morris, Multiple locations, AL:** Project Manager & Geologist.Subsurface investigations at six (6) different sites throughout Autauga, Elmore, and Montgomery Counties to determine possible extent and quality of sand and gravel deposits in association with conservation easements. Subsurface investigations at four (4) different sites throughout Coosa, Lee, and Randolph Counties to determine extent and quality of bedrock deposits in association with conservation easements.
- **Wiregrass Construction Company Inc., AL & GA:** Project Manager & Geologist responsible for advancing multiple exploratory soil borings and quantifying subsurface sand and gravel reserves on both a 720-acre property located in Mt. Vernon Alabama and 206-acre property located in Deatsville, Alabama. Served as the Project Manager & geologist responsible for advancing multiple exploratory soil borings and quantifying subsurface sand and gravel reserves on a 183-acre site located in Willacoochee, Georgia.
- **Elmore Sand and Gravel, Elmore, AL:** Project Manager & Geologist. Subsurface investigation to determine quality and extent of sand and gravel deposits on a 336-acre parcel of a much larger mine site.
- **Geotechnical Exploration and Karst Study, Honda Manufacturing of Alabama Facility, Lincoln, Talladega, AL:** In 1999 and 2000, Mr. Tanner worked as the Geologist for the project team on a geotechnical exploration and karst study for an automobile manufacturing facility proposed near Lincoln, Talladega County, Alabama. This study consisted of providing geologic, hydrogeologic and geotechnical engineering services for the project. The entire site encompassed approximately 1,400 acres with the area of the manufacturing facility consisting of approximately 60 acres including a future expansion area. The site is underlain geologically by the Knox Group and associated residuum. The manufacturing equipment for the proposed facility allowed for almost no settlement, which required special considerations for the foundation design. Work included a compilation and review of applicable geologic literature for the area, development of a geologic map for the site, review of historical aerial photographs to identify sinkholes and karst features, mapping of lineaments, a site-wide reconnaissance of the manufacturing area to identify/confirm karst features, drilling and logging of borings and rock core holes, and surface geophysical surveying (resistivity, electromagnetics, and seismic) to evaluate the geologic characteristics of the residuum and upper bedrock at the site and provide recommendations for foundation design criteria. A design was provided that was used in the repair of more than 200 sinkholes and karst features identified during site grading for construction.
- **Alabama Power CCR Investigation and Monitoring Well Installation, Plant Berry, Bucks, Mobile County, AL:** TTL was contracted by Alabama Power Company (APCo) to provide environmental services related to installation of groundwater monitoring wells and data collection in areas surrounding an

Ash Pond and Gypsum Storage Area at Plant Berry in Mobile County, Alabama. The project was designed to assist in addressing new Coal Combustion Residuum (CCR) regulations. TTL followed a rigid safety protocol for clearing subsurface utilities using a Hydrovac. TTL geologists described core samples obtained from sonic drilling and prepared typed logs utilizing the GiNT program and APCo's format. Each run of core was photographed for documentation purposes. TTL also ran downhole geophysical logs (natural gamma) in selected boreholes utilizing a COLOG Digital Logger. TTL also performed slug and bail tests in select monitoring wells and evaluated the field data to determine hydraulic conductivity values. During the course of field activities, TTL personnel corresponded daily with the APCo project manager to transmit information collected in order to make decisions regarding well screen settings.

- **Harris Property Assessment and Remediation, University Boulevard, Tuscaloosa, AL:** In 2012, TTL was requested by our client to conduct a Limited Phase II Environmental Site Assessment (ESA) of a site located in downtown Tuscaloosa on a terrace of the Black Warrior River. A Phase I ESA had previously been completed for the site by another consultant who had identified Recognized Environmental Conditions (RECs) and recommended a Phase II ESA. The additional assessment was recommended on the basis of determining from the Phase I ESA that the prior historical use of the property had included a dry cleaning facility that operated on the site for a 26-year period from 1966 until 1992. Initially, TTL implemented the scope recommended by the previous consultant consisting of a detection-level assessment, advancing 5 soil borings and completing two of the borings as monitoring wells. Soil and groundwater samples were collected and analyzed for Volatile Organic Compounds (VOCs). Five VOCs were detected in soil including trichloroethelyne (TCE) and tetrachloroethene, also known as perchloroethene (PCE) or PERC. Groundwater analytical results indicated that groundwater at the site was not significantly impacted. However, PCE concentrations in several of the soil samples exceeded the Alabama Department of Environmental Management's (ADEM's) regulatory screening level for PCE in soil. As a result of these findings, the property owner elected to enter the site into the Alabama Department of Environmental Management's (ADEM's) Voluntary Cleanup Program (VCP) in an effort to obtain a Letter of Concurrence for the site and clear the way for redeveloping the site. The additional assessment consisted of drilling and sampling 19 additional borings and installation of 2 additional monitoring wells, a well inventory and a risk assessment. Investigative derived waste (IDW) accumulated during the assessment was characterized and properly disposed including preparation of the necessary ADEM Form 300. An Environmental Covenant was prepared and filed for the purpose of restricting: (1) the future use of groundwater and (2) property use to commercial use only. During the cut and grading for the redevelopment of the site, approximately 1,600 tons of soil was removed and disposed at a local Subtitle D Municipal Solid Waste Landfill. The site has since been redeveloped with construction the construction of a new bank facility.
- **Department of Energy, Evaluation of Sinkhole Occurrence in the Valley and Ridge Province, 32-County Area of East TN:** Mr. Tanner managed a project for the Department of Energy (DOE) to perform a regional evaluation of karst activity in a 32-county area of eastern Tennessee to assess the possible impacts related to subsidence and sinkhole development. The evaluation was performed to establish the environmental acceptability of low-level radioactive waste disposal techniques for below-grade installation of radioactive waste in a candidate site to be constructed in the thick residual soil units that overlie carbonate rocks of the Knox Group. This work consisted of the compilation of a database on karst features for the Valley and Ridge Province in east Tennessee; selection, based on the database, of areas with a history of subsidence similar to the candidate area; detailed evaluations, and relate findings to the candidate site, and; estimate using the database, the aerial density and frequency of sinkhole occurrence in areas underlain by

carbonate bedrock in east Tennessee.

- **Geologic Hazards Assessment, ALDOT Corridor Study for the Proposed Elevated Expressway on SR-38 (US 280), Jefferson and Shelby Counties, AL:** Mr. Tanner served as the senior geologist and geological consultant for the project and was responsible for researching, compiling and evaluating published literature on the geology and geologic hazards for the project area, including information on sinkholes and underground mining in the area (the Birmingham area has been mined extensively for iron ore and coal resources for almost 200 years), reviewed the boring logs drilled for the preliminary geotechnical exploration and correlated the logs with available published geological literature by the Geological Survey of Alabama as well as the U.S. Geological Survey. Performed field geologic mapping of geologic contact and measurement of strike and dip of bedding for correlation as well as to supplement published data. Reviewed all historic records of underground mining files at the Department of Industrial Relations in Birmingham, AL. Performed a Geologic Hazards Assessment for US 280 road improvements project from Elton B. Stephens Parkway on the west end to Eagle Point Parkway on the east end and includes the I-459/US 280 interchange in Hoover, AL. The total length for the proposed mainline bridge structure was approximately 12.0 miles with expected span lengths of 133 to 165 feet. The project was situated within the Valley and Ridge Physiographic Province and crossed numerous geologic units comprised of both clastic and carbonate rocks. The area has been subjected to intense stresses that have resulted in significant folding, faulting and jointing of the rocks. The purpose of the Assessment was to identify and evaluate the various geologic conditions that could represent hazards to the project.

  The following activities were part of the project:

  - Compiled and reviewed published and unpublished literature from the U.S. Geological Survey (USGS), Alabama Geological Survey (AGS), Alabama Department of Transportation (ALDOT), and U.S. Department of Agriculture, (USDA) on the geology and mining relevant to the project study area.
  - Identified and obtain copies of historic topographic maps for the study area. Topographic maps compiled for the Birmingham South 7.5-Minute Quadrangle for the years 1959, 1970, 1978, 1997, and 2009 covering the west segment of the project in Jefferson County were reviewed and topographic maps compiled for the years 1959, 1970, 1978, 1988, 1998, and 2009 covering the east segment of the project in Jefferson and Shelby Counties were reviewed.
  - Interviewed personnel with the Alabama Department of Industrial Relations (ADIR), Department of Safety and Inspection to identify relevant underground mine maps for documented mines in the vicinity of the project. Also interviewed personnel with the U.S. Geological Survey (USGS), Alabama Geological Survey (AGS), Alabama Department of Transportation (ALDOT), and U.S. Department of Agriculture (USDA) on the geology and mining relevant to the project study area.
  - Identified, obtained and reviewed stereoscopically, copies of historic aerial photographs for the study area. Aerial photographs compiled and reviewed for the years 1956, 1960, 1967, 1992, and 1997 covering the west segment of the project in Jefferson County and aerial photographs compiled for the years 1957, 1967, 1975, 1981, 1987, 1992, and 2005 covering the east segment of the project in Shelby County were reviewed.

- **Alabama Power Company Monitoring Well Development at Plants Miller and Gorgas Ash Ponds, Jefferson and Walker Counties, AL:** In 2016, Mr. Tanner managed an Alabama Power Company (APCo) project for TTL providing professional services to APCo at Ash Ponds located at Plants Miller and Gorgas. TTL provided services to develop 26 monitoring wells at Plant Gorgas ranging in depth from 45 to 325 feet and 11 monitoring wells at Plant Miller ranging in depth from 37 to

234 feet. The wells were located in areas underlain by carbonate bedrock. TTL followed APCo's Standard Operating Procedures for Groundwater Well Development. The wells within the APCo system were developed for the eventual purpose of collecting subsurface water quality samples. Well development was necessary to ensure hydraulic conductivity was achieved and maintained between the well screen and aquifer and to remove fines in the well screen to allow free flow of formation water into the well screen and to reduce turbidity of the water during sampling events. APCo's criteria was to lower turbidity to 5 NTUs or less where possible and to 10 NTUs or below at a minimum. For extremely turbid wells, the protocol called for use of a bailer and/or surge block during development. Upon completion of well development, TTL personnel measured each well's final total depth. For wells with very low flow rates it was necessary to over-pump the well. A number of different methods were utilized to develop the wells including air-lift, surge block, and submersible pumps. In cases where wells were deeper than about 150 feet, TTL utilized an Arch pneumatic well development pump powered by a 375 CFM compressor. Some of the deeper wells required up to five or more days to develop. TTL was able to achieve the APCo's desired development criteria for all wells.

- **Siting, Characterization and Permitting, Morris Farm MSW Landfill, Lawrence County, AL:** Mr. Tanner's work has included numerous siting studies for municipal solid waste and industrial landfills. This regional facility was sited in Lawrence County in the Tuscumbia Limestone. As the project manager, Mr. Tanner was responsible for project activities which included the drilling and construction of 35 wells and piezometers across the 350-acre site, performing a sinkhole survey which included a desktop review of historical aerial photographs, an extensive survey of surrounding water well users, a resistivity survey, and a dye-tracer study. The project included expert testimony before an Administrative Law Judge. Mr. Tanner's experience in karst was instrumental in obtaining site approval and permitting for the first municipal solid waste landfill to be approved in karst terrane by the State environmental regulatory agency under Subtitle D regulations.
- **Former Tuscaloosa Chevrolet Dealership VCP Project, Tuscaloosa, AL:** In 2012, TTL was engaged by our client to perform a Phase I Environmental Site Assessment (ESA) on a former automobile dealership that had operated from 1950s until 2006. Dealership operations had included automobile maintenance and painting and bodywork. Numerous in-ground hydraulic lifts and five underground fuel storage tanks (USTs), as well as a radiator repair shop were present on the site. At the time the assessment was performed, the site had already reported a release from site USTs to the State, and a remediation system had been installed and was operating at the site. Findings from the Phase I ESA included recommendations for extensive Phase II assessment of soils and groundwater. Results of the Phase II assessment as well as several additional phases of assessment identified metals (arsenic, lead and chromium) as well as volatile organic compounds (VOCs) including BTEX and trichloroethylene (TCE) in site soils and groundwater. Mr. Tanner served as a technical consultant to the project. As a result of Phase II findings, TTL, working with our client, developed a voluntary cleanup program (VCP) application for the property and interred the site property into the VCP. Remedial efforts included in the preparation and execution of a Site Cleanup Plan included the removal and off-site disposal of five USTs, hydraulic lifts and contaminated soil. TTL had to coordinate between the Alabama Department of Environmental Management's (ADEM's) VCP program and UST program managers due to the active, on-site leaking UST investigation. Site closure under the VCP included a restriction on groundwater use formalized in an Environmental Covenant. The ADEM issued a conditional letter of concurrence documenting that cleanup efforts were satisfactorily completed in 2015. The property has since been redeveloped as a mixed-use commercial/residential property and the ADEM issued a no further action (NFA) letter for the former

UST system in 2017.

- **U.S. AID Spring Low-Flow Augmentation Project, Damascus, Syria:** Mr. Tanner has provided consulting services on numerous water resources and groundwater projects. In 1983, Mr. Tanner was assigned to Damascus, Syria where he participated in the evaluation and assessment of Figeh Spring, the third largest spring in the world and the principal source of water supply for the City of Damascus. The purpose of the work was to develop augmentation for low-flow conditions for the spring. The scope of work included geologic mapping, correlation of stratigraphic units, and the design and performance of pumping tests for evaluating aquifer characteristics.
- **Mississippi Lime Corporation, Hydrogeologic Evaluation of the Mississippi Lime Underground Mine, Ste. Genevieve, Ste. Genevieve County, MO:** Project Manager - Project involving the evaluation of hydrogeologic conditions of a karst aquifer (Ste. Genevieve Limestone, aka Spergen Limestone) which flooded a large 2 square mile underground room and pillar mine located adjacent to the Mississippi River in Missouri. The Ste. Genevieve Limestone is an oolitic and pure calcium carbonate mined as an additive in a variety of products. Work included field investigations and compilation and interpretation of data collected from drilling of 23 monitoring and observations wells, and design and construction of a large diameter dewatering well, a comprehensive water budget analysis and interpretation of the stratigraphy and structural geology of the area, and the design, management and performance of a large pumping test, and analysis and interpretation of data collected during the test.
- **Bryant-Denny Stadium South End Zone Expansion, The University of Alabama, Tuscaloosa, AL:** Performed a Phase I Environmental Site Assessment for Bryant-Denny Stadium South End Zone Expansion.
- **Shelton State College, C.A. Fredd Campus, Tuscaloosa, AL:** Performed a Phase I Environmental Site Assessment and a limited Phase II Environmental Site Assessment on approximately 8-acres of property east of the C.A. Fredd campus.
- **Former Shelton State College Campus, Tuscaloosa, AL:** Performed a Phase I Environmental Site Assessment on former Shelton State College campus, approximately 1-acre of property.
- **University of West Alabama, Livingston, AL:** Performed a Phase I Environmental Site Assessment on two sites located on The University of West Alabama campus.
- **Gamma Phi Beta Sorority House, Tuscaloosa, AL:** Performed a Phase I Environmental Site Assessment on sorority house property.
- **Tenn-Tom Waterway, Various Cities in Mississippi:** Helped establish the geology along the three sections of the waterway: River Section, Canal Section, and Pool Section.
- **John H. Kerr Dam, Boydton, VA:** Reviewed historical hydrologic records for this area and performed regression analyses.
- **Former Pensacola Air Force Base, Pensacola, FL:** Completed environmental site assessment with associated soils and groundwater investigations and remediation for development of a new analytical laboratory facility. These efforts included application for applicable environmental permits.
- **Green Mountain Management Landfill Facility, Graysville, Jefferson County, AL:** Completed a site characterization for a three-hundred ninety acre Subtitle D solid waste landfill. Scope included characterization of site geology, hydrogeology, and drainage and development of groundwater monitoring plan. Prepared solid waste permit application to the Alabama Department of Environmental Management (ADEM) and obtained operations permit.

- **Shelton State College, C.A. Fredd Campus, Tuscaloosa, AL:** Performed Phase I Environmental Site Assessment and a limited Phase II Environmental Site Assessment on approximately 8-acres of property east of the C.A. Fredd campus.

PROFESSIONAL PUBLICATIONS

"Construction of Dual-Pack Wells to Eliminate Sand and Enhance Well Efficiency" with Bashir A. Memon, in National Drillers Buyers Guide, v. 11, no. 4, April 1990.

"Aquifer Remediation Using an Interceptor Well (Corrective Action) System in Southeastern Washington County, Alabama", with Bashir A. Memon and Tom Sciple, in Proceedings of the 7th National Conference on Hazardous Wastes and Hazardous Materials, 1990, p. 172-180.

"Hydrogeology of Limestone Terranes, Annotated Bibliography of Carbonate Rocks, Volume Four" with Esad Prohic, Josef Zoetl, and Bernatdette N. Roche, Verlag Heinz Heise, West Germany, 1989, v. 10, 267 p.

"Iron Bacteria and Well Failure" with Bashir A. Memon, in National Drillers Buyers Guide, v. 8, no. 9, August 1988, p. 54.

"Iron Bacteria and Well Failure" with Bashir A. Memon, P.E. LaMoreaux and Tom Sciple, in Alabama Association for Water Pollution Control Newsletter, v. 8, no. 1, June 1988, p. 6-7.

"Evaluation of Sinkhole Occurrence in the Valley and Ridge Province, East Tennessee, Phase III" with J. G. Newton, ORNL/Sub/86-78911/3, Oak Ridge National Laboratory, November 1987, 49 p.

"Assessment of Subsidence in Karst Terranes at Selected Areas in East Tennessee and Comparison with a Candidate Site at Oak Ridge, Tennessee, Phase II" with J. G. Newton, ORNL/Sub/86-78911/2, Oak Ridge National Laboratory, Oak Ridge, Tennessee, September 1987, 82 p.

"Regional Inventory of Karst Activity in the Valley and Ridge Province, Eastern Tennessee, Phase I" with J. G. Newton, ORNL/Sub/86-78911/1, Oak Ridge National Laboratory, Oak Ridge, Tennessee, September 1987, 98 p.

"Case Histories of Induced Sinkholes in the United States" with J. G. Newton, in Beck, B.F. and Wilson, W. L. eds., Karst hydrogeology: Engineering and environmental applications: Proceedings, 2nd Multidiscipline Conference on Sinkholes, Rotterdam, Netherlands, A. A. Balkema, 1987, p. 15-23.

"Hydrogeology of Limestone Terranes, Annotated Bibliography of Carbonate Rocks, Volume Three" with P. Shore Davis, Verlag Heinz Heise, West Germany, 1986, v. 2, 341 p.

Multidiscipline Conference on Sinkholes, Rotterdam, Netherlands, A. A. Balkema, 1987, p. 15-23.

SECTION 3

HYDROGEOLOGICAL EVALUATION
MARCH 1998

by

TTL, Inc.

TABLE OF CONTENTS

		Page
3.1	INTRODUCTION	3-1
3.2	PREVIOUS INVESTIGATIONS	3-1
3.3	SITE DESCRIPTION	3-5
3.4	INVESTIGATORY PROCEDURES	3-10
3.5	REGIONAL GEOLOGY AND STRATIGRAPHY	3-16
3.6	STRUCTURE	3-19
3.7	SITE-SPECIFIC GEOLOGY	3-20
3.8	REGIONAL HYDROGEOLOGY	3-25
3.9	SITE-SPECIFIC HYDROGEOLOGY	3-25
3.10	WATER-WELL INVENTORY	3-35
3.11	REFERENCES	3-40

APPENDIX 3.1

3.1A - Boring Logs and Piezometer-Completion Diagrams for Piezometers 97-1 Through 97-17, Hydrogeological Evaluation, January 1998

3.1B - Boring Logs for Ground-Water Monitoring, Wells MW1 through MW9, Ground-Water Monitoring Report, February 1997

3.1C - Boring Logs for Piezometers 11A and C1-1 through C1-5, Supplement to October 1994 Hydrogeological Evaluation, Revised May 19, 1995

3.1D - Boring Logs and Piezometer-Completion Diagrams for Piezometers 94-1 through 94-33, 94-35, and 94-36 and Boreholes 94-34, EXB3, and EXB4; Hydrogeological Evaluation; October 1994

3.1E - Boring Logs B-1 through B-5, Geotechnical Evaluation, November 1992

3.1F - Boring Logs and Well-Completion Diagrams for PZ-1 through PZ-4, E-1 and DW-1; Ground-Water Evaluation (Phases I and II); August 1992

TABLE OF CONTENTS (Cont.)

3.1G - Boring Logs and Piezometer-Completion Diagrams for Piezometers 04-1, 04-2, 04-5, 04-6, and 04-7; Geological Evaluation; August 1988

Appendix 3.2 - Ground-Water Elevations in Piezometers and Monitoring Wells; March 1994 through January 1998.

LIST OF TABLES

No.		Page
3.1	Borehole characteristics and construction characteristics of piezometers, monitoring wells, and temporary borings	3-11
3.2	Highest ground-water elevations in piezometers and monitoring wells	3-27
3.3	Water-supply wells and springs within about one mile of the Black Warrior Solid Waste Facility	3-37

LIST OF FIGURES

No.		Page
3.1	Locations of monitoring wells, piezometers, boreholes, and geological cross-sections	3-2
3.2	Topographic map of Black Warrior Solid Waste Facility	3-6
3.3	Geological cross-section A-A' and water levels in the perched and first-saturated zones	3-7
3.4	Geological cross-section B-B' and water levels in the first-saturated zone	3-8
3.5	Regional geologic map	3-17
3.6	Generalized geological columnar sections	3-18
3.7	Geological cross-section C-C' and water levels in the perched and first-saturated zones	3-21
3.8	Geological cross-section D-D' and water levels in the first-saturated zone	3-22
3.9	Elevations of the top of the very stiff unstructured clay at the base of the first-saturated zone	3-23
3.10	Composite of highest ground-water elevations (from March 1994 through January 1998) in piezometers and monitoring wells completed in the first continuous zone of saturation	3-32
3.11	Ground-water elevations in first continuous zone of saturation on April 21, 1997	3-33
3.12	Water-supply wells and springs within about one mile of the Black Warrior Solid Waste Facility	3-36

SECTION 3

HYDROGEOLOGICAL EVALUATION MARCH 1998

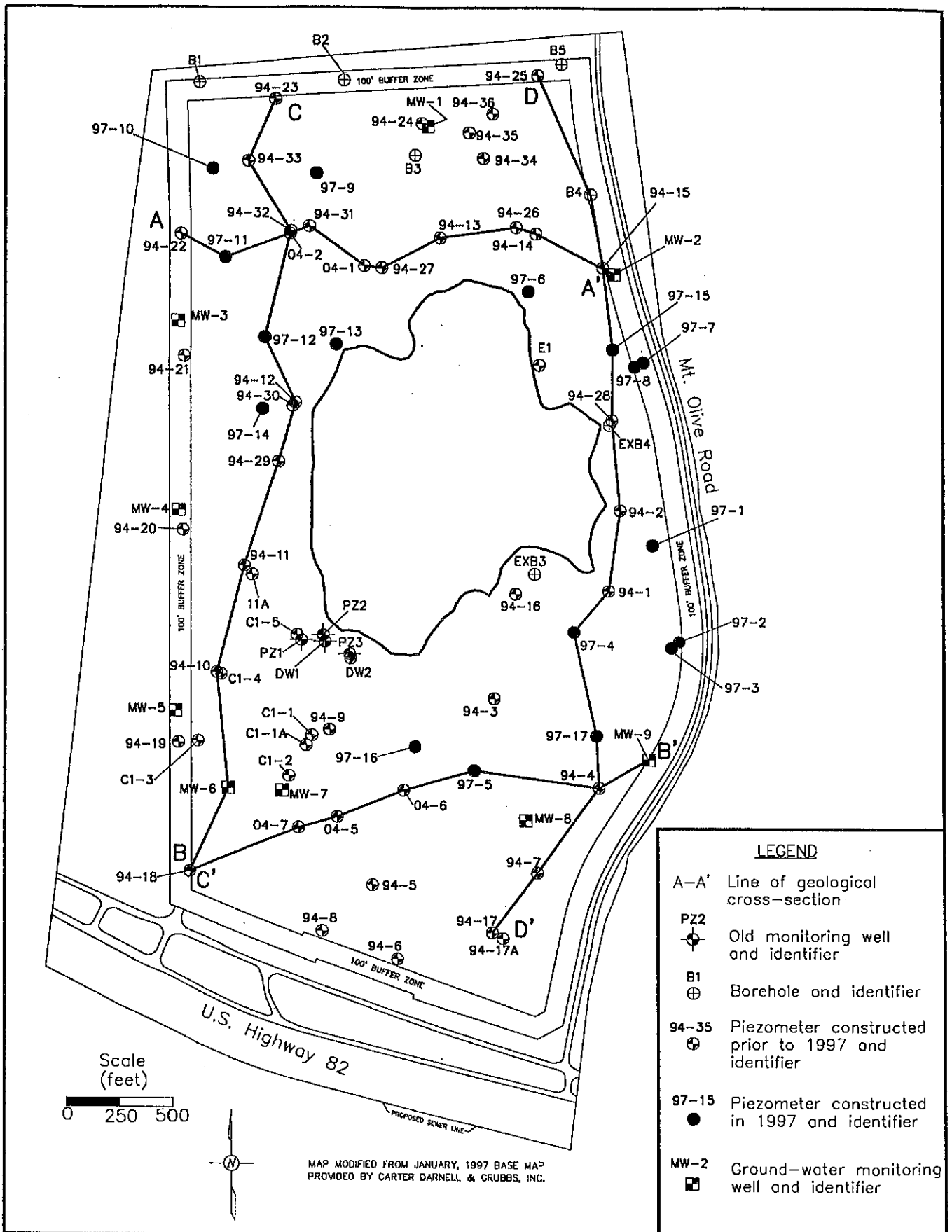
3.1 INTRODUCTION

TTL prepared this hydrogeologic evaluation to comply with the current solid-waste regulations (revised November 1996) and to provide hydrogeological data for designing cells 3 through 14 at the Black Warrior Solid Waste Facility. As requested by Carter, Darnell & Grubbs, **TTL** revised the previous hydrogeological evaluation (October 1994) and included additional data for the map of the highest ground water in the first continuous zone of saturation. Seventeen additional piezometers were constructed for this hydrogeological evaluation.

3.2 PREVIOUS INVESTIGATIONS

TTL used results of the hydrogeological evaluation and results of previous investigations to interpret the hydrogeology at the Black Warrior Solid Waste Facility site. Several boreholes have been augered and piezometers and monitoring wells constructed at the site since 1981. The locations of the boreholes, piezometers, and wells that were used for the current evaluation are shown on Figure 3.1. **TTL** used the boring logs and depths to water reported for, or measured in, several of the boreholes and piezometers in interpreting the hydrogeological characteristics of the site. To provide background information, the purposes and results of those previous investigations are summarized below.

In March 1981, **TTL** augered three test borings at the site--Coker Landfill (now the Black Warrior Solid Waste Facility). The work was performed for the City of Tuscaloosa (**TTL, Inc.**; 1981). Two of the boreholes were converted to monitoring wells to comply with ADEM (Alabama Department of Environmental Management) regulations. Casing was placed in the third borehole sometime after March 1981 so that the boring could be used as a well.



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.1. Locations of monitoring wells, piezometers, boreholes, and geological cross-sections; Hydrogeological Evaluation; Block Worrior Solid Waste Facility; Tuscolooso County, Alabama.

In January 1988, the City of Tuscaloosa submitted an application to ADEM for a permit to expand the Coker Landfill. To fulfill ADEM requirements for the permit, Hankins and Harrison Engineering, Inc. retained **TTL** to perform a geological evaluation for the City of Tuscaloosa. **TTL** augered eight borings at the site for the evaluation. Five of the eight borings were converted to piezometers. **TTL** completed the geological evaluation and submitted a report to the City of Tuscaloosa in October, 1988 (**TTL, Inc.**; 1988).

In May 1992, two of the monitoring wells that were constructed in March 1981 were plugged and abandoned because their constructions were outdated. To update the construction, a third monitoring well constructed in March 1981 was replaced. In May 1992, **TTL** also constructed four monitoring wells at the landfill as part of a ground-water evaluation for the City of Tuscaloosa Solid Waste Disposal Authority. The four wells constructed for the ground-water evaluation and the replaced well replaced the old monitoring system (**TTL, Inc.**; 1992a).

TTL augered five boreholes in the northernmost part of the site in October and November 1992. These five boreholes were augered for the City of Tuscaloosa Solid Waste Disposal Authority as part of a geotechnical evaluation for a northern expansion of the Coker Landfill (**TTL, Inc.**; 1992b).

As discussed in the investigatory procedures section below, **TTL** completed the current hydrogeological evaluation by utilizing geological logs and/or water levels for borings, piezometers, and monitoring wells constructed during the previous investigations. The locations of all the borings, piezometers, and monitoring wells that have been completed at the site are shown on Figure 3.1. The information from these sources was combined with and compared to information obtained during the current investigation to determine the geology and hydrogeology at the site. Thus, geological logs and/or water levels were used for monitoring well E-1; piezometers 04-1, 04-2, 04-5, 04-6, and 04-7; piezometers PZ-1, PZ-2, PZ-3, and DW-1; and boreholes B-1 through B-5. Well E-1 is the replacement well that was constructed in 1992 to replace the original well E-1 that was constructed in March 1981. Piezometers 04-1, 04-2, 04-5, 04-6, and 04-7 were constructed in October 1988 for the geological evaluation. Piezometers PZ-1, PZ-2, PZ-3, and DW-1 were constructed for the 1992 ground-water evaluation. Boreholes B-1 through B-5 were constructed in October and November 1992 for the geotechnical evaluation for the northern expansion.

Piezometers 94-1 through 94-33, 94-35, and 94-36, and boreholes 94-34, EXB3, and EXB4 were constructed in March, August, and September 1994 for the October 1994 Hydrogeological Evaluation. These piezometers and boreholes were completed to determine the geology, depths to ground water, and ground-water flow directions within the Black Warrior Solid Waste Facility property. Slug and bail tests were completed for determining the rates of ground-water flow, and water wells within one mile of the site were inventoried.

The next phase of hydrogeologic work at the site was in response to a March 2, 1995 memorandum from Dale Case of ADEM to Gerald Hardy (ADEM). Mr. Case recommended pump or slug tests to determine the hydraulic conductivity of the first continuous zone of saturation. Mr. Case also asked for TTL to determine the southern extent of seeps in the northwestern part of the site. **TTL, Inc.** subsequently determined the permeability of the first continuous zone of saturation in the southwestern part of the site where cell 1 of the landfill was to be constructed. Piezometers 11A, and C1-1 through C1-5 were constructed for the May 1995 revision of the Hydrogeological Evaluation. Further, **TTL** determined the southern extent of ground-water seeps that emanate at the contact of sands and a clay in the northwestern part of the site. Results of these additional activities were reported in May 1995 as Section 4 of the Project Manual. Mr. Ron Hicks of ADEM requested that **TTL** also compare ground-water elevations at the site to historical maximum ground-water levels in Tuscaloosa County, Alabama. This comparison was forwarded to ADEM in January 1996 as Appendix 4.4 to the revised Project Manual.

After review of the revised Project Manual, ADEM personnel issued a permit for the site and approved the construction of cells 1 and 2.

Monitoring wells MW1 through MW9 were constructed in June and November 1996 for ground-water detection monitoring at the Black Warrior Solid Waste Facility. The boring logs and/or well-construction diagrams for these borings, piezometers, and monitoring wells are provided in Appendices 3.1 B-G. The locations of these borings, piezometers, and monitoring wells are shown on Figure 3.1.

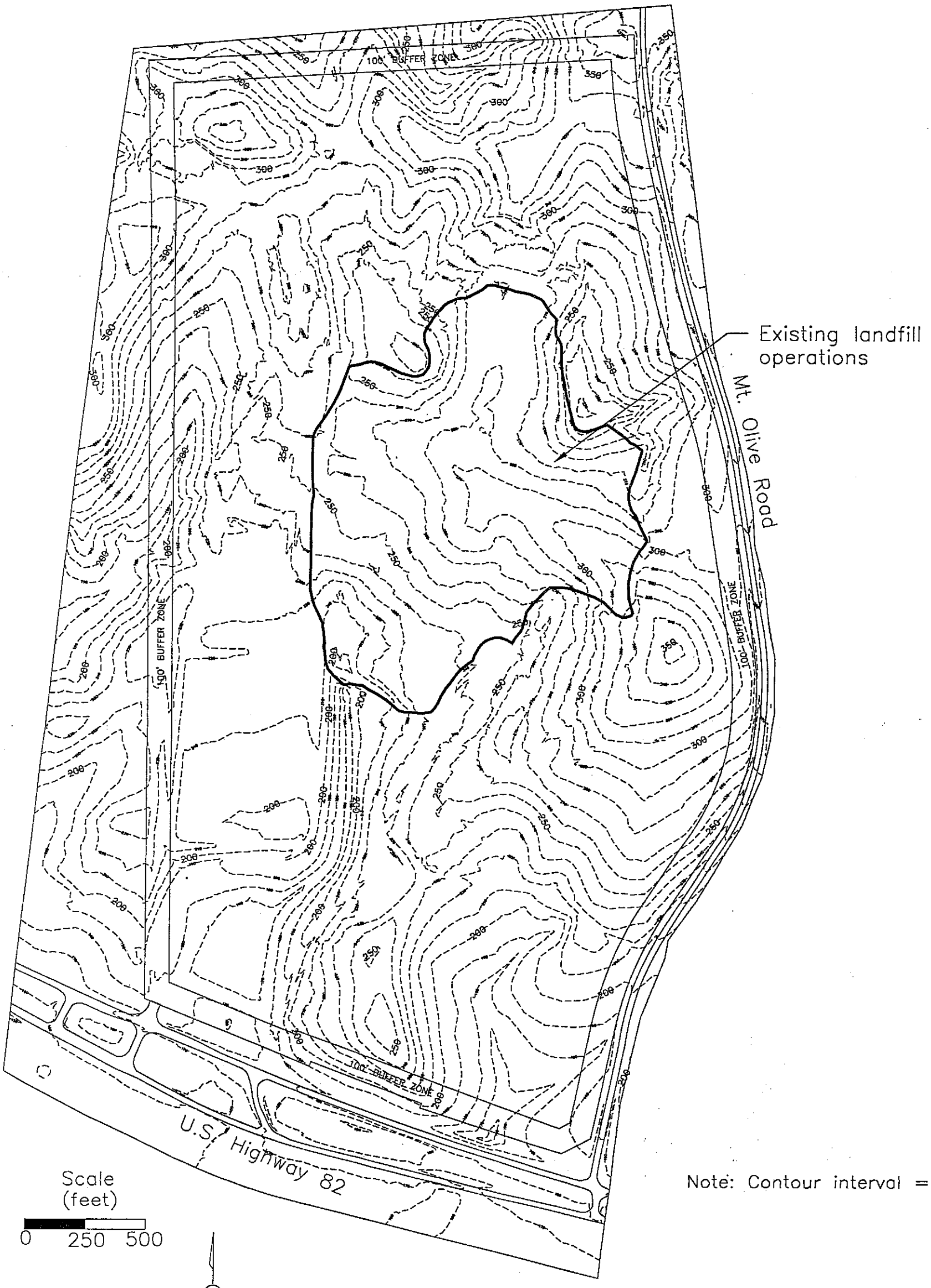
3.3 SITE DESCRIPTION

The site is about two miles northeast of Coker, Alabama, which is in west-central Tuscaloosa County. The site is in the eastern half of Section 11 and the southeast quarter of Section 2, Township 21 South, Range 11 West of the Coker 7½-minute U.S. Geological Survey topographic map. The southern property boundary is the north right-of-way of U.S. Highway 82. The eastern property boundary is contiguous to Mount Olive Road (County Road 23). The northern and western boundaries of the Landfill site adjoin privately-owned property.

The site is within the Fall Line Hills District of the East Gulf Coastal Plain physiographic province (DeJarnette and Crownover, 1987). The Fall Line Hills District is characterized by dissected uplands with a few broad or flat divides. The land surface is generally between 100 to 450 feet AMSL (above mean sea level) in the Fall Line Hills District. South of the site (south of Highway 82) is the Alluvial Plain District of the East Gulf Coastal Plain, which is characterized by floodplains and terraces along major rivers such as the Black Warrior River. The Black Warrior River is about 2.5 miles south of the landfill property.

The landfill is on property that is about 4,000 feet long and has a maximum width of about 2,500 feet. The property is widest in the central part of the site. Boreholes have been augered and piezometers constructed throughout the site.

The January 1998 topography of the Black Warrior Solid Waste Facility property is shown on Figure 3.2. The site encompasses two north-south trending ridges that are along the eastern and western sides of the site. Closed, former landfill operations are within the natural valley between these two ridges (see Figure 3.2). The current landfill operations (cells 1 and 2) are in the western part of the site. Figures 3.3 and 3.4, which are east-west geological cross-sections of the northern and southern parts, respectively, of the site show the characteristics of the ridges along the eastern and western sides of the site. These cross-sections show topography prior to construction of cells 1 and 2.

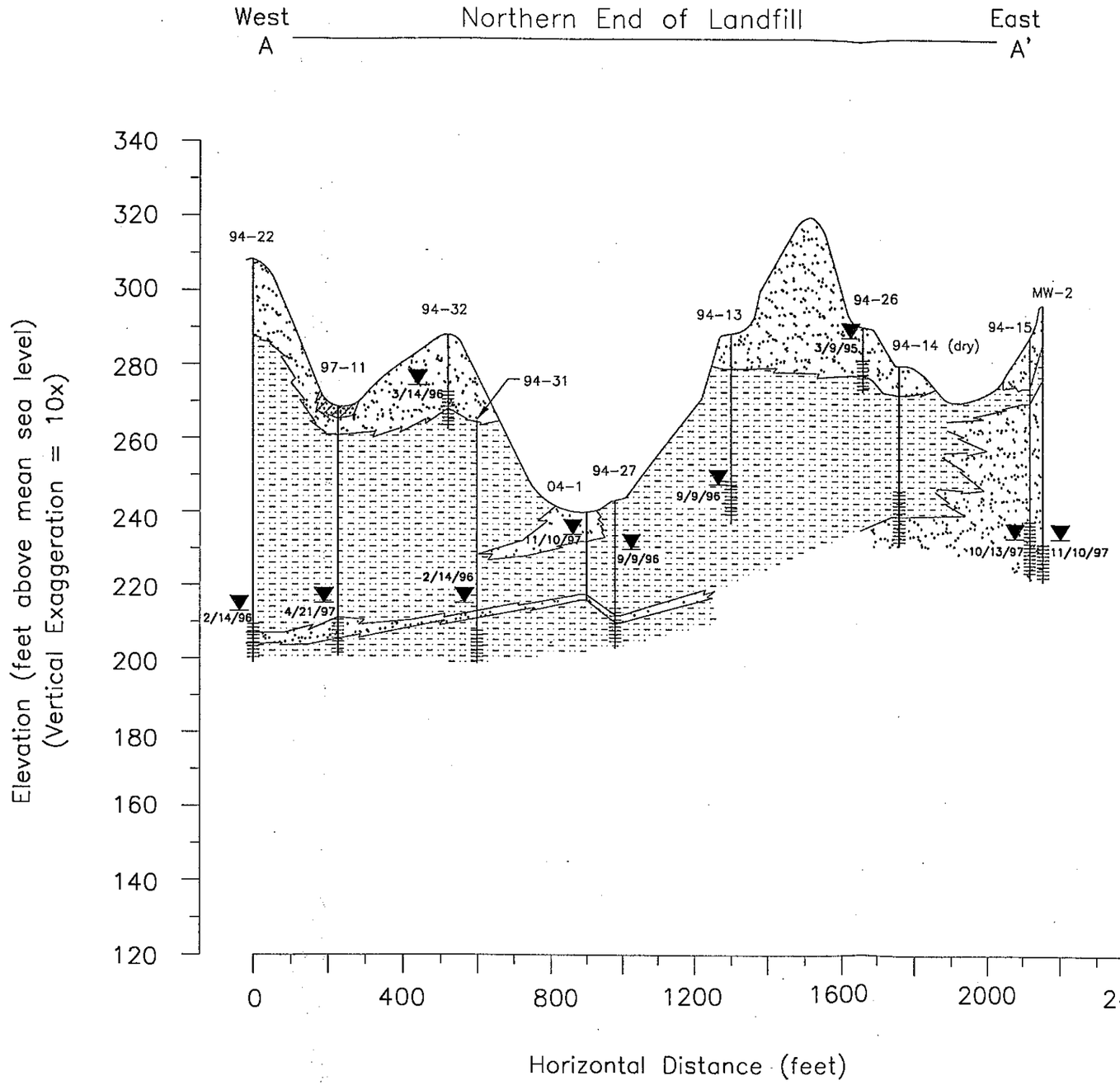


Note: Contour interval = 10 feet

TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.2. Topographic map of Black Warrior Solid Waste Facility site; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.



LEGEND

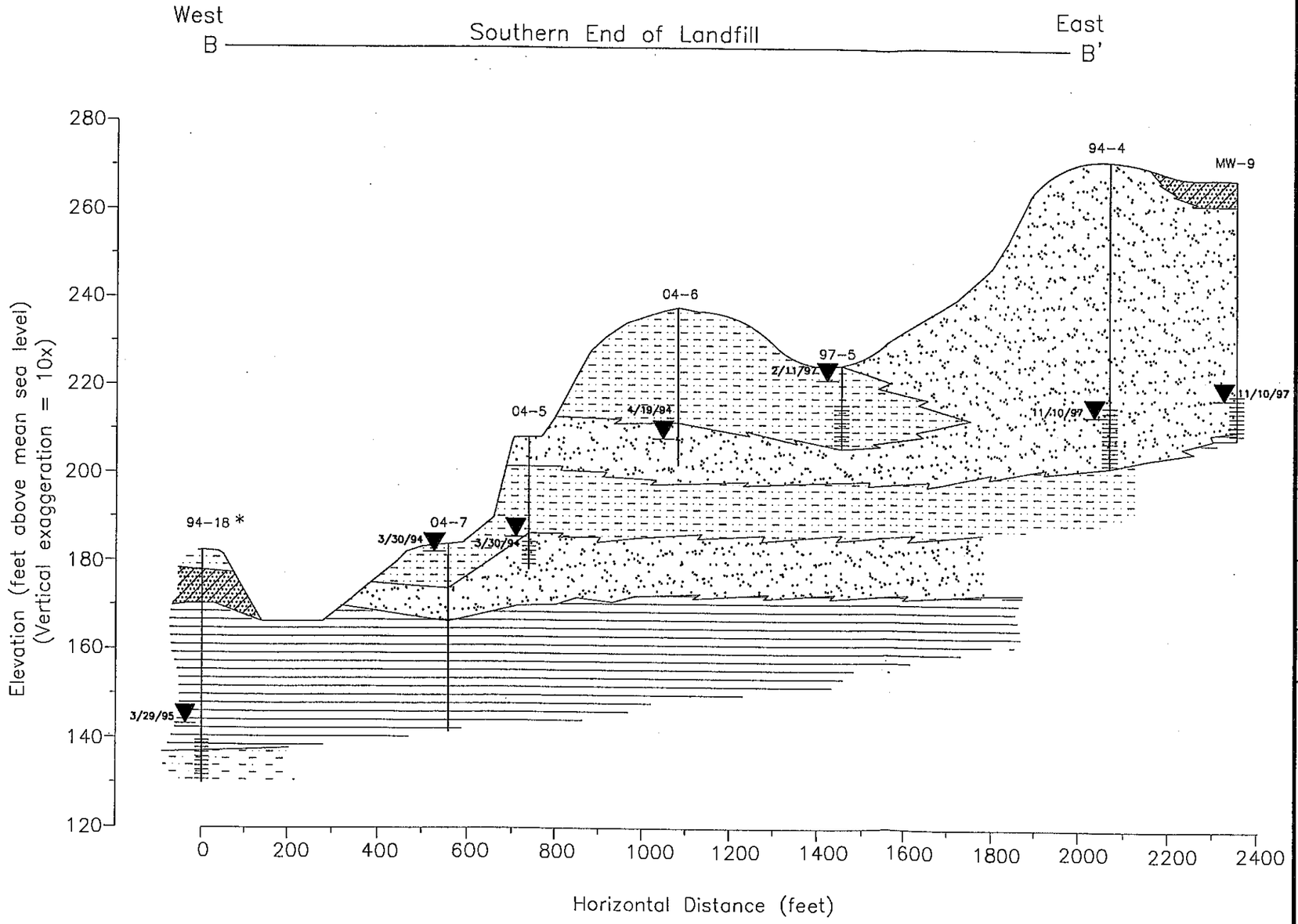
- SAND, very fine- to fine-grained, silty, and/or clayey
- SILT
- CLAY, silty with laminae of very fine-grained sand
- ▼ 11/10/97 — Highest water level and date of measurement
- 94-27 — Piezometer or monitoring well and identifier
- Screened interval (screened interval not known for piezometer 04-1.)

TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.3. Geological cross-section A-A' (West-East) and highest water levels in the perched and first-saturated zones from March 1994 through January 1998; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

[Line of cross-section shown on Figure 3.1.]



LEGEND

SAND; very fine- to fine-grained, silty and/or clayey

SILT

CLAY; silty with laminae of very fine-grained sand

CLAY; silty; very stiff

▼ 11/10/97 Highest water level and date of measurement

* Note: Piezometer 94-18 is screened beneath the very stiff, unsaturated clay.

94-4 Piezometer or monitoring well and identifier

Screened interval (screened interval not known for piezometer 04-7 and 04-6.)

TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.4. Geological cross-section B-B' (West-East) and highest water levels in the first-saturated zone from March 1994 through January 1998; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

[Line of cross-section shown on Figure 3.1.]

The extreme northern part of the site has several steep-sided hills that join to form an east-west highland. Surface runoff is principally north and south off this highland. Land-surface elevations are about 160 to 180 feet AMSL in the southernmost part of the landfill site but 300 to 350 feet AMSL in the northernmost part of the site.

Prior to constructing Subtitle D cells 1 and 2, solid waste had been disposed in the central part of the site. The eastern, western, and northern parts of the site have been disturbed by activities associated with constructing cells 1 and 2. There are several unpaved roads at the site. These roads have resulted primarily from preparation of drilling pads for augering boreholes and constructing piezometers for the current and previous hydrogeological evaluations and for hauling construction materials to build cells 1 and 2. A paved road (the access road to the landfill) extends northward from U. S. Highway 82 to the southern extent of landfill operations. There are pipelines and overhead electrical wires for coalbed methane production in the eastern and northern parts of the site. Alabama Power Company has a right-of-way for overhead electrical wires in the northern part of the site.

Prior to use of the site for a landfill, an intermittent stream flowed through the valley that dissects the site. Water from two drainageways entered this stream in the northern part of the site. Eventually, pipes were installed to convey the water from these two drainageways into a larger pipe that coincides with the intermittent stream. These three pipes then were covered with solid waste. The southern part of the intermittent stream was relocated eastward to provide for space to construct cell 1 of the Subtitle landfill. Water from the covered pipes now empties into the relocated drainageway and flows to a sedimentation pond that is at the southern end of the site.

3.4 INVESTIGATORY PROCEDURES

In January 1997, **TTL** began field activities to construct 17 piezometers at the Black Warrior Solid Waste Facility. These 17 piezometers, 97-1 through 97-17, were completed to depths between 19 and 95 feet BLS. The locations of these piezometers are shown on Figure 3.1 and boring logs and provided in Appendix 3.1A. These piezometers were placed in areas of the site where there was no solid waste and where additional water-level data were needed.

A truck-mounted drill (CME-75) equipped with 4¼-inch ID hollow-stem augers was used to auger boreholes for the piezometers. The piezometers were constructed by removing the hollow-stem augers and inserting 10 feet of 2-inch diameter PVC (polyvinylchloride) screen connected to 10 to 90 feet (depending on depth of borehole) of PVC riser into the open borehole. A sand pack of graded filter sand was emplaced around each well screen and a bentonite plug was placed on top of the sand pack. A cement/bentonite seal was placed on top of the bentonite plug. The well head for each piezometer consists of about 3 feet of PVC casing that is sealed with a PVC cap. The piezometers were not completed with protective steel casings because the piezometers will not be used for long-term monitoring. Characteristics of boreholes and piezometers and monitoring wells constructed during this investigation and during previous investigations at the site are provided in Table 3.1 and on the respective boring logs in Appendix 3.1A-G.

Each piezometer constructed during this hydrogeological evaluation was developed with a Westinghouse pneumatic pump until the ground water recovered from each piezometer was relatively clear. The elevations of the measuring point at the top of each piezometer and the land surface adjacent to each piezometer were surveyed by Almon Associates, Inc.

Depths to water were measured with an electric tape in existing piezometers and monitoring wells twice monthly in February, March, and April 1997 to comply with the revised ADEM Division 13 regulations (13-335-13-4-.11). Beginning in June 1997, depths to water also were measured monthly in existing piezometers and monitoring wells. The water levels in the wells subsequently were used to determine the directions and gradients of ground-water flow at the site.

TABLE 3.1. Borehole characteristics and construction characteristics of piezometers, monitoring wells, and temporary borings; previous investigations and July 1997 Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

Monitoring Well/ Borehole/ Piezometer I.D.	Date Augered/ Constructed	Total Depth (ft. BLS)[1]	Diameter of Borehole (inches)	Diameter of PVC Casing (inches)	Screened Interval (ft. BLS)	Slot Size of Screen (inches)	Sand Pack (ft. BLS)	Bentonite Pellet Seal (ft. BLS)	Cement/ Bentonite Seal (ft. BLS)	Date Abandoned
Geological Evaluation, August 1988										
04-1	5/3/88	24	7.25	2	unk[2]	unk	unk	unk	unk	
04-2	5/3/88	19	7.25	2	14-19	0.010	13-19	----	0-13[3]	
04-5	5/4/88	29	7.25	2	24-29	0.010	22-29	----	0-22[3]	
04-6	8/4/88	39	7.25	2	unk	unk	unk	unk	unk	Jan.-Feb. 1996[4]
04-7	8/4/88	42.5	7.25	2	unk	unk	unk	unk	unk	6/19/95
Ground-Water Evaluation (Phases I and II), August 1992										
PZ-1	5/8/92	28	7.25	2	11-20.5	0.010	10-21	7-10;21-28	0-7	9/27/95
PZ-2	5/8/92	13.5	8.25	8.25	6-10.5	0.010	4-11	2-4;11-13.5	0-2	5/30/96
PZ-3	5/8/92	25	7.25	2	14-18.5	0.010	12-19	9-12;19-25	0-9	
PZ-4	7/2/92	22	7.25	2	5.2-9.2	0.010	3.9-10.6	3.5-3.9	0-3.5	9/27/95
E-1	7/2/92	19	7.25	2	9-18	0.010	7-19	5-7	0-5	
DW-1	5/8&11/92	13.5;43	14;7.25	8;2	33-42.5	0.010	30-43	28-30	0-13.5;0-28	9/27/95
DW-2	5/8/92	25	14	8	----	----	----	----	0-25	----
Geotechnical Evaluation, November 1992										
B1	10/26/92	96	7.25	----	----	----	----	----	0-96	Sept. 1994
B2	10/27/92	21	7.25	----	----	----	----	----	0-21	Sept. 1994
B3	10/28/92	54	7.25	----	----	----	----	----	0-54	Sept. 1994
B4	10/28/92	76	7.25	----	----	----	----	----	0-76	Sept. 1994
B5	10/29/92	76	7.25	----	----	----	----	----	0-76	Sept. 1994
Hydrogeological Evaluation, October 1994										
94-1	3/4/94	104	8.25	2	84-103	0.010	80-104	74-80	0-74	
94-2	3/9/94	21	7.25	2	11-20	0.010	7.5-21	4-7.5	0-4	
94-3	3/8/94	54	7.25	2	39-53	0.010	23.5-54	20-23.5	0-20	
94-4	3/8/94	71	7.25	2	56-70	0.010	42-71	39-42	0-39	
94-5	3/11/94	46	7.25	2	36-45	0.010	33-46	30-33	0-30	
94-6	3/11/94	46	7.25	2	34-43	0.010	30.5-46	27.5-30.5	0-27.5	
94-7	3/9/94	27	7.25	2	17-26	0.010	13-27	10-13	0-10	
94-8	3/10/94	21	7.25	2	11-20	0.010	9-21	6-9	0-6	

Continued on next page

TABLE 3.1–Continued (Page 2 of 4)

Monitoring Well/ Borehole/ Piezometer I.D.	Date Augered/ Constructed	Total Depth (ft. BLS)[1]	Diameter of Borehole (inches)	Diameter of PVC Casing (inches)	Screened Interval (ft. BLS)	Slot Size of Screen (inches)	Sand Pack (ft. BLS)	Bentonite Pellet Seal (ft. BLS)	Cement/ Bentonite Seal (ft. BLS)	Date Abandoned
94-9	3/10/94	29	7.25	2	17-26	0.010	14.5-29	11.5-14.5	0-11.5	6/19/95
94-10	3/14/94	49	7.25	2	39-48	0.010	36-49	32.5-36	0-32.5	6/5-6/97
94-11	3/14/94	84	7.25	2	73-82	0.010	70-84	66.5-70	0-66.5	6/6/95
94-12	3/12/94	31	7.25	2	19-28	0.010	16-31	12.5-16	0-12.5	8/18/97
94-13	3/12/94	51	7.25	2	40-49	0.010	37-51	34-37	0-34	
94-14	3/15/94	49	7.25	2	34-48	0.010	31-49	28-31	0-28	Jan.-Feb. 1996[4]
94-15	3/16/94	66	7.25	2	50-64	0.010	46.5-66	43-46.5	0-43	
94-16	3/16/94	44	7.25	2	34-43	0.010	31-44	28-31	0-28	
94-17A	8/11/94	19	8.25	2	5-14	0.010	3-19	1.5-3	0.1.5	
94-17	8/12/94	49	8.25	2	39-48	0.010	35-49	33-35	0-33	
94-18	8/10/94	53	8.25	2	43-52	0.010	37-53	35-37	0-35	Aug. 1996[5]
94-19	8/10/94	44	8.25	2	29-43	0.010	27-44	25-27	0-25	6/5/95
94-20	8/11/94	34	8.25	2	19-33	0.010	16-34	14-16	0-14	
94-21	8/16/94	37.5	8.25	2	27.5-36.5	0.010	24-37.5	22-24	0-22	
94-22	8/15/94	109	8.25	2	99-108	0.010	95-109	93-95	0-93	
94-23	8/17/94	22.5	8.25	2	12.5-21.5	0.010	7.5-22.5	5.5-7.5	0-5.5	
94-24	8/17/94	32.5	8.25	2	22.5-31.5	0.010	19-32.5	17-19	0-17	
94-25	8/17/94	72	8.25	2	57-71	0.010	48-72	46-48	0-46	
94-26	8/17/94	19	8.25	2	9-18	0.010	7-19	5-7	0-5	
94-27	8/15/94	39.5	8.25	2	29.5-38.5	0.010	27-39.5	25-27	0-25	
94-28	8/18/94	55	8.25	2	40-54	0.010	36-55	34-36	0-34	
94-29	8/10/94	84	8.25	2	50-59	0.010	47-84	45-47	0-45	between 5&11/95[6]
94-30	9/28/94	63	7.25	2	53-62	0.010	50-63	48-50	0-48	Dec. 1995[7]
94-31	9/29/94	67	7.25	2	57-66	0.010	53-67	50.5-53	0-50.5	
94-32	9/29/94	75	7.25	2	15.5-24.5	0.010	11.5-25.5	9.5-11.5	0-9.5	
94-33	9/29/94	58	7.25	2	48-57	0.010	45-58	43-45	0-43	between 5&9/96[8]
94-34	9/29/94	75	7.25	----	----	----	----	----	0-75	Sept. 1994
94-35	9/30/94	75	7.25	2	65-74	0.010	61-75	59-61	0-59	
94-36	10/2/94	26	7.25	2	16-25	0.010	12.5-26	10.5-12.5	0-10.5	
EXB3	8/12/94	74	8.25	----	----	----	----	----	0-74	Sept. 1994
EXB4	8/18/94	74	8.25	----	----	----	----	----	0-74	Sept. 1994

Continued on next page

TABLE 3.1–Continued (Page 3 of 4)

Monitoring Well/ Borehole/ Piezometer I.D.	Date Augered/ Constructed	Total Depth (ft. BLS)[1]	Diameter of Borehole (inches)	Diameter of PVC Casing (inches)	Screened Interval (ft. BLS)	Slot Size of Screen (inches)	Sand Pack (ft. BLS)	Bentonite Pellet Seal (ft. BLS)	Cement/ Bentonite Seal (ft. BLS)	Date Abandoned
Supplement to Hydrogeological Evaluation, May 1995										
C1-1	4/14/95	29	8.25	2	26-28	0.010	23.5-29	21.5-23.5	0-21.5	9/1/95
C1-1A	4/14/95	20	8.25	2	17-19	0.010	15-20	13-15	0-13	9/1/95
C1-2	4/14/95	24	8.25	2	21-23	0.010	20-24	18-20	0-18	9/1/95
C1-3	4/17/95	34	8.25	2	29-33	0.010	28-34	26-28	0-26	9/1/95
C1-4	4/14/95	41.5	8.25	2	39-41	0.010	37.5-41.5	35.5-37.5	0-35.5	6/5-6/95
C1-5	4/17/95	14	8.25	2	11.5-13.5	0.010	10.5-14	9-10.5	0-9	9/1/95
11A	4/17/95	34	8.25	2	24-33	0.010	22-34	20-22	0-20	6/6/95
Ground-Water Monitoring Report, February 1997										
MW1	6/17/96	35	10.25	4	25-34	0.010	22.5-35	19.5-22.5	0-19.5	
MW2	6/18/96	75	10.25	4	65-74	0.010	62-75	57-62	0-57	
MW3	6/20/96	54	10.25	4	44-53	0.010	41-54	38-41	0-38	
MW4	6/20/96	15	10.25	4	5-14	0.010	3-15	1-3	0-1	
MW5	11/12/96	54	10.25	4	24-53	0.010	19-54	16-19	0-16	
MW6	11/12/96	23	10.25	4	13-22	0.010	10-23	8-10	0-8	
MW7	11/13/96	34	10.25	4	24-33	0.010	21-34	18-21	0-18	
MW8	6/19/96	26	10.25	4	16-25	0.010	13-26	10-13	0-10	
MW9	6/19/96	59	10.25	4	49-58	0.010	46-59	43-46	0-43	
Hydrogeological Evaluation, July 1997										
97-1	1/7/97	69	8.25	2	59-68	0.010	55-69	53-55	0-53	
97-2	1/7-10/97	49	8.25	2	39-48	0.010	36-49	34-36	0-36	
97-3	1/7-8/97	95	8.25	2	85-94	0.010	82-95	78-82	0-78	
97-4	1/10/97	84	8.25	2	74-83	0.010	71-84	68-71	0-68	
97-5	1/13/97	19	8.25	2	9-18	0.010	6-19	4-6	0-4	
97-6	1/13/97	39	8.25	2	29-38	0.010	26-39	24-26	0-24	
97-7	1/13/97	22.5	8.25	2	12.5-21.5	0.010	10-22.5	8-10	0-8	
97-8	1/13/97	48	8.25	2	38-47	0.010	36-48	34-36	0-34	
97-9	1/14/97	69	8.25	2	59-68	0.010	56-69	53-56	0-53	
97-10	1/14/97	84	8.25	2	74-83	0.010	71-84	68-71	0-68	8/18/97

Continued on next page

TABLE 3.1–Continued (Page 4 of 4)

Monitoring Well/ Borehole/ Piezometer I.D.	Date Augered/ Constructed	Total Depth (ft. BLS)[1]	Diameter of Borehole (inches)	Diameter of PVC Casing (inches)	Screened Interval (ft. BLS)	Slot Size of Screen (inches)	Sand Pack (ft. BLS)	Bentonite Pellet Seal (ft. BLS)	Cement/ Bentonite Seal (ft. BLS)	Date Abandoned
97-11	1/15/97	68	8.25	2	58-67	0.010	55-68	52-55	0-52	8/18/97
97-12	1/15/97	54	8.25	2	44-53	0.010	41-54	39-41	0-39	8/18/97
97-13	1/15/97	54	8.25	2	44-53	0.010	41-54	39-41	0-39	8/18/97
97-14	1/16/97	44	8.25	2	34-43	0.010	31-44	29-31	0-29	
97-15	1/16/97	53	8.25	2	43-52	0.010	41-53	39-41	0-39	
97-16	1/17/97	49	8.25	2	39-48	0.010	37-49	35-37	0-35	
97-17	1/17/97	78.5	8.25	2	68.5-77.5	0.010	66-78.5	63-66	0-63	

[1] Feet below land surface.
[2] Information not known.
[3] Annulus backfilled with soil and cement instead of a cement/bentonite grout seal.
[4] Piezometer 94-14 and 04-6 destroyed by bulldozer during construction activities in Jan.-Feb. 1996.
[5] Piezometer 94-18 paved over with new entrance road in August 1996.
[6] Piezometer 94-29 covered with dirt; partially removed with bulldozer/grader in March 1997; could not be located.
[7] Piezometer 94-30 covered with dirt in Dec. 1995; could not be located.
[8] Piezometer 94-33 removed with bulldozer July-Sept. 1997.

An inventory of water wells was conducted on September 20 and 21, 1994 as part of the October 1994 Hydrogeological Evaluation. The inventory was conducted by interviewing property owners within one mile of the boundaries of the Black Warrior Solid Waste Facility site. At least 90 percent of these owners were contacted during this inventory.

Slug and bail tests were conducted in piezometers 94-4, 94-10, 94-28, 94-29, and 94-31 on October 5, 1994. These piezometers are in the southeast, southwest, east-central, west-central, and north-northwest parts of the site, respectively. The slug and bail tests were used to determine the hydraulic conductivity of the first-saturated zone at the site. About 5 feet of solid 1½-inch diameter PVC was used to raise and lower quickly the water levels in the five piezometers. A sensitive pressure transducer was used to measure accurately the changes in water levels in the piezometers in response to insertion or removal of the solid PVC. The transducer was connected to an In Situ data logger. Algorithms in the AQTESOLV computerized software (Geraghty & Miller, Inc. 1989) were used to analyze the data recorded by the data logger so that the hydraulic conductivities of the first-saturated zone could be evaluated.

The hydrogeology of the site was determined by reviewing results of augering and testing of boreholes/piezometers during this investigation and the previous investigations at the site. Outcrops at the site were examined and the results of the examinations compared to samples retrieved from boreholes during the previous and the present investigations at the site. The stratigraphy at the site was determined by reviewing publications of the Alabama Geological Survey and interviewing personnel at the Survey who are knowledgeable of the geology of the Coker, Alabama area. The hydrogeology also was determined by reviewing electrical logs and "header" information for coalbed methane wells that are at or near the Black Warrior Solid Waste Facility site. All of this information was compiled to interpret the environments of deposition and associated stratigraphic relationships for the sediments at the site. These relationships then were combined with the depths to water to establish the on-site hydrogeology and, in particular, the characteristics of the first-saturated zone.

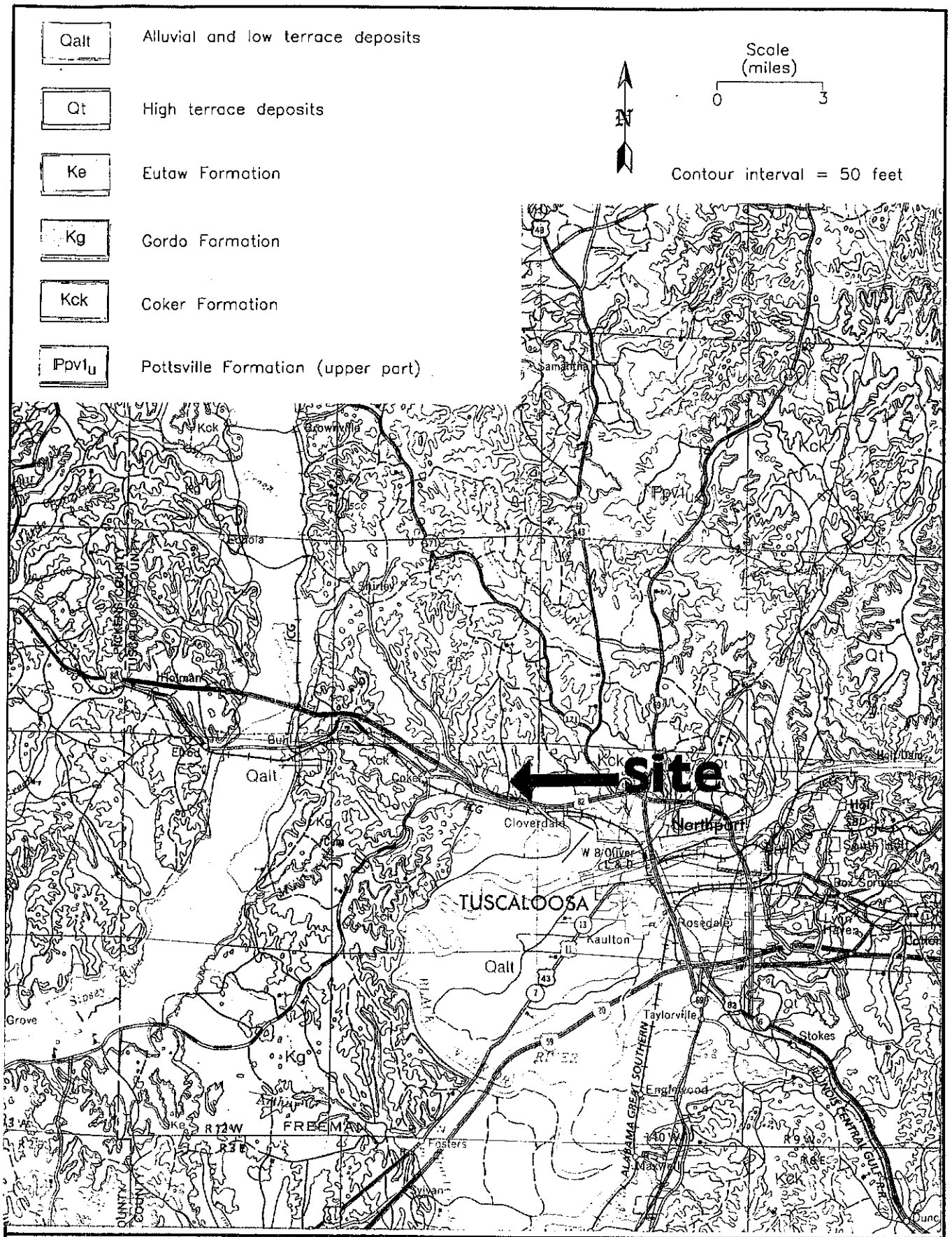
The potential for tectonic-like structural deformations at the site was evaluated by reviewing publications of the Alabama Geological Survey. The depths to the Pottsville Formation at or very near the site were estimated by reviewing the "header" information on electrical logs for coalbed

methane wells. These depths were estimated by noting the land-surface elevations at the coalbed methane wells and by noting the reported depths at which the surface casings were set. Oil and Gas Board regulations require that the surface casing must be set at least 50 feet into the top of the rock of the Pottsville Formation. An allowance of 50 feet was used for the actual depth versus reported depth of the casing of each coalbed methane well. Evaluations of structure also were completed by examining the depths to the top of a thick, stiff, unstructured clay that is continuous beneath the landfill site.

3.5 REGIONAL GEOLOGY AND STRATIGRAPHY

The Black Warrior Solid Waste Facility site is about four miles south of the contact between the unconsolidated Cretaceous-age deposits of the Coastal Plain Physiographic Province and rocks of the Pottsville Formation (see Figure 3.5). The Black Warrior Solid Waste Facility site is in west-central Alabama and is on an unconsolidated, basal, terrigenous unit of the Cretaceous Series of deposits known as the Tuscaloosa Group. In western and central Alabama, the Tuscaloosa Group is divided into the Gordo Formation and the Coker Formation (Drennen, 1953a; Smith and King, 1983). The Gordo Formation comprises an interbedded series of gravel, sand, and clay beds (Conant and others, 1945) and the underlying Coker Formation comprises highly cross-bedded and lenticular beds of sand and ferruginous clay (Monroe and others, 1946). The Coker Formation is subdivided further into an upper, unnamed member and a lower Eoline Member. The upper unnamed member comprises variegated and mottled massive ferruginous clay that, locally, is sandy. The lower Eoline Member comprises massive cross-stratified and ripplemarked sands and laminated clays with some partings of glauconitic sand (Drennen, 1953a; 1953b).

In Tuscaloosa County, the Tuscaloosa Group commonly is overlain by Holocene and Pleistocene alluvial and terrace deposits. The Tuscaloosa Group unconformably overlies the rocks of the Paleozoic Pottsville Formation. The top of the Pottsville Formation, which is deeply eroded, slopes about 30 to 35 feet per mile toward the southwest in Tuscaloosa County (Paulson, Miller, and Drennen, 1962). Drennen (1953a) reported that the Gordo Formation is as much as 400 feet thick and the Coker Formation can be, locally, as much as 350 feet thick in Tuscaloosa County and vicinity. The Pottsville Formation is at least 2,500 feet thick in Tuscaloosa County. A generalized columnar section that shows the relationships of the Pottsville Formation, the Coker and Gordo Formations of the Tuscaloosa Group, and the Holocene/Pleistocene deposits is shown in Figure 3.6.

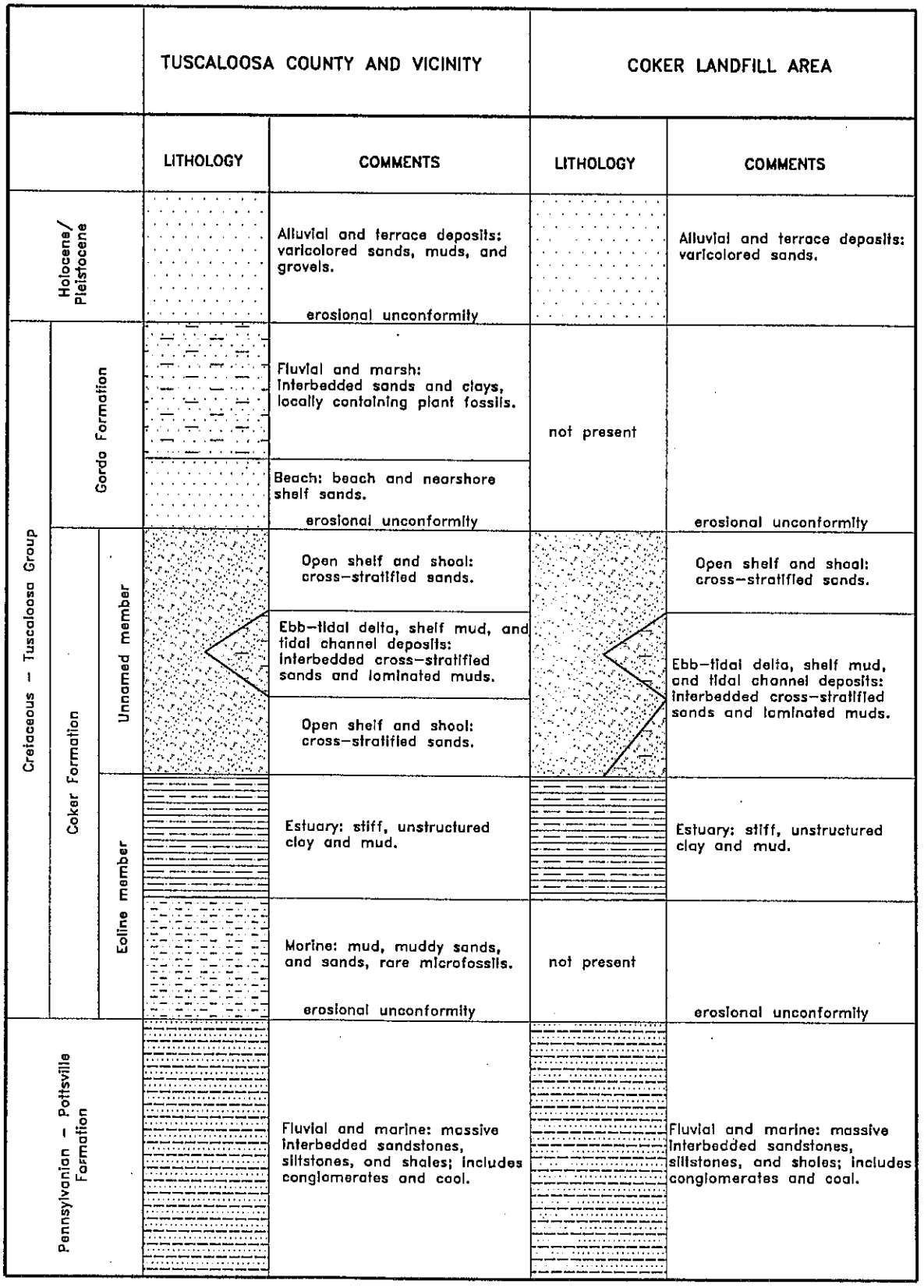


TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.5 Regional geologic map and site of Black Warrior Solid Waste Facility, Tuscalooso County, Alabama.

(modified from Szabo, Osborne, and Copeland, 1988)



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.6. Generalized geological columnar sections for Tuscaloosa County and vicinity and for Black Warriar Solid Waste Facility Area; Hydrogeological Evaluation; Tuscaloosa County, Alabama. [Modified from Hummel, 1994]

In Tuscaloosa County, the Tuscaloosa Group comprises a transgressive-regressive sequence of open-shelf sands and estuary muds. The sands and muds are overlain by and interfinger with tidal delta, tidal channel, and shelf muds and sands. This sequence is capped by marine sands, marsh muds, and fluvial sands and clays. The geometry of the Tuscaloosa Group in Tuscaloosa County is complex because of the laterally discontinuous nature of the lithologic units and because there are numerous minor and major erosional unconformities (Hummell, 1994, personal communication).

3.6 STRUCTURE

Review of a map of the top of the Pottsville Formation in Alabama that was prepared by Kidd (1976) indicated no fault-like offsets in the Pottsville Formation at or near the Landfill site. Likewise, review of a map of the top of the Pottsville Formation prepared by Paulson, Miller, and Drennen (1962) indicated no fault-like offsets in the Pottsville Formation at or near the site.

Pashin (1991) reported that cross-sections from Mississippi that were prepared by Thomas (1988) showed that normal faults in the Pottsville Formation terminate at the unconformable contact of the Pottsville Formation with the overlying Cretaceous strata. Pashin mapped a topographic lineament that coincides with the Landfill site. None of his other lineaments were near the site. The topographic lineament mapped by Pashin has a northeast-southwest orientation and roughly dissects the northern half of the landfill site.

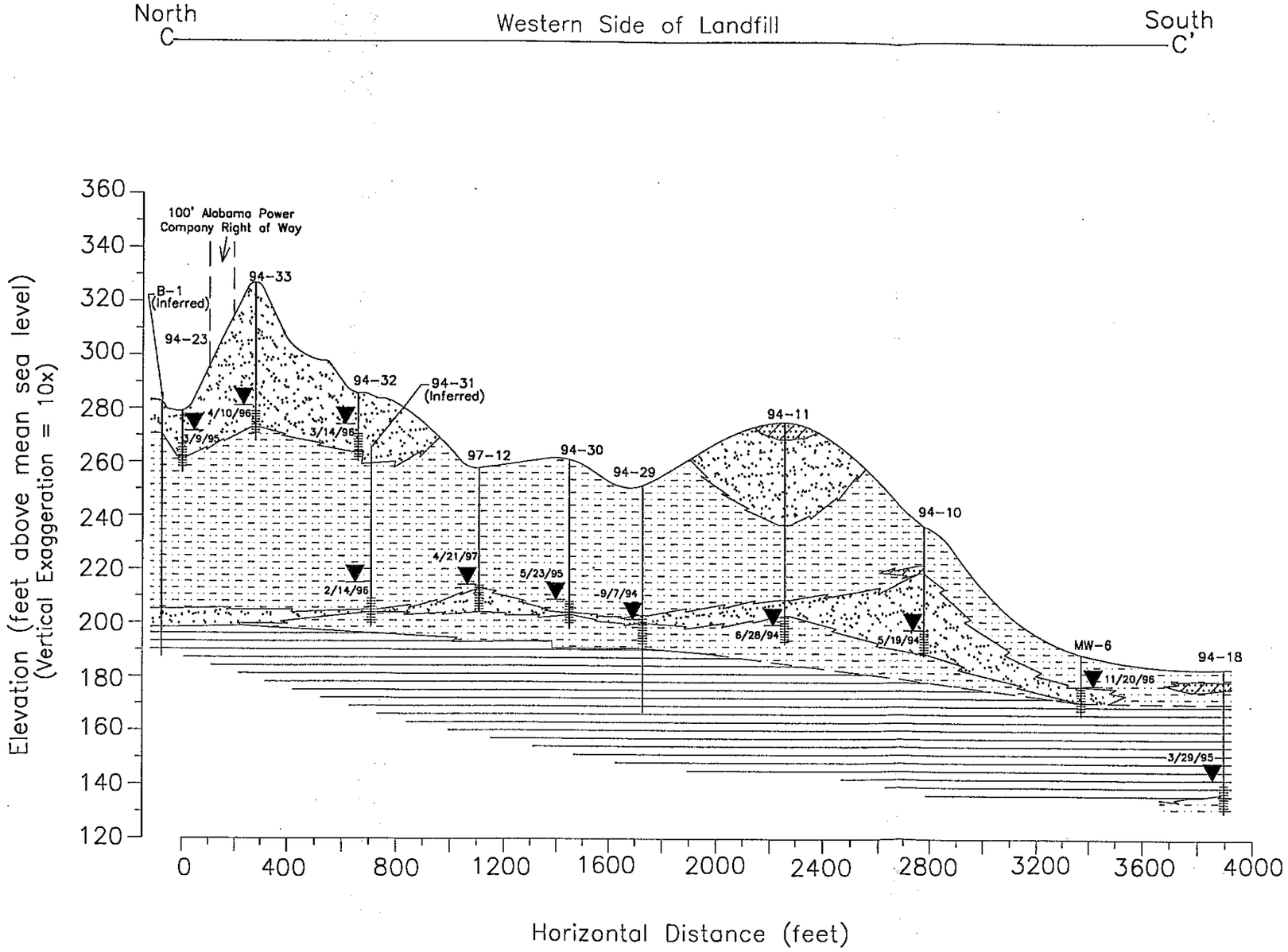
Review of the elevations of the top of the Pottsville derived from logs of coalbed methane wells indicated that there might be a fault affecting the top of the Pottsville Formation. A coalbed methane well in the quarter section west of the western boundary of the landfill site had casing set at an elevation of about 300 feet BMSL (below mean sea level). Coalbed methane wells within or near the eastern boundary of the landfill site had elevations roughly between 85 and 115 feet BMSL. Allowing a variation of 50 feet for the actual elevations at the wells provides for a difference in elevation of about 200 feet between the areas.

The top of the stiff unstructured clay was tagged in several boreholes at the site. The elevations of the top of this clay are shown in Figure 3.9. Review of the geological cross-sections (Figures 3.3, 3.4, 3.7 and 3.8) and the map of the top of the very stiff unstructured clay (Figure 3.9) indicatedthat there is no faulting of the unconsolidated deposits at the Black Warrior Solid Waste Facility site. The very stiff unstructured clay beneath the landfill does not have significant offsets or evidences of post-depositional structural movement.

3.7 SITE-SPECIFIC GEOLOGY

The principal geological units penetrated at the Black Warrior Solid Waste Facility site comprise estuarine clays and muds that are overlain by open-shelf sands. Tidal delta and/or shelf muds interfinger with estuary deposits and shelf sands at the site. These estuarine, tidal delta, and shelf deposits are in the upper unnamed member of the Coker Formation. The open-shelf sands are massive, laterally continuous and have their maximum thicknesses along the eastern, northern, and western boundaries of the site. Although there may be some Holocene-Pleistocene alluvial and terrace deposits on the hilltops at higher elevations at the site, these sediments can be so similar to some of the Tuscaloosa Group sediments that they can not be distinguished at the site (Hummel, personal communication). There are some limited amounts of alluvial deposits immediately adjacent to the stream that dissects the site. Alluvial deposits are exposed in the southernmost part of the site; other alluvial deposits probably have been covered by the landfill operations.

Review of the electrical log and associated "header" information for a coalbed methane well that is in the northern part of the landfill site indicates that the top of the Pottsville Formation is about 100 feet below mean sea level at the site. The land surface at the well is about 330 AMSL. Based on this information, the maximum thickness of the Coker Formation at the site is about 400 feet. There are three principal lithofacies at the Landfill site. The lowermost of these facies is a very stiff, silty, unstructured clay that was deposited in an estuarine environment and has very small horizontal and vertical permeabilities. This clay is beneath the entire site and is the confining layer beneath the first-saturated zone. The top of this stiff clay was penetrated in 14 boreholes. Only two boreholes (94-17 and 94-18) penetrated the entire thickness of the clay. The locations of the 14 boreholes with corresponding elevations of the top of the clay and the thickness of the clay that was penetrated are shown on Figure 3.9.



LEGEND

- SAND, very fine- to fine-grained, silty, and/or clayey
- SILT
- CLAY, silty with laminae of very fine-grained sand
- CLAY, silty, very stiff
- ▼ Highest woter level and date of measurement

*Note: Piezometer 94-18 is screened beneath the very stiff unstructured clay.

94-33 Piezometer or monitoring well and identifier

Screened interval

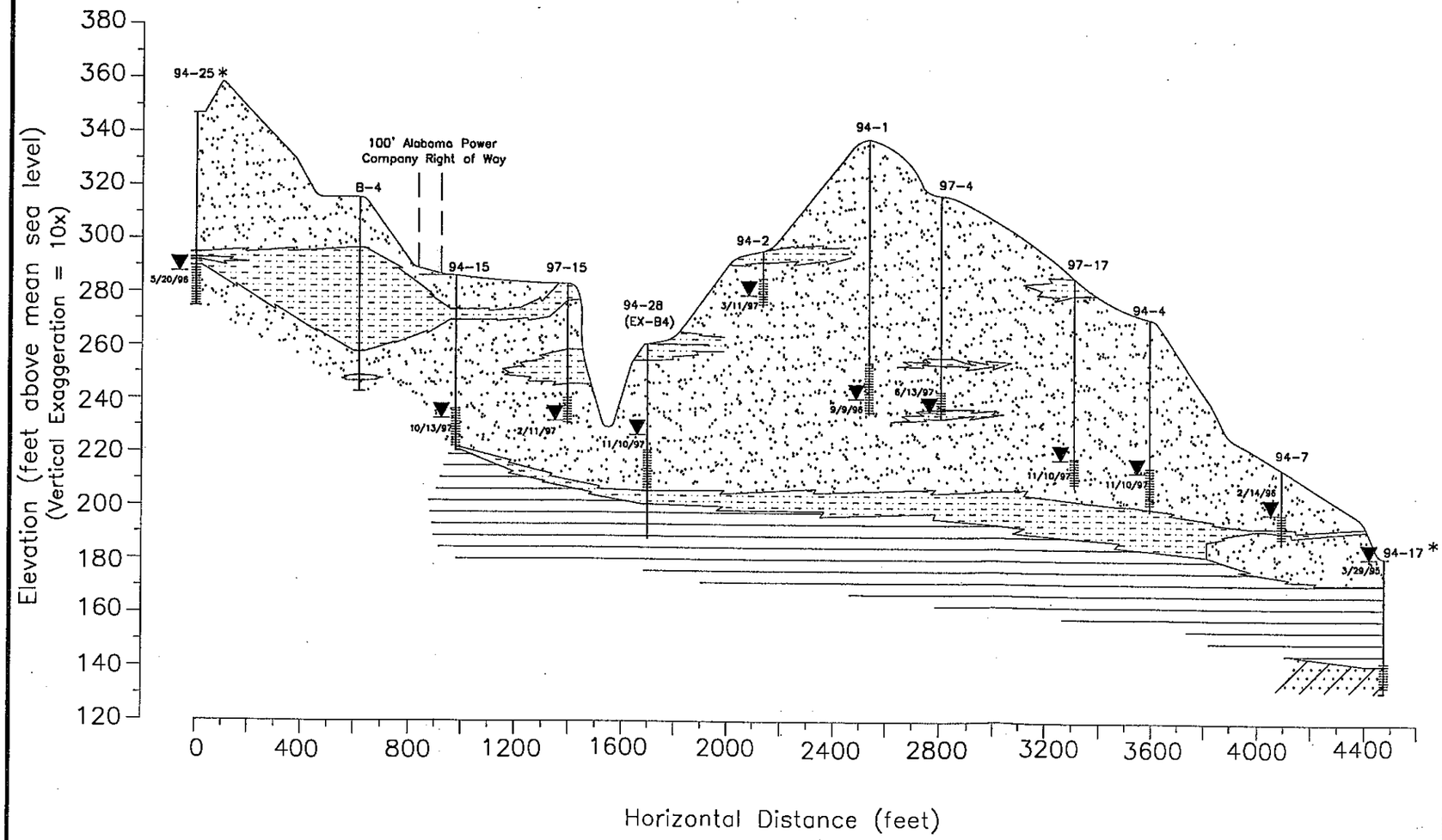
TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.7. Geological cross-section C-C' (North-South) and highest water levels in the perched and first-saturated zones from March 1994 through January 1998; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

[Line of cross-section shown on Figure 3.1.]

North D — Eastern Side of Landfill — South D'



LEGEND

- SAND, very fine- to fine-grained, silty, and/or clayey
- SILT
- CLAY, silty with laminae of very fine-grained sand
- CLAY, silty, very stiff
- ▼ 2/14/96 — Highest water level and date of measurement

* Note: Piezometer 94-17 is screened beneath the very stiff, unstructured clay. Piezometers 94-25 and 94-2 are screened in perched zone.

94-17 — Piezometer or boring and identifier

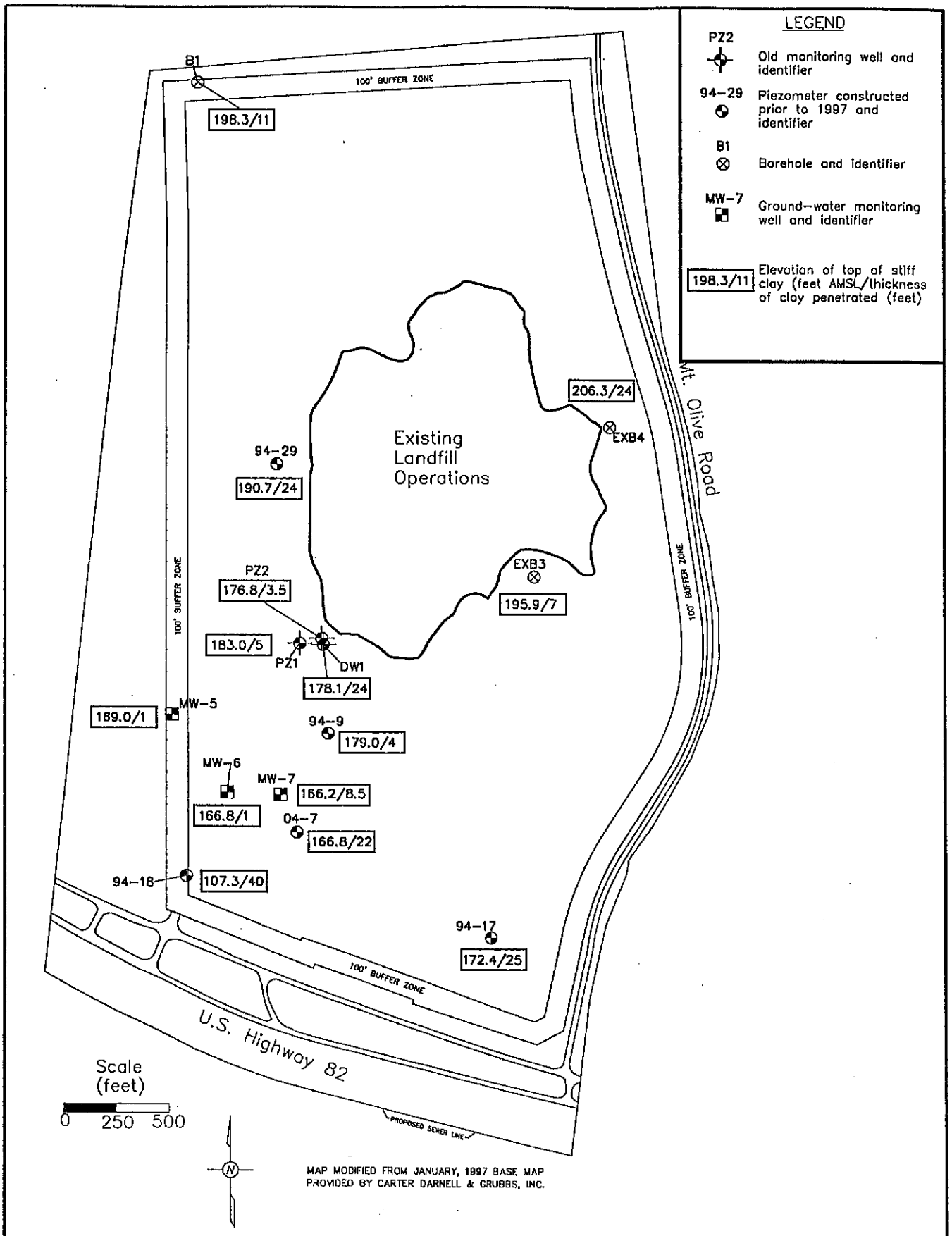
Screened interval

TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.8. Geological cross-section D-D' (North-South) and highest water levels in the first-saturated zone from March 1994 through January 1998; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

[Line of cross-section shown on Figure 3.1.]



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.9. Elevations of the top of the very stiff unstructured clay at base of the first-saturated zone; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

The lateral continuity of the very stiff clay throughout the Landfill site can be seen in Figure 3.9 and in the geological cross-sections of Figures 3.7 and 3.8. The stiff clay is 25 to 40 feet thick in the southern part of the site and at least 10 to 24 feet thick in the northern part of the site. The top of the very stiff clay is between about 170 and about 200 feet AMSL and dips southwestward at the site. The top of the very stiff clay is less than about 10 feet BLS or it is exposed at the lowermost elevations in the southern part of the site. In contrast, the top of the very stiff clay is about 90 feet BLS in the northwestern part of the site.

As noted above, the very stiff clay has very small permeabilities. Three Shelby tube samples of this very stiff clay were collected during the ground-water evaluation by **TTL** in 1992. The permeabilities from triaxial-permeability tests of these three samples were 4.2×10^{-7}, 1.1×10^{-8}, and 1.4×10^{-8} centimeter per second. These permeabilities are very small.

The second and third principal lithofacies immediately overlie the very stiff clay. The second lithofacies is a micaceous, relatively stiff clay that contains laminae and lenses of very fine-grained sand. These laminae and lenses of sand occur within the clay throughout the site. The lenses of sand usually are less than 1 inch thick but can be up to 5 inches thick. The third lithofacies caps the hills at the site and comprises micaceous, silty and/or clayey, very fine- to fine-grained sands. The third lithofacies interbeds/intercalates with the second lithofacies. The interbedding/intercalating configurations of these second and third lithofacies resulted from transgressive-regressive depositional processes. The relatively stiff clays were deposited in tidal deltaic and/or estuarine environments. The sands were deposited in tidal delta and/or shoal/shelf environments.

The second lithofacies, the micaceous stiff clay, is 40 to 70 feet thick in the western and northern parts of the site. The great thicknesses of the clay in these areas can be seen in geological cross sections A-A' (Figure 3.3) and C-C' (Figure 3.7), which are through the northern and western parts of the site, respectively. As can be seen in the cross-sections, 40 to 50 feet of sand (the third lithofacies) caps the hills in these areas of the site. Near the base of the thick clay are water-bearing sands that range in thickness from about 1 to about 25 feet. The top of the saturated zone is within these sands.

The second lithofacies, the micaceous clay, is much thinner and the third lithofacies, the very fine- to fine-grained sand, is more massive in the southern and eastern parts of the site. The very fine- to fine-grained sand is as much as 100 feet thick in the east-central part of the site. The comparative thicknesses of the clay and the sand in these southern and eastern areas can be seen in geological cross-sections B-B' (Figure 3.4) and D-D' (Figure 3.8), which are through the southern and eastern parts of the site, respectively. The top of the first-saturated zone is within, roughly, the basal 20 feet of the sand in the eastern part of the site.

3.8 REGIONAL HYDROGEOLOGY

The Pottsville Formation and the Coker Formation can be tapped as supplies for water wells in the vicinity of the Black Warrior Solid Waste Facility site. The Pottsville Formation underlies 200 to 400 feet of the Coker Formation in the vicinity of the site. The Pottsville Formation generally yields only small quantities of water to wells; these quantities usually are adequate only for domestic and stock supplies. The water in the Pottsville Formation, which occurs in joints, fractures, and along bedding planes, commonly is objectionable to consumers because of elevated concentrations of iron that can stain clothes and appliances and can cause the water to have a metallic taste.

The Coker Formation is a principal aquifer in west Alabama. Sand and gravel beds in the Coker Formation are very productive aquifers in Tuscaloosa County. Wells in the Coker Formation can be shallow, dug wells or drilled wells that are several hundreds of feet deep. For example, there are two public-supply wells at Coker, Alabama. These wells, which are about two miles west of the landfill site, are screened between 150 and 180 feet BLS and produce 130 and 170 gallons per minute of water. The water from the wells must be treated to reduce the concentrations of iron.

3.9 SITE-SPECIFIC HYDROGEOLOGY

The first-saturated zone overlies the very stiff unstructured clay that is laterally continuous and thick beneath the site. There also are localized perched zones of water that occur in the sands that cap the hills in the northern part of the site. Between the top of the Pottsville Formation and the base of the very stiff unstructured clay are 200 to 300 feet of gravels, sands, and clays of the Coker Formation that are the uppermost aquifer.

In the eastern part of the site, the ground water of the first-saturated zone occurs predominantly in the basal part of the thick, silty and/or clayey, very fine- to fine-grained sand (third principal lithofacies). As can be seen in Figure 3.8 and Table 3.2, the ground water in this first-saturated zone south of the Alabama Power right-of-way is between 220 and 240 feet AMSL in the eastern part of the site.

In contrast, ground water in the first-saturated zone in the western, northern, and southern parts of the site occurs predominantly in 1- to 25-foot-thick silty and/or clayey, very fine- to fine-grained sand that is interbedded/intercalated within the stiff, micaceous clay (second principal lithofacies). This interbedding/intercalating of the sand with the clay is especially evident in geological cross-section C-C' (Figure 3.7). Part or all of the screen of each of the piezometers tapping the first-saturated zone in the western, northern, and southern parts of the landfill were within the water-bearing 1- to 25-foot-thick sand. The stiff clay above the 1- to 25-foot-thick sand contains laminae and occasional thin (less than 1 inch to 5 inches thick) lenses of very fine-grained sand. The thin lenses of sand occur sporadically within the clay. The samples of these thin lenses of sand retrieved during augering of the boreholes for the piezometers were often moist or wet. Boreholes for piezometers were not augered far below the base of the 1- to 25-foot-thick sand. There could be such lenses of saturated sand below the base of the 1- to 25-foot-thick sand. These lenses could be hydraulically connected to the 1- to 25-foot-thick sand. Therefore, the first-saturated zone is considered to extend from the 1- to 25-foot-thick water-bearing sand tapped by the piezometers to the top of the very stiff unstructured clay that is beneath the landfill site.

As shown on Figure 3.7, the ground-water levels in the first-saturated zone are between about 200 and about 220 feet AMSL in the western part of the site. As described above, the ground water in this zone is between about 220 and about 240 feet AMSL in the eastern part of the site (see Figure 3.8).

TABLE 3.2. Highest ground-water elevations in piezometers and monitoring wells; March 1994 through January 1998; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

Note: Elevation of measuring point: top of casing
ft. BMP: feet below measuring point
ft. AMSL: feet above mean sea level

Monitoring Well/ Piezometer/ Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
MW1	278.2	280.92	2/25/97	22.78	258.14
MW2	296.5	299.44	11/10/97	66.10	233.34
MW3	256.2	258.61	12/12/97	47.21	211.40
MW4	194.4	196.88	9/10/97	7.59	189.29
MW5	222.0	225.02	1/13/98	27.57	197.45
MW6	188.8	191.62	11/20/96	14.52	177.10
MW7	196.7	199.56	3/24/97	24.47	175.09
MW8	215.4	217.84	9/10/97	16.78	201.06
MW9	267.6	270.14	11/10/97	52.52	217.62
97-1	309	313.19	1/13/98	62.13	251.06
97-2	312.8	316.90	12/12/97	52.78	264.12
97-3	312.6	317.74	1/13/98	90.87	226.87
97-4	317.4	322.51	6/13/97	86.48	236.03
97-5	224.9	229.29	1/13/98	7.25	222.04
97-6	268.4	273.17	1/13/98	28.85	244.32
97-7	278.4	281.08	1/13/98	7.97	273.11
97-8	279.2	281.91	2/25/97	48.27	233.64
97-9	280.3	283.53	10/13/97	54.35	229.18
97-10	293.4	297.74	3/11/97	81.20	216.54
97-11	268.6	273.16	4/21/97	58.04	215.12

Continued on next page

Table 3.2–Continued (Page 2 of 4)

Monitoring Well/ Piezometer/ Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
97-12	258.1	262.77	4/21/97	48.30	214.47
97-13	254.8	259.32	2/11/97	44.37	214.95
97-14	243.9	248.46	2/25/97	39.78	208.68
97-15	283.7	286.15	1/13/98	53.01	233.14
97-16	245.2	249.19	4/21/97	40.59	208.60
97-17	286.6	288.86	11/10/97	70.56	218.30
94-1	338.2	340.21	9/9/96	100.15	240.06
94-2	296.1	297.44	1/13/98	15.84	281.60
94-3	263.5	267.63	9/10/97	39.16	228.47
94-4	270.5	272.09	11/10/97	58.53	213.56
94-5	249.3	251.23	4/10/96	42.81	208.42
94-6	245	246.77	4/10/96	40.82	205.95
94-7	214.7	215.60	2/14/96	17.17	198.43
94-8	218.3	220.26	2/14/96	16.22	204.04
94-9	204	205.75	3/18/94	19.19	186.56
94-10	237	238.60	5/19/94	40.82	197.78
94-11	276.3	278.15	6/28/94	78.60	199.55
94-12	269.16	270.69	4/19/94	20.82	249.87
94-13	287.5	289.32	1/13/98	41.57	247.75
94-15	286.4	288.43	10/13/97	55.30	233.13
94-16	260.8	262.27	3/11/97	33.74	228.53
94-17A	181.0	184.08	3/29/95	2.32	181.76
94-17B	181.4	183.36	3/29/95	22.20	161.16
94-18	183.3	186.06	3/29/95	42.86	143.20
94-19	231.3	233.25	5/23/95	34.00	199.25

Continued on next page

Table 3.2–Continued (Page 3 of 4)

Monitoring Well/ Piezometer/ Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
94-20	211.3	213.77	2/14/96	17.54	196.23
94-21	241	244.38	1/13/98	31.50	212.88
94-22	308.7	311.17	2/14/96	98.23	212.94
94-23	278.1	281.42	3/9/95	9.74	271.68
94-24	275	278.11	1/13/98	22.05	256.06
94-25	346.3	350.04	5/20/96	62.23	287.81
94-26	291.2	293.24	3/9/95	5.58	287.66
94-27	243.3	247.35	9/9/96	17.56	229.79
94-28	260.7	263.50	1/13/98	36.73	226.77
94-29	251.2	253.86	9/7/94	52.87	200.99
94-30	261.7	262.31	5/23/95	53.50	208.81
94-31	266.5	270.55	2/14/96	55.27	215.28
94-32	286.3	288.11	3/14/96	13.70	274.41
94-33	326.8	328.52	4/10/96	47.26	281.26
94-35	308.4	310.15	9/10/97	72.62	237.53
94-36	304.3	306.02	4/10/96	16.23	289.79
PZ-1	206	209.94	3/9/95	21.02	188.92
PZ-2	186.8	192.31	5/20/96	7.21	185.10
PZ-3	196.1	199.27	1/13/98	12.01	187.26
E-1	226.8	229.30	2/14/96	2.31	226.99
DW-1	185.1	188.27	3/29/95	21.08	167.19
04-1	239.2	241.53	11/10/97	7.62	233.91
04-2	286.7	288.31	3/14/96	14.05	274.26
04-5	206.6	208.37	3/30/94	22.75	185.62
04-6	239.8	241.35	4/19/94	33.33	208.02

Continued on next page

Table 3.2–Continued (Page 4 of 4)

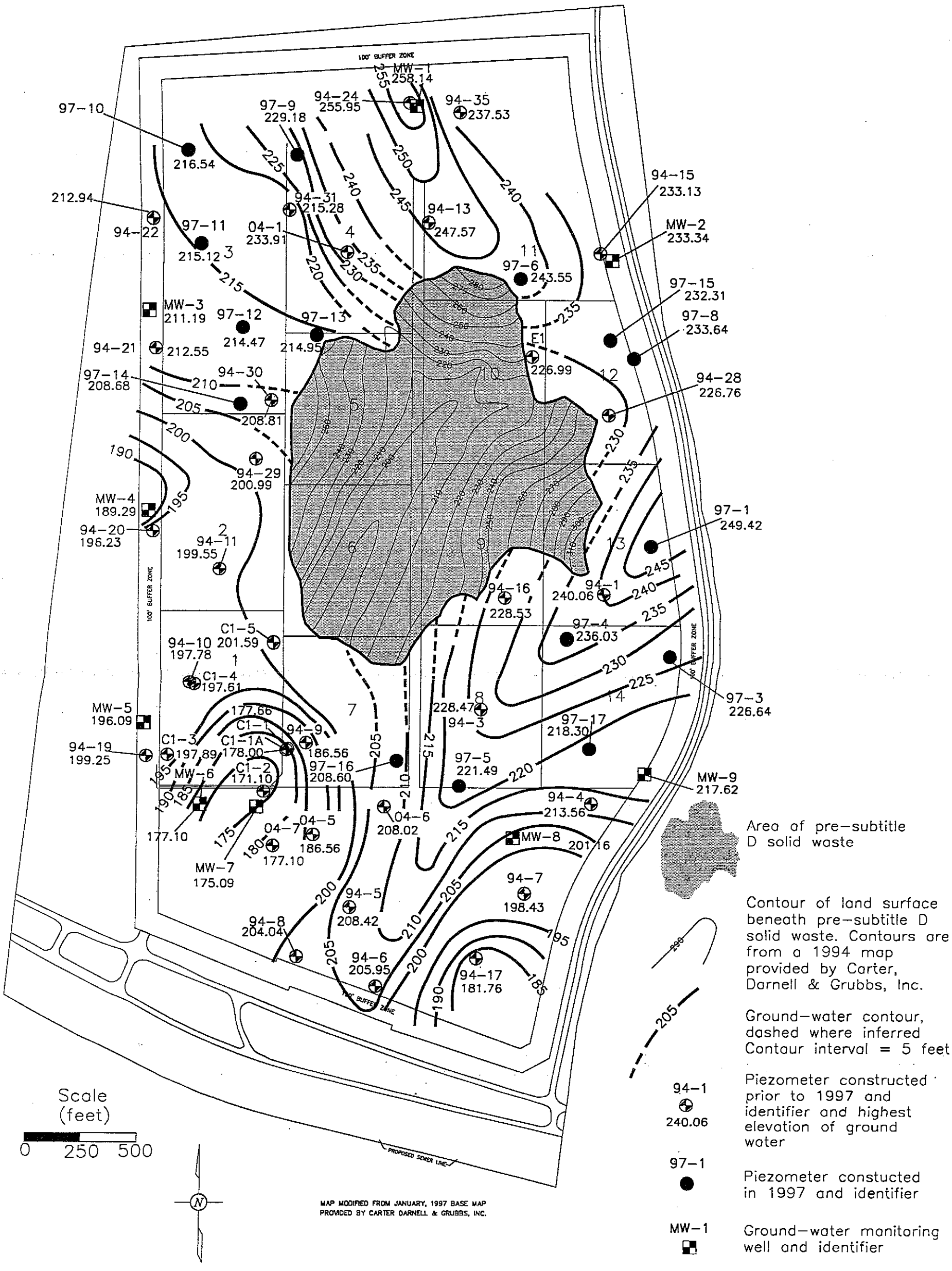
Monitoring Well/ Piezometer/ Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
04-7	184.8	186.91	3/30/94	4.78	182.13
C1-1	196.3	200.03	5/23/95	22.37	177.66
C1-1A	196.8	199.17	5/23/95	21.17	178.00
C1-2	190.9	194.57	8/11/95	23.47	171.10
C1-3	224.9	226.23	5/23/95	28.34	197.89
C1-4	234.2	238.11	5/23/95	40.50	197.61
C1-5	211.3/211.22	215.19/215.20	4/26/95	13.60	201.59
11-A	263.9	265.48	4/26/95	26.07	239.41

Depths to water were measured twice monthly in all the existing piezometers and monitoring wells at the site in February, March, and April 1997 and about monthly from June 1997 through January 1998. The water levels in all of the piezometers completed in the first-saturated zone then were used to contour the ground-water levels in the first-saturated zone and to determine the directions and rates of ground-water flow in the first-saturated zone. Boreholes, piezometers, and monitoring wells were not augered/constructed in the area of the old landfill operations. Therefore, the ground-water levels in the first-saturated zone in the area of the old landfill operations were not contoured. The historical ground-water data were reviewed and the highest measurement, to date, for each borehole, piezometer, or monitoring well was used to contour the ground water in the first zone of saturation (see Table 3.2). All the water-level data for the site are tabulated in Appendix 3.2.

The historically highest ground-water levels in the first-saturated zone are shown in Figure 3.10. This map was used by Carter, Darnell & Grubbs to design the Subtitle D cells. Figure 3.11 is a contour map of ground-water elevations in the first continuous zone of saturation on April 21, 1997. South of the Alabama Power Company right-of-way, the general direction of ground-water flow in the first-saturated zone is south or southwest. More specifically, ground water in the first-saturated zone flows toward the drainageway in the south-central and southwestern parts of the site, generally to the south in the southeastern part of the site, and to the southwest in the northwest part of the site.

The hydraulic gradients of the first-saturated zone were estimated from the ground-water elevations on April 21, 1997. The hydraulic gradient in the south-central part of the site was 0.04 ft/ft (foot per foot) between piezometers 94-3 and 97-16. The hydraulic gradient in the northeastern part of the site was 0.02 ft/ft between piezometer 97-6 and monitoring well MW-2. The hydraulic gradient in the southeastern part of the site was 0.02 ft/ft between piezometer 94-1 and monitoring well MW-9. Between piezometers 97-9 and 94-22, the hydraulic gradient in the northwestern part of the site was about 0.02 ft/ft.

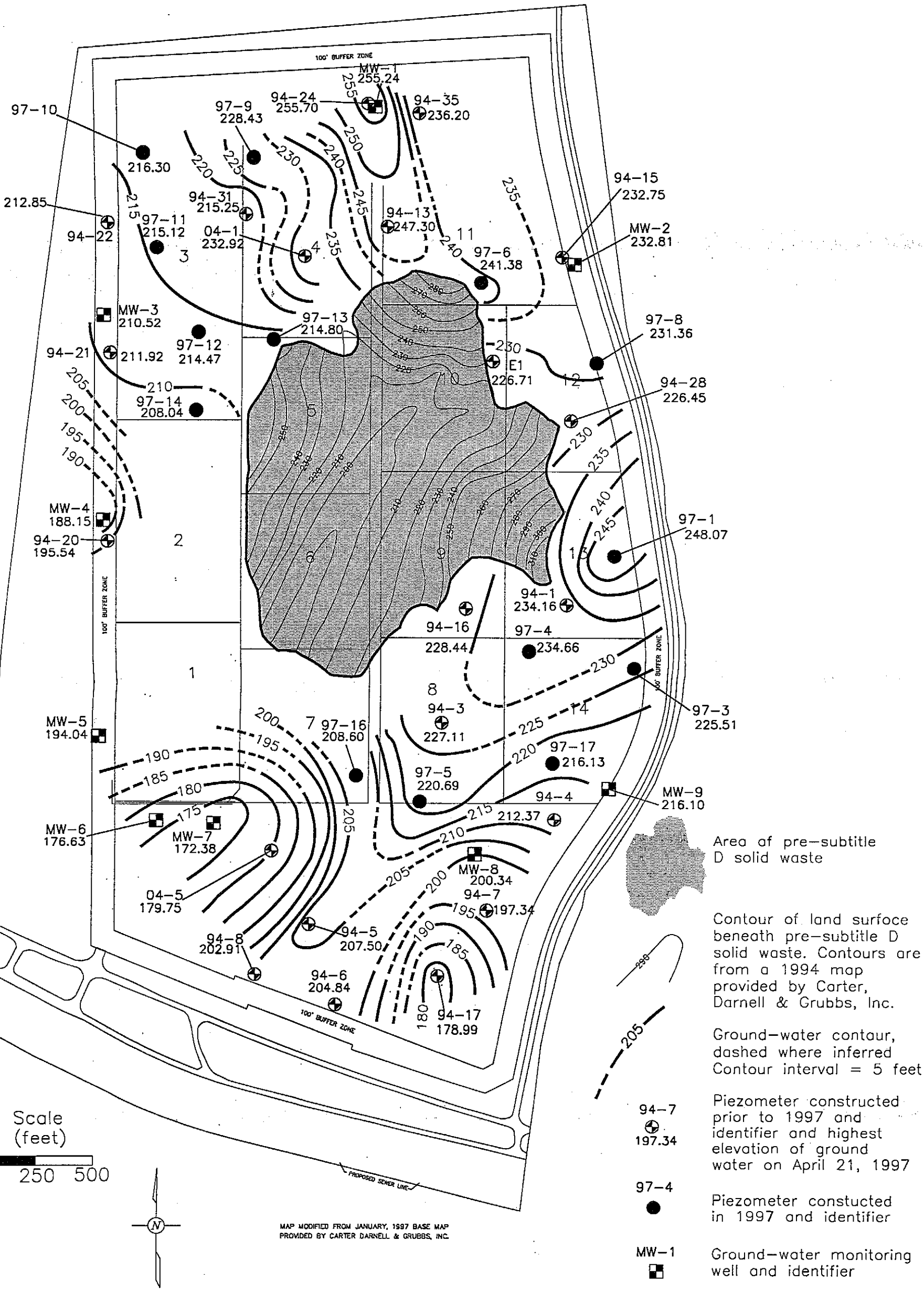
As described above, the water in the first-saturated zone occurs in silty and/or clayey very fine- to fine-grained sand that is interbedded/intercalated within the micaceous, relatively stiff clay. The effective porosity of these sands probably is about 15 percent (Mercer and Waddell, 1993).



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.10. Composite of highest ground-water elevations from March 1994 through January 1998 in piezometers and monitoring wells completed in the first continuous zone of soturation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.11. Ground-water elevations in piezometers and monitoring wells completed in the first continuous zone of saturation on April 21, 1997; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

For the October 1994 Hydrogeologic Evaluation, slug and bail tests were used to estimate the hydraulic conductivities of the water-bearing materials of the first-saturated zone. Tests in piezometers 94-4, 94-28, and 94-31 were used to estimate the hydraulic conductivities of the sediments. These piezometers are in the southeastern, east-central, and north-northwestern parts of the site where cells for disposing municipal solid waste will be constructed. Also, a test in piezometer 94-10, which was in the southwestern part of the site but has been abandoned, was used to estimate hydraulic conductivities of the sediments.

Piezometers 94-4 and 94-28 are screened across the base of the silty and/or clayey, very fine- to fine-grained sand (see cross-section, Figure 3.8). The hydraulic conductivities of the sediments at these piezometers are on the order of 0.06 foot per minute (0.03 centimeter per second) and 2×10^{-3} foot per minute (1×10^{-3} centimeter per second), respectively. The greater hydraulic conductivity at piezometer 94-4 probably resulted from a much thicker section of sand adjacent to the screen of piezometer 94-4 than was adjacent to the screen at piezometer 94-28.

Piezometer 94-31 is in the north-northwestern part of the site. Two of the 9 feet of screen of piezometer 94-31 are across a very fine- to fine-grained sand with gravel. The remainder of the screen is predominantly across clay that contains laminae and thin lenses of very fine-grained sand. The hydraulic conductivity of the sediments adjacent to the screen of the piezometer is on the order of 3×10^{-3} foot per minute (1.5×10^{-3} centimeter per second). This hydraulic conductivity is considered representative of the 2 feet of the very fine- to fine-grained sand with gravel.

Piezometer 94-10, which was in the southwestern part of the landfill site but has been abandoned, was screened within the interbedded/intercalated silty and/or clayey, very fine- to fine-grained sands. The hydraulic conductivity of the sediments adjacent to the screen of piezometer 94-10 is on the order of 6×10^{-3} foot per minute (3×10^{-3} centimeter per second).

Based on the slug and bail tests of the four piezometers, the hydraulic conductivities of the sediments adjacent to the screens of the piezometers range from 0.06 to 6×10^{-3} foot per minute. The average hydraulic conductivity is 1.8×10^{-2} foot per minute (9.1×10^{-3} centimeter per second), which was used for determining the rates of ground-water flow in the first-saturated zone at the landfill site. Using this average hydraulic conductivity and the effective porosity of 15 percent, the rates of ground-water flow in the first-saturated zone were 2.4×10^{-3}, 2.4×10^{-3}, 4.8×10^{-3}, and

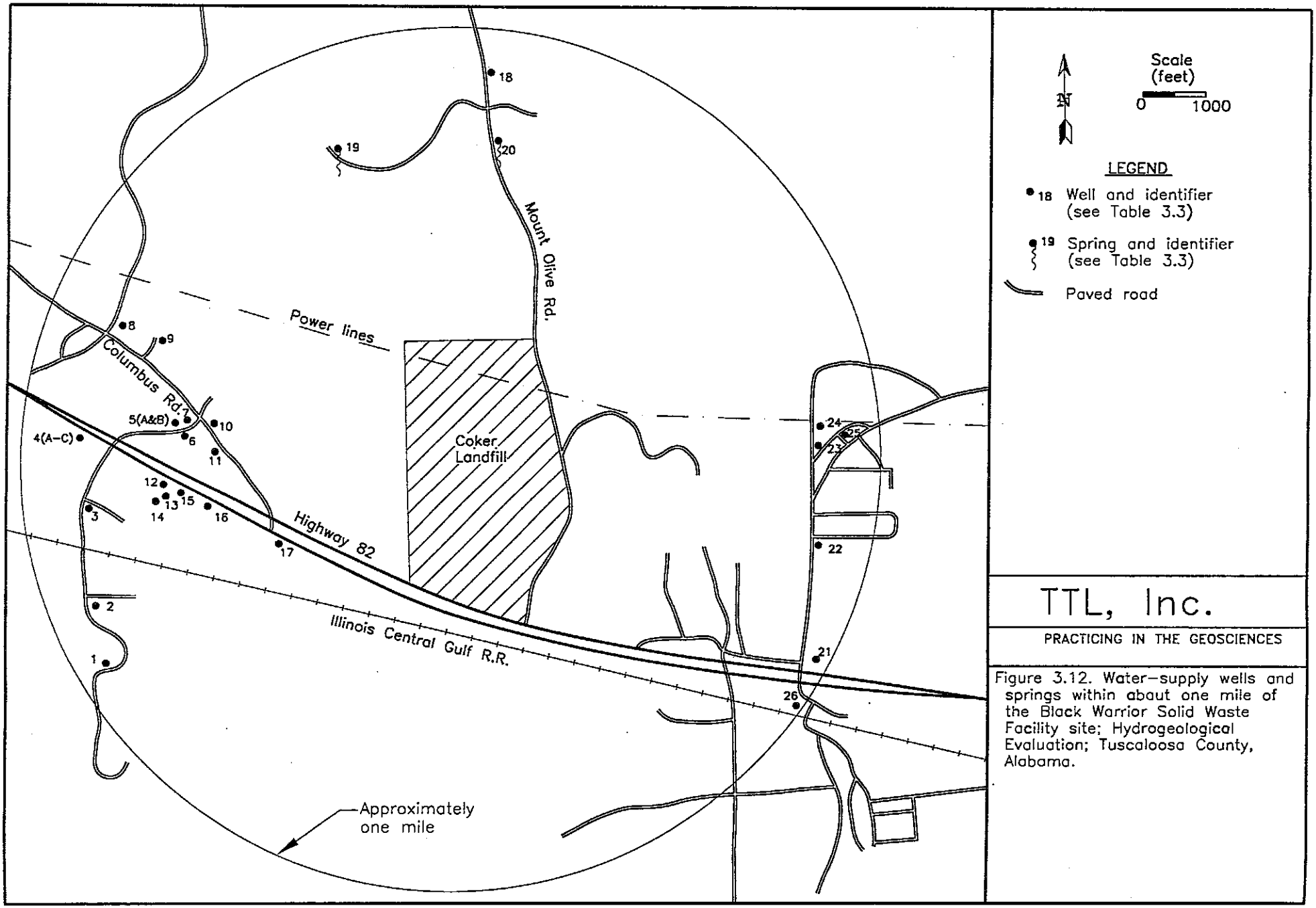
2.4×10^{-3} foot per minute in the northwestern, northeastern, south-central, and southeastern parts, respectively, of the site on April 21, 1997.

The localized perched zones of ground water in the sands that cap the hills are only about 10 feet thick and are at elevations greater than 260 feet AMSL at the site. The relationships of the perched zones to the first-saturated zone can be seen in cross-sections through the northern and western parts of the landfill (Figures 3.3 and 3.7). The perched zones are sporadic and occur beneath the tops of some, but not all, of the hills in the northern part of the site. The perched zones result from the substantial contrast in vertical permeability between the very fine- to fine-grained sands that cap the hills and the underlying micaceous, stiff clay. The directions of ground-water flow in the perched zones correspond to the slopes of the surface topography.

Alluvial deposits that are immediately adjacent to the drainageway that dissects the landfill site contain some ground water. These alluvial deposits are of limited extent. Because they adjoin with the materials of the first-saturated zone, the water levels in the piezometers/wells completed in the alluvial deposits were used to contour the water levels in the first-saturated zone.

3.10 WATER-WELL INVENTORY

An inventory was conducted to identify water-supply wells and springs within one mile of the Black Warrior Solid Waste Facility property. At least 90 percent of the landowners within one mile of the Landfill property were contacted during the inventory. Based on the inventory, there are 26 domestic water wells, a commercial water well, and 2 springs within one mile of the landfill property. Locations of these wells are shown on Figure 3.12. Owners of the wells and construction characteristics of the wells (where available) are provided in Table 3.3.



TTL, Inc.

PRACTICING IN THE GEOSCIENCES

Figure 3.12. Water-supply wells and springs within about one mile of the Black Warrior Solid Waste Facility site; Hydrogeological Evaluation; Tuscaloosa County, Alabama.

TABLE 3.3. Water-supply wells and springs within about one mile of the Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama. [Locations of wells and springs are shown on Figure 3.12. The "House No." of this table corresponds to the identifying numbers shown on Figure 3.12]

House No.	Owner	Address	Depth of Well (feet)	Depth to Water (feet)	Comments
1	Charles Mitchum	Lake Robinwood Rd.	>100	---	Used as domestic-supply well.
2	Katie Webb-Edgeworth	Lake Robinwood Rd.	18	---	Not used since 1968.
3	Walter Maughn	Lake Robinwood Rd.	20	---	Used to water livestock.
4 (A-C)	Millard Evans	Highway 82, Coker	---	---	Three wells in trailer park. Residents say wells not used--trailer park supplied by Coker Water Authority.
5 (A&B)	Mitch Porter	Highway 82, Coker	---	---	Two well--not used.
6	Gail Taylor	Highway 82, Coker	---	---	Used for domestic supply.
7	Booth	Highway 82, Coker	---	---	Well supplies two trailers.
8	Marler	Columbus Rd.	---	---	House vacant--well not being used.
9	Marler	Columbus Rd.	160	---	Well not used; 4" casing to 154'; 2" casing to 160'; drilled in 1954.
10	Tony Kauchick	Columbus Rd.	42	---	Used for irrigation only.
11	Lenora Hardin	Columbus Rd.	45	---	Used for irrigation only.
12	Woodrow Shaw	Highway 82	40	---	Not used.
13	Nolan Brantley	Highway 82	---	---	Not used.
14	Billy Edgeworth	Highway 82	30	15' in 1991	Not used.

Continued on next page

TABLE 3.3–Continued

House No.	Owner	Address	Depth of Well (feet)	Depth to Water (feet)	Comments
15	T.B. Lewis	Highway 82	108	—	Not used; 2" galvanized casing.
16	Dalton Harrison	Highway 82	—	—	Not used.
17	Gulf States Paper	Highway 82	60	—	Well used to water logs in chip mill yard.
18	Dan Higgins	Mt. Olive Rd.	—	—	Supplies 4 trailers.
19	Helen Elledge-Riner	Elldge Lake Rd.	—	—	Spring–supplies 2 houses.
20	W.P. Sutton	Mt. Olive Rd.	—	—	Spring–not used.
21	James Espey, Cloverdale Texaco	Highway 82	80	—	Used for domestic supply.
22	B.G. Hagler	Flatwoods Rd.	25	22	Used for domestic supply.
23	Henry Boone	Flatwoods Rd.	22	—	Not used; no pump in well.
24	Paul Gammon	Flatwoods Rd.	18	—	Not used.
25	Walter Bobo	Flatwoods Rd.	25	—	Not used.
26	Julia Moreton	Highway 82	20	—	Not used.

The reported depths of the 26 wells ranged from 18 to 160 feet. Only 10 of the 25 wells are currently being used. Six well owners (two west, one southwest, one north, and two southeast of the landfill property) reported using ground water for domestic purposes. The nearest domestic well that is being used is about 3,000 feet west of the Landfill property. Two owners of wells west of the Landfill property use ground water for irrigation. The owner of a well west of the Landfill property uses ground water to supply livestock. The commercial well is closest to the Landfill property. This well, which is owned by Gulf States Paper Company, is used to wet logs at a chip mill. The well and chip mill are about 2,000 feet west of the southwestern corner of the landfill property.

The majority of residents of Coker, Alabama are supplied with drinking water by the Coker Water Authority. Coker Water Authority obtains water from two public-supply wells. Based on review of published information (Gillette, 1988) and conversations with Coker Water Authority personnel, these public-supply wells are about two miles west of the landfill property and are 180 to 200 feet deep. The wells are screened from about 150 to 180 feet BLS.

There are coalbed methane wells immediately adjacent to or on the Black Warrior Solid Waste Facility site. These wells are about 2,900 feet deep and are used to pump water from the Pottsville Formation. Pumpage of the water reduces hydrostatic pressures thereby providing for increased seepage of methane gas from saturated coal seems. As noted above, the coalbed methane wells are required by the Alabama Oil and Gas Board to have casing that extends at least 50 feet into the top of the rock of the Pottsville Formation.

3.11 REFERENCES

Drennen, C. W., 1961, Geologic map of Tuscaloosa County, Alabama: Alabama Geological Survey Special Map 16, Tuscaloosa, Alabama.

Conant, L. C., Eargle, D. H., Monroe, W. H., Morris, H. H., 1945, Geologic map of Tuscaloosa and Cottondale Quadrangles, Alabama, showing areal geology and structure of Upper Cretaceous Formations: U. S. Geol. Survey Oil and Gas Invest. Map No. 37.

DeJarnette, S. S., and Crownover, J. E., 1987, Geohydrology and susceptibility of major aquifers to surface contamination in Alabama; area 6: U. S. Geological Survey Water-Resources Investigations Report 97-4113.

Drennen, C. W., 1953a, Reclassification of outcropping Tuscaloosa Group in Alabama: Amer. Assoc. Petrol. Geol. Bull., v. 37, p. 522-538.

Drennen, C. W., 1953b, Stratigraphy and structure of outcropping pre-Selma Coastal Plain beds of Fayette and Lamar Counties, Alabama: U. S. Geol. Survey Circ. 27.

Geraghty & Miller, Inc., 1989, AQTESOLV: Geraghty & Miller Modeling Group, Reston, VA.

Hummel, R. L., 1994, Sedimentology and depositional systems of the Tuscaloosa Group, west-central Alabama: Unpublished Ph. D., dissertation, Florida State University, Tallahassee.

Hunter, J. A. and Moser, P. H., 1990, Ground-water availability in Tuscaloosa County, Alabama: Alabama Geological Survey, Special Map 219, Tuscaloosa, Alabama.

Kidd, J. T., 1976, Configuration of the top of the Pottsville Formation in west-central Alabama: Alabama Geological Survey, Map 1, Tuscaloosa, Alabama.

Mercer, J. W., and Waddell, R. K., 1993, Contaminant transport in groundwater *in* Mainment, D. R., ed. in chief, Handbook of hydrology: McGraw-Hill, Inc., New York.

Miller, J. D., Jr., 1958, Ground water in the vicinity of Bryce State Hospital, Tuscaloosa County, Alabama: Alabama Geological Survey, Information Series 12, Tuscaloosa, Alabama.

Miller, J. D., Jr., and Causey, L. V., 1958, Geology and ground-water resources of Tuscaloosa County, Alabama: Alabama Geological Survey, Information Series 14, Tuscaloosa, Alabama.

Monroe, W. H., Conant, L. C., Eargle, D. H., 1946, Pre-Selma Upper Cretaceous stratigraphy of western Alabama: Amer. Assoc. Petrol. Geol. Bull., v. 30, p. 187-212.

REFERENCES (CONT.)

Osborne, W. E., Szabo, M. W., Copeland, C. W., and Neathery, T. L., 1989, Geologic map of Alabama: Alabama Geological Survey, Special Map 220, Tuscaloosa, Alabama.

Pashin, J. C., 1991, Regional analysis of the Black Creek-Cobb coalbed-methane target interval, Black Warrior Basin, Alabama: Alabama Geological Survey Bull. 145.

Paulson, Q. F., Miller, J. D., Jr., and Drennen, C. W., 1962, Ground-water resources and geology of Tuscaloosa County, Alabama: Alabama Geological Survey, County Report 6, Tuscaloosa, Alabama.

Raymond, D. E., Osborne, W. E., Copeland, C. W., and Neathery, T. L., 1988, Alabama stratigraphy: Alabama Geological Survey, Circular 140, Tuscaloosa, Alabama.

Smith, L. W., and King. D. T., Jr., 1983, The Tuscaloosa Formation: fluvial facies and their relationships to the basement topography and changes in paleoslope *in* Carrington, T. J., ed., Current studies of Cretaceous formations in eastern Alabama and Columbus, Georgia: Guidebook 20th Annual Field Trip, Alabama Geological Society, p. 11-16.

Szabo, M. W., Osborne, W. E., Copeland, C. W., 1988, Geologic map of Alabama: Alabama Geological Survey Special Map 220, 5 sheets.

Thomas, W. A., 1988, The Black Warrior Basin, *in* Sloss, L. L., ed., Sedimentary cover--North American craton: Geol. Soc. Amer, The Geology of North America, v. D-2, p. 471-492.

TTL, Inc., 1981, Installation of monitoring wells; compacted bales waste landfill; Letter report.

TTL, Inc., 1988, Geological evaluation for the Coker sanitary landfill; City of Tuscaloosa, Alabama.

TTL, Inc., 1992a, Ground-water evaluation--phases I and II; Coker sanitary landfill; Tuscaloosa County, Alabama: August 24, 1992.

TTL, Inc., 1992b, Status report; geotechnical evaluation; Coker sanitary landfill: November 16, 1992 letter report.

TTL, Inc., 1992, Ground-water evaluation--phases I and II; Coker sanitary landfill; Tuscaloosa County, Alabama.

TTL, Inc., 1994, Hydrogeological evaluation; Coker sanitary landfill; Tuscaloosa County, Alabama.

TTL, Inc., 1995, Supplement to October 1994 hydrogeological evaluation for cells 1 and 2; Coker sanitary landfill; Tuscaloosa County, Alabama.

TTL, Inc., 1996, Maximum ground-water elevations in first zone of saturation *in* Supplement to October 1994 hydrogeological evaluation for cells 1 and 2; 1995; Coker sanitary landfill; Tuscaloosa County, Alabama.

APPENDIX 3.1

APPENDIX 3.1A

Boring Logs and Piezometer-Completion Diagrams for Piezometers 97-1 Through 97-17

Hydrogeological Evaluation, January 1998

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-1
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/7/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *69 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *309.00 Feet AMSL*	COORDINATE NORTH: 1179696
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923307*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, moderate brown (5YR 4/4), sandy
5		SM	SAND, light brown (5YR 5/6), very fine-grained, silty
10		ML	SILT, light brown (5YR 5/6), sandy, micaceous
15		SM	SAND, light brown and dark yellowish orange (10YR 6/6), very fine-grained, silty, glauconitic, micaceous
20			
25			SAND, light brown and dark yellowish orange, micaceous, glauconitic, w/ironstone fragments --------Very moist--------
30		SC	SAND, dark yellowish orange, fine-grained w/thin light gray clay lenses
35		CL SC	CLAY, light gray and moderate orange pink (5YR 8/4), sandy SAND, moderate orange pink and very pale orange (10YR 8/2), very fine-grained, silty, micaceous, w/occasional thin clay lenses
40			--------Moist--------

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

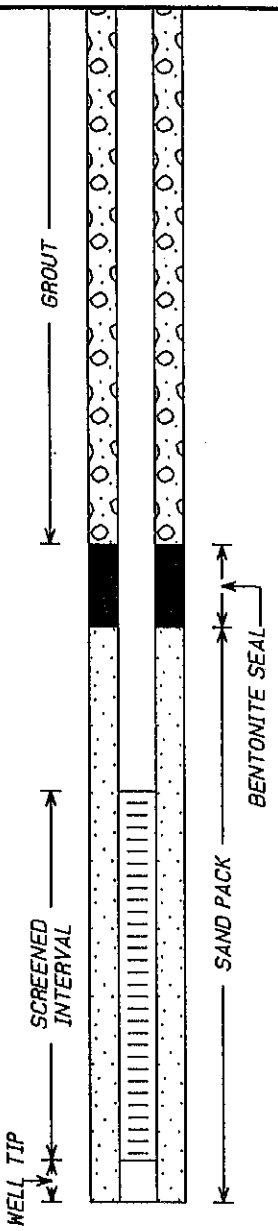
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-1 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		SC	--------Very moist--------
50			SAND, light brown and moderate orange pink, very fine-grained, silty, micaceous w/thin light gray clay lenses, silty --------Very moist--------
55			
60			SAND, moderate orange pink, moderate reddish orange (10R 6/6), very fine-grained, silty, micaceous, w/thin clay lenses --------Saturated--------
65			
70			BORING TERMINATED AT 69 FEET BELOW LAND SURFACE.
75			
80			

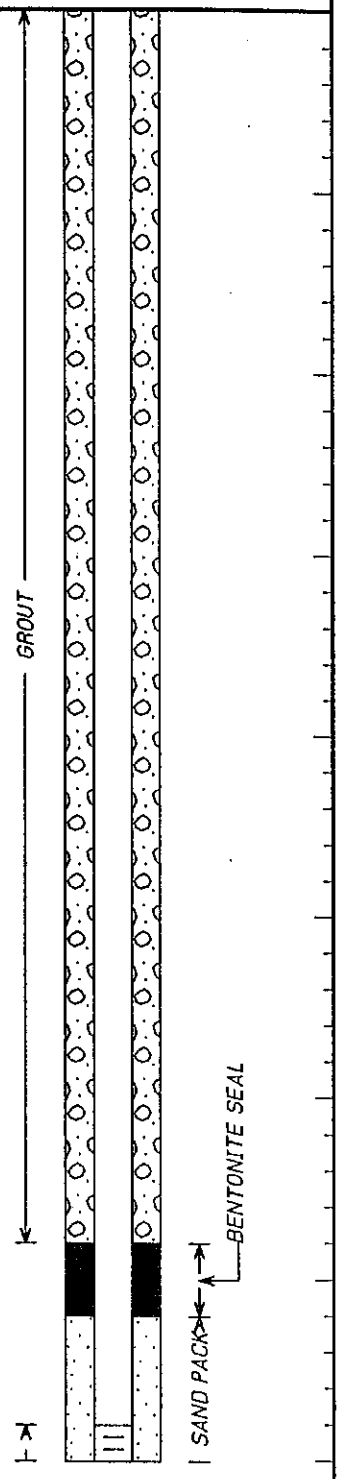
PIEZOMETER CONSTRUCTION



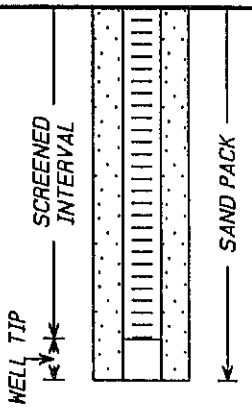
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-2
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/7/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *312.80 Feet AMSL*	COORDINATE NORTH: 1179209
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923408*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
	CL	CLAY, light brown (5YR 5/4), sandy
5	SC	SAND, light brown and grayish orange (10YR 7/4), fine-grained, clayey
10		
15		SAND, light brown, fine-grained, silty
20		SAND, dark yellowish orange (10YR 6/6), fine grained, silty ---------Moist---------
25		SAND, light brown, fine-to medium-grained, silty w/mica
30		---------Very moist---------
		Ironstone nodule
35	CL SC	CLAY, moderate red (5R 5/4), and light gray (N7), sandy SAND, dark yellowish orange (10YR 6/6) and moderate pink (5R 7/4), very fine-grained w/light gray (N7) thin clay lenses
40		

PIEZOMETER CONSTRUCTION



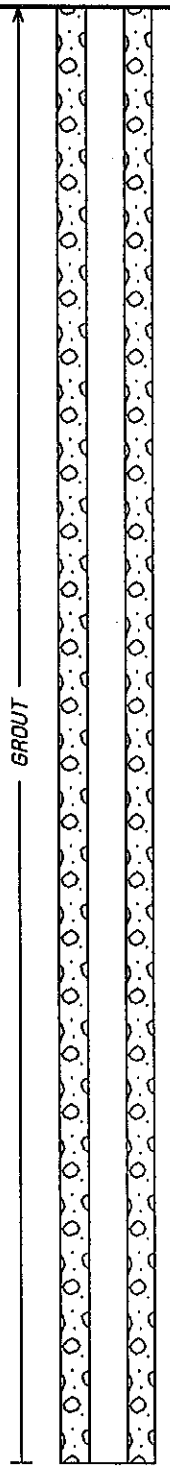
TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-2 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
45		SC		
50			BORING TERMINATED AT 49 FEET BELOW LAND SURFACE. Note: Pulled piping and drilled to 49 ft. BLS (extra 10 ft.) based on saturated zone at approx. 43 ft. BLS at 97-3	
55				
60				
65				
70				
75				
80				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/7/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *95 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *312.60 Feet AMSL*	COORDINATE NORTH: 1179203
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923397*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
	CL	CLAY, light brown (5YR 5/4), sandy
5	SC	SAND, light brown and grayish orange (10YR 7/4), fine-grained, clayey
10		
15		SAND, light brown, fine-grained, silty
20		SAND, dark yellowish orange (10YR 6/6), fine-grained, silty ---------Moist---------
25		SAND, light brown, fine-to medium-grained, silty w/mica
30		---------Very moist---------
		Ironstone nodule
35	CL SC	CLAY, moderate red (5R 5/4), and light gray (N7), sandy SAND, dark yellowish orange (10YR 6/6) and moderate pink (5R 7/4), very fine-grained w/light gray (N7) thin clay lenses
40		

PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC.

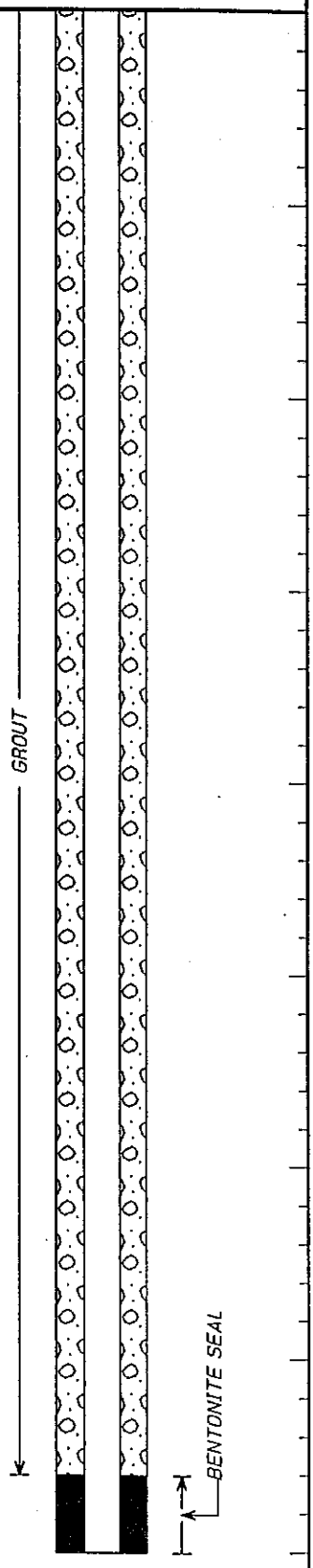
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-3 (Continued)

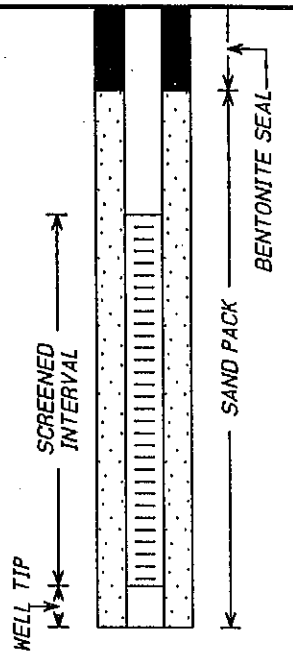
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SC	
		CL	CLAY, light gray w/moderate red (5R 5/4) streaks, sandy
		SC	SAND, moderate reddish orange (10R 6/6), very fine-grained, micaceous w/occasional thin light gray lenses
45			---------Saturated---------
		CL	CLAY, dark yellowish brown (10YR 4/2), silty w/mica
		SC	SAND, dark yellowish orange, very fine-grained w/occasional light gray clay lenses, micaceous
50			---------Moist---------
55			
			SAND, dark yellowish orange and very pale orange (10YR 8/2), moderate reddish orange, very fine-grained, micaceous, w/occasional very light gray thin clay lenses
60			
65			
70			
75			
80			

PIEZOMETER CONSTRUCTION



TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-3 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
85		SC		
90			--------Saturated---------	
		CL	CLAY, pale yellowish brown, stiff w/very fine-grained sand laminae	
95			BORING TERMINATED AT 95 FEET BELOW LAND SURFACE.	
100				
105				
110				
115				
120				



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-4
GED/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/10/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *84 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *317.40 Feet AMSL*	COORDINATE NORTH: 1179279
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1922934*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SM	SAND, moderate yellowish brown (10YR 5/4), fine-grained, silty
5			SAND, light brown (5YR 5/6), fine-grained, silty
10			
15			
20			SAND, dark yellowish orange, fine-grained, micaceous
25			SAND, dark yellowish orange, fine-grained, micaceous
30			SAND, very pale orange (10YR 8/2), fine-grained, micaceous
35			
40			

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

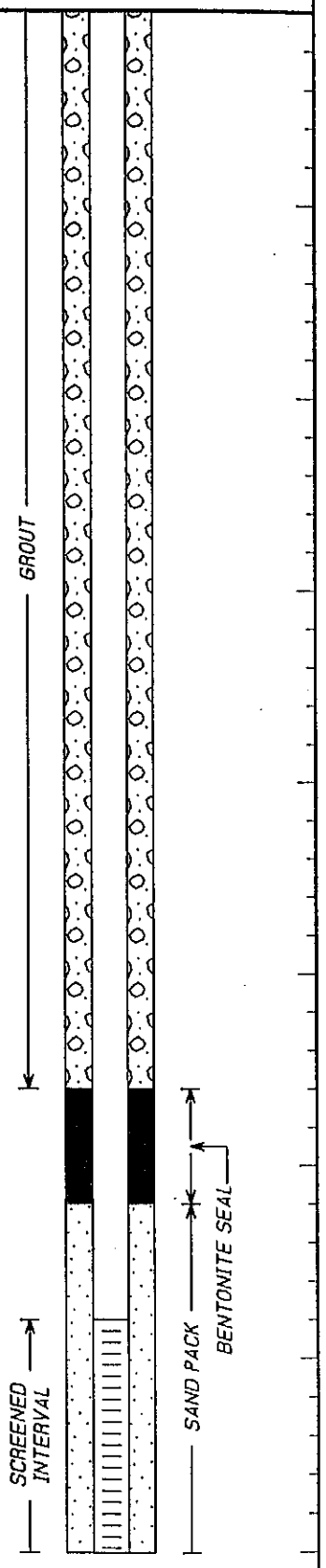
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-4 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		SM	
50			--------Moist--------
55			
60			
65		CL	CLAY, moderate red (5R 5/4) and light gray (N7), w/very fine-grained sand lenses
70		SC	SAND, light brown, fine grained, micaceous w/occasional thin gray clay lenses
			SAND, moderate reddish orange (10R 6/6), light brown, and very pale orange w/occasional thin gray clay lenses
			--------Very moist--------
75			
80			

PIEZOMETER CONSTRUCTION



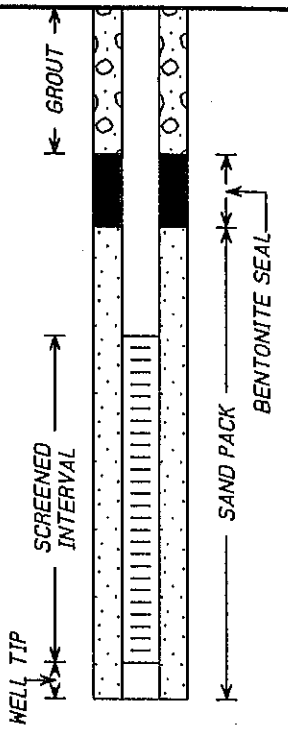
TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-4 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
		SC		WELL TIP, SCREENED INTERVAL, SAND PACK
		CL	CLAY, light brownish gray, stiff w/very fine-grained sand laminae	
			BORING TERMINATED AT 84 FEET BELOW LAND SURFACE.	
85				
90				
95				
100				▼
105				
110				
115				
120				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-5
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/13/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *19 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *224.90 Feet AMSL*	COORDINATE NORTH: 1178608
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1922454*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, dark yellowish brown (10YR 4/2), sandy
5			CLAY, dark yellowish brown and light gray (N7), sandy
			---------Very moist to wet---------
10			CLAY, light brown (5YR 5/6) and light gray, sandy, relatively stiff
			Ironstone fragments
15			CLAY, dark gray w/very fine-grained sand laminae
20			BORING TERMINATED AT 19 FEET BELOW LAND SURFACE.
25			
30			
35			
40			

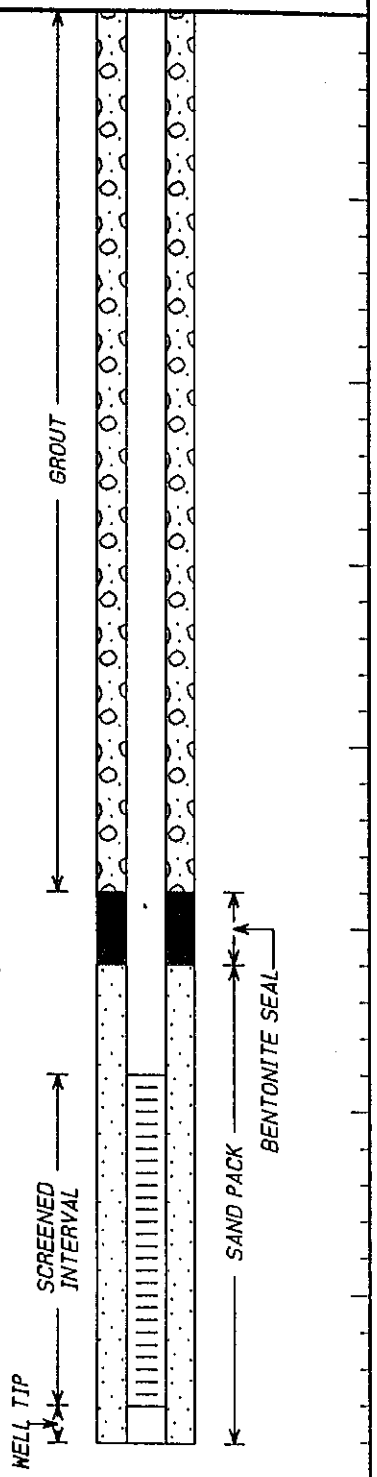
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-6
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/13/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *39 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *268.40 Feet AMSL*	COORDINATE NORTH: 1180907
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1922713*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
	SC	SAND, dark yellowish orange (10YR 6/6), clayey
5	CL	CLAY, light brown (5YR 5/6) and light gray (N7), sandy
10		Micaceous
15		CLAY, dark gray (N3) w/very-fine grained sand laminae
20	ML	SILT, light gray and dark gray, micaceous
		---------Moist---------
	CL	CLAY, dark gray w/very fine-grained sand laminae, micaceous
25		
	ML	SILT, light gray, micaceous, clayey
30		---------Very moist---------
	CL	CLAY, dark gray w/very fine-grained sand laminae, micaceous
35		W/occasional 4 to 6 inch wet silt lenses
	ML	SILT, light brown, micaceous
40		BORING TERMINATED AT 39 FEET BELOW LAND SURFACE.

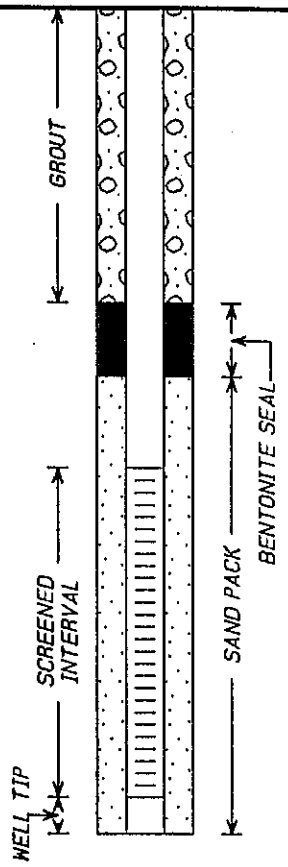
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-7
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/13/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *22.5 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *278.40 Feet AMSL*	COORDINATE NORTH: 1180552
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923223*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, light brown w/organics, sandy
10			CLAY, light gray (N7) w/thin (1/8"-1/4") lenses of silt, micaceous --------Very moist--------
15			CLAY, light gray and moderate pink (5R 7/4) w/numerous thin (1/8"-1/4") wet lenses of very fine-grained sand, pale yellowish orange (10YR 8/6)
20			CLAY, medium dark dray (N4) w/very fine-grained sand laminae, micaceous
25			BORING TERMINATED AT 22.5 FEET BELOW LAND SURFACE.
30			
35			
40			

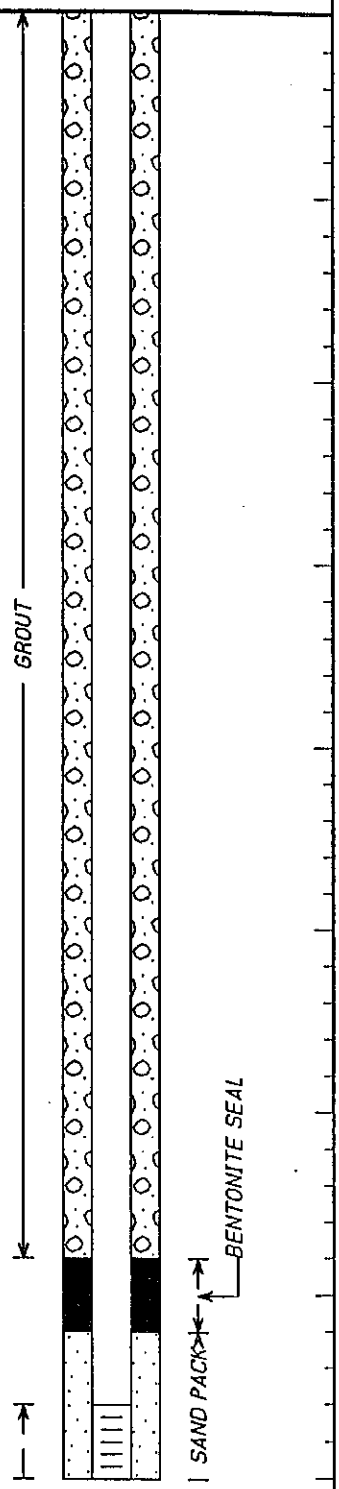
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-8
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/13/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *48 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *279.20 Feet AMSL*	COORDINATE NORTH: 1180552
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923227*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, light brown w/organics, sandy
5			
10			
			CLAY, light gray (N7) w/thin (1/8"-1/4") lenses of silt, micaceous, very moist ---------Very moist---------
15			CLAY, light gray and moderate pink (5R 7/4) w/numerous thin (1/8"-1/4") wet lenses of very fine-grained sand, pale yellowish orange (10YR 8/6)
			CLAY, medium dark dray (N4) w/very fine-grained sand laminae, micaceous
20			
			CLAY, medium dark gray (N4) w/very fine-grained sand laminae, micaceous
25			
			CLAY, medium dark gray w/very fine-grained sand laminae
			With 1/4" very fine-grained sand lenses --------Very moist--------
30			
			CLAY, light brownish gray (5YR 6/1), w/very fine-grained sand laminae, thin lenses of fine-grained sand light brown
35		SC	SAND, light brown and very pale orange, fine-grained, micaceous w/thin clay lenses pale yellowish brown
40			

PIEZOMETER CONSTRUCTION



TTL, Inc

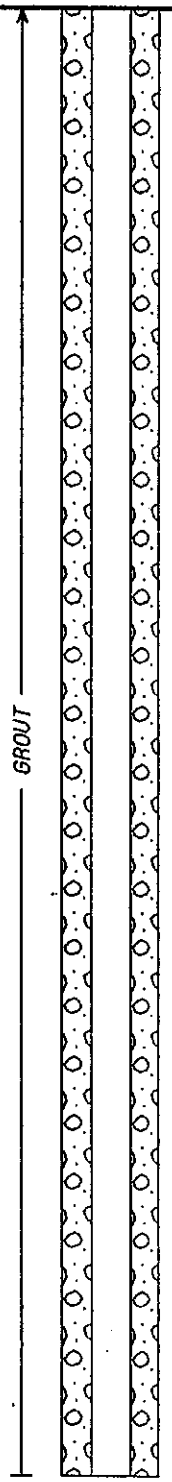
TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-8 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
45		SC	Fewer clay lenses, sand is moist ---------Very moist---------	WELL TIP, SCREENED INTERVAL, SAND PACK
		CL	CLAY, dark yellowish brown (10YR 4/2), very stiff w/occasional very fine-grained sand laminae	
50			BORING TERMINATED AT 48 FEET BELOW LAND SURFACE.	
55				
60				
65				
70				
75				
80				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-9
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/14/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *69 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *280.30 Feet AMSL*	COORDINATE NORTH: 1181462
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921701*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SC	SAND, dark yellowish orange (10YR 6/6), fine-grained clayey, w/mica
5		CL	CLAY, dark yellowish orange and light brown (5YR 5/6), sandy w/mica
10			
		SM	SAND, dark yellowish orange, fine-grained w/mica --------Wet--------
15		CL	CLAY, light brown, sandy w/ironstone fragments
			CLAY, medium dark gray (N4) w/very fine-grained sand laminae
20			
25			CLAY, medium dark gray w/very fine-grained laminae, micaceous
			With 6" very fine-grained sand lenses --------Wet--------
30			
35			Occasional moist very thin (1/16") very fine-grained sand lenses
40			CLAY, medium dark gray w/very fine-grained sand laminae, micaceous

PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC.

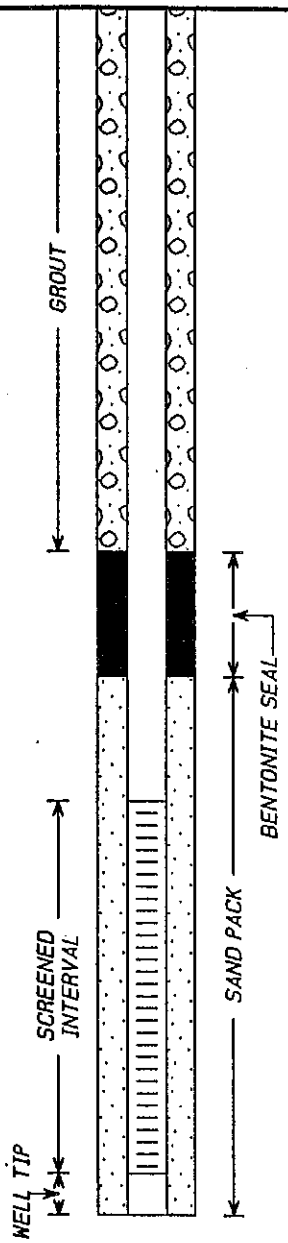
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-9 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		CL	
50			
55			
60			CLAY, medium dark gray w/very moist very fine-grained sand laminae, micaceous
65		SM	SAND, medium dark gray, fine-to medium-grained w/gravel
			---------Wet---------
			Gravel more abundant
		CL	CLAY, medium dark gray w/very fine-grained sand laminae, micaceous
70			BORING TERMINATED AT 69 FEET BELOW LAND SURFACE.
75			
80			

PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-10
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/14/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *84 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *293.40 Feet AMSL*	COORDINATE NORTH: 1181482
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921213*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		SM	SAND, dark yellowish orange (10YR 6/6), very pale orange (10YR 8/2) and light brown (5YR 5/6), fine-grained, micaceous, silty
10			Iron staining
15		SC CL	SAND, dark yellowish orange and very pale orange w/occasional thin, approximate 1/4" clay lenses CLAY, medium dark gray (N4) w/very fine-grained sand laminae, micaceous
20			
25			
30			CLAY, medium dark gray w/very fine-grained sand laminae, micaceous
35			
40			

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

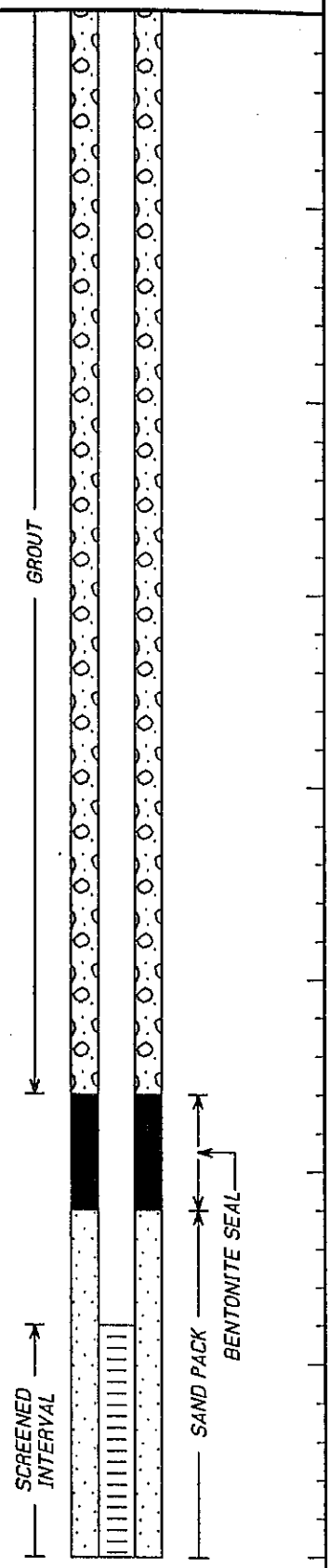
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-10 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		CL	
50			
55			very fine-grained sand lenses --------Very moist to wet--------
60			CLAY, medium dark gray w/very fine-grained sand laminae
65			
70			Approximate 6" medium dark gray fine-grained sand lense --------Wet--------
			Approximate 4" light gray (N7), fine-grained sand lense --------Wet--------
		SM	SAND, light brown, fine-grained w/ironstone
75		CL	CLAY, medium dark gray w/very fine-grained sand laminae
		SM	SAND, light brown, fine-grained w/thin clay lenses
		SC	SAND, very pale orange, fine-grained w/thin clay lenses and ironstone lenses --------Wet--------
80		CL	CLAY, medium dark gray w/very fine-grained sand laminae

PIEZOMETER CONSTRUCTION



TTL, Inc

JOB NUMBER: 78-304

TTL, INC.

PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-10 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
		CL	CLAY, pale yellowish brown (5YR 5/2) w/very fine-grained sand laminae	WELL TIP, SCREENED INTERVAL, SAND PACK
		SM	SAND, light brown, fine-to medium-grained w/occasional thin clay lenses	
			---------Wet---------	
85			BORING TERMINATED AT 84 FEET BELOW LAND SURFACE.	
90				
95				
100				▼
105				
110				
115				
120				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-11
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/15/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *68 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *268.60 Feet AMSL*	COORDINATE NORTH: 1181065
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921274*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		ML	SILT, dark yellowish brown (10YR 4/2), sandy
5		SM	SAND, dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), fine-grained, silty
10		CL	CLAY, dark yellowish orange and light gray (N7), slightly stiff
			CLAY, light brown (5YR 5/6) and pale yellowish brown (10YR 6/2), w/very fine-grained sand laminae, micaceous
15			CLAY, medium dark gray (N4), w/very fine-grained sand laminae, micaceous
20			
25			3" lense of silt ---------Very moist--------- CLAY, medium dark gray w/very fine-grained sand laminae
30			
35			
40			

PIEZOMETER CONSTRUCTION

GROUT

TTL, Inc

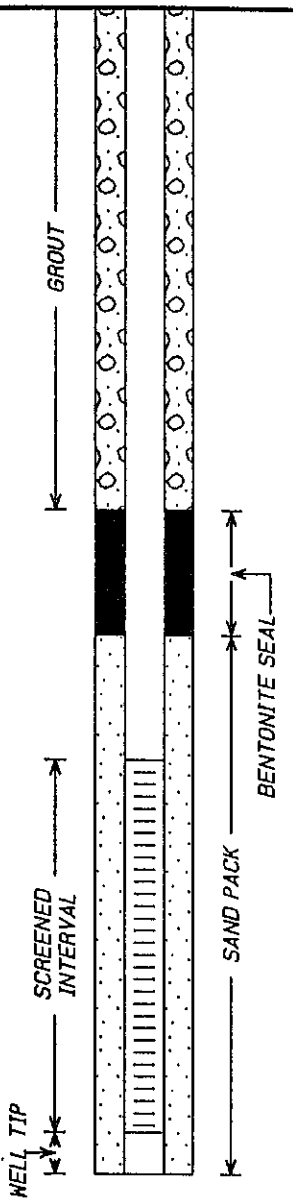
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-11 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		CL	
50			
55			
			4" sand lense, fine-grained ---------Wet---------
60		SM	SAND, light gray, fine-grained, silty, micaceous ---------Wet---------
			Fine-to medium-grained w/occasional gravel
65		CL	CLAY, medium dark gray w/very fine grained sand laminae, micaceous
			BORING TERMINATED AT 68 FEET BELOW LAND SURFACE.
70			
75			
80			

PIEZOMETER CONSTRUCTION



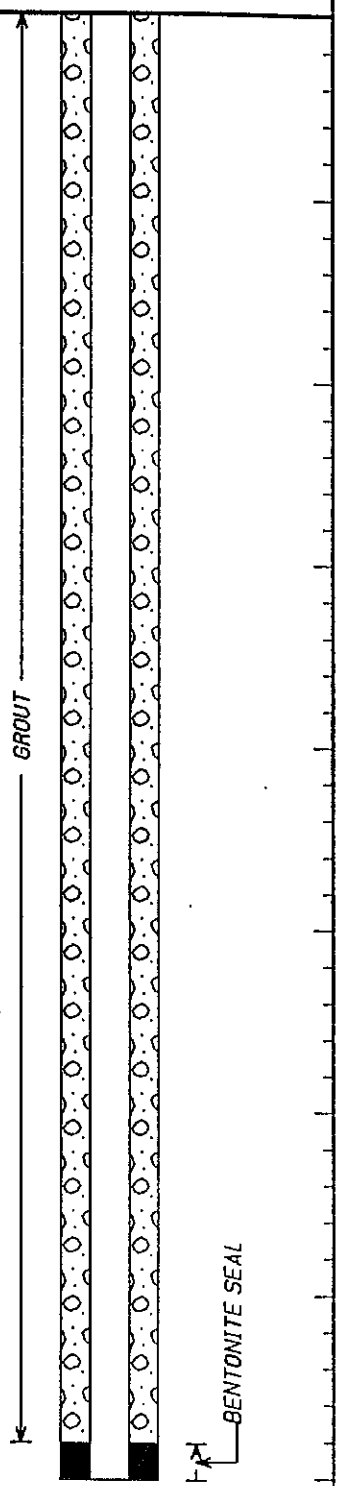
TTL, Inc

JOB NUMBER: 79-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-12
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/15/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *258.10 Feet AMSL*	COORDINATE NORTH: 1180686
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921461*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, light brown (5YR 5/6), sandy
5			CLAY, light brown and light gray (N7), sandy
10			
15			CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae, micaceous
20			CLAY, medium dark gray w/very fine-grained sand laminae, micaceous
25			
30			
35			
40			

PIEZOMETER CONSTRUCTION



TTL, Inc

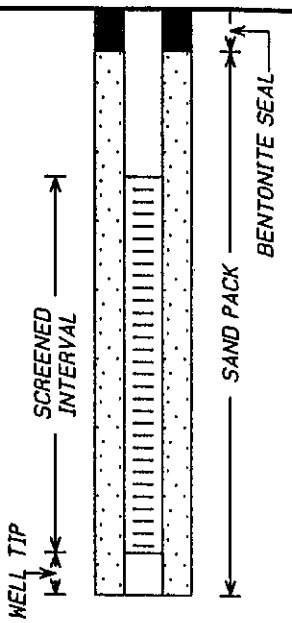
TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-12 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		CL	
			Approximate 4" very fine-grained sand lense --------Wet--------
50		SM	SAND, light gray, fine-to medium-grained w/gravel --------Wet--------
		CL	CLAY, medium dark gray w/very fine-grained sand laminae, micaceous
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			
65			
70			
75			
80			

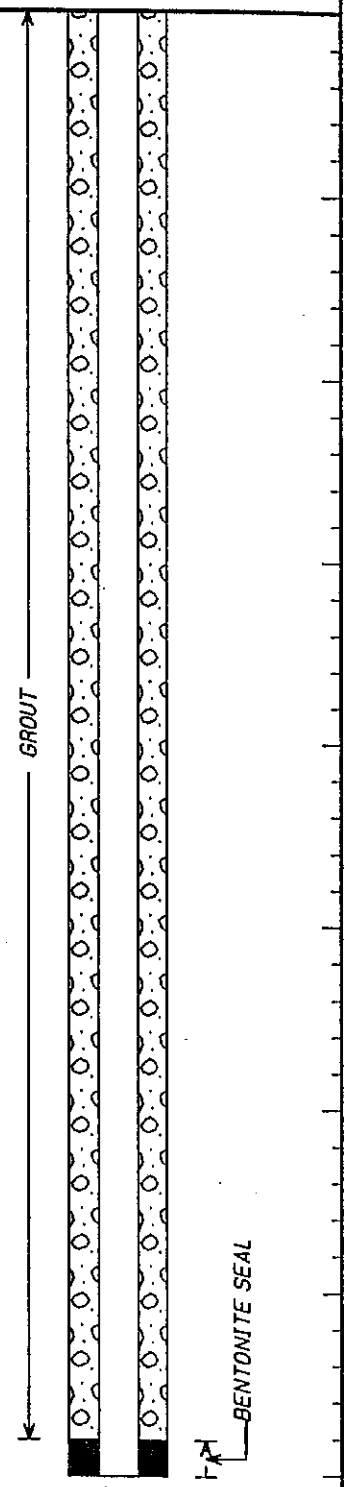
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-13
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/15/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *254.80 Feet AMSL*	COORDINATE NORTH: 1180654
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921793*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, light brown (5Y 5/6), sandy
10			CLAY, pale yellowish brown (10YR 6/2) and light brown w/very fine-grained sand laminae
15			CLAY, medium dark gray (N4) w/very fine-grained sand laminae, micaceous
20			
25			Approximate 1/8" very fine-grained sand lense --------Moist--------
30			1/2" very fine-grained sand lense --------Very moist-------- 1/4" very fine-grained sand lense --------Very moist--------
35			
40		SM CL	SAND, light gray (N7), fine-grained, micaceous --------Wet--------

PIEZOMETER CONSTRUCTION

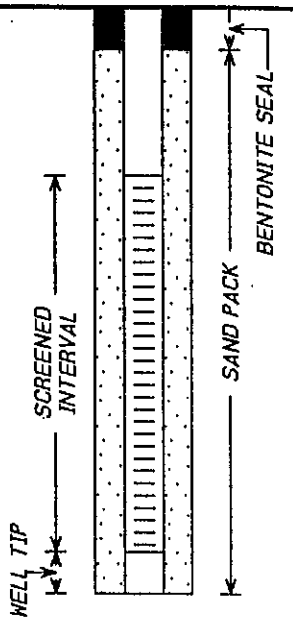


TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-13 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, medium dark gray w/very fine-grained sand laminae
			1/4" very fine-grained sand lense --------Wet--------
		SM	SAND, light gray, fine-grained, micaceous --------Wet--------
45		CL	CLAY, medium dark gray w/very fine-grained sand laminae
		SM	SAND, light gray and very pale orange (10YR 8/2), fine-to medium-grained
50		CL	CLAY, medium dark gray w/very fine-grained sand laminae, micaceous
		SM	SAND, fine-to medium-grained w/gravel
		CL	CLAY, medium dark gray w/very fine-grained sand laminae
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			
65			
70			
75			
80			

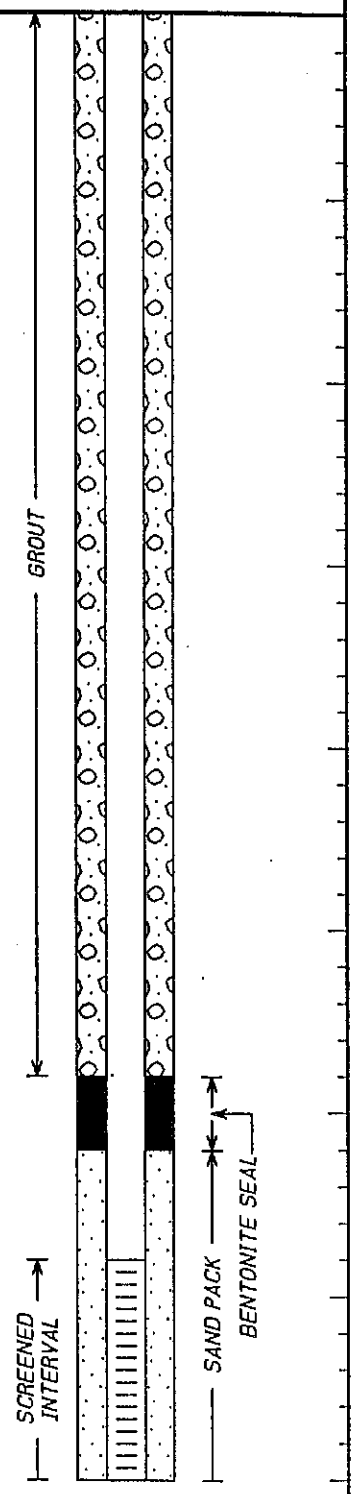
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-14
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/16/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *44 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *243.90 Feet AMSL*	COORDINATE NORTH: 1180344
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1921451*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		CL	CLAY, light brown (5YR 5/6) and light gray (N7), silty
5			CLAY, sandy
10			CLAY, medium dark gray (N4) w/very fine-grained sand laminae, micaceous
15			
20			CLAY, approximate 1/4" very fine-grained silty sand lense ---------Very moist---------
25			Moist sand laminations Approximate 4" very fine-grained sand ---------Wet---------
30			Approximate 6" very fine-grained sand lense ---------Very moist--------- Approximate 4" very fine-grained sand lense ---------Very moist--------- Approximate 4" very fine-grained sand lense (very moist) ---------Very moist---------
35			
40		SM	SAND, light gray, fine-to medium-grained w/gravel (fossils)

PIEZOMETER CONSTRUCTION



TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-14 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
		SM	1/4" coal seam	WELL TIP, SCREENED INTERVAL, SAND PACK
		CL	CLAY, medium dark gray w/very fine-grained sand laminae	
			BORING TERMINATED AT 44 FEET BELOW LAND SURFACE.	
45				
50				
55				
60				
65				
70				
75				
80				

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-15
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/16/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *53 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *283.70 Feet AMSL*	COORDINATE NORTH: 1180633
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923117*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, light brown (5YR 5/6), sandy
		SC	SAND, light brown, fine-grained, clayey --------Very moist--------
10			SAND, light red (5R 6/6) w/light gray with thin clay lenses, micaceous --------Very moist--------
15			
20			SAND, light red and dark yellowish orange (10YR 6/6), w/thin light gray clay lenses --------Wet--------
		CL	SAND, medium-grained sand w/ironstone layer approximate 1/4"
25			CLAY, medium dark gray (N4), w/very fine-grained sand laminae
30			
			Approximate 1/4" very fine-grained sand lense --------Very moist--------
35			CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae
			Approximate 1/8" ironstone layer --------Wet--------
		SM	CLAY, pale yellowish brown and medium dark gray w/very fine-grained sand laminae
40			Ironstone layer approximate 1/8" --------Wet--------

PIEZOMETER CONSTRUCTION

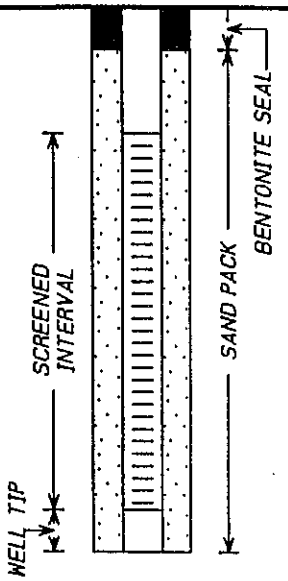
GROUT

BENTONITE SEAL

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-15 (Continued)

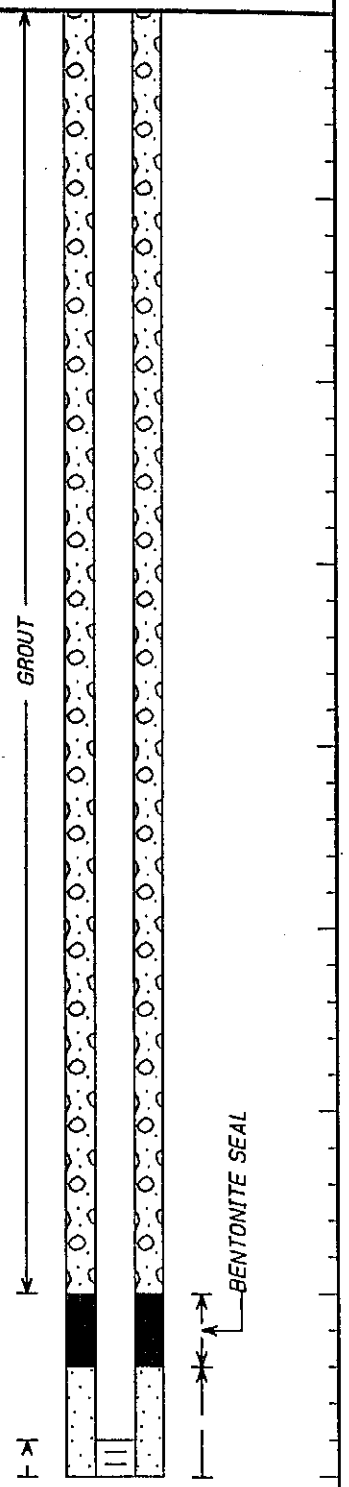
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
45		SM	SAND, dark yellowish orange and light brown, fine-grained w/occasional thin clay lenses, micaceous	
50			SAND, very pale orange (10YR 8/2) and light brown, fine-grained, micaceous w/occasional thin clay lenses	
		CL	CLAY, pale yellowish brown w/very fine-grained sand laminae	
55			BORING TERMINATED AT 53 FEET BELOW LAND SURFACE.	
60				
65				
70				
75				
80				



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-16
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/17/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *245.20 Feet AMSL*	COORDINATE NORTH: 1178723
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1922170*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, light brown (5YR 5/6) and light gray (N7), sandy
			Iron staining
5			CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae
10			CLAY, pale yellowish brown and light brown w/very fine-grained sand laminae
15			
20			
			CLAY, medium dark gray (N4) w/very fine-grained sand laminae
25			
30			Approximate 1/8" very fine-grained sand lense --------Moist--------
			Approximate 1/2" very fine-grained sand lense --------Very moist--------
35			Approximate 1" very fine-grained sand lense --------Very moist--------
			Approximate 1" very fine-grained sand lense --------Very moist--------
			Approximate 1/4" very fine-grained sand lense --------Very moist--------
		SM	Approximate 1/2" thick ironstone layer
40			

PIEZOMETER CONSTRUCTION



TTL, Inc

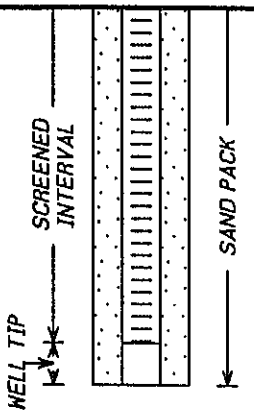
TTL, INC.

PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-16 (Continued)

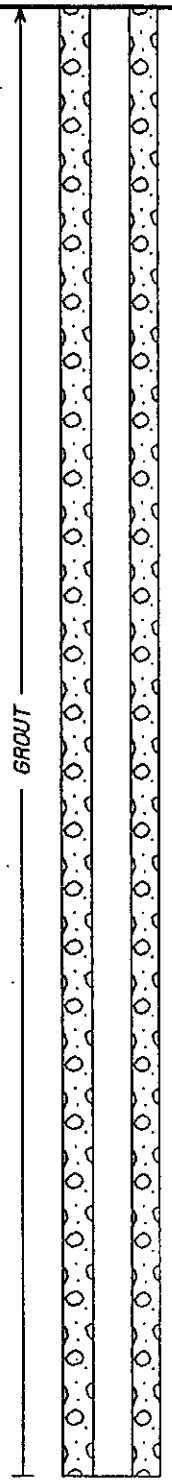
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PIEZOMETER CONSTRUCTION
		SM	SAND, dark yellowish orange, fine-grained, micaceous --------Very moist--------- ---------Wet--------- W/occasional thin approximate 1/4" light gray (N7) clay lenses	
45		CL	CLAY, medium dark gray w/very fine-grained sand laminae Approximate 6" very fine-grained sand lense ---------Wet---------	
		SM	SAND, fine-grained, light gray, micaceous ---------Wet---------	
		CL	CLAY, medium dark gray w/very fine-grained sand laminae	
50			BORING TERMINATED AT 49 FEET BELOW LAND SURFACE.	
55				
60				
65				
70				
75				
80				



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 97-17
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *1/17/97*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *78.5 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *286.60 Feet AMSL*	COORDINATE NORTH: 1178779
DRILLING METHOD: *4-1/4" ID HSA, CME-75 W/5' CONT. SPS*		COORDINATE EAST: *1923039*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, light brown (5YR 5/6), sandy
10		SM	SAND, fine-grained, light brown, silty
15			SAND, clayey & silty
20		SC	SAND, light brown & very pale orange (10YR 8/2), micaceous, w/occasional thin approximate 1/16" clay lense
25			SAND, very pale orange w/occasional thin clay lense
30			SAND, very pale orange & light brown, fine-grained
35			SAND, w/occasional thin clay lense
40			

PIEZOMETER CONSTRUCTION



TTL, INC.

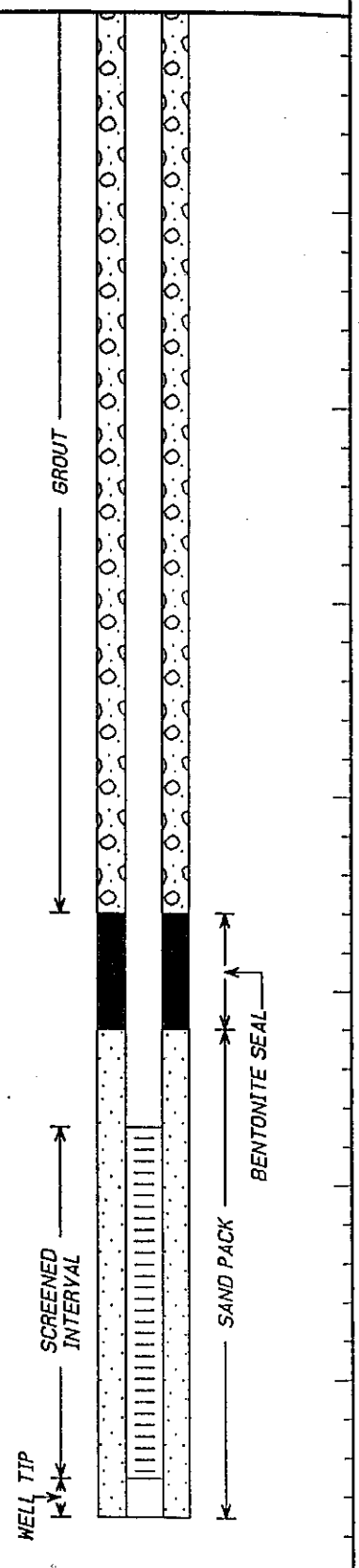
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER 97-17 (Continued)

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
45		SC	
			--------Very moist--------
50			
55			
			SAND, very pale orange, light brown & light red (5R 6/6), w/occasional clay lenses
60			--------Moist--------
65			
70			--------Wet--------
75			Ironstone fragments
			BORING TERMINATED AT 78.5 FEET BELOW LAND SURFACE. Ironstone layer--auger refusal.
80			

PIEZOMETER CONSTRUCTION



TTL, Inc

JOB NUMBER: 79-304

APPENDIX 3.1B

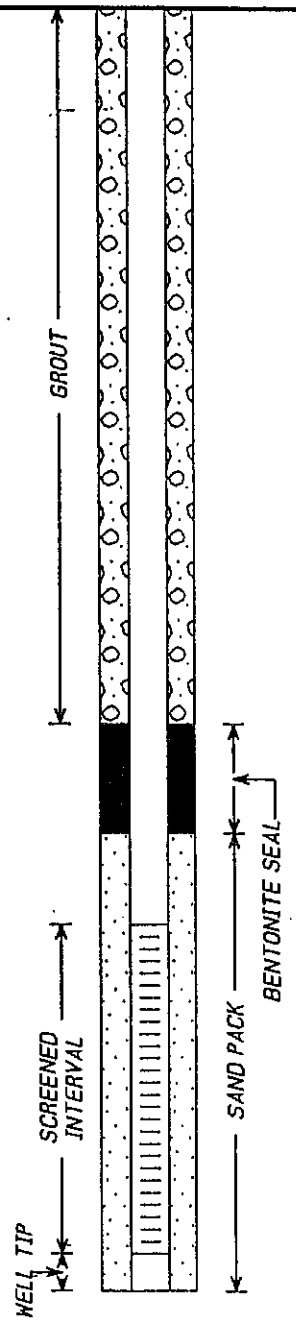
Boring Logs for Ground-Water Monitoring, Wells MW1 through MW9

Ground-Water Monitoring Report, February 1997

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW1 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/17/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *35 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *278.2 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, dark yellowish orange (10YR 6/6), sandy
5			CLAY, pale yellowish brown (10YR 6/2) & lt. brown (5YR 5/6) w/very fine-grained sand & mica
10			w/ironstone fragments
15			CLAY, medium dark gray (N4) with very fine-grained sand laminae & mica
20			
25			
30			sand laminae, more abundant, moist
		ML	SILT, w/very fine-grained sand & mica, very moist
		CL	CLAY, medium dark gray, relatively stiff, w/very fine-grained sand laminae, moist
35			BORING TERMINATED AT 35 FEET BELOW LAND SURFACE.
40			

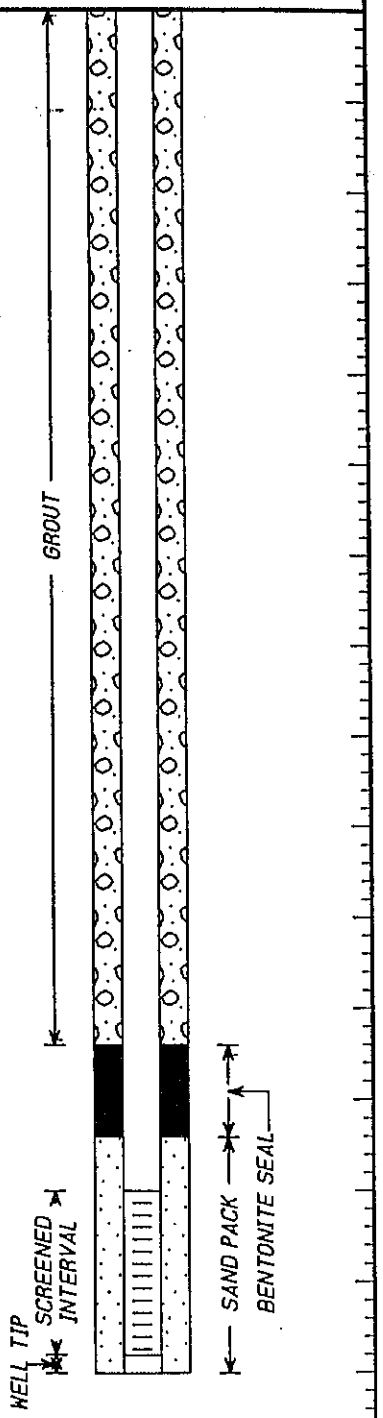
MONITORING WELL CONSTRUCTION
(4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW2 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/18/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *75 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *296.5 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		SM	SAND, dark yellowish orange (10YR 6/6), fine grained w/mica
10		SC	SAND, lt. brown (5YR 5/6), fine grained & clayey
			w/occasional ironstone
15		CL	CLAY, light brown & very lt. gray (N8), sandy
			Pale brown (5YR 5/2) & dark yellowish orange w/inter-fingering very fine-grained sand laminae & mica, very moist
20		SC	SAND, grayish orange (10YR 7/4) & pale yellowish brown (10YR 6/2), fine grained w/occ. clay lenses and ironstone, micaceous
25			
30			Very pale orange (10YR 8/2) & lt. brown, fine-grained, micaceous w/occ. thin clay lenses (1/8-1/2" thick)
35			
40			
45			
50			moist
55			
60			SAND, very pale orange & lt. brown, fine-grained w/occ. clay lenses, micaceous, glauconitic, very moist
65			wet
70			
75		SM	SAND, moderate brown (5YR 3/4) & dusky brown w/ironstone fragments, fine to medium grained, micaceous, glauconitic
			BORING TERMINATED AT 75 FEET BELOW LAND SURFACE.
80			

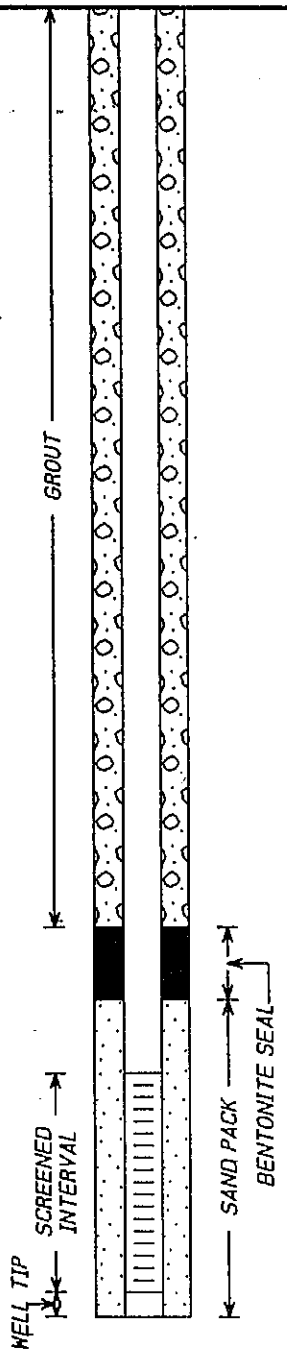
MONITORING WELL CONSTRUCTION (4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW3 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/20/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *256.2 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
0		SC	SAND, lt. brown (5YR 6/4), fine grained, clayey
5		CL	CLAY, lt. brown & medium lt. gray (N6), sandy
			CLAY, lt. brown & medium lt. gray, silty, stiff
			w/very fine-grained sand laminae, micaceous
10			medium dark gray (N4) w/very fine-grained sand laminae, micaceous
15			
20			
25			
30			
35			
40			
		SC	SAND, medium lt. gray (N6), fine grained, micaceous, clayey (very moist)
45		CL	CLAY, medium dark gray, micaceous w/abundant sand laminae
50			less abundant sand laminae
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			

MONITORING WELL CONSTRUCTION
(4-inch diameter)

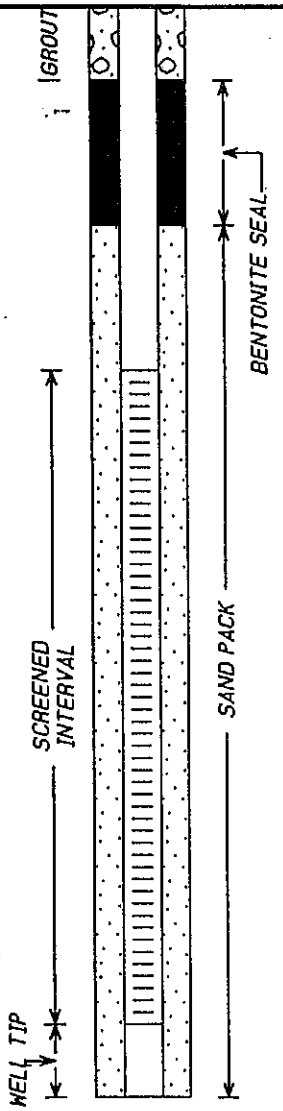


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW4 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/20/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *15 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *194.4 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		SM	SAND, dark yellowish orange (10YR 6/6), fine grained, micaceous
		SC	SAND, fine grained, pale yellowish brown (10YR 6/2) & lt. brown (5YR 5/6), micaceous, clayey (very moist)
			with occasional ironstone fragments
		CL	CLAY, pale yellowish brown & lt. brown, micaceous, w/very fine-grained sand laminae
			medium dark gray (N4) w/very fine-grained sand laminae
			moist sand laminae
			BORING TERMINATED AT 15 FEET BELOW LAND SURFACE.

MONITORING WELL CONSTRUCTION (4-inch diameter)

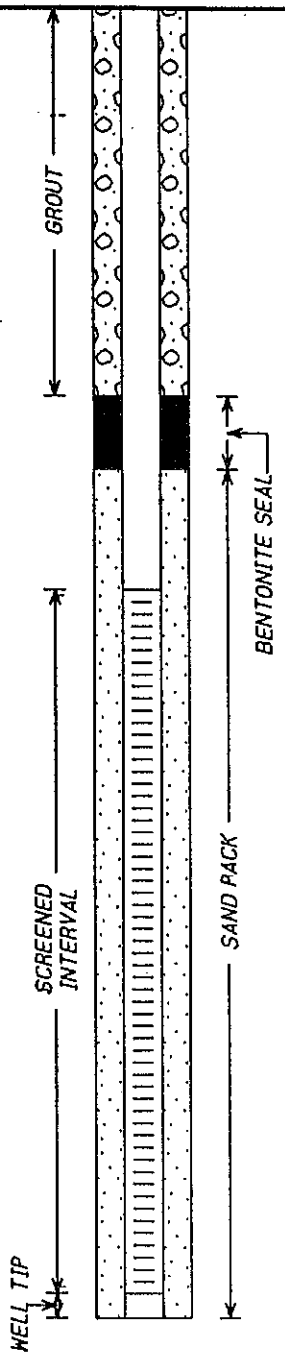


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW5 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/12/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *222.0 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, reddish brown (5/6), sandy
10		ML	SILT, olive brown (4/3), w/trace organics
		SM	SAND, yellow (7/6), very fine-grained, micaceous
15			
20			
		SC	SAND, yellow (7/6) and dark yellowish brown (4/6), w/occ. brownish yellow, clay lenses (6/6), moist
25		CL	Ironstone seam
		SM	CLAY, gray (5/1), w/very fine-grained sand laminae
			SAND, red (4/6) & yellowish red (5/6), fine-grained, micaceous, saturated
30		CL	CLAY, dark gray (4/), w/very fine-grained sand laminae, micaceous
35			
40			
			3" very fine-grained sand lense, greenish-gray (6/1), saturated
45			
50		SC	SAND, gray (5/1), very fine-grained, micaceous, w/occ. clay lenses, wet
		CL	CLAY, gray (5/1), w/occ. very fine-grained sand laminae, micaceous
			CLAY, gray (5/1), stiff, no sand laminae
55			BORING TERMINATED AT 54 FEET BELOW LAND SURFACE.
60			

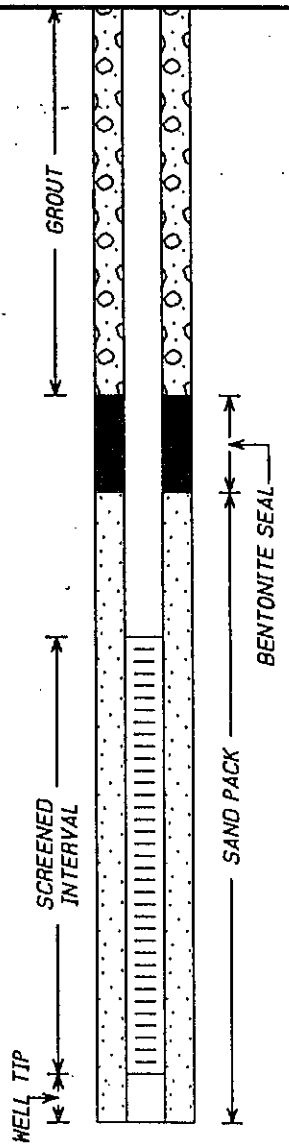
MONITORING WELL CONSTRUCTION (4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW6 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/12/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *23 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *188.8 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		CL	CLAY, strong brown (5/6 & 5/8), sandy
			light gray (7/1) & light brown (6/4), sandy
10			light gray (7/1) & light brown (6/4), w/very fine-grained sand laminae, micaceous iron staining moist sand lenses
15		SC	SAND, strong brown (4/6) & pale yellow (7/3), very fine-grained, micaceous w/occ. clay lenses, (saturated)
20		CL	CLAY, reddish gray (6/1) & brown (5/4), w/very fine-grained olive yellow, sand laminae (6/6), micaceous
			very dark gray w/very fine-grained sand laminae, gray (6/1), micaceous
			very dark gray (3/1), very stiff
25			BORING TERMINATED AT 23 FEET BELOW LAND SURFACE.
30			

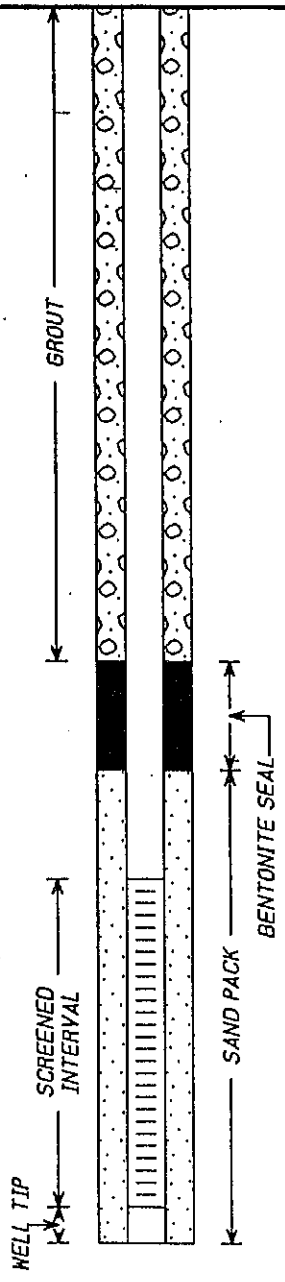
MONITORING WELL CONSTRUCTION (4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW7 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *11/13/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *39 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *196.7 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
		CL	CLAY, strong brown (4/6), sandy
5			light brown (6/3), strong brown & occ. gray (5/1 & 6/1), sandy
10			
15			
20			
25			
30		SC	light brown (6/3) & gray (6/1), very sandy, moist
		CL	SAND, brownish yellow (6/6), clayey, micaceous, saturated
			gray (6/1) & yellowish brown (6/6), silty, stiff
			2" coal seam
35			gray (5/1) & weak red (4/3), very stiff, silty
40			BORING TERMINATED AT 39 FEET BELOW LAND SURFACE.

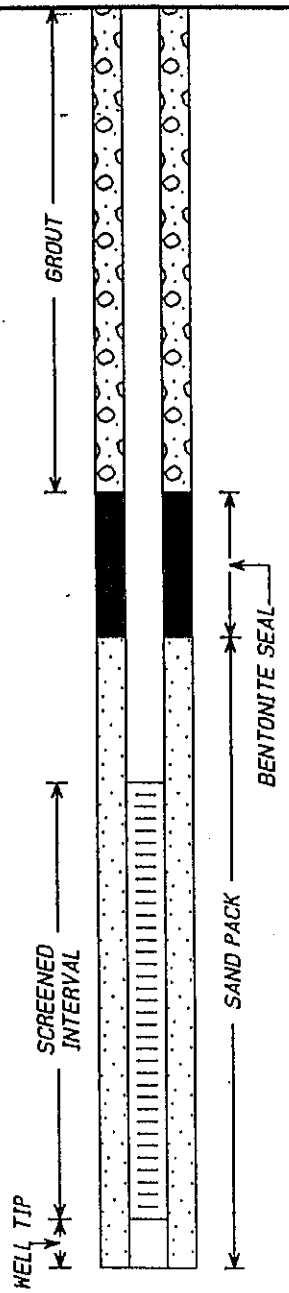
MONITORING WELL CONSTRUCTION
(4-inch diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW8 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/19/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *26 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *215.4 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
	ML	SILT, dark yellowish brown (10YR 4/2), sandy
	SC	SAND, lt. brown (5YR 5/6), fine grained, clayey
5		moderate yellowish brown (10YR 5/4) & very pale orange (10YR 8/2), fine grained & clayey, micaceous
10		moist
15	SM	SAND, lt. brown & moderate brown (5YR 4/4)
		very moist
		w/occasional ironstone
20		saturated
		ferruginous
25	CL	CLAY, medium gray (N5), sandy
		BORING TERMINATED AT 26 FEET BELOW LAND SURFACE.
30		

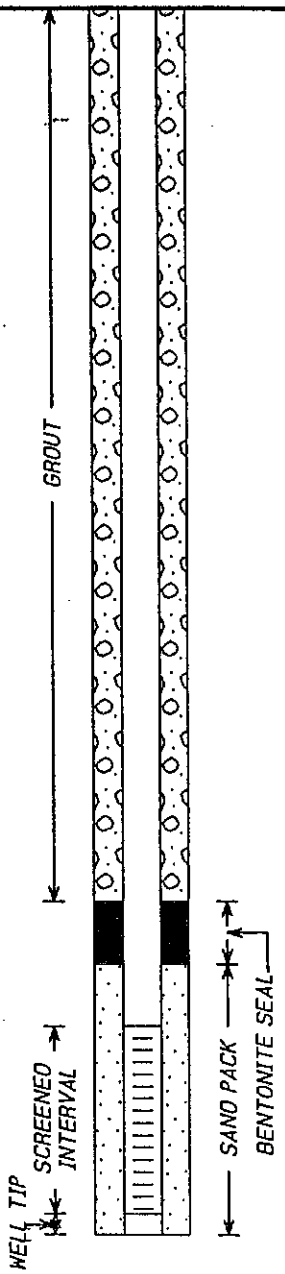
MONITORING WELL CONSTRUCTION (4-inch-diameter)



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE FACILITY	LOG OF BORING MW9 AND WELL CONSTRUCTION
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE AUGERED: *6/19/96*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *79-304*	BORING DEPTH: *59 Feet BLS*
DRILLER: *KEN PATE & CREW*	L.S.ELEVATION: *267.6 Feet AMSL*	BORING DIAMETER: 10.25 Inches
DRILLING METHOD: *CME-75 W/4-1/4" & 6-1/4" ID HSA & 5' CONT. SPS*		

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION
5		ML	SILT, dark yellowish brown (10YR 4/2), sandy
10		SC	SAND, dark yellowish orange (10YR 6/6) & lt. brown (5YR 5/6), fine grained, clayey, micaceous
15			
20			light brownish gray (5YR 6/1) & pinkish gray (5YR 8/1)
25			moderate orange pink (5YR 8/4) & dark yellowish orange, fine grained, micaceous, w/occ. very lt. gray (N8) thin clay lenses
30			grayish orange (10YR 7/4) & dark yellowish orange, fine grained, micaceous; w/occ. thin (1/8") clay lenses (very lt. gray)
35			very pale orange (10YR 8/2), grayish orange & dark yellowish orange & moderate orange pink (5YR 8/4), micaceous, clayey
40			
45			moist
50			saturated
55			w/occasional ironstone
60		CL	CLAY, medium gray (N4), sandy
		SC	SAND, medium gray, fine to medium-grained, gray, clayey, micaceous
			BORING TERMINATED AT 59 FEET BELOW LAND SURFACE.
65			
70			

MONITORING WELL CONSTRUCTION (4-inch diameter)



APPENDIX 3.1C

Boring Logs for Piezometers 11A and C1-1 through C1-5

Supplement to October 1994 Hydrogeological Evaluation, Revised May 19, 1995

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-1
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *29.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *196.3 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		ML	SILT, dark yellowish brown (10YR 4/2), sandy		
5		CL	CLAY, light brown (5YR 5/6), sandy & silty		
10			CLAY, light brown & dark yellowish orange, sandy ------Moist------ Micaceous, very sandy		
15					
20			CLAY, light gray (N7) and moderate red (5R 4/6), silty and stiff		
25		SC CL	CLAY, light gray & dark gray (N3) with very fine-grained sand laminae SAND, light brown, fine-grained, micaceous, clayey CLAY, light olive gray (5Y 6/1) & medium gray (N5), stiff		
30			BORING TERMINATED AT 29.0 FEET BELOW LAND SURFACE.		
35					
40					
45					

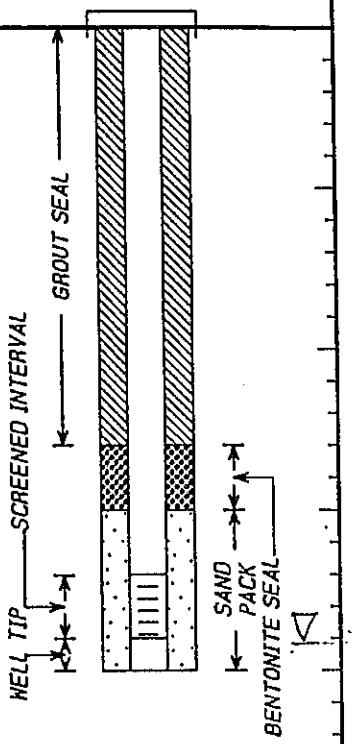
GROUT SEAL
SCREENED INTERVAL
WELL TIP
SAND PACK
BENTONITE SEAL

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER CI-1A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *20.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *196.8 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		ML	SILT, dark yellowish brown (10YR 4/2), sandy	
		CL	CLAY, light brown (5YR 5/6), sandy & silty	
5				
10			CLAY, light brown & dark yellowish orange, sandy -----Moist----- Micaceous, very sandy	
15				
20			CLAY, light gray (N7) and moderate red (5R 4/6), silty and stiff BORING TERMINATED AT 20.0 FEET BELOW LAND SURFACE.	
25				
30				
35				
40				
45				

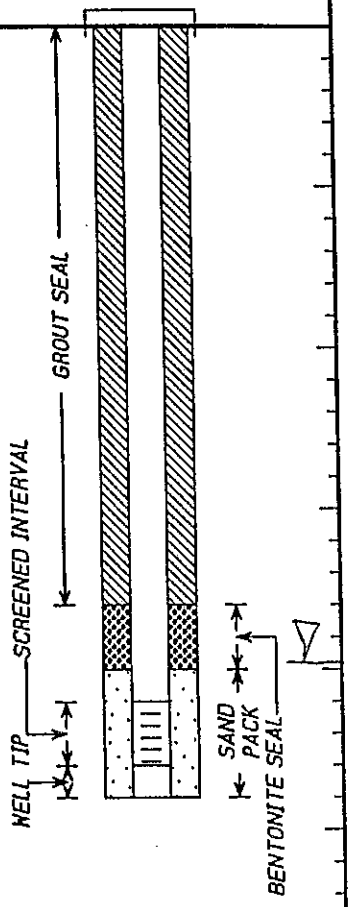
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-2
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *24.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *190.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
		ML	SILT, dark yellowish brown (10YR 4/2), sandy	
5		CL	CLAY, light brown (5YR 5/6), sandy	
10			CLAY, pale yellowish orange (10YR 8/6) & dark yellowish orange (10YR 6/6) & light brown, very sandy (moist)	
15			CLAY, very pale orange (10YR 8/2) & dark yellowish orange, very sandy, micaceous -----Very moist----- -----Very sandy-----	
20				
25			BORING TERMINATED AT 24.0 FEET BELOW LAND SURFACE.	
30				
35				
40				
45				

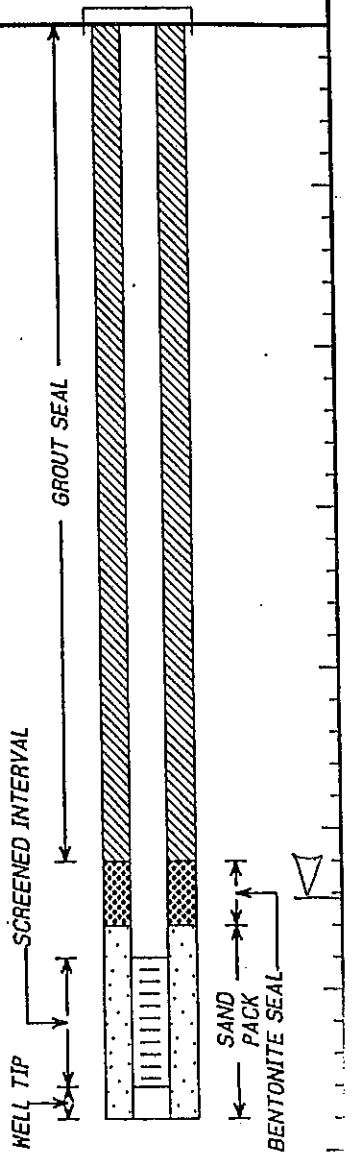
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER CI-3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *34.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *224.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		CL	CLAY, light brown (5YR 6/4), sandy	
218.9		SM	SAND, dark (10YR 6/6) & pale yellowish (10YR 8/6) orange, fine-grained with mica	
10				
15				
204.9			With occ. clay lenses	
20		SC	SAND, dark & pale yellowish orange, fine-grained w/mica and occ. clay lenses	
25				
			SAND, dark & pale yellowish orange & lt. brown, fine-grained, w/mica & occ. clay lenses	
			------Very moist------	
194.9			Saturated	
30		CL	CLAY, pale brown (5YR 5/2), silty, stiff	
			------Ironstone (about 1/8" thick) & sand lense about 3" thick------ (wet)	
			CLAY, light (N7) & dark (N3) gray w/very fine sand laminae & mica (Sand laminae are very moist)	
35			BORING TERMINATED AT 34.0 FEET BELOW LAND SURFACE.	
40				
45				

PIEZOMETER CONSTRUCTION

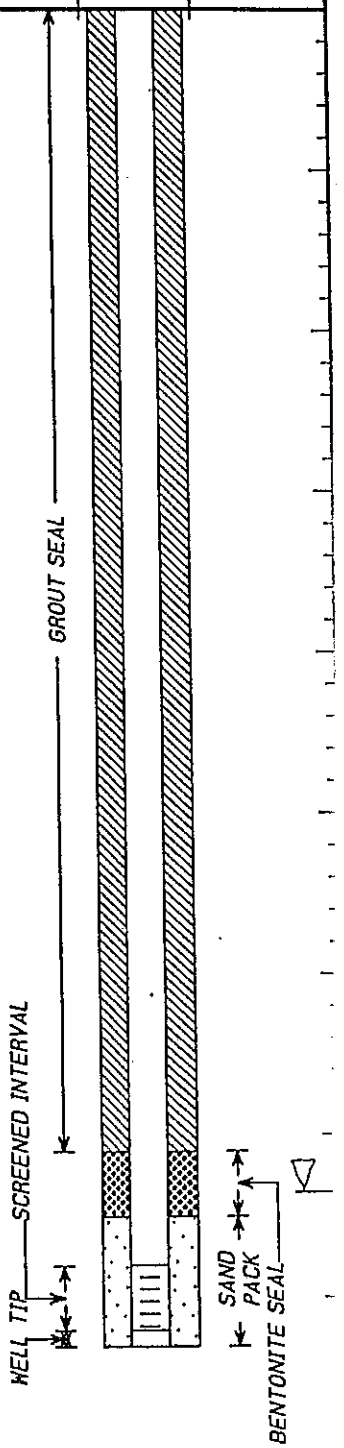


TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER C1-4
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/14/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *41.5 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *234.2 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SC	SAND, dark yellowish brown (10YR 4/2), clayey
	CL	CLAY, light brown (5YR 5/6), sandy, micaceous
5		CLAY, pale yellowish (10YR 6/2) brown, very pale orange (10YR 8/2) & dark yellowish orange w/very fine-grained sand laminae & mica
10		------W/Ironstone------
	SM	SAND, dark (10YR 6/6) & pale yellowish orange (10YR 8/6), fine-grained w/mica
15	SC	SAND, dark & pale yellowish orange, fine-grained w/mica & occ. clay lenses
20		
25		SAND, dark & pale yellowish orange, fine-grained w/occ. clay lenses & mica
30		------Ironstone fragments------
35		SAND, very pale orange, fine-grained w/mica & occ. clay lenses
		------Wet------
40		SAND, fine to medium grained, clayey, w/mica
	CL	CLAY, olive gray (5Y 4/1) w/very fine-grained sand laminae & mica
		BORING TERMINATED AT 41.5 FEET BELOW LAND SURFACE.
45		

PENETRATION (blows per ft.)

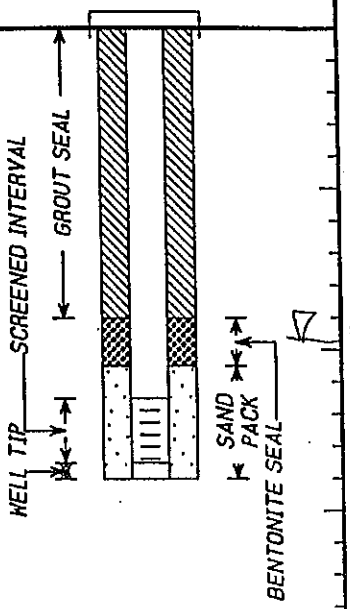
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER CI-5
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *14.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *211.3 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		CL	CLAY, light brown (5YR 5/6) & dark yellowish orange (10YR 6/6), sandy w/mica		
5			CLAY, light brown & very pale orange (10YR 8/2) w/very fine-grained sand laminae & mica & ironstone fragments		
		SC	SAND, light brown, fine-grained w/occ. clay lenses		
10			SAND, dusky yellow (5Y 6/4), fine-grained w/mica, clayey -----Very moist-----		
		CL	CLAY, light (N7) & dark gray (N3) w/very fine-grained sand laminae & mica		
15			BORING TERMINATED AT 14.0 FEET BELOW LAND SURFACE.		
20					
25					
30					
35					
40					
45					



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 11A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *4/17/95*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *59-304*	BORING DEPTH: *34.0 Feet BLS*
DRILLER: *KEVIN MITCHELL & CREW*	L.S.ELEVATION: *263.9 Feet AMSL*	COORDINATE NORTH: N/A
DRILLING METHOD: *CME 55 W/4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *N/A*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, very pale orange (10YR 8/2) & moderate yellowish orange (10R 6/6), fine-grained w/mica		GROUT SEAL
5					
10			SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2)		
15			W/occ. thin ironstone lenses (Iron-staining)		
20					
25			"Very moist"		SCREENED INTERVAL
		CL	Thin ironstone layer about 1/4" thick		
30			CLAY, pale yellowish brown (10YR 6/2) w/very fine-grained sand laminae & mica & ironstone fragments		SAND PACK
			CLAY, light brownish gray (5YR 6/1) & dark yellowish orange w/very fine-grained sand laminae & mica		BENTONITE SEAL
			------Relatively stiff------		
35			BORING TERMINATED AT 34.0 FEET BELOW LAND SURFACE.		WELL TIP
40					
45					

TTL, Inc

APPENDIX 3.1D

Boring Logs and Piezometer-Completion Diagrams for Piezometers 94-1 through 94-33, 94-35, and 94-36 and Boreholes 94-34, EXB3, and EXB4

Hydrogeological Evaluation, October 1994

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-1
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-4-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *104 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *338.2 Feet AMSL*	COORDINATE NORTH: 1179481
DRILLING METHOD: *CME 75 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923098*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SM	SAND, LIGHT BROWN (5 YR 6/6), FINE-GRAINED	11
				16
10				25
				32
15				17
				13
20			SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	7
			SAND, GRAYISH-ORANGE (10 YR 7/4) AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA	10
25			SAND, GRAYISH-ORANGE AND MODERATE ORANGE PINK (5 YR 8/4), FINE-GRAINED, WITH MICA	10
				13
30				20
				18
35			SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	26
			SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA	20
40				38
				17
45				28
				17
50				19
				25
55				

PIEZOMETER CONSTRUCTION

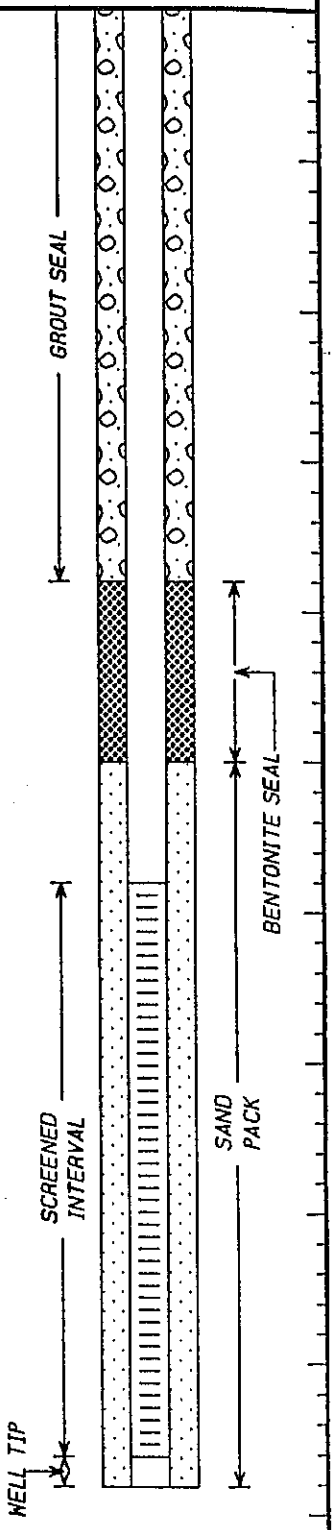
GROUT SEAL

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-1

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)
60	SM		33
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED, WITH MICA	32
65			36
70		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	45
75			34
80	SC	SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	26
		SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
85		SAND, MODERATE ORANGE PINK (10 R 7/4), DARK YELLOWISH ORANGE, AND LIGHT GRAY (N7), SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	35
90		SAND, LIGHT RED (5 R 6/6), DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, VERY FINE-GRAINED WITH MICA AND OCCASIONAL CLAY LENSES	40
95		SAND, MODERATE RED (5 R 5/4), DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY TO FINE-GRAINED WITH MICA AND OCCASIONAL CLAY LENSES	46
100		SAND, MODERATE RED AND LIGHT RED, SILTY, FINE-GRAINED, SATURATED	64
		SAND, MODERATE RED AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
105		BORING TERMINATED AT 104 FEET BELOW LAND SURFACE	
110			

PIEZOMETER CONSTRUCTION



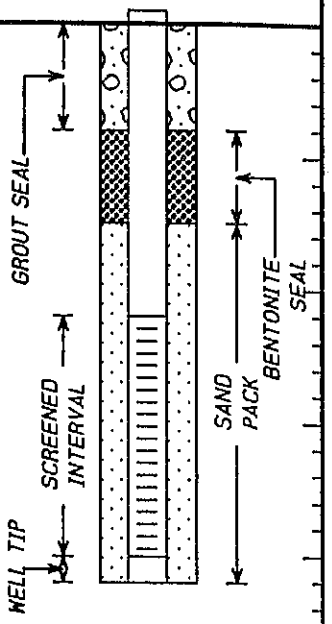
TTL, Inc

JOB NUMBER: 45-479

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-2
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-9-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *21 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *296.1 Feet AMSL*	COORDINATE NORTH: 1179866
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923154*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
		CL	CLAY, LIGHT BROWN (5 YR 5/6), SANDY	6
5		SM	SAND, LIGHT BROWN, SILTY, VERY FINE-GRAINED	8
				6
10			SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10YR 8/6), VERY FINE GRAINED, WITH MICA	20
			SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA, MOIST	12
15			SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA, SATURATED	15
		SC	SAND, VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED WITH MICA	12
20			SAND, MODERATE ORANGE PINK (5 YR 8/4) AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	20
				14
25			BORING TERMINATED AT 21 FEET BELOW LAND SURFACE	
30				
35				
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION

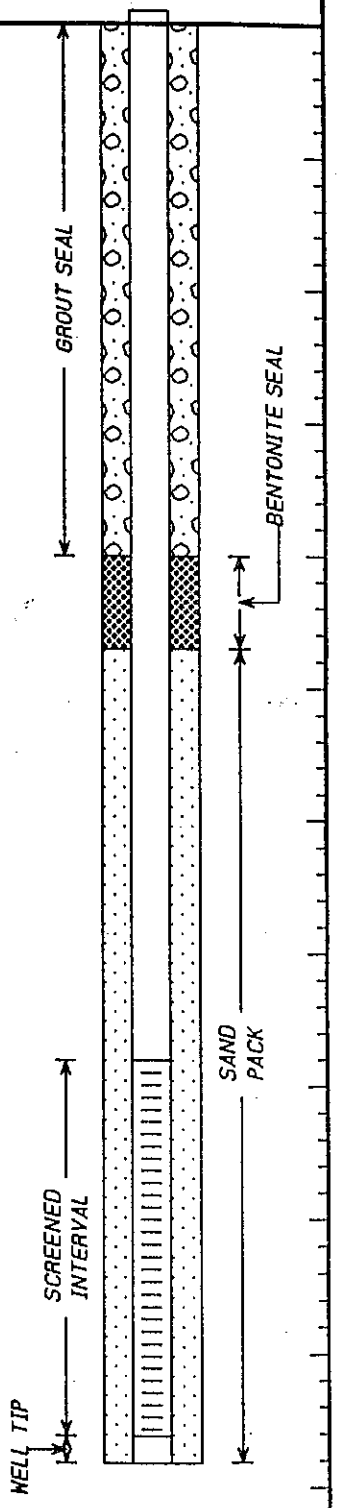


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-3
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-8-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *54 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *263.5 Feet AMSL*	COORDINATE NORTH: 1178959
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922549*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SM	SAND, PALE YELLOWISH-BROWN (10 YR 8/6), FINE-GRAINED	4
		SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED WITH IRONSTONE FRAGMENTS	9
		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED	10
10	SC	SAND, PALE REDDISH-BROWN (10 R 5/4), FINE-GRAINED WITH LIGHT GRAY (N7) SILT LENSES	14
			9
15		SAND, MODERATE PINK (5 R 7/4) AND MODERATE ORANGE PINK (10 R 7/4), FINE-GRAINED WITH OCCASIONAL CLAY AND SILT LENSES	14
			15
20			20
			19
25	CL	CLAY, LIGHT BROWN (5 R 5/6) AND LIGHT GRAY, SILTY	16
			17
		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY, SILTY AND SANDY	23
30			26
			28
35			27
			59
40			46
		CLAY, MEDIUM DARK GRAY AND LIGHT GRAY, SILTY AND SANDY WITH COAL FRAGMENTS	
	SC	SAND, MODERATE YELLOWISH-BROWN (10 YR 5/4) AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, CLAYEY WITH MICA, VERY MOIST	+50
45	SM		45
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED WITH MICA, SATURATED	83
50	CL	SAND, GRAYISH-ORANGE (10 YR 7/4), FINE-GRAINED WITH MICA	
		CLAY, MEDIUM DARK GRAY, SILTY AND STIFF WITH OCCASIONAL SILTY AND VERY FINE-GRAINED SAND LENSES.	
		CLAY, OLIVE-GRAY (5 Y 4/1), SILTY AND STIFF	
55		BORING TERMINATED AT 54 FEET BELOW LAND SURFACE	

PIEZOMETER CONSTRUCTION

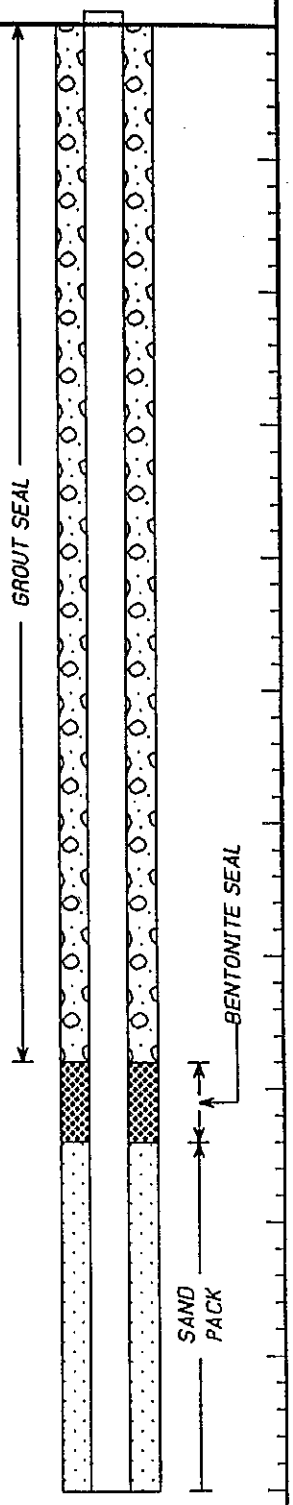


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-4
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-8-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *71 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *270.5 Feet AMSL*	COORDINATE NORTH: 1178530
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923051*

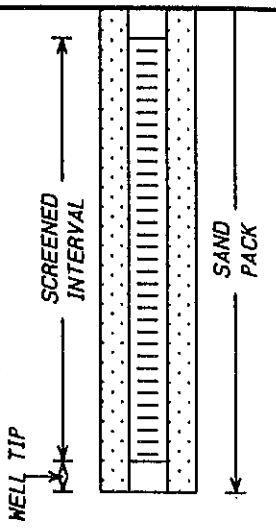
DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SC	SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED, CLAYEY	12 22 15
	SM	SAND, VERY PALE ORANGE (10 YR 8/2) AND LIGHT BROWN (5 YR 6/4) FINE-GRAINED	23
10	SC	SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	25 23
15	SM	SAND, DARK YELLOWISH-ORANGE, FINE-GRAINED	15 13 16
20		SAND, DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH IRONSTONE FRAGMENTS	11
25		SAND, MODERATE ORANGE PINK (5 YR 8/4) AND LIGHT BROWN, FINE-GRAINED, WITH MICA	10
30		SAND, MODERATE ORANGE PINK AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA	17 24
35		SAND, MODERATE ORANGE PINK, DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA	21 18
40	SC	SAND, MODERATE ORANGE PINK AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	24 24 25
45			29
50		SAND, MODERATE PINK (5 R 7/4), MODERATE RED (5 R 5/4), DARK YELLOWISH-ORANGE, AND LIGHT RED (5 R 6/6), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	39
55		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	52

PIEZOMETER CONSTRUCTION



TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-4

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		SC	SAND, VERY PALE ORANGE, DARK YELLOWISH-ORANGE, AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES,	66	
			SAND, LIGHT BROWN AND MODERATE BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	18	
65				20	
70		CL	CLAY, MEDIUM GRAY (N5) AND LIGHT GRAY (N7), SILTY AND SANDY	58	
			BORING TERMINATED AT 71 FEET BELOW LAND SURFACE		
75					
80					
85					
90					
95					
100					
105					
110					



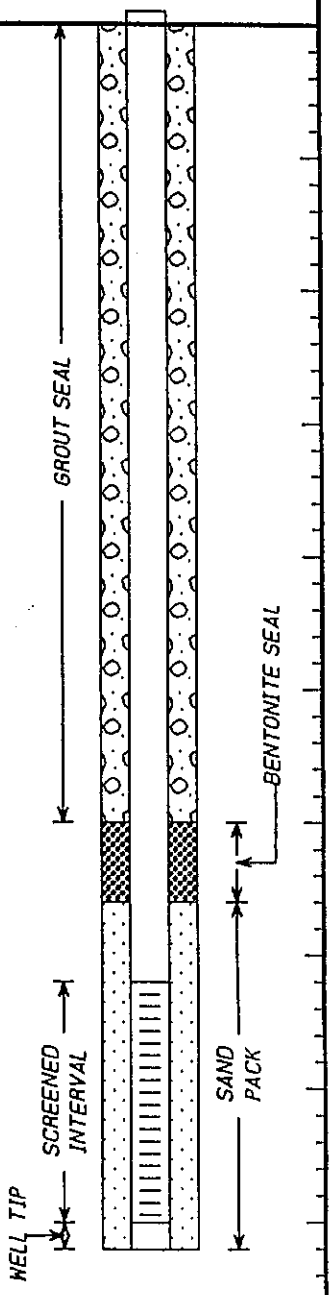
TTL, Inc

JOB NUMBER: 45-479

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-5
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-11-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *46 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *249.3 Feet AMSL*	COORDINATE NORTH: 1178060
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921965*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0	SM	SAND, MODERATE BROWN (5 YR 4/4) AND DUSKY YELLOWISH-BROWN (10 YR 2/2), SILTY, FINE-GRAINED	4
	ML	SILT, LIGHT BROWN (5 YR 5/6), SANDY	27
5			41
			25
10			9
	SM	SAND, LIGHT BROWN, SILTY, FINE-GRAINED, WITH MICA	10
15		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	9
	CL	CLAY, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10 YR 8/6), SANDY	14
20		CLAY, LIGHT BROWN, VERY PALE ORANGE (10 YR 8/2), AND DARK YELLOWISH-ORANGE, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	13
		CLAY, DARK YELLOWISH-ORANGE, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	31
25		CLAY, LIGHT BROWN AND LIGHT GRAY (N7), SILTY, WITH MICA	16
		CLAY, LIGHT BROWN, PALE REDDISH-BROWN (10 R 5/4), AND LIGHT GRAY, SILTY, WITH MICA	24
30		CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, SILTY, WITH MICA	29
		CLAY, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA, VERY MOIST	18
35		CLAY, VERY PALE ORANGE AND PALE YELLOWISH-BROWN, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	26
	SC	SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, WITH MICA AND OCCASIONAL CLAY LENSES	23
40		SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	31
			32
45	CL	CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	13
		BORING TERMINATED AT 46 FEET BELOW LAND SURFACE	
50			
55			

PIEZOMETER CONSTRUCTION

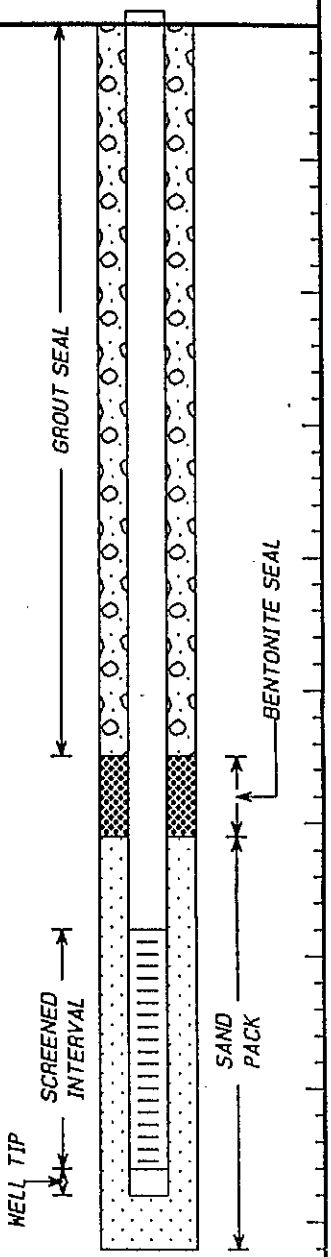


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-6
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-11-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *46 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *245.0 Feet AMSL*	COORDINATE NORTH: 1177705
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922084*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	SM	SAND, LIGHT BROWN (5 YR 5/6) AND DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED	7
	ML	SILT, LIGHT BROWN, SANDY, WITH MICA	15
5			22
		SILT, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), SANDY, WITH MICA	13
	SM	SAND, PALE YELLOWISH-ORANGE (10 YR 8/6) AND VERY PALE ORANGE (10 YR 8/2), SILTY, WITH MICA	13
10			12
15			13
			19
20			15
			21
25	SC	SAND, PALE YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	15
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	12
30			16
			25
35			16
			30
40			22
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, MOIST	
	CL	SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	24
45			32
		CLAY, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY	
		CLAY, OLIVE GRAY (5 Y 4/1) AND DARK GREENISH-GRAY (5 GY 4/1), WITH SILT AND VERY FINE-GRAINED SAND	
50		BORING TERMINATED AT 46 FEET BELOW LAND SURFACE	
55			

PIEZOMETER CONSTRUCTION

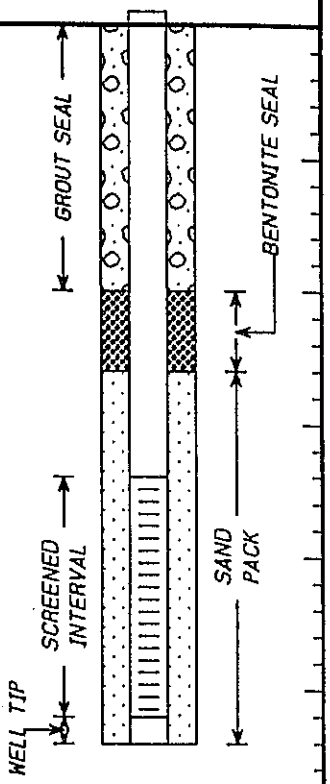


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-7
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO. AL.*	DATE DRILLED: *3-9-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *27 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *214.7 Feet AMSL*	COORDINATE NORTH: 1178121
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922755*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	SC	SAND, LIGHT BROWN (5 YR 6/6), FINE-GRAINED AND CLAYEY	10
	SM	SAND, LIGHT BROWN, SILTY AND VERY FINE-GRAINED	10
5	SC	SAND, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED AND CLAYEY	11
	SM	SAND, LIGHT BROWN, FINE-GRAINED	9
10		SAND, DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	10
		SAND, LIGHT BROWN, FINE-GRAINED, WITH MICA	12
15		SAND, DARK YELLOWISH-BROWN (10 YR 4/2), FINE-GRAINED, WITH MICA AND IRONSTONE FRAGMENTS	17
		SAND, VERY PALE ORANGE AND LIGHT BROWN, FINE-GRAINED, WITH MICA, SATURATED	30
20	SC	SAND, GRAYISH-ORANGE (10 YR 7/4), SILTY AND VERY FINE-GRAINED	27
	CL SC	SAND, LIGHT BROWN, VERY PALE ORANGE, AND LIGHT GRAY (N7), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	24
25		CLAY, LIGHT GRAY (N7), STIFF	
		SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	
30		BORING TERMINATED AT 27 FEET BELOW LAND SURFACE	
35			
40			
45			
50			
55			

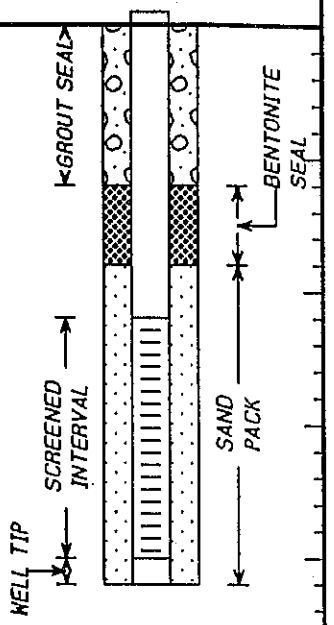
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-8
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-10-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *21 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *218.3 Feet AMSL*	COORDINATE NORTH: 1177839
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921725*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	ML	SILT, LIGHT BROWN (5 YR 5/6), CLAYEY	12
		SILT, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10YR 6/6), CLAYEY, WITH MICA	17
		SILT, LIGHT BROWN AND PALE YELLOWISH-BROWN (10 YR 6/2), CLAYEY, WITH MICA	19
		SILT, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), SANDY, WITH MICA	16
10	SM	SAND, PALE YELLOWISH-ORANGE (10 YR 8/6) AND VERY PALE ORANGE, SILTY, VERY FINE-GRAINED, WITH MICA	14
15		SAND, PALE YELLOWISH-ORANGE, DARK YELLOWISH-ORANGE, AND LIGHT BROWN, FINE-GRAINED, WITH MICA, MOIST	12 13
		SAND, LIGHT BROWN, FINE-TO MEDIUM-GRAINED, WITH MICA	
20	CL	CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN, SILTY, WITH MICA	40
	ML		
	CL	SILT, LIGHT BROWN, SANDY, WITH MICA	31
25		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY (N7), WITH SILT AND VERY FINE-GRAINED SAND, WITH MICA	
		BORING TERMINATED AT 21 FEET BELOW LAND SURFACE	
30			
35			
40			
45			
50			
55			

PIEZOMETER CONSTRUCTION

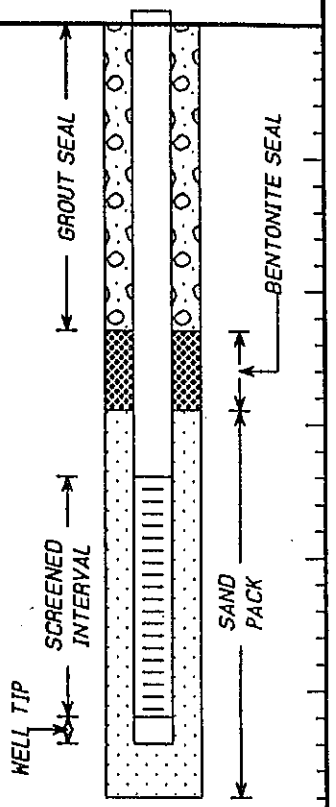


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-9
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-10-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *29 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *204.0 Feet AMSL*	COORDINATE NORTH: 1178807
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921759*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	CL	CLAY, LIGHT BROWN (5 YR 5/6), SILTY	11
5		CLAY, LIGHT BROWN AND VERY PALE ORANGE (10 YR 8/2), SANDY AND SILTY	18
		CLAY, LIGHT BROWN AND LIGHT GRAY (N7), SILTY AND STIFF	19
10		CLAY, LIGHT BROWN AND LIGHT GRAY, SILTY	28
	SC	SAND, DARK YELLOWISH-ORANGE (10 YR 6/6) AND LIGHT GRAY, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	29
15	ML		33
	SC	SILT, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE (10 YR 8/2), CLAYEY, VERY MOIST	29
		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE (10 YR 6/6), FINE-GRAINED, WITH MICA	40
20		SAND, LIGHT BROWN, DARK YELLOWISH-ORANGE, AND LIGHT GRAY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	40
	ML	SAND, MODERATE BROWN (5 YR 3/4), SILTY, FINE-GRAINED, AND CLAYEY	36
25	CL	SAND, MODERATE BROWN, SILTY, FINE-GRAINED, AND CLAYEY, SATURATED	29
		SAND, LIGHT BROWN AND DARK YELLOWISH-BROWN (10 YR 4/2) FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	42
30		SILT, LIGHT BROWN, DARK YELLOWISH ORANGE, AND VERY PALE ORANGE, CLAYEY	
		SILT, DARK GREENISH-GRAY (5 GY 4/1), CLAYEY	
35		CLAY, OLIVE GRAY (5 Y 3/2), SILTY AND STIFF	
		CLAY, DARK GRAY (N3) AND LIGHT GRAY (N7), STIFF WITH SILT AND VERY FINE-GRAINED SAND	
40		BORING TERMINATED AT 29 FEET BELOW LAND SURFACE	
45			
50			
55			

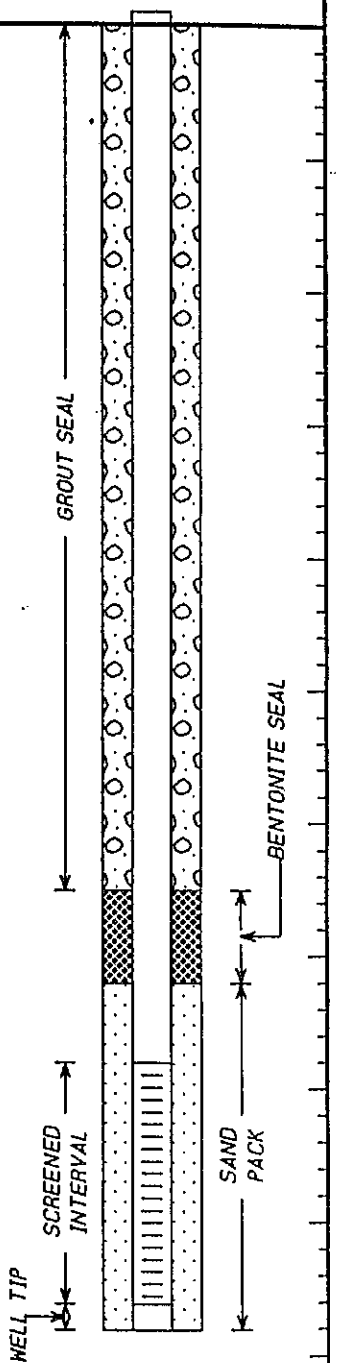
PIEZOMETER CONSTRUCTION



TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-10
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-14-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *237.0 Feet AMSL*	COORDINATE NORTH: 1179076
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921223*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
	CL	CLAY, LIGHT BROWN (5 YR 5/6), SILTY	4
		CLAY, MODERATE ORANGE PINK (5 YR 8/4) AND VERY PALE ORANGE (10 YR 8/2), SILTY	8
5		CLAY, MODERATE ORANGE PINK, VERY PALE ORANGE, AND MODERATE RED (5 R 4/6), SILTY AND SANDY	29
		CLAY, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE, WITH SILT AND VERY FINE SAND AND MICA	21
10			23
		CLAY, PALE YELLOWISH-BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE (10 YR 6/6), WITH SILT AND VERY FINE SAND AND MICA	40
15	ML		38
	SM	SILT, LIGHT BROWN, PALE YELLOWISH BROWN, AND VERY PALE ORANGE, CLAYEY	
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA	38
20	SC	SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	25
		SAND, GRAYISH-ORANGE (10 YR 7/4) AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	33
25			27
		SAND, DARK YELLOWISH-ORANGE AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	46
30			37
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	42
35			38
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES	53
40			22
		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES, VERY MOIST	45
45		SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	27
	CL	CLAY, OLIVE GRAY (5 Y 4/1) AND LIGHT GRAY (N7), SILTY, WITH MICA AND VERY FINE-GRAINED SAND	+50
50		BORING TERMINATED AT 49 FEET BELOW LAND SURFACE	
55			

PIEZOMETER CONSTRUCTION

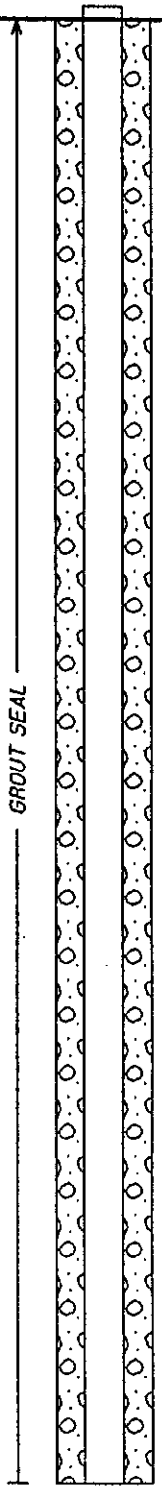


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-11
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO. AL.*	DATE DRILLED: *3-14-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *84 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *276.3 Feet AMSL*	COORDINATE NORTH: 1179592
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921362*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	ML	SILT, LIGHT BROWN (5 YR 5/6), SANDY	7 23 27
	SM	SAND, LIGHT BROWN, SILTY, VERY FINE-GRAINED, WITH MICA	30
10		SAND, LIGHT BROWN AND PALE YELLOWISH-ORANGE (10 YR 6/2), SILTY, VERY FINE-GRAINED, WITH MICA	23
15		SAND, PALE YELLOWISH ORANGE (10 YR 8/6) AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA	21 23
20			21 28
25			28 34
30		SAND, MODERATE BROWN (5 YR 4/4), VERY PALE ORANGE, AND PALE YELLOWISH-BROWN (10 YR 6/2), FINE-GRAINED, WITH MICA	24 28
35		SAND, MODERATE BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND IRONSTONE FRAGMENTS	50 84
40		SAND, VERY PALE ORANGE, FINE-GRAINED, WITH MICA, MOIST	56
45	CL	CLAY, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, SANDY AND SILTY, WITH MICA	53 33 27
50		CLAY, LIGHT BROWN, PALE YELLOWISH-BROWN, AND VERY PALE ORANGE, SILTY WITH VERY FINE SAND AND MICA	29 35
55		CLAY, MEDIUM DARK GRAY (N4) AND LIGHT GRAY (N7), WITH SILT AND VERY FINE SAND AND MICA	44

PIEZOMETER CONSTRUCTION

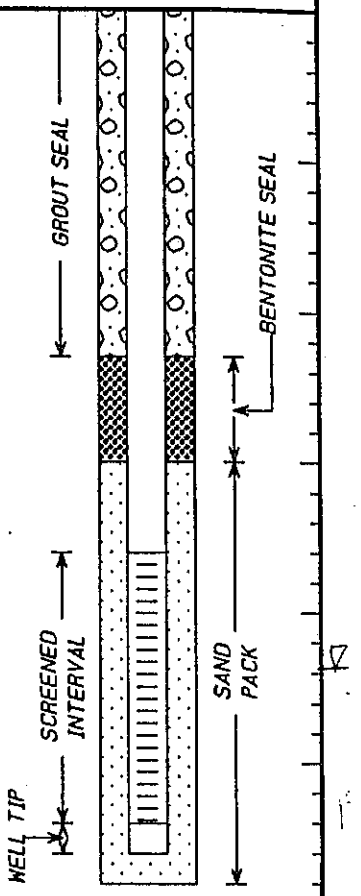


TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-11

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)
60		CL	CLAY, PALE YELLOWISH-BROWN, VERY PALE ORANGE, AND DARK YELLOWISH ORANGE (10 YR 6/6), SILTY WITH VERY FINE SAND AND MICA	51
			CLAY, DARK YELLOWISH-ORANGE, PALE YELLOWISH-BROWN, AND VERY PALE ORANGE, SILTY WITH VERY FINE SAND AND MICA	42 44
65				38 75
70		SC	SAND, DARK YELLOWISH-BROWN (10 YR 4/2), LIGHT BROWN, AND DARK YELLOWISH-ORANGE, SILTY, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	86 74
75			SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, SILTY, WITH MICA	80 87
			SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	73
80		CL	SAND, LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH--ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	48
85			CLAY, MEDIUM DARK GRAY AND LIGHT GRAY, WITH SILT AND VERY FINE-GRAINED SAND AND MICA	
			CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	
90			BORING TERMINATED AT 84 FEET BELOW LAND SURFACE	
95				
100				
105				
110				

PIEZOMETER CONSTRUCTION

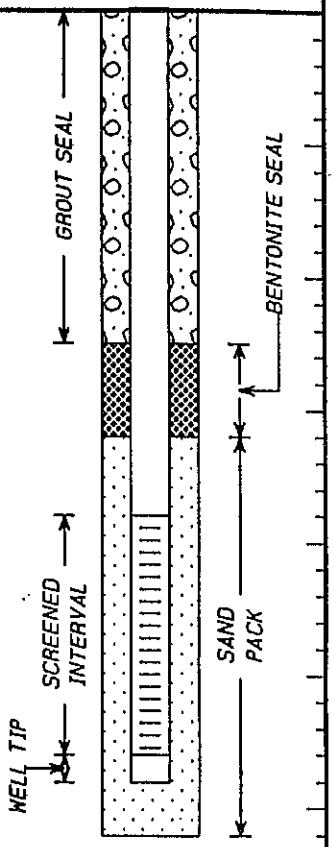


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-12
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-12-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *31 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *265.0 Feet AMSL*	COORDINATE NORTH: 1180386
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921603*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		CL	CLAY, LIGHT BROWN (5 YR 6/6) AND VERY PALE ORANGE (10 YR 8/2), SANDY	6
5				13
				15
			CLAY, DARK YELLOWISH-ORANGE (10 YR 6/6) AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE SAND AND MICA	20
10				21
			CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	44
15				44
				56
20				51
				51
25				40
				65
30				55
			BORING TERMINATED AT 31 FEET BELOW LAND SURFACE	
35				
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION

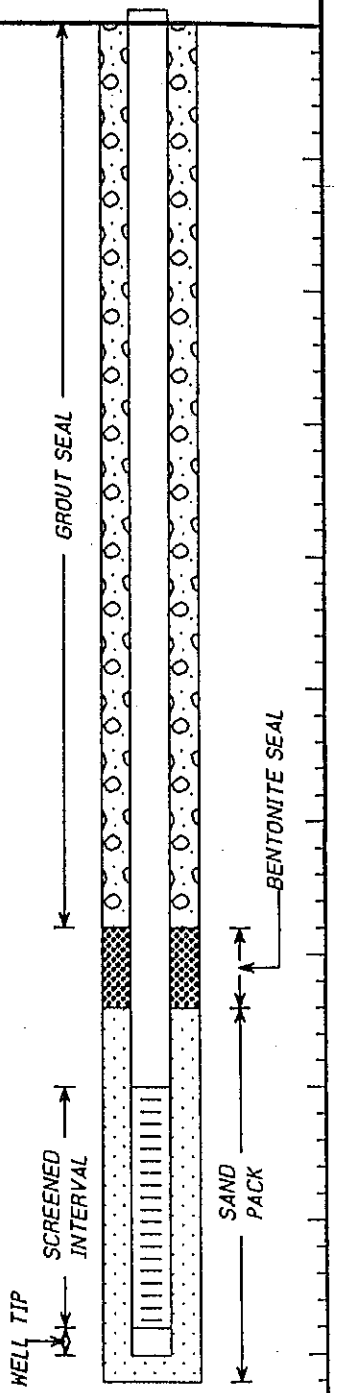


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-13
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-12-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *51 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *287.5 Feet AMSL*	COORDINATE NORTH: 1181160
DRILLING METHOD: *CME 55 WITH 4 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922296*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SC	SAND, LIGHT BROWN (5 YR 5/6), CLAYEY	4
		SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), WITH SILT AND VERY FINE SAND WITH MICA	17
		SAND, LIGHT BROWN, DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE (10 YR 8/2), FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	18
10	CL	CLAY, DARK YELLOWISH-ORANGE AND LIGHT GRAY (N7), SILTY WITH IRONSTONE FRAGMENTS	28 16
15		CLAY, DARK YELLOWISH-ORANGE AND PALE YELLOWISH-BROWN (10 YR 6/2), WITH SILT AND VERY FINE SAND AND MICA	22
		CLAY, DARK GRAY (N3) AND PALE YELLOWISH BROWN, WITH SILT AND VERY FINE SAND AND MICA	31
20		CLAY, OLIVE GRAY (5 Y 4/1), WITH SILT AND VERY FINE SAND AND MICA	31 22
25			61 42
30		CLAY, OLIVE GRAY, SILTY, WITH VERY FINE SAND AND MICA, STIFF	44 59
35			73 +50
40			+50 +50
45		CLAY, OLIVE GRAY, SILTY, WITH VERY FINE SAND AND MICA, SATURATED	+50 +50
50			+50
		BORING TERMINATED AT 51 FEET BELOW LAND SURFACE	+50
55			

PIEZOMETER CONSTRUCTION

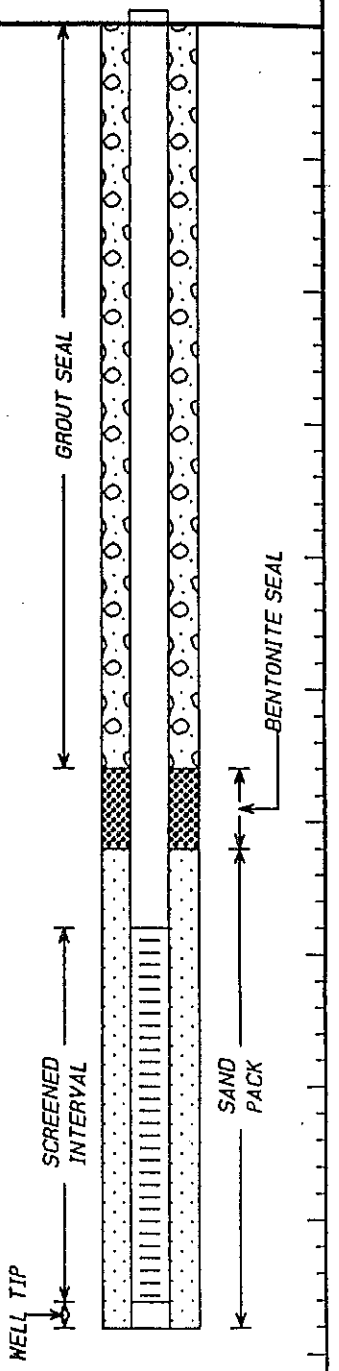


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-14
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-15-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *49 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *280.1 Feet AMSL*	COORDINATE NORTH: 1181183
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922749*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SC	SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED, CLAYEY	
			SAND, LIGHT BROWN, PALE YELLOWISH-BROWN (10 YR 6/2) AND VERY PALE ORANGE (10 YR 8/2), CLAYEY, WITH MICA	
10		CL	CLAY, GRAYISH-ORANGE (10 YR 7/4) AND LIGHT GRAY (N7), SILTY, WITH MICA	
			CLAY, LIGHT BROWN AND PALE YELLOWISH-BROWN (10 YR 6/2), SILTY, WITH MICA	
15			CLAY, OLIVE GRAY (5 Y 4/1), SILTY, WITH MICA	
20			CLAY, OLIVE GRAY, WITH SILT AND VERY FINE SAND AND MICA	
25			CLAY, OLIVE GRAY, SILTY, WITH MICA	
30			CLAY, OLIVE GRAY, SILTY WITH VERY FINE SAND AND MICA	
35				
40			CLAY, OLIVE GRAY, WITH SILT AND VERY FINE SAND AND MICA, SATURATED	
45		SC	SAND, LIGHT BROWN, PALE YELLOWISH-BROWN, SILTY, FINE-GRAINED, WITH OCCASIONAL CLAY LENSES	
		ML	SILT, OLIVE GRAY, CLAYEY, WITH MICA	
		SM	SAND, LIGHT BROWN AND PALE YELLOWISH BROWN, SILTY, FINE-GRAINED, WITH MICA AND GLAUCONITE	
50		ML	SILT, OLIVE GRAY, CLAYEY	
			BORING TERMINATED AT 49 FEET BELOW LAND SURFACE	
55				

PIEZOMETER CONSTRUCTION

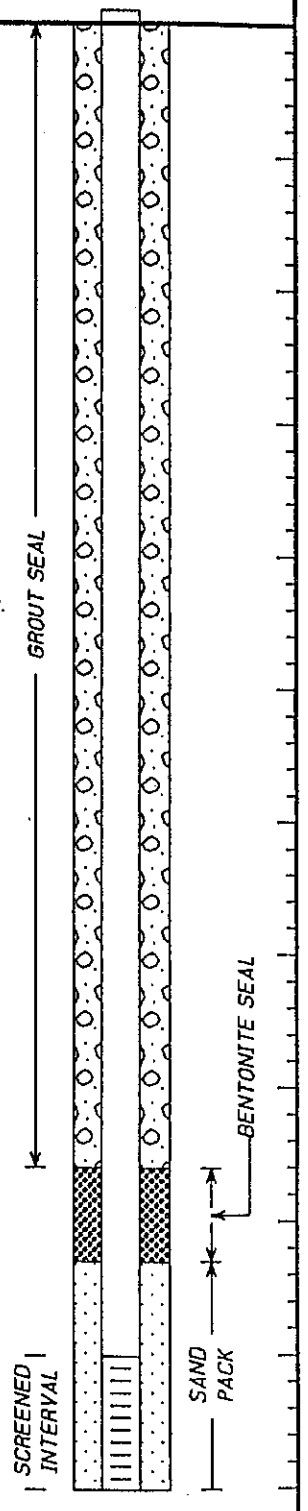


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-15
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *3-16-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *66 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *286.4 Feet AMSL*	COORDINATE NORTH: 1181025
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1923070*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5	SM	SAND, MODERATE BROWN (5 YR 4/4), FINE-GRAINED, WITH MICA	4
		SAND, LIGHT BROWN (5 YR 5/6), FINE-GRAINED	8 12
10		SAND, LIGHT BROWN AND DARK YELLOWISH-ORANGE (10 YR 6/6), SILTY, FINE-GRAINED, WITH MICA	13
		SAND LIGHT BROWN, SILTY, FINE-GRAINED, WITH MICA	13
15	CL	CLAY, PALE YELLOWISH-BROWN (10 YR 6/2), DARK YELLOWISH-ORANGE, AND VERY PALE ORANGE (10 YR 8/2), SILTY, WITH MICA AND COAL FRAGMENTS	16 46
20	SC	SAND, DARK YELLOWISH-BROWN (10 YR 4/2), LIGHT BROWN, VERY PALE ORANGE, AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	54 40
25		SAND, VERY PALE ORANGE AND DARK YELLOWISH-ORANGE, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	25 49
30		SAND, VERY PALE ORANGE, DARK YELLOWISH-ORANGE, PALE YELLOWISH-BROWN, AND LIGHT BROWN, FINE-GRAINED, WITH MICA AND CLAY LENSES	+50 75
35			65 45
40			35 57
45		SAND, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES	68 19
50			32 79
55			61

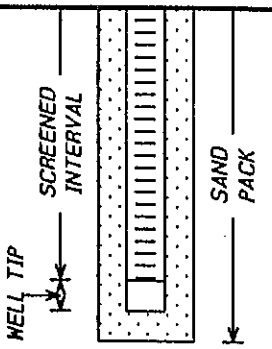
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-15

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		SC ML SM	SAND, LIGHT BROWN, VERY PALE ORANGE, AND PALE YELLOWISH-BROWN, FINE-GRAINED, WITH MICA AND OCCASIONAL CLAY LENSES, SATURATED	68	
			SILT, LIGHT BROWN, PALE YELLOWISH BROWN, AND DARK YELLOWISH ORANGE, WITH CLAY LENSES AND MICA	58	
			SAND, PALE YELLOWISH-BROWN AND VERY PALE ORANGE, SILTY, AND VERY FINE-GRAINED, WITH MICA AND GLAUCONITE	+50	
65			SAND, DUSKY BROWN (5 YR 2/2), LIGHT BROWN, AND PALE YELLOWISH-BROWN, FINE-TO MEDIUM-GRAINED, WITH MICA AND GLAUCONITE	+50	
		CL	SAND, MODERATE BROWN AND DUSKY BROWN, SILTY, FINE-GRAINED, WITH IRONSTONE FRAGMENTS AND MICA	+50	
			CLAY, OLIVE GRAY (5 Y 4/1), SILTY AND STIFF		
70			BORING TERMINATED AT 66 FEET BELOW LAND SURFACE		
75					
80					
85					
90					
95					
100					
105					
110					

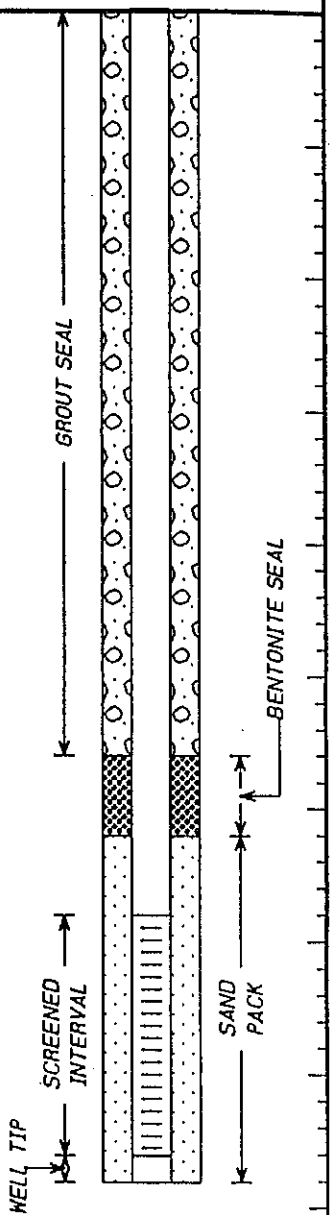


TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-16
GEO/ENG: *STEVE GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *3-16-94*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *44 Feet BLS*
DRILLER: *KEVIN MITCHELL*	L.S.ELEVATION: *260.8 Feet AMSL*	COORDINATE NORTH: *1179465*
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922653*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	ML	SILT, MODERATE BROWN (5YR 3/4), SANDY
5		SILT, MODERATE BROWN, SANDY AND CLAYEY
10	CL	CLAY, PALE YELLOWISH-BROWN (10 YR 6/2) AND LIGHT BROWN (5 YR 5/6), SILTY
15		
20		CLAY, OLIVE GRAY (5 Y 4/1), SILTY, WITH MICA
25		
30		CLAY, LIGHT BROWN AND MODERATE BROWN, SILTY
35	ML	SILT, LIGHT BROWN, VERY PALE ORANGE (10 YR 8/2), AND PALE YELLOWISH-BROWN, SANDY, WITH OCCASIONAL CLAY LENSES
	SM	SAND, LIGHT BROWN AND PALE YELLOWISH-BROWN, FINE- TO MEDIUM-GRAINED, SATURATED
	ML	SILT, LIGHT BROWN AND PALE YELLOWISH-BROWN, CLAYEY
40	SM	SAND, LIGHT BROWN AND VERY PALE ORANGE, SILTY, FINE-GRAINED, WITH MICA AND GLAUCONITE
	ML	SILTY, OLIVE GRAY, SANDY, WITH MICA
	SM	SAND, LIGHT BROWN AND VERY PALE ORANGE, FINE-GRAINED, WITH MICA AND GLAUCONITE
45	CL	CLAY, OLIVE GRAY, SILTY, WITH MICA
50		BORING TERMINATED AT 44 FEET BELOW LAND SURFACE
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION

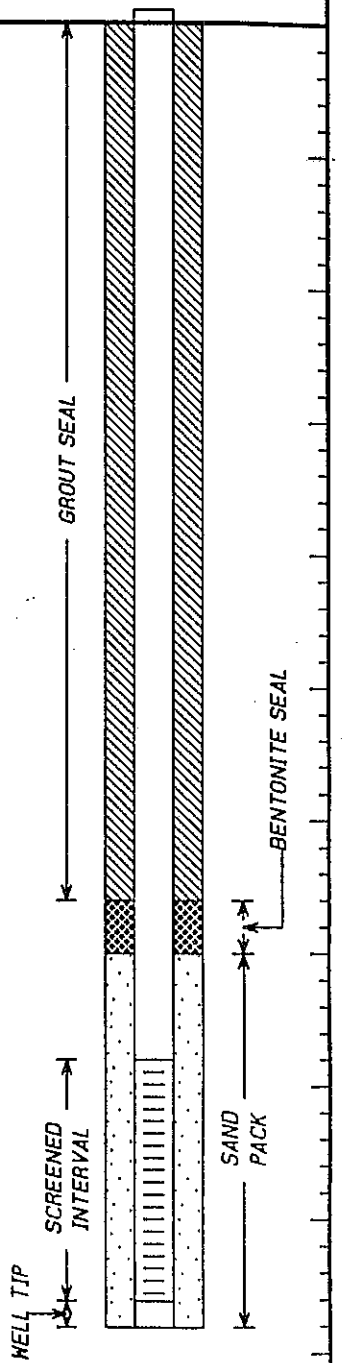


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-17
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/12/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *49 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *181.4 Feet AMSL*	COORDINATE NORTH: 1177830
DRILLING METHOD: *CME 75 w/4-1/4-inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922538*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
		SM	SAND, dark yellowish brown (10YR 4/2), fine-grained	
5		SC	SAND, very pale orange (10YR 8/2) & pale yellowish orange (10YR 8/6), clayey	
10		CL	CLAY, light olive gray (5Y 5/2), pinkish gray (5YR 8/1) w/mod. red (5R 5/4) streaks, silty and stiff	
15				
20			CLAY, pale red purple (5RP 6/2) & light brownish gray (5YR 6/1), silty and stiff	
25			CLAY, light brownish gray (5YR 6/1) & pale red purple, silty and stiff	
30			CLAY, olive gray (5Y 3/2), silty and stiff	
			CLAY, light olive gray, silty and stiff	
35		ML	SILT, grayish green (10GY 5/2) clayey with mica	
40			SILT, grayish green clayey and sandy with mica, moist	
45			WET	
50			BORING TERMINATED AT 49 FEET BELOW LAND SURFACE.	
55				

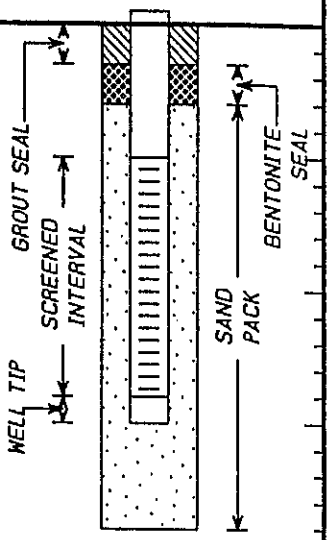
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-17A
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/11/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *19 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *181.0 Feet AMSL*	COORDINATE NORTH: 1177822
DRILLING METHOD: *CME 75 w/4-1/4-inch HSA*		COORDINATE EAST: *1922542*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	FINE SAND, dark yellowish brown (10YR 4/2)		
5		SC	CLAYEY SAND, very pale orange (10YR 8/2) & pale yellowish orange (10YR 8/6)		
10		CL	STIFF SILTY CLAY, light olive gray (5Y 5/2), pinkish gray (5YR 8/1) w/mod. red (5R 5/4) streaks		
15					
20			BORING TERMINATED AT 19 FEET BELOW LAND SURFACE.		
25					
30					
35					
40					
45					
50					
55					

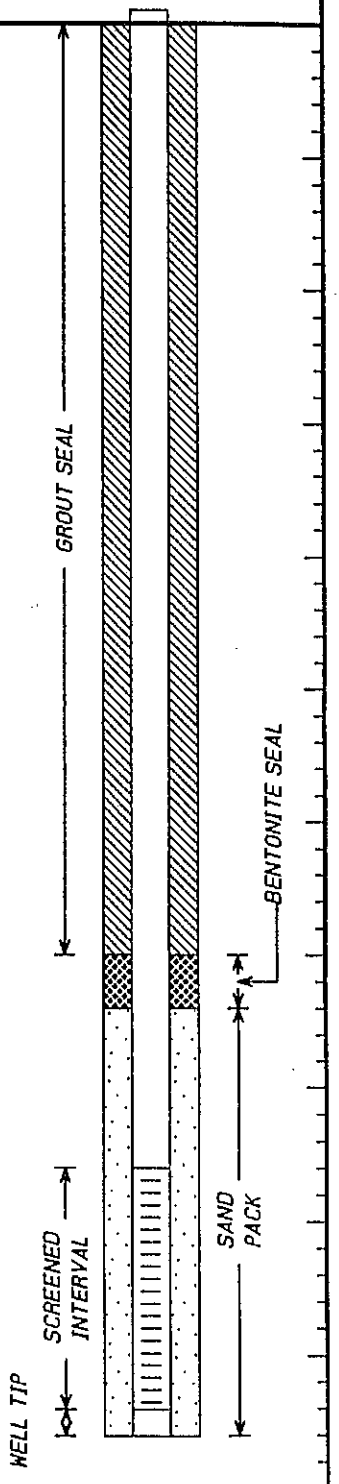


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-18
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *53 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *183.3 Feet AMSL*	COORDINATE NORTH: 1171822
DRILLING METHOD: *CME 75 WITH 4-1/4 in. HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921097*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		CL	CLAY, light brown (5YR 6/4), sandy	
		ML	SILT, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), clayey	
10		CL	CLAY, pale yellowish brown (10YR 6/2) & dark yellowish orange, silty	
15			CLAY, silty and stiff	
20			CLAY, medium light gray (N6) with dark yellowish orange & moderate red (5R 4/6) streaks, silty and stiff	
25				
30				
35			CLAY, light bluish gray (5B 7/1) & olive gray (5Y 3/2), silty and stiff	
40				
45				
			CLAY, light bluish gray & olive gray w/moderate red streaks, silty and stiff	
50			CLAY, olive black (5Y 2/1) stiff w/silt and very fine sand laminae and mica	
55			BORING TERMINATED AT 53 FEET BELOW LAND SURFACE.	

PIEZOMETER CONSTRUCTION

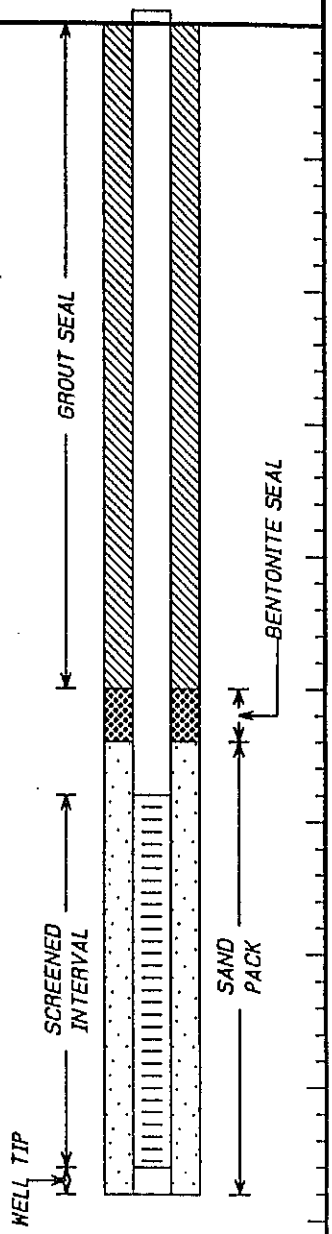


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-19
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *44 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *231.3 Feet AMSL*	COORDINATE NORTH: 1178742
DRILLING METHOD: *CME 75 w/4-1/4 inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921044*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		ML	SILT, light brown (5YR 6/4) silty w/mica	
			SILT, dark yellowish orange (10YR 6/6) w/occasional light gray (N7) clay laminae	
10			SILT, sandy w/ occasional clay laminae	
15 215.8		SM	SAND, very pale orange (10YR 8/2) very fine grained w/mica	
20 210.3		SC	SAND, dark yellowish orange very fine grained w/occasional clay laminae & mica	
25				
30			SAND, dark yellowish orange & very pale orange (10YR 8/2) very fine grained w/occ. clay laminae & mica Moist	
197.3		CL	Ironstone fragments	
35			CLAY, dark gray (N3) & dark greenish gray (5G 4/1) silty & stiff w/very fine sand laminae, mica & gloucamite Wet	
40				
45			BORING TERMINATED AT 44 FEET BELOW LAND SURFACE.	
50				
55				

PIEZOMETER CONSTRUCTION

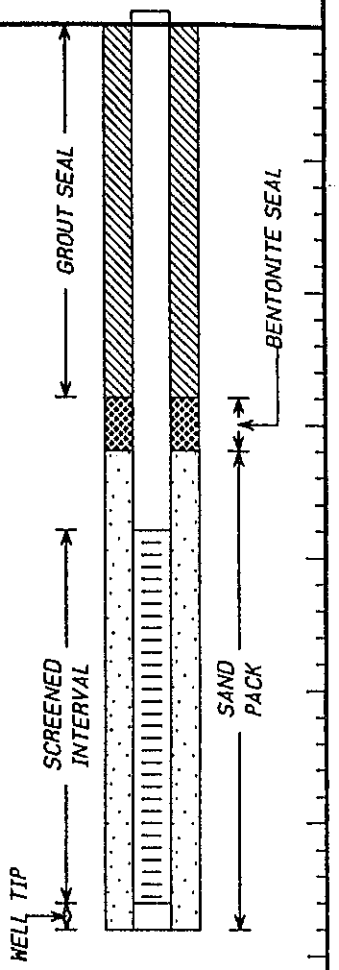


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-20
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *COKER, ALABAMA*	DATE DRILLED: *8/11/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *34 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *211.30 Feet AMSL*	COORDINATE NORTH: 1179765
DRILLING METHOD: *CME 75 with 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921067*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SM	SAND, light brown (5YR 6/4) & dark yellowish orange (10YR 6/6), fine-grained, w/mica	
10		SC	SAND, dark yellowish orange & very pale orange (10YR 8/2), fine-grained, w/occasional clay laminae & mica	
15		SM	SAND, dark yellowish orange, fine-grained, w/mica	
			SAND, very pale orange, fine-grained, w/mica (Wet)	
20		SC	SAND, dark yellowish orange, fine-grained, w/thin ironstone layers	
			SAND, dark yellowish orange & moderate yellowish brown (10YR 5/4), fine-grained, w/occasional clay laminae & mica	
25		ML CL	SILT, dark yellowish orange & grayish orange pink (10R 8/2), clayey, w/mica	
		SM CL	CLAY, pale yellowish brown (10YR 6/2) & grayish orange pink, silty & stiff	
30			SAND, dark yellowish & pale yellowish orange (10YR 8/6), fine-grained, w/mica & thin ironstone fragments	
			CLAY, medium dark gray (N4), w/very fine sand laminae & mica	
35			BORING TERMINATED AT 34 FEET BELOW LAND SURFACE.	
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION

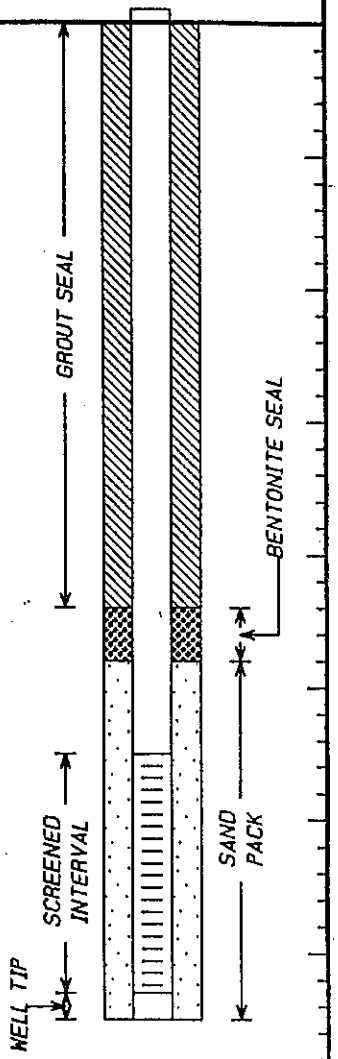


TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-21
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/16/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *37.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *241.0 Feet AMSL*	COORDINATE NORTH: 1180596
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921073*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		SC	SAND, light brown (5YR 6/4), clayey	
		CL	CLAY, light brown, sandy	
5				
			CLAY, light brown & light olive gray (5Y 5/2), silty	
10				
15			CLAY, light brown & light olive gray, silty, w/very fine sand laminae & mica	
			CLAY, medium dark gray (N4), silty, w/very fine sand laminae & mica	
20				
25			1/8" thin very fine sand lense (moist) sand, very fine grained (moist)	
			CLAY, med. light gray (N6) silty, w/very fine sand laminae & mica	
30		SM		
			SAND, light brown & light olive gray (5Y 6/1), fine grained, clayey	
		CL		
35			CLAY, medium dark gray silty, w/very fine sand laminae & mica	
			very fine sand lense (very moist)	
			BORING TERMINATED AT 37.5 FEET BELOW LAND SURFACE.	
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION



TTL, Inc

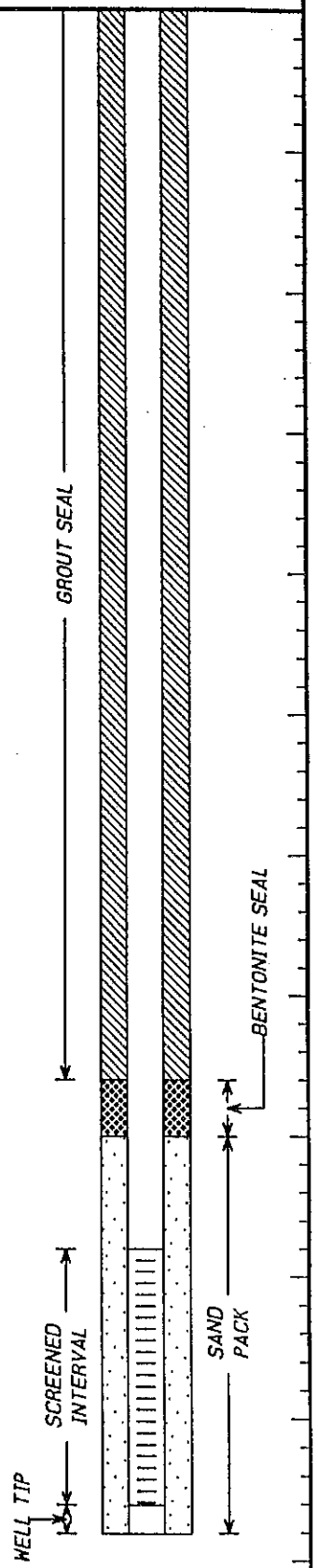
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-22
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/15/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *109 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *308.7 Feet AMSL*	COORDINATE NORTH: 1181175
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921059*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		ML	SILT, grayish orange (10YR 7/4) & light brown (5YR 6/4), sandy		
5		SM	SAND, light brown (5YR 6/4), very fine grained		
10			SAND, light brown & very pale orange (10YR 8/2), very fine grained w/mica		
15					
20					
25		CL	CLAY, light olive gray (5Y 5/2) & moderate red (5R 5/4), silty & stiff		
			CLAY, light brown & very light gray (N8), silty & sandy		
30			CLAY, light brown & very light gray, silty & sandy w/ironstone fragments		
			CLAY, medium dark gray (N4), silty, w/very fine sand laminae & mica		
35					
40					
45					
50					
55					GROUT SEAL

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-22

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	SILTY CLAY, medium dark gray, w/very fine sand laminae		
65					
70					
75					
80					
85					
90					
95					
100		SC	SAND, medium light gray (N6), very fine grained, w/occasional clay laminae		
105		CL	SAND w/GRAVEL, medium light gray (N6), very fine grained, w/occasional clay laminae CLAY, medium dark gray, silty, w/very fine sand laminae & mica Small coal fragments @ 108.5 ft.		
110			BORING TERMINATED AT 109 FEET BELOW LAND SURFACE.		



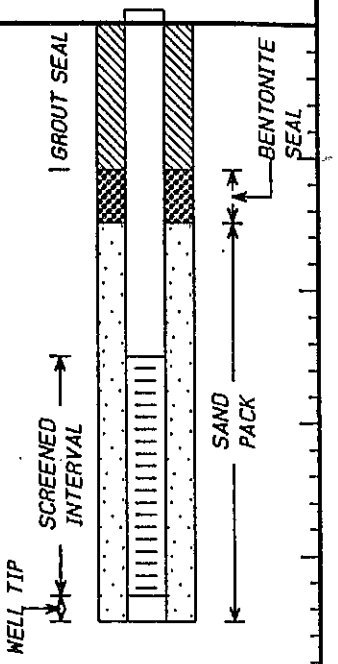
TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-23
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *COKER, ALABAMA*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *22.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *278.1 Feet AMSL*	COORDINATE NORTH: 1181813
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921511*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
0		SM	SAND, moderate brown (5YR 4/4)	
5		SC	SAND, light brown (5YR 6/4), clayey	
10				
15			SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2), clayey, w/mica & glauconite, very moist Saturated	
20		CL	CLAY, medium dark gray (N4), silty, w/very fine-grained sand laminae & mica	
25			BORING TERMINATED AT 22.5 FEET BELOW LAND SURFACE.	
30				
35				
40				
45				
50				
55				

PIEZOMETER CONSTRUCTION



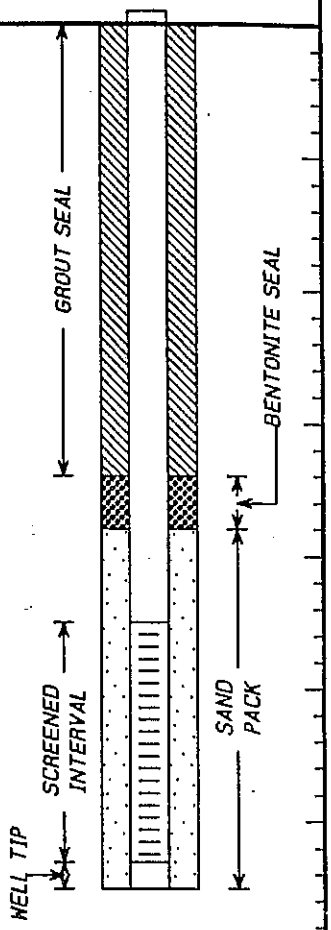
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-24
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *32.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *275.0 Feet AMSL*	COORDINATE NORTH: 1181698
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922206*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SM	SAND, light brown (5YR 6/4), silty
	SC	SAND, light brown, clayey
	CL	CLAY, very pale orange (10YR 8/2) & light brown, silty & sandy
5		
		CLAY, light olive gray (5Y 5/2) & light brown, silty, w/very fine grained sand laminae & mica
10		
15		CLAY, medium dark gray (N4), silty, w/very fine grained sand laminae & mica
		CLAY, light brown, silty, w/very fine grained sand laminae & ironstone fragments
20		CLAY, medium dark gray, silty, w/very fine sand laminae & mica
25		2-3" sand lense (Moist)
	SM	Approx. 3" sand lense
	CL	SAND, medium dark gray, very fine grained, Wet
30		CLAY, medium dark gray, silty, w/very fine grained sand laminae & mica
		BORING TERMINATED AT 32.5 FEET BELOW LAND SURFACE.
35		
40		
45		
50		
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION



TTL, Inc

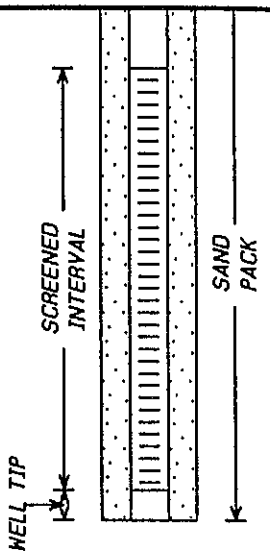
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-25
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *72.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *346.3 Feet AMSL*	COORDINATE NORTH: 1181928
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922759*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, dark reddish brown (10R 3/4), silty, fine grained		GROUT SEAL
10					
15			SAND, very pale orange (10YR 8/2) & light brown (5YR 6/4) very fine-grained, w/mica & glauconite		
20					
25					
30			moist		
35					
40					
45					
50			Thin layer of ironstone (1/16")		BENTONITE SEAL
		CL	CLAY, pale yellowish brown (10YR 6/2) & very pale orange, silty, w/very fine sand laminae mica		SAND PACK
55		SM CL	SAND, light brown, fine-grained w/mica		

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-25

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL	CLAY, pale yellowish brown, silty, w/very fine sand laminae		
		SM	SAND, very pale orange & light brown, fine-grained, w/mica, wet		
60			SAND, pinkish gray (5YR 8/1), fine-grained, w/occasional clay laminae (Wet)		
65					
70					
			BORING TERMINATED AT 72.0 FEET BELOW LAND SURFACE.		
75					
80					
85					
90					
95					
100					
105					
110					

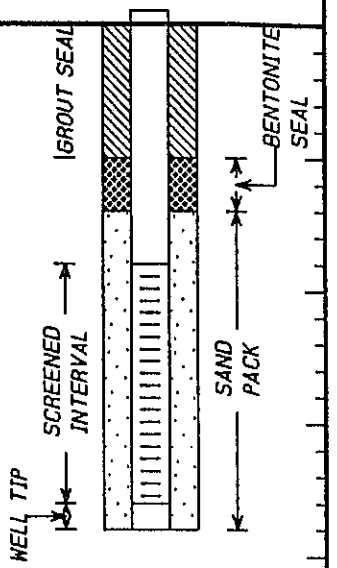


TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-26
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/17/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *19.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *291.2 Feet AMSL*	COORDINATE NORTH: 1181211
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922656*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, light brown (5YR 6/4), very fine-grained		
10		SC	SAND, light olive gray (5Y 6/1) & brown (5YR 6/4), clayey		
			SAND, very pale orange (10YR 8/2) & light brown, (Very moist)		
15			wet		
		CL	CLAY, light brown, silty		
			CLAY, medium dark gray (5YR 6/4) silty, w/very fine sand laminae		
20			BORING TERMINATED AT 19.0 FEET BELOW LAND SURFACE.		
25					
30					
35					
40					
45					
50					
55					



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-27
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/15/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *39.5 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *243.3 Feet AMSL*	COORDINATE NORTH: 1181016
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922013*

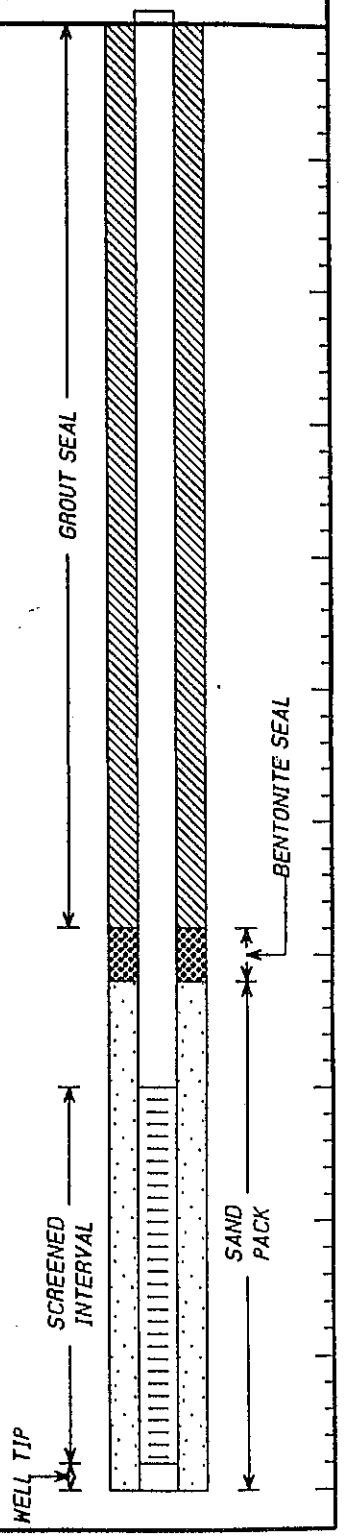
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		CL	CLAY, light brown (5YR 6/4) & light olive gray (5Y 6/1), silty, w/mica		GROUT SEAL
10			CLAY, medium gray (N5), silty, w/very fine sand laminae & mica		
15					
20					
25			CLAY, medium gray, silty, w/abundant very fine sand laminae & mica		BENTONITE SEAL
30		SM	SAND, dark greenish-gray (5GY 4/1), very fine-grained w/gravel, w/mica & glauconite, (moist)		SCREENED INTERVAL
35		CL	CLAY, dark gray (N3), w/sparse very fine sand laminae		SAND PACK
40			BORING TERMINATED AT 39.5 FEET BELOW LAND SURFACE.		WELL TIP
45					
50					
55					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-28
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/18/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *55.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *260.7 Feet AMSL*	COORDINATE NORTH: 1180296
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1923113*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		CL	CLAY, medium dark gray (N4), with very fine sand laminae & mica	
		SM	SAND, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), fine-grained, with mica	
10		SC	with occasional clay laminae	
15				
20				
25				
30				
35			moist	
40			wet	
45				
50		SW	SAND, medium brown (5YR 4/4), fine- to medium-grained with ironstone	
55			BORING TERMINATED AT 55.0 FEET BELOW LAND SURFACE.	

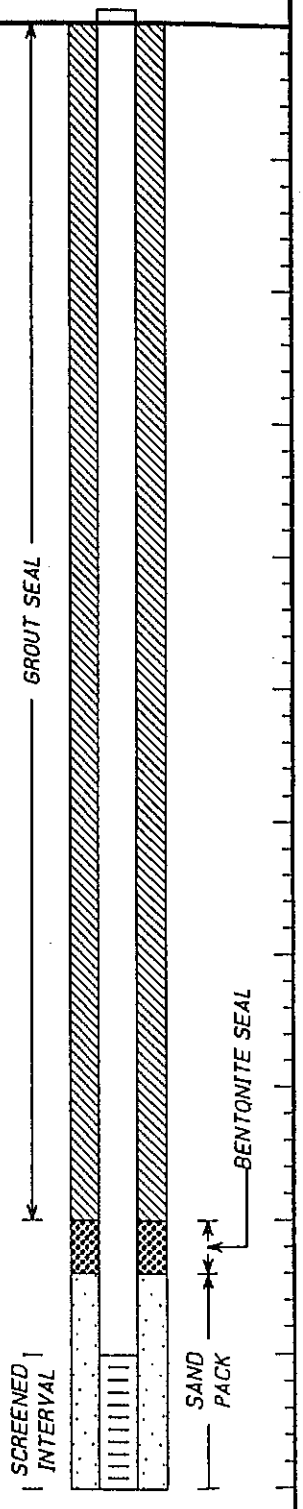
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-29
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/10/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *84.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *251.2 Feet AMSL*	COORDINATE NORTH: 1180093
DRILLING METHOD: *CME 75 WITH 4-1/4" HOLLOW-STEM AUGERS*		COORDINATE EAST: *1921524*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		CL	CLAY, light brown (5YR 6/4) & pale brown (5YR 5/2), silty		
			Coal fragments 4 to 6'		
5			CLAY, very pale orange (10YR 8/2) pale yellowish brown (10YR 6/2) & light brown, silty		
10			CLAY, medium dark gray (N4), w/very fine sand laminae & mica		
15					
20					
25					
30					
35					
40			CLAY, dark greenish gray (5GY 4/1), silty, w/fine-grained sand laminae & mica (Wet)		
45					
50		SC	SAND, light brown, fine-grained, w/occasional clay & ironstone fragments, mica, glauconite		
		CL	CLAY, dark greenish gray, silty, w/fine-grained sand laminae		
		SM	SAND, dark greenish gray, fine-grained, glauconitic, w/mica w/gravel (wet)		
55		CL	CLAY, dark greenish gray, silty, w/fine-grained sand laminae & mica		



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-29

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	2" to 3" layer of fine sand w/mica (Wet)		WELL TIP, SCREENED INTERVAL, SAND PACK
		Coal	COAL, grayish-black (N2), (lignite)		
		CL	CLAY, dark gray (N3) & dark greenish gray, silty & stiff		
65			CLAY, dark greenish gray, silty, w/occasional very fine sand laminae		
			STIFF CLAY, greenish black (5GY 2/1)		
			3" coal seam (lignite)		
70			CLAY, greenish black, silty, w/very fine sand laminae & mica		
		Coal	COAL, grayish black, (lignite)		
75		CL	CLAY, dark gray (N3), silty & stiff		
80					
85			BORING TERMINATED AT 84.0 FEET BELOW LAND SURFACE.		
90					
95					
100					
105					
110					

TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-30
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/28/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *63 Feet BLS*
DRILLER: *KEITH McKAPHAN*	L.S.ELEVATION: *261.7 Feet AMSL*	COORDINATE NORTH: 1180361
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL w/3-1/4" ID HSA*		COORDINATE EAST: *1921590*

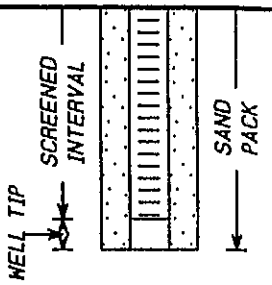
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		CL	CLAY, dark yellowish-orange (10 YR 6/6) and pale yellowish-brown (10 YR 6/2), silty		
5			CLAY, pale yellowish-brown & dark yellowish-orange, silty with very fine-grained laminae		
			CLAY, pale yellowish brown & dark yellowish orange, silty w/very fine-grained sand laminae & mica		
10			CLAY, dark gray (N3), silty w/very fine-grained laminae and mica		
15					
20		SM	SAND, medium dark gray (N5), very fine-grained, silty,		
		CL	CLAY, dark gray, silty w/very fine-grained sand laminae and mica		
25			CLAY, dark gray, silty w/very fine-grained sand laminae		
30					
35					
40			Very moist thin (about two-inch) sand lense		
45					
50			One to two-inch sand, lense-moist		
			sand lense, four to five-inches thick w/clay laminae (moist but not wet)		
55					

GROUT SEAL
BENTONITE SEAL
SAND PACK

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-30

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL			
		SM	SAND, medium-gray (N5), fine-grained w/gravel, mica and glauconite, saturated		
60		CL	CLAY, dark gray, silty w/very fine-grained sand laminae and mica		
			CLAY, dark gray, w/very fine-grained sand laminae and mica		
			BORING TERMINATED AT 63 FEET BELOW LAND SURFACE.		
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					



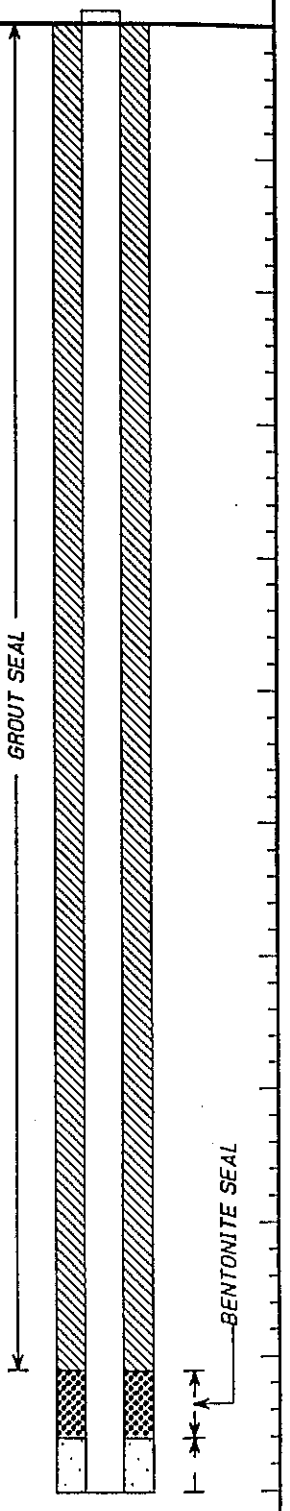
TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-31
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/28/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *67 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *266.5 Feet AMSL*	COORDINATE NORTH: 1181215
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921667*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)
5		SC	SAND, dark yellowish-orange (10YR 6/6) & pale yellowish-brown (10YR 6/2), fine-grained and clayey	
		CL	CLAY, pale yellowish-brown & dark yellowish-orange, silty w/very fine-grained sand laminae	
10			CLAY, dark gray (N3), silty w/very fine-grained sand laminae and mica thin (about one-inch) layer of very fine-grained sand, moist	
15				
		SM	SAND, very fine-grained and silty, with mica, very moist	
20		CL	CLAY, dark gray, silty with very fine-grained sand laminae and mica thin (about one-inch) layer of very fine-grained sand, moist	
25				
30				
35				
40				
45			CLAY, dark gray w/very fine-grained sand laminae & mica with multiple very-fine grained thin (1/4 to 1/2-inch) moist sand lenses	
50				
55			CLAY, dark gray w/very fine-grained sand laminae & mica	

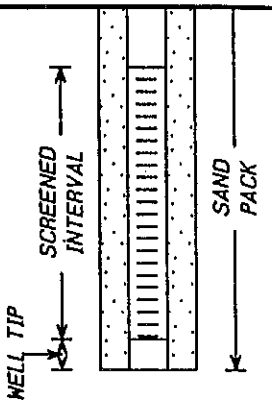
PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-31

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL			
		SM	SAND, very fine to fine-grained with gravel		
65		CL	CLAY, dark gray with very fine-grained sand laminae and mica		
			BORING TERMINATED AT 67 FEET BELOW LAND SURFACE.		
70					
75					
80					
85					
90					
95					
100					
105					
110					



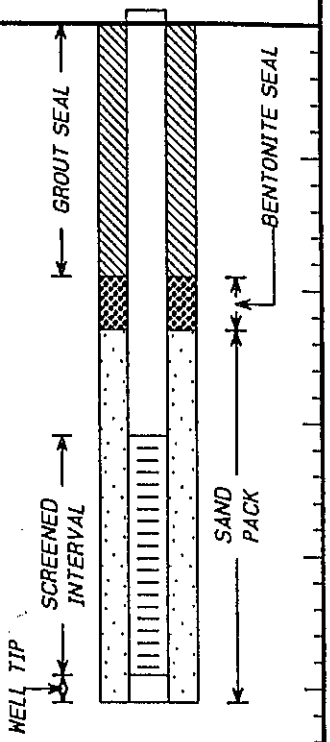
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-32
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *25.5 Feet BLS*
DRILLER: *KEITH McKAPHAN*	L.S.ELEVATION: *286.3 Feet AMSL*	COORDINATE NORTH: 1181189
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921581*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION
0	SM	SAND, moderate brown (5YR 5/4), very fine-grained with organics
		SAND, light brown (5YR 5/6), very fine-grained and clayey
5		fragments of ironstone
		SAND, pale reddish-brown (10R 5/4) & very pale-orange (10YR 8/2), very fine-to fine-grained with mica
10		SAND, pale reddish-brown, very pale orange, and dark yellowish-orange (10YR 6/6), fine-grained with mica and fragments of ironstone
15		Saturated
20		SAND, light brown, very pale orange, & dark yellowish-orange, very fine-grained, clayey with mica
25	CL	CLAY, dark yellowish-orange & light gray (N7), silty with very fine-grained sand laminae and mica
		CLAY, dark gray, silty w/very fine-grained sand laminae and mica
		BORING TERMINATED AT 25.5 FEET BELOW LAND SURFACE.
30		
35		
40		
45		
50		
55		

PENETRATION (blows per ft.)

PIEZOMETER CONSTRUCTION



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-33
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *58.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *326.8 Feet AMSL*	COORDINATE NORTH: 1181520
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1921385*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, dark reddish-brown (10R 3/4) fine-grained and clayey		GROUT SEAL
5					
10					
15					
17			SAND, very pale orange (10YR 8/2), fine-grained		
20			SAND, dark reddish-brown, fine-grained and clayey		
22			SAND, dark reddish-brown & dark yellowish orange (10YR 6/6) and light gray (N7), fine-grained and clayey		
25					
27			SAND, light brown & dark yellowish-orange fine-grained, clayey with mica (moist)		
30			Less clayey, glauconitic (very moist)		
32			Ironstone fragments		
35					
37			SAND, dark yellowish-orange & very pale orange, fine-grained w/mica & glauconite		
40					
45					
47			SAND, dark yellowish-orange, very pale orange, & dark reddish-brown, fine-grained w/mica		
50			Saturated		SCREENED INTERVAL
52		CL	CLAY, light brown, silty		SAND PACK
55					BENTONITE SEAL

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANOFILL	LOG FOR TEMPORARY PIEZOMETER 94-33

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL	CLAY, dark gray, silty, w/very fine-grained sand laminae and mica		WELL TIP, SAND PACK
			BORING TERMINATED AT 58.0 FEET BELOW LAND SURFACE.		
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					

TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-34
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/29/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *75.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *334.5 Feet AMSL*	COORDINATE NORTH: 1181535
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922500*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, moderate reddish-brown (10R 4/6), fine-grained, clayey with mica		Borehole filled to land surface with cement grout on 10/3/94
10			SAND, moderate reddish-brown & dark yellowish-orange (10YR 6/6), fine-grained, clayey with mica		
15					
20					
25			SAND, dark yellowish-orange & very pale orange, fine-grained, clayey w/mica		
30			SAND, mod. reddish-brown, very pale & dark yellowish-orange, fine-grained clayey w/mica		
35					
40			Less clayey		
45		CL	CLAY, light brown, silty w/coal fragments laminated with very fine-grained sand, silty fragments of ironstone		
50			CLAY, dark gray (N3), silty, w/very fine-grained sand laminae and mica		
55		SM CL	SAND, very fine-grained w/mica (moist) CLAY, dark gray, silty w/very fine-grained sand laminae and mica		

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-34

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		CL	CLAY, dark gray, silty, w/sfs laminae & mica		
65					
70		SM	SAND, very fine-grained, silty w/mica		
		CL	CLAY, dark gray, silty with very fine-grained sand laminae		
75			BORING TERMINATED AT 75.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

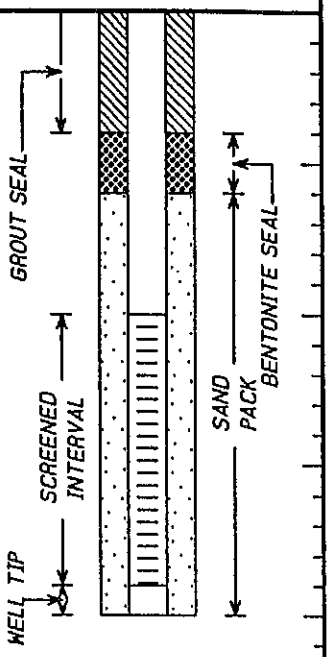
TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-35
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *9/30/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *75.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *308.4 Feet AMSL*	COORDINATE NORTH: 1181655
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922434*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		SM	SAND, very pale orange (10YR 8/2), very fine-grained with mica		GROUT SEAL
			SAND, moderate reddish-brown (10R 4/6), fine-grained, clayey with mica		
			SAND, dark yellowish-orange (10YR 6/6) & moderate red ((5R 4/6), very fine-grained and clayey		
10			SAND, very pale orange, dark yellowish-orange & mod. reddish-brown, very fine-grained w/mica		
15			SAND, dark yellowish-orange, very pale orange & mod. reddish-brown, very fine-grained and clayey		
		CL	fragments of ironstone		
20			CLAY, dark yellowish-orange & light brown (5YR 5/6), silty		
			wtih very fine-grained sand laminae & mica		
			CLAY, dark gray (N3) with very fine-grained sand laminae and mica		
25		SM			
		CL	CLAY, dark yellowish-orange & light brown, silty w/very fine-grained sand laminae & mica		
			CLAY, dark gray with very fine-grained sand laminae & mica		
30			SAND, very fine-grained with mica		
			CLAY, dark gray, silty w/very fine-grained sand laminae & mica		
35					
40					
45					
50					
55		SM			

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 94-35

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
60		SM	SAND, very pale orange & pale yellowish-brown (10YR 6/2), very fine-grained with mica fragments of ironstone		
65		CL	CLAY, dark gray w/very fine-grained sand laminae & mica		
		SM	SAND, light gray (N7), very fine-grained, silty with mica		
70		CL	CLAY, dark gray, silty w/very fine-grained sand laminae & mica one-inch sandy seam (very moist)		
		SM	SAND, light gray, fine-grained, clayey with mica, saturated		
75		CL	CLAY, dark gray, w/very fine-grained sand laminae & mica		
		SM	SAND, light gray, very fine-grained, silty w/mica (moist)		
			BORING TERMINATED AT 75.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					



TTL, Inc

JOB NUMBER: 49-304

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 94-36
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *10/2/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *26.0 Feet BLS*
DRILLER: *KEVIN McKAPHAN*	L.S.ELEVATION: *304.3 Feet AMSL*	COORDINATE NORTH: 1181746
DRILLING METHOD: *MOBILE B47 TRK-MTD. DRILL W/3-1/4" ID HSA*		COORDINATE EAST: *1922545*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
0		SM	SAND, dark yellowish-orange (10YR 6/6) & light brown (5YR 5/6), fine-grained with mica		GROUT SEAL; BENTONITE SEAL
5			SAND, light brown, fine-grained and clayey w/mica		
10			----moist----		
15					
20			-----saturated-----		SCREENED INTERVAL; SAND PACK
25		CL	CLAY, dark yellowish orange & light brown, silty		WELL TIP
			CLAY, dark yellowish orange & pale yellowish brown (10YR 6/2), silty with very fine-grained sand laminae		
			BORING TERMINATED AT 26.0 FEET BELOW LAND SURFACE.		
30					
35					
40					
45					
50					
55					

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER EXB3
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/12/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *74.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *263.9 Feet AMSL*	COORDINATE NORTH: 1179558
DRILLING METHOD: *CME 75 W/4-1/4 inch HOLLOW-STEM AUGERS*		COORDINATE EAST: *1922743*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		ML	SILT, light brown (5YR 6/4), with occasional clay laminae		No piezometer constructed in the borehole.
		CL	CLAY, medium gray (N5), silty, with very fine sand laminae		
5					
			CLAY, light brown, silty, with very fine sand laminae		
10			CLAY, moderate brown (5YR 6/6) & light brown, silty, with ironstone fragments		
		SC	SAND, dark yellowish orange (10YR 6/6) & very pale orange (10YR 8/2), very fine-grained, with clay laminae lenses 1/8" to 1/2" thick		
15					
20					
25			SAND, dark yellowish orange & very pale orange, very fine-grained, with clay laminae & mica		
30					
35					
40			SAND, light brown, very fine-grained, with clay laminae		
		CL	CLAY, pale yellowish brown (10YR 8/6), with light brown very fine-grained sand laminae		
45		SM	SAND, light brown, fine-grained, with mica and glauconite (Saturated)		
		SC	SAND, dark yellowish orange & very pale orange, with occasional clay laminae, mica, and glauconitic		
50					
55					

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER EXB3

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		SC			
60		SM	SAND, dark yellowish orange, fine-grained, with mica & glauconitic		
65			SAND, dark yellowish orange, fine-grained, with mica & glauconitic		
70		CL	CLAY, dark gray (N3), silty & stiff (Dry)		
			CLAY, dark gray, stiff, with sparse very fine sand laminae		
75			BORING TERMINATED AT 74.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER EXB4
GEO/ENG: *STEVE T. GRAMMAS*	LOCATION: *TUSCALOOSA CO., AL*	DATE DRILLED: *8/18/94*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *49-304*	BORING DEPTH: *74.0 Feet BLS*
DRILLER: *CURTIS LEE & CREW*	L.S.ELEVATION: *261.3 Feet AMSL*	COORDINATE NORTH: 1180273
DRILLING METHOD: *CME 75 WITH 4-1/4" HSA*		COORDINATE EAST: *1923101*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
5		CL	CLAY, medium dark gray (N4), with very fine sand laminae & mica		Piezometer not constructed in this borehole.
		SM	FINE SAND, very pale orange (10YR 8/2) & dark yellowish orange (10YR 6/6), with mica		
10			With occasional clay laminae		
15					
20					
25					
			FINE SAND, very pale orange (10YR 8/2) & dark yellowish orange, with mica & occasional clay laminae		
30					
35			moist		
40					
45					
			FINE TO MEDIUM SAND, medium brown (5YR 4/4)		
50			with ironstone		
55		CL			

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHOR. COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER EXB4

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL	SILTY CLAY, medium dark gray, with very fine sand laminae & mica		
			Very little sand laminae		
60			STIFF CLAY, with no fine sand laminae		
			STIFF CLAY, medium dark gray, (no sand laminae)		
65			with lignite lense		
70			coal lense		
			with occasional fine sand laminae		
75			BORING TERMINATED AT 74.0 FEET BELOW LAND SURFACE.		
80					
85					
90					
95					
100					
105					
110					

TTL, Inc

APPENDIX 3.1E

Boring Logs B-1 through B-5

Geotechnical Evaluation, November 1992

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-1
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-26-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *28-184*	BORING DEPTH: *98.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *285.66 Feet AMSL*	WATER LEVEL: *45.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75 W/SS & ST*		NO. OF SAMPLES: *19*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
5	SC	SAND, Moderate brown (5YR 3/4) to light brown (5YR 5/6), silty to clayey, grading down to dark yellowish orange (10YR 6/6)	8
	CL	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6), silty, stiff	12
10	CH	CLAY, Pale yellowish brown (10YR 6/2), silty, laminated with fine sand, stiff, dry	25
15	CL	CLAY, Dark yellowish orange (10YR 6/6) to pale yellowish brown (10YR 6/2) with limonite concretions along fractures, very moist	31
	CH	CLAY, Olive gray (5Y 4/1), laminated with very fine-grained, very pale orange (10YR 8/2) sand and silt, moist	
20			
25	CL/SC	As Above, but thickness of sand/silt layers increases to very thin beds (1 cm - 3 cm).	20
30		As Above; grain size of sand beds increases to fine, number of sand beds increases downward	21
35		Dry	22
40		As Above, with 2 - 3 inch thick, very moist sand beds	23
45			22
50			

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-1
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-26-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *96.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *285.66 Feet AMSL*	WATER LEVEL: *45.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75 W/SS & ST*		NO. OF SAMPLES: *19*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
55	CL		20
	SC/CL	SAND, Light olive gray (5Y 6/1), interbedded with stiff, olive gray (5Y 4/1) CLAY laminated with fine sand, moist	22
60		As Above, wet	25
65			
70	CH	CLAY, Olive gray (5Y 4/1), laminated to interbedded with silt and fine sand, very stiff, moist	27
75	CL	Dry	23
	SM/CL	SAND, Light olive gray (5Y 6/1), medium to fine-grained, rounded, wet, interbedded with CLAY	24
80		As Above, with pieces of rounded gravel	
85	CH	CLAY, Olive black (5Y 2/1), silty, very stiff, no distinct laminations, interbedded with olive gray (5Y 4/1) silty clay laminated with silt.	21
90		As above, but without interbedded olive gray clay	22
95			18
100		BORING TERMINATED AT 96.0 FEET BLS WATER LEVEL MEASURED 10/27/92	

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-2
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-27-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *21.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *275.93 Feet AMSL*	WATER LEVEL: *7.2*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *8*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Dark yellowish orange (10YR 6/6), clayey	14
5		SC	SAND, Dark yellowish orange to very pale orange (10YR 8/2) (5YR 5/8), grades downward from fine- to medium-grained, loose, moist	
			Saturated	24
10				
15		CH	CLAY, Pale yellowish brown (10YR 6/2), silty, stiff, sticky	28
		CH	CLAY, Olive gray (5Y 4/1), laminated with yellowish gray (5Y 8/1) silt, very stiff vertically but friable along silt laminae	23
20				23
			BORING TERMINATED AT 21.0 FEET BLS WATER LEVEL MEASURED 10/27/92	
25				
30				
35				
40				
45				
50				

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-3
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *54.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *320.65 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *7*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0	SC	SAND, Light brown (5YR 5/6), fine- grained, very silty, clayey, slightly dense, dry	13
5			
10	SM	SAND, Dark yellowish orange (10YR 6/6) to grayish orange (10YR 7/4) fine- to medium- grained, micaceous, very friable, dry	9
15		As Above, laminated with light brown (5YR 5/6) staining, very moist	8
20		SAND, Greyish orange (10YR 7/4) mottled with light brown (5YR 5/6) oxidized zones, medium- grained	
25	SC	SAND, As above, but interbedded with CLAY SAND, Grayish orange (10YR 7/4) to light brown (5YR 6/4), very clayey, poorly sorted, laminated to interbedded with CLAY	11
30	CL	CLAY, Dark yellowish orange (10YR 6/6), silty, stiff	22
35	SC	SAND, Grayish orange (10YR 7/4) to light brown (5YR 6/4), very clayey, poorly sorted SAND, Grayish orange (10YR 7/4) to very pale orange (10YR 8/2) fine- to medium- grained, very friable	9
40			
45	CL	CLAY, Dark yellowish orange (10YR 6/6) mottled with very pale orange (10YR 8/2), silty, very stickey	27
50	CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff, parts along laminae, difficult to part perpendicular to laminae, slightly moist	

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-3
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *54.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *320.65 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *7*

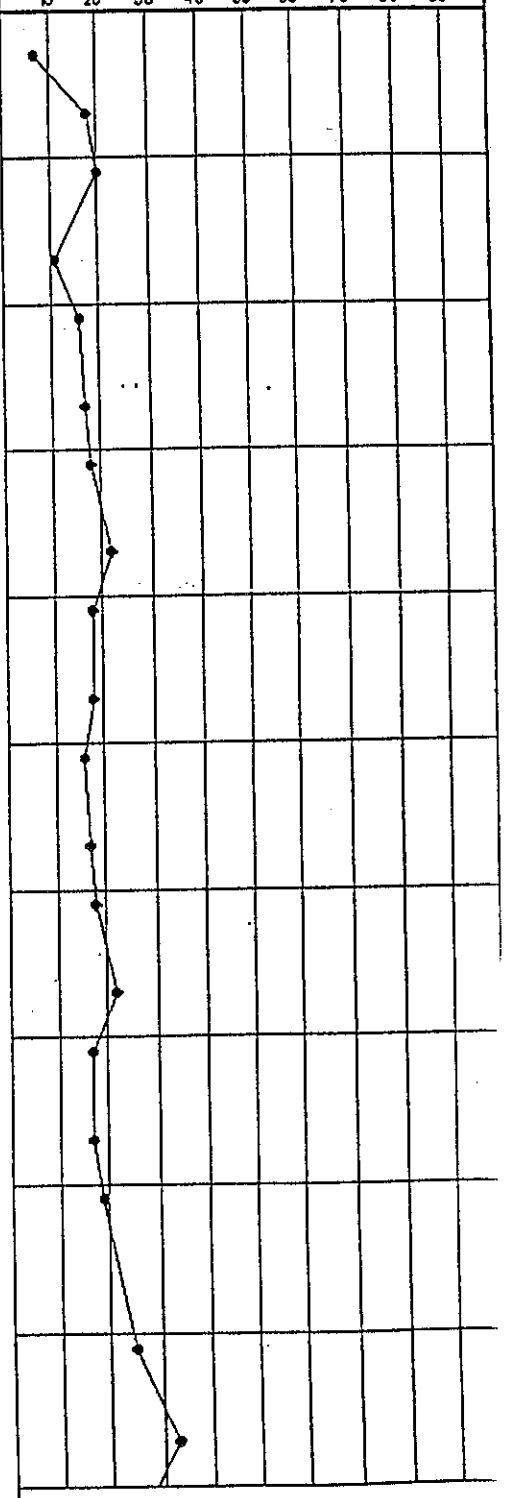
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)	STANDARD PENETRATION TEST DATA (blows per foot) 10 20 30 40 50 60 70 80 90
		CH			
55			BORING TERMINATED AT 54.0 FEET BLS		
60					
65					
70					
75					
80					
85					
90					
95					
100					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-4
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *322.32 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *30*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Moderate reddish brown (10R 4/8) to light brown (5YR 5/8), very clayey, fine-grained sand, slightly stiff, dry	14
10			SAND, Moderate reddish brown (10R 4/8) to light brown (5YR 5/8), fine- to medium- grained, friable, dry	12
20			SAND, Light brown (5YR 5/8), fine- grained, clayey, dry to slightly moist, cohesive	10
25		CL	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/8) and dark yellowish orange (10YR 6/6), silty, sticky, stiff, moist	20
30		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff, parts along laminae, difficult to part perpendicular to laminae, slightly moist	21
35		CL	CLAY, Pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/8), mottled with zones of limonitic concretions along iron-stained laminae, moist	20
40		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff	20
45				
50				

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90



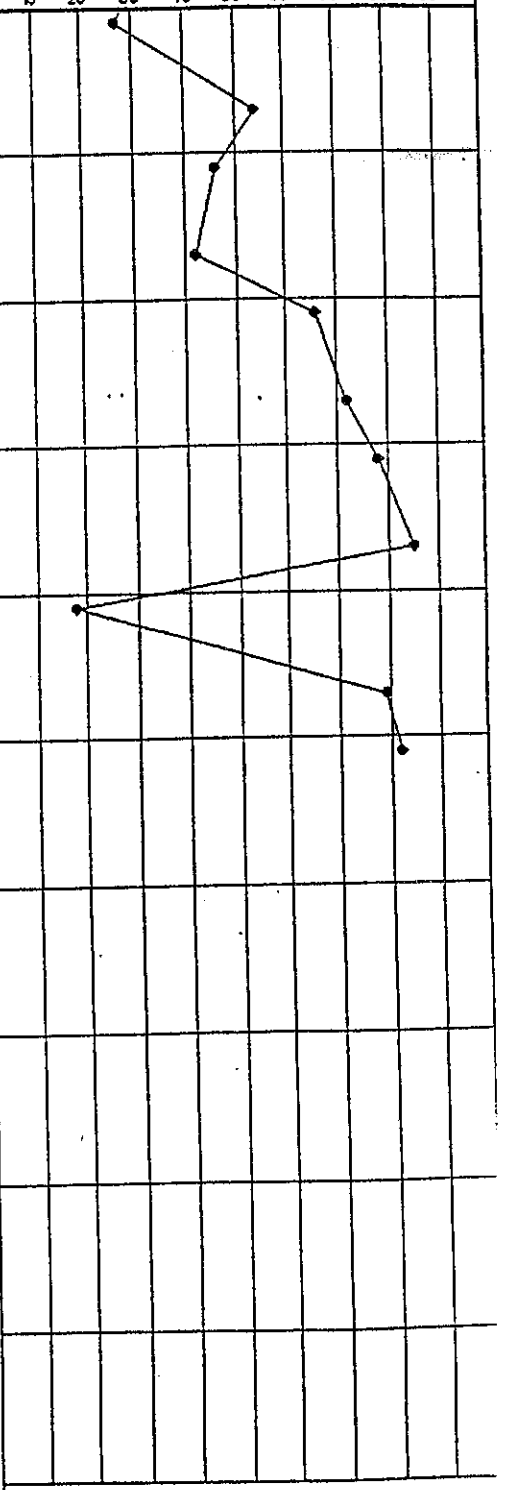
TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-4
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-28-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *322.32 Feet AMSL*	WATER LEVEL: *NOT ENCOUNTERED*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *30*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
		CH		17
55		CH	CLAY, Pale yellowish brown (10YR 8/2) to light brown (5YR 5/8), mottled with limonitic concretions, fractures at 45 degree angle	18
60				
		SM	SAND, Very pale orange (10YR 8/2), medium grained, well sorted, laminated, friable to loose, dry	4
65				
70				
		CL	CLAY, Pale yellowish brown (10YR 8/2) interbedded with SAND, very pale orange (10YR 8/2) to grayish orange (10YR 7/4)	17
75		SM	SAND, Grayish orange (10YR 7/4), fine- to medium- grained, laminated, dry	5
			BORING TERMINATED AT 76.0 FEET BLS	
80				
85				
90				
95				
100				

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90

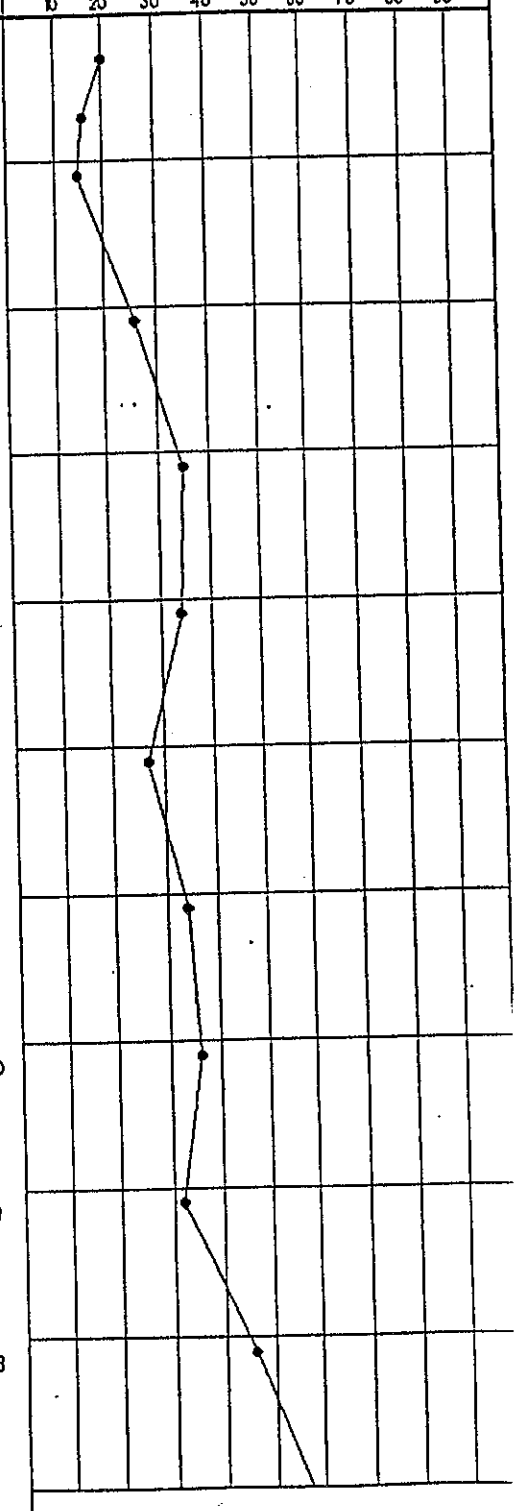


TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-5
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-29-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *369.01 Feet AMSL*	WATER LEVEL: *62.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *17*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
0		SC	SAND, Moderate reddish brown (10R 4/6), fine- grained, clay and hematite or limonite cemented, stiff, dry to slightly moist	16
5				
10				11
15			SAND, Light brown (5YR 5/8), medium- to fine- grained, clayey, slightly friable, moist	18
20				15
25			Limonitic concretions	
		SM	SAND, Very pale orange (10YR 8/2), medium-grained, laminated with clay partings, very loose, dry	7
30				8
35				10
40				9
45				8
50				

STANDARD PENETRATION TEST DATA (blows per foot)

10 20 30 40 50 60 70 80 90



TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	COKER LANDFILL TUSCALOOSA, ALABAMA	LOG OF BORING B-5
GEO/ENG: *CARRIE BARTEK*	LOCATION: *TUSCALOOSA ALABAMA*	DATE DRILLED: *10-29-92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *76.0 Feet BLS*
DRILLER: *JEFF LOWRY & CREW*	L.S. ELEV.: *369.01 Feet AMSL*	WATER LEVEL: *62.0 Feet BLS*
DRILLING METHOD: *3-1/4 INCH ID HOLLOW STEM CME-75*		NO. OF SAMPLES: *17*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	MOISTURE (%)
55		SM		18
60		SC	SAND, Dark yellowish orange (10YR 6/6), fine- to medium-grained, clayey, moist	8
65			Wet	7
70		CH	CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6), stickey, stiff	13
75		CH	CLAY, Olive gray (5Y 4/1), laminated with silt, very stiff	32
			BORING TERMINATED AT 76.0 FEET BLS WATER LEVEL MEASURED 10/28/92	22
80				
85				
90				
95				
100				

STANDARD PENETRATION TEST DATA
(blows per foot)

10 20 30 40 50 60 70 80 90

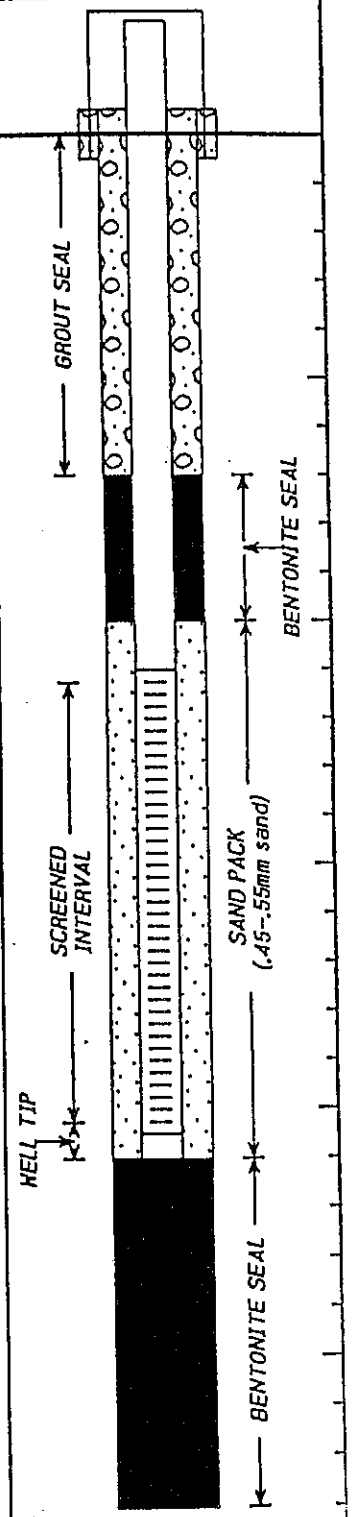
APPENDIX 3.1F

Boring Logs and Well-Completion Diagrams for PZ-1 through PZ-4, E-1, and DW-1

Ground-Water Evaluation (Phases I and II), August 1992

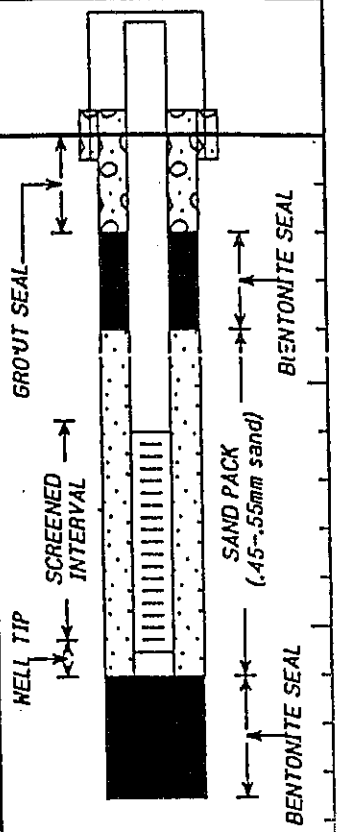
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *LAURA E. WHITAKER*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *28 Feet*
DRILLER: *JEFF LOWERY & CREW*	ELEV. L.S.: *208.76 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *20.23 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
			NO SAMPLE 0-1 FOOT		
		SD	SAND, light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4), fine- to medium-grained	67%	
		CL	CLAY, light brown (5YR 5/6), firm, with some fine- to medium-grained sand		
5		SC	CLAYEY SAND, light brown (5YR 5/6), fine-grained, with few mica flakes, moist	100%	
		CL	CLAY, light gray (N7) with dark yellowish orange mottling, silty (iron stained), firm, occasional thin mica laminations		
10				100%	
		SC	INTERBEDDED SAND AND CLAY, sand very iron-stained, clay light gray.		
		SD	sharp contact @ 12 ft. BLS		
			SAND, iron-stained, silty, occasional clay lenses up to 1.5 inches thick		
15			moist	100%	
20				90%	
		COAL	COAL, black (N1), firm		
		CL	CLAY, olive gray (5Y 4/1), very firm		
25				100%	
		COAL	COAL, black (N1), firm		
		CL	CLAY, olive gray (5Y 4/1), very firm		
30			BORING TERMINATED AT 28 FEET BLS BORING BACKFILLED WITH BENTONITE TO 21 FEET BLS WATER LEVEL MEASURED 5/11/92		



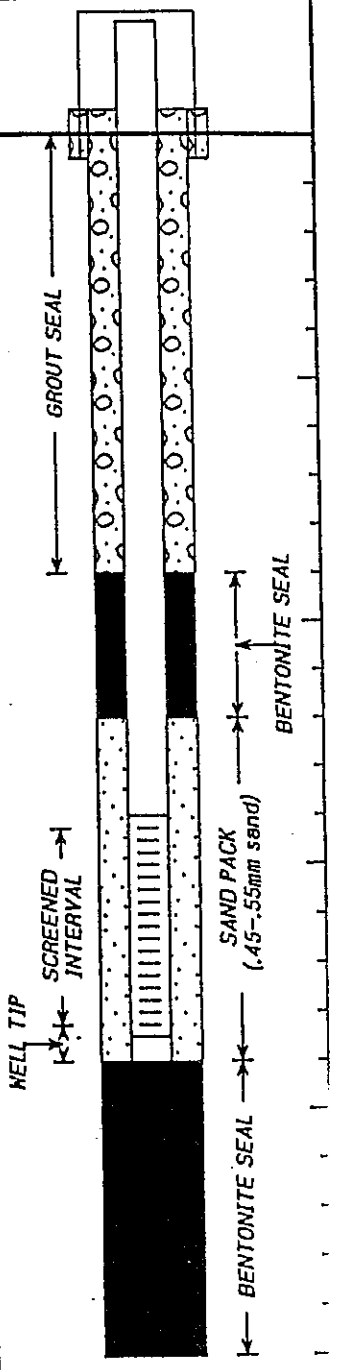
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-2 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *13.5 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *191.35 Feet AMSL*	BORING DIAMETER *9.0 inches*
DRILLING METHOD: *4 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *9.53 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
0		CL	CLAY, Moderate reddish brown (10R 4/6) to light brown (5YR 5/6), very sandy, moist, sticky	100%	
10		SC	SAND, Dark yellowish orange (10YR 6/6), fine-grained, silty interbedded with clay, wet		
		CL	CLAY, pale yellowish brown (10YR 6/2), stiff, sticky grading down to dark black clay at 13.5 feet BLS		
			BORING TERMINATED AT 13.5 FEET BLS BORING BACKFILLED WITH BENTONITE TO 11 FEET BLS WATER LEVEL MEASURED 5/11/92		



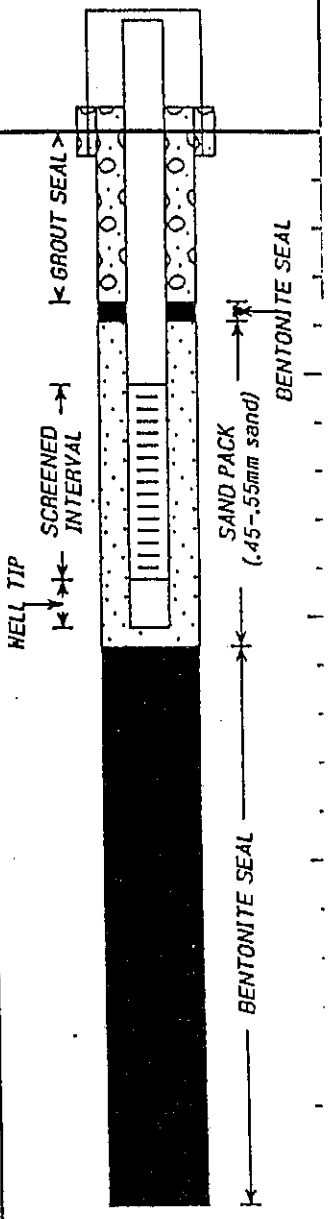
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-3 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *LAURA E. WHITAKER*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *25 Feet*
DRILLER: *JEFF LOWERY & CREW*	ELEV. L.S.: *198.92 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *15.92 Feet BLS*

DEPTH (feet)	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY
	SD	SAND, dark yellowish orange (10YR 6/6), medium- to coarse-grained, loose, and moist	40%
	SC	3" clay lense	
5		3" clay lense	50%
		dark iron stains	
	CL	CLAY, light gray (N7) and dark yellowish orange (10YR 6/6), firm, with some silt, fine sand, and mica laminations	
10			100%
15			100%
	SM	SAND, silty, iron-stained, medium-grained, clayey, wet	
		friable	
20	CL	CLAY, grayish olive green (5GY 3/2), light gray (N7) silty laminations, grades down to stiff silty clay	100%
		Shelby-tube sample 22.5-25 feet BLS	
25		BORING TERMINATED AT 25 FEET BLS BORING BACKFILLED WITH BENTONITE TO 19 FEET BLS WATER LEVEL MEASURED 5/11/92	
30			



TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING PZ-4 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *7/2/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *22.0 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *185.51 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *9.65 Feet BLS*

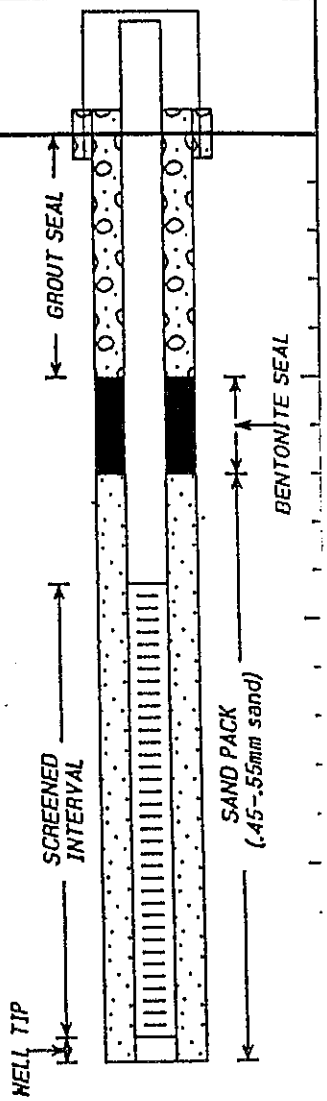
DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
		CL	CLAY, Light brown (5YR 5/6), silty, sandy, stiff, moist		
5			CLAY, Pale yellowish brown (10YR 6/2) mottled with light brown (5YR 5/6) clay, slightly moist, crumbly	100%	
		SC CL	SAND, Pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/6), very silty, laminated, damp to wet		
10			CLAY, Pale yellowish brown (10YR 6/2) grading down to olive gray (5GY 4/1), very stiff. Fractures present to about 19 feet BLS. Fractures are stained dark yellowish orange (10YR 6/6).		
15					
20			SHELBY TUBE (19.5 – 22.0 FEET BLS)		
			BORING TERMINATED AT 22.0 FEET BLS BORING BACKFILLED WITH BENTONITE TO 10.6 FEET BLS WATER LEVEL MEASURED 7/16/92		
25					
30					



TTL, Inc

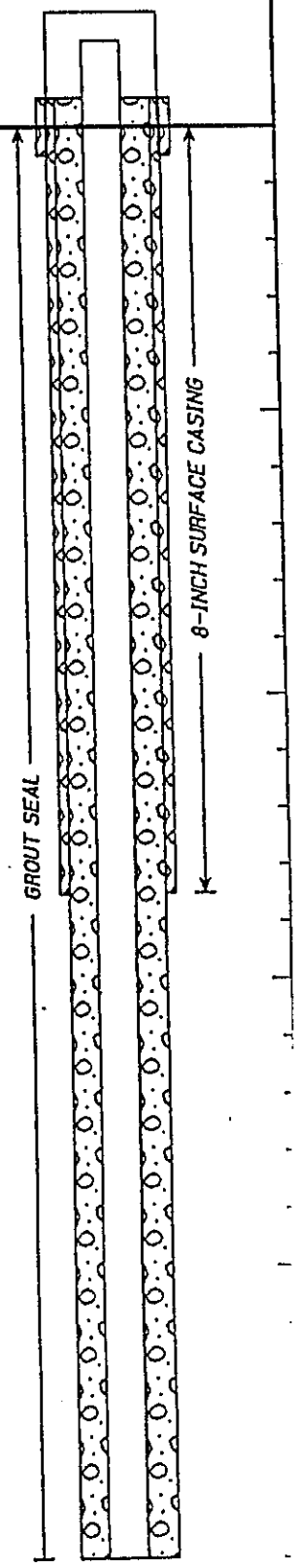
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING E-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *C.S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *7/2/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *19.0 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *229.20 Feet AMSL*	BORING DIAMETER *7.25 inches*
DRILLING METHOD: *3 1/4" I.D. HSA W/CONTINUOUS SAMPLERS*		WATER LEVEL: *0.41 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
5		CL	CLAY, Dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4), very sandy, grading down to sticky, silty CLAY	100%	
10		SC	CLAY, Light olive gray (5Y 5/2), stiff, moist, interbedded to laminated with fine-to medium-grained SAND every 1 to 4 inches. SAND lenses are very moist, increase downward. Wet at about 14 feet BLS.		
15			SAND, Light olive gray (5Y 5/2), fine grained, interbedded with silty CLAY. Sand is cross-laminated and wet. wet		
20			BORING TERMINATED AT 19.0 FEET BLS WATER LEVEL MEASURED 7/18/92		
25					
30					



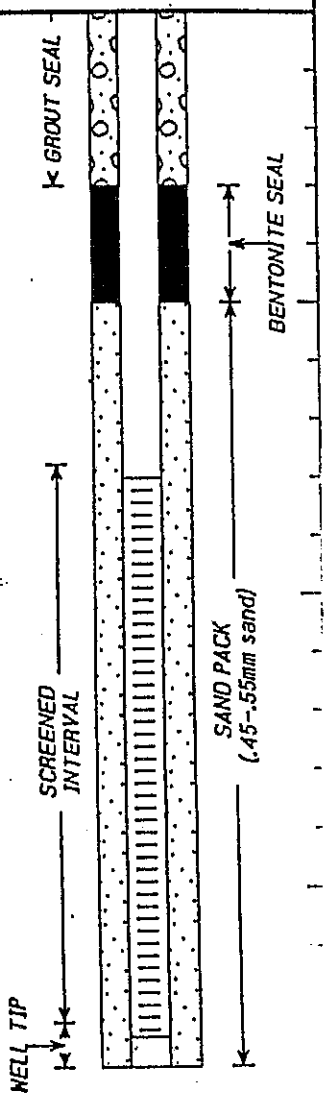
TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING DW-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92 & 5/11/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *43 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *187.7 Feet AMSL*	BORING DIAMETER *12 & 7.25 inches*
DRILLING METHOD: *10 1/4" & 3 1/4" I.D. HSA W/STS*		WATER LEVEL: *22.66 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
5		CL	CLAY, Light brown (5YR 5/6), very sandy, moist, sticky	100%	
		SC	SAND, Dark yellowish orange (10YR 6/6), fine-grained, very silty, interbedded with clay, wet.		
		CL	CLAY, Pale yellowish brown (10YR 6/2), stiff, sticky grading down to dark black clay at 9.0 feet BLS		
10			CLAY, Olive gray (5Y 4/1), very stiff, dry, with local zones of silty, reddish, mottled lenses		
			8" SURFACE CASING SET TO 13.5 FEET BLS		
			SHELBY TUBE FROM 14.0 TO 18.5 FEET BLS		
15					
20					
25					



TTL, INC. PRACTICING IN THE GEOSCIENCES	CITY OF TUSCALOOSA COKER LANDFILL	LOG OF BORING DW-1 & WELL-CONSTRUCTION DETAILS
GEO/ENG: *CARRIE S. BARTEK*	LOCATION: *TUSCALOOSA COUNTY, AL*	DATE AUGERED: *5/8/92 & 5/11/92*
DRILL AGENCY: *TTL, Inc.*	JOB NUMBER: *26-164*	BORING DEPTH: *43 Feet*
DRILLER: *CURTIS LEE & CREW*	ELEV. L.S.: *187.7 Feet AMSL*	BORING DIAMETER *12 & 7.25 inches*
DRILLING METHOD: *10 1/4" & 3 1/4" I.D. HSA W/STS*		WATER LEVEL: *22.66 Feet BLS*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	RECOVERY	WATER LEVEL
30		CL			
		ML	SILT, Yellowish gray (5Y 7/2), laminated, sandy, dry, friable	100%	
35					
40		SC	SAND, Light olive gray (5Y 5/2), interbedded with silty CLAY, moist		
			BORING TERMINATED AT 43 FEET BLS WATER LEVEL MEASURED 5/15/92		
45					
50					



APPENDIX 3.1G

Boring Logs and Piezometer-Completion Diagrams for Piezometers 04-1, 04-2, 04-5, 04-6, and 04-7

Geological Evaluation, August 1988

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-1
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-3-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *24 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *242.19 Feet AMSL*	COORDINATE NORTH: 1181028
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921928*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		SM	LIGHT BROWN SILTY FINE SAND		
			REDDISH TAN SILTY MEDIUM SAND		
5			WHITE SILTY MEDIUM SAND (MOIST)		
		CL	RED AND GRAY SILTY CLAY		
10			BROWN SILTY CLAY		
			DARK GRAY SILTY CLAY		
15			WITH LIGHT GRAY FINE SAND LENSES		
20		SP	LIGHT GRAY, MICACEOUS, SILTY FINE TO MEDIUM SAND WITH GRAVEL (SATURATED)		
			BORING TERMINATED AT 24 FEET		
25					
30					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-2
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-3-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *19 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *289.12 Feet AMSL*	COORDINATE NORTH: 1181179
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921577*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	BROWN SILTY FINE SAND WITH ORGANICS		
		SC	RED CLAYEY FINE TO MEDIUM SAND		
			WITH PURPLE CLAY LAYERS		
5			WITH OCCASIONAL PURPLE AND GRAY SILTY CLAY LAYERS		
		SM	REDDISH BROWN SILTY FINE SAND		
10			TAN VERY FINE SAND		
			(MOIST)		
15			WITH WHITE SILTY FINE SAND AND REDDISH BROWN SILT (SATURATED)		
			BORING TERMINATED AT 19 FEET		
20					
25					
30					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-5
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *5-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *29 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *208.94 Feet AMSL*	COORDINATE NORTH: 1178386
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921796*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	SILTY FINE SAND WITH ORGANICS		
		SC	RED CLAYEY FINE SAND		
5					
			RED AND TAN MOTTLED SILTY CLAY		
10		CL			
			WITH FINE SAND LAYERS		
15					
			REDDISH BROWN SILTY FINE SAND		
			TAN AND GRAY SILTY CLAY		
			GRAY SILTY CLAY WITH LIGHT GRAY FINE SAND		
20			WITH LIGHT BROWN SILT LAMINAE		
		SM	ALTERNATING LIGHT BROWN, TAN AND BROWN SILTY FINE SAND WITH IRONSTONE AND GRAY CLAYEY SILT LAYERS		
25					
			BROWN FERRUGINOUS SILTY FINE SAND		
			SATURATED BROWN FERRUGINOUS SILTY FINE SAND		
30			BORING TERMINATED AT 29 FEET		

TTL, Inc

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-6
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *8-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *39 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *241.98 Feet AMSL*	COORDINATE NORTH: 1178515
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1922115*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		CL	GRAY, RED AND TAN MOTTLED SILTY CLAY		
			GRAY AND TAN MOTTLED SILTY CLAY		
5			TAN MICACEOUS FINE SANDY SILTY CLAY		
			GRAY AND TAN FINE SANDY SILTY CLAY		
10					
15			GRAY FINE SANDY SILTY CLAY LAMINATED		
20					
			WITH OCCASIONAL FINE SAND LAYERS		
25			2" TAN SILTY FINE SAND GRAY FINE SANDY SILTY CLAY		
30					

TTL, INC.
PRACTICING IN THE GEOSCIENCES

BLACK WARRIOR SOLID WASTE AUTHORITY
COKER LANDFILL

LOG FOR TEMPORARY PIEZOMETER
04-6

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
		CL			
		SM	TAN AND GRAY SILTY FINE SAND WITH SILT LAYERS AND FERROGINOUS		
			(MOIST)		
35			TAN MICACEOUS SILTY FINE SAND		
			BORING TERMINATED AT 38 FEET		
40					
45					
50					
55					
60					

TTL, Inc. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG OF TEMPORARY PIEZOMETER 04-7
GEO/ENG: *DEWEY TRAPP*	LOCATION: *TUSCALOOSA CO., AL.*	DATE DRILLED: *8-4-88*
DRILL AGENCY: *TTL, INC.*	JOB NUMBER: *45-479*	BORING DEPTH: *42.5 Feet BLS*
DRILLER: *CURTIS LEE*	L.S.ELEVATION: *187.48 Feet AMSL*	COORDINATE NORTH: 1178334
DRILLING METHOD: *CME 55 WITH 3 1/4 in. ID HOLLOW STEM AUGERS*		COORDINATE EAST: *1921615*

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blows per ft.)	PIEZOMETER CONSTRUCTION
		OL	BROWN CLAYEY SAND WITH ORGANICS		
		CL	RED FINE SANDY CLAY		
			TAN AND RED MOTTLED		
5					
10		SM	TAN AND GRAY MOTTLED SILTY FINE SAND		
			(MOIST		
15					
		CH	GRAY CLAYEY SILT WITH IRON STAINING		
			DARK GRAY CLAYEY SILT		
20			OLIVE GREEN AND DARK GRAY SILTY CLAY		
25					
30					

TTL, Inc

TTL, INC. PRACTICING IN THE GEOSCIENCES	BLACK WARRIOR SOLID WASTE AUTHORITY COKER LANDFILL	LOG FOR TEMPORARY PIEZOMETER 04-7

DEPTH (feet)	GRAPHIC LOG	SOIL CLASS	MATERIALS DESCRIPTION	PENETRATION (blow per ft.)	PIEZOMETER CONSTRUCTION
35		CH	OLIVE GREEN, DARK GRAY AND RED SILTY CLAY.		
40			LIGHT TAN AND GRAY SILTY CLAY		
			BORING TERMINATED AT 42.5 FEET DUE TO HARDNESS OF CLAY		
45					
50					
55					
60					

TTL, Inc

APPENDIX 3.2

Ground-Water Elevations in Piezometers and Monitoring Wells; March 1994 through January 1998

APPENDIX 3.2. Ground-water elevations in piezometers and monitoring wells; March 1994 through January 1998; Hydrogeological Evaluation; Black Warrior Solid Waste Facility; Tuscaloosa County, Alabama.

Note: ***Elevation of measuring point:*** *top of casing*

ft. BMP: *feet below measuring point*

ft. AMSL: *feet above mean sea level*

The date of occurrence and the elevation of the highest water level, as of 1/13/98, are blocked. The highest water levels through 1/13/98 were used in Figure 3.10 .

Piezometers, monitoring wells, and borings were ***"dry"*** *if they contained no water or if the water levels were not greater than 0.5 foot above the bottom of the well tip.*

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
MW1	278.2	280.92	7/29/96	26.15	254.77
			8/20/96	26.47	254.45
			9/9/96	26.03	254.89
			9/26/96	26.48	254.44
			11/21/96	26.09	254.83
			2/11/97	28.23	252.69
			2/25/97	22.78	258.14
			3/11/97	25.79	255.13
			3/24/97	25.92	255.00
			4/7/97	25.93	254.99
			4/21/97	25.68	255.24
			6/13/97	25.72	255.20
			7/16/97	25.80	255.12
			8/13/97	25.31	255.61
			9/10/97	25.13	255.79
			10/13/97	26.08	254.84
			11/10/97	25.93	254.99
			12/12/97	25.73	255.19
			1/13/98	25.13	255.79
MW2	296.5	299.44	7/29/96	66.60	232.84
			8/19/96	66.78	232.66
			9/9/96	66.77	232.67
			9/26/96	66.75	232.69
			11/21/96	66.85	232.59
			2/11/97	66.95	232.49
			2/25/97	66.85	232.59
			3/11/97	66.81	232.63
			3/24/97	66.95	232.49
			4/7/97	67.00	232.44
			4/21/97	66.63	232.81
			6/13/97	66.49	232.95
			7/16/97	67.21	232.23
			8/13/97	66.44	233.00
			9/10/97	66.30	233.14
			10/13/97	67.02	232.42
			11/10/97	66.10	233.34

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			12/12/97	66.55	232.89
			1/13/98	66.12	233.32
MW3	258.2	258.61	7/30/96	47.91	210.70
			8/20/96	47.76	210.85
			9/10/98	47.91	210.70
			9/26/96	47.83	210.78
			11/21/96	47.82	210.79
			2/11/97	48.28	210.33
			2/25/97	48.18	210.43
			3/11/97	48.21	210.40
			3/24/97	48.45	210.16
			4/7/97	48.48	210.13
			4/21/97	48.09	210.52
			6/13/97	47.91	210.70
			7/16/97	47.93	210.68
			8/13/97	47.77	210.84
			9/10/97	47.59	211.02
			10/13/97	47.47	211.14
			11/10/97	47.42	211.19
			12/12/97	47.21	211.40
			1/13/98	47.58	211.03
MW4	194.4	196.88	7/30/96	8.96	187.92
			8/20/96	9.04	187.84
			9/10/96	9.11	187.77
			9/26/96	9.27	187.61
			11/21/96	9.15	187.73
			2/11/97	8.77	188.11
			2/25/97	8.63	188.25
			3/11/97	9.45	187.43
			3/24/97	8.79	188.09
			4/7/97	8.63	188.25
			4/21/97	8.73	188.15
			6/13/97	8.64	188.24
			7/16/97	8.63	188.25
			8/13/97	8.42	188.46
			9/10/97	7.59	189.29
			10/13/97	9.02	187.86
			11/10/97	8.99	187.89
			12/12/97	8.79	188.09
			1/13/98	7.90	188.98
MW5	222.0	225.02	11/20/96	32.55	192.47
			11/27/96	34.03	190.99
			12/4/96	34.60	190.42
			12/11/96	34.79	190.23
			2/11/97	30.39	194.63
			2/25/97	29.09	195.93
			3/11/97	29.41	195.61
			3/24/97	30.45	194.57

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			4/7/97	30.58	194.44
			4/21/97	30.98	194.04
			6/13/97	30.35	194.67
			7/16/97	29.09	195.93
			8/13/97	28.93	196.09
			9/10/97	29.25	195.77
			10/13/97	31.04	193.98
			11/10/97	30.77	194.25
			12/12/97	30.52	194.50
			1/13/98	27.57	197.45
MW6	188.8	191.62	11/20/96	14.52	177.10
			11/27/96	14.76	176.86
			12/4/96	14.75	176.87
			12/11/96	14.75	176.87
			2/11/97	14.86	176.76
			2/25/97	14.79	176.83
			3/11/97	14.85	176.77
			3/24/97	14.98	176.64
			4/7/97	15.03	176.59
			4/21/97	14.99	176.63
			6/13/97	15.07	176.55
			7/16/97	15.12	176.50
			8/13/97	15.14	176.48
			9/10/97	15.32	176.30
			10/13/97	15.52	176.10
			11/10/97	15.28	176.34
			12/12/97	15.48	176.14
			1/13/98	15.27	176.35
MW7	196.7	199.56	11/20/96	26.49	173.07
			11/27/96	26.83	172.73
			12/4/96	26.86	172.70
			12/11/96	26.75	172.81
			2/11/97	27.31	172.25
			2/25/97	27.34	172.22
			3/11/97	27.35	172.21
			3/24/97	24.47	175.09
			4/7/97	27.45	172.11
			4/21/97	27.18	172.38
			6/13/97	27.49	172.07
			7/16/97	27.60	171.96
			8/13/97	27.23	172.33
			9/10/97	27.23	172.33
			10/13/97	27.40	172.16
			11/10/97	27.37	172.19
			12/12/97	27.62	171.94
			1/13/98	27.52	172.04
MW8	215.4	217.84	7/30/96	17.60	200.24
			8/20/96	17.77	200.07

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			9/9/96	17.76	200.08
			9/26/96	17.80	200.04
			11/21/96	18.76	199.08
			2/11/97	17.65	200.19
			2/25/97	17.58	200.26
			3/11/97	17.48	200.36
			3/24/97	17.48	200.36
			4/7/97	17.48	200.36
			4/21/97	17.50	200.34
			6/13/97	17.59	200.25
			7/16/97	17.72	200.12
			6/13/97	16.97	200.87
			9/10/97	16.78	201.16
			10/13/97	17.31	200.53
			11/10/97	17.27	200.57
			12/12/97	17.32	200.52
			1/13/98	17.02	200.82
MW9	267.6	270.14	7/29/96	52.61	217.53
			8/19/96	52.74	217.40
			9/9/96	53.07	217.07
			9/26/96	53.20	216.94
			11/21/96	53.73	216.41
			2/11/97	54.26	215.88
			2/25/97	54.28	215.86
			3/11/97	54.26	215.88
			3/24/97	54.18	215.96
			4/7/97	54.15	215.99
			4/21/97	54.04	216.10
			6/13/97	53.74	216.40
			7/16/97	55.08	215.06
			8/13/97	54.61	215.53
			9/10/97	52.57	217.57
			10/13/97	54.79	215.35
			11/10/97	52.52	217.62
			12/12/97	52.87	217.27
			1/13/98	53.01	217.13
97-1	309.0	313.19	2/11/97	66.53	246.66
			2/25/97	66.01	247.18
			3/11/97	65.86	247.33
			3/24/97	66.32	246.87
			4/7/97	66.39	248.80
			4/21/97	65.12	248.07
			6/13/97	64.30	248.89
			7/16/97	64.25	248.94
			8/13/97	63.96	249.23
			9/10/97	63.77	249.42
			10/13/97	64.03	249.16
			11/10/97	63.85	249.34
			12/12/97	63.63	249.56

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			1/13/98	62.13	251.06
97-2	312.8	316.90	2/11/97	dry	----
			2/25/97	dry	----
			3/11/97	dry	----
			3/24/97	52.90	264.00
			4/7/97	52.88	264.02
			4/21/97	dry	----
			6/13/97	53.00	263.90
			7/16/97	dry	----
			8/13/97	dry	----
			9/10/97	52.98	263.92
			10/13/97	53.01	263.89
			11/10/97	52.91	263.99
			12/12/97	52.78	264.12
			1/13/98	50.98	265.92
97-3	312.6	317.74	2/11/97	92.49	225.25
			2/25/97	92.48	225.26
			3/11/97	92.43	225.31
			3/24/97	92.46	225.28
			4/7/97	92.40	225.34
			4/21/97	92.23	225.51
			6/13/97	92.22	225.52
			7/16/97	92.94	224.80
			8/13/97	91.57	226.17
			9/10/97	91.10	226.64
			10/13/97	91.72	226.02
			11/10/97	91.66	226.08
			12/12/97	91.47	226.27
			1/13/98	90.87	226.87
97-4	317.4	322.51	2/11/97	87.89	234.62
			2/25/97	87.89	234.62
			3/11/97	dry	----
			3/24/97	dry	----
			4/7/97	87.85	234.66
			4/21/97	87.85	234.66
			6/13/97	86.48	236.03
			7/16/97	87.03	235.48
			8/13/97	87.31	235.20
			9/10/97	86.55	235.96
			10/13/97	87.84	234.67
			11/10/97	87.85	234.66
			12/12/97	87.69	234.82
			1/13/98	87.72	234.79
97-5	224.9	229.29	2/11/97	7.80	221.49
			2/25/97	10.37	218.92
			3/11/97	9.20	220.09
			3/24/97	8.67	220.62

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			4/7/97	8.35	220.94
			4/21/97	8.60	220.69
			8/13/97	8.68	220.61
			7/16/97	8.14	221.15
			8/13/97	7.94	221.35
			9/10/97	10.08	219.21
			10/13/97	11.35	217.94
			11/10/97	10.04	219.25
			12/12/97	9.26	220.03
			1/13/98	7.25	222.04
97-6	268.4	273.17	2/11/97	29.84	243.33
			2/25/97	30.98	242.19
			3/11/97	29.62	243.55
			3/24/97	31.40	241.77
			4/7/97	31.04	242.13
			4/21/97	31.79	241.38
			8/13/97	31.56	241.61
			7/16/97	30.28	242.89
			8/13/97	31.26	241.91
			9/10/97	31.99	241.18
			10/13/97	32.37	240.80
			11/10/97	32.05	241.12
			12/12/97	31.75	241.42
			1/13/98	28.85	244.32
97-7	278.4	281.08	2/11/97	11.47	269.61
			2/25/97	12.27	268.81
			3/11/97	11.20	269.88
			3/24/97	10.90	270.18
			4/7/97	10.87	270.21
			4/21/97	9.75	271.33
			6/13/97	9.72	271.36
			7/16/97	9.53	271.55
			8/13/97	9.10	271.98
			9/10/97	8.96	272.12
			10/13/97	9.27	271.81
			11/10/97	9.18	271.90
			12/12/97	8.95	272.13
			1/13/98	7.97	273.11
97-8	279.2	281.91	2/11/97	48.42	233.49
			2/25/97	48.27	233.64
			3/11/97	49.56	232.35
			3/24/97	49.49	232.42
			4/7/97	49.55	232.36
			4/21/97	50.55	231.36
			6/13/97	49.60	232.31
			7/16/97	49.53	232.38
			8/13/97	49.33	232.58
			9/10/97	49.17	232.74

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			10/13/97	49.92	231.99
			11/10/97	49.30	232.61
			12/12/97	49.02	232.89
			1/13/98	48.78	233.13
97-9	280.3	283.53	2/11/97	55.05	228.48
			2/25/97	55.07	228.46
			3/11/97	55.06	228.47
			3/24/97	54.99	228.54
			4/7/97	55.00	228.53
			4/21/97	55.10	228.43
			6/13/97	55.08	228.45
			7/16/97	54.95	228.58
			8/13/97	53.91	229.62
			9/10/97	54.48	229.05
			10/13/97	54.35	229.18
			11/10/97	54.35	229.18
			12/12/97	54.53	229.00
			1/13/98	54.45	229.08
97-10	293.4	297.74	2/11/97	81.27	216.47
			2/25/97	81.21	216.53
			3/11/97	81.20	216.54
			3/24/97	81.33	216.41
			4/7/97	81.48	216.26
			4/21/97	81.44	216.30
			6/13/97	81.27	216.47
			7/16/97	81.20	216.54
			8/13/97	81.16	216.56
			9/10/97	abandoned	----
97-11	268.6	273.16	2/11/97	59.00	214.16
			2/25/97	59.72	213.44
			3/11/97	59.40	213.76
			3/24/97	59.30	213.86
			4/7/97	59.20	213.96
			4/21/97	58.04	215.12
			6/13/97	58.09	215.07
			7/16/97	59.19	213.97
			8/13/97	59.73	213.43
			9/10/97	abandoned	----
97-12	258.1	262.77	2/11/97	48.73	214.04
			2/25/97	49.37	213.40
			3/11/97	48.56	214.21
			3/24/97	48.65	214.12
			4/7/97	48.70	214.07
			4/21/97	48.30	214.47
			6/13/97	48.62	214.15
			7/16/97	48.58	214.19
			8/13/97	48.50	214.27

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			9/10/97	abandoned	----
97-13	254.8	259.32	2/11/97	44.37	214.95
			2/25/97	48.88	210.44
			3/11/97	44.61	214.71
			3/24/97	44.82	214.50
			4/7/97	44.65	214.67
			4/21/97	44.52	214.80
			6/13/97	44.73	214.59
			7/16/97	44.59	214.73
			8/13/97	44.66	214.66
			9/10/97	44.42	214.90
			10/13/97	44.73	214.59
			11/10/97	44.69	214.63
			12/12/97	44.89	214.43
			1/13/98	44.78	214.54
97-14	243.9	248.46	2/11/97	40.31	208.15
			2/25/97	39.78	208.68
			3/11/97	40.16	208.28
			3/24/97	40.30	208.16
			4/7/97	40.13	208.33
			4/21/97	40.42	208.04
			6/13/97	40.45	208.01
			7/16/97	40.33	208.13
			8/13/97	40.40	208.06
			9/10/97	abandoned	----
97-15	283.7	286.15	2/11/97	53.84	232.31
			2/25/97	54.10	232.05
			3/11/97	dry	----
			3/24/97	dry	----
			4/7/97	dry	----
			4/21/97	dry	----
			6/13/97	dry	----
			7/16/97	dry	----
			8/13/97	dry	----
			9/10/97	54.00	232.15
			10/13/97	dry	-----
			11/10/97	54.10	232.05
			12/12/97	54.07	232.08
			1/13/98	53.01	233.14
97-16	245.2	249.19	2/11/97	40.92	208.27
			2/25/97	40.79	208.40
			3/11/97	40.77	208.42
			3/24/97	40.67	208.52
			4/7/97	40.63	208.56
			4/21/97	40.59	208.60
			6/13/97	40.72	208.47

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			7/16/97	40.68	208.51
			8/13/97	40.78	208.41
			9/10/97	40.85	208.54
			10/13/97	41.39	207.80
			11/10/97	41.47	207.72
			12/12/97	41.54	207.65
			1/13/98	40.83	208.36
97-17	286.6	288.86	2/11/97	72.60	216.26
			2/25/97	72.66	216.18
			3/11/97	72.74	216.12
			3/24/97	72.77	216.09
			4/7/97	72.80	216.06
			4/21/97	72.73	216.13
			6/13/97	72.40	216.46
			7/16/97	72.13	216.73
			8/13/97	71.88	216.98
			9/10/97	71.35	217.51
			10/13/97	70.81	218.05
			11/10/97	70.56	218.30
			12/12/97	71.03	217.83
			1/13/98	71.35	217.51
94-1	338.2	340.21	3/18/94	101.74	238.47
			3/25/94	not measured	----
			3/30/94	102.97	237.24
			4/19/94	102.99	237.22
			5/19/94	103.39	236.82
			6/28/94	103.34	236.87
			8/1/94	103.20	237.01
			9/7/94	102.44	237.77
			10/5/94	103.04	237.17
			3/9/95	103.86	236.35
			3/13/95	102.61	237.60
			3/29/95	103.62	236.59
			4/26/95	103.92	236.29
			5/23/95	103.48	236.73
			6/22/95	103.72	236.49
			7/19/95	102.06	238.15
			8/11/95	102.52	237.69
			9/15/95	102.60	237.61
			10/30/95	102.94	237.27
			11/21/95	102.94	237.27
			12/13/95	102.04	238.17
			1/10/96	102.14	238.07
			2/14/96	100.85	239.36
			3/14/96	101.32	238.89
			4/10/96	102.63	237.58
			5/20/96	101.18	239.03
			9/9/96	100.15	240.06
			2/11/97	101.38	238.83

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/25/97	101.16	239.05
			3/11/97	101.34	238.87
			3/24/97	102.30	237.91
			4/7/97	102.33	237.88
			4/21/97	106.05	234.16
			6/13/97	101.26	238.95
			7/16/97	106.30	233.91
			8/13/97	101.30	238.91
			9/10/97	100.92	239.29
			10/13/97	100.68	239.53
			11/10/97	105.80	234.41
			12/12/97	100.80	239.41
			1/13/98	103.50	236.71
94-2	296.1	297.44	3/18/94	dry	----
			3/25/94	dry	----
			3/30/94	dry	----
			4/19/94	dry	----
			5/19/94	dry	----
			6/28/94	dry	----
			8/1/94	dry	----
			9/7/94	dry	----
			10/5/94	dry	----
			3/9/95	19.32	278.12
			3/13/95	19.65	277.79
			3/29/95	21.28	276.16
			4/26/95	22.06	275.38
			5/23/95	22.08	275.36
			6/22/95	22.01	275.43
			7/19/95	22.15	275.29
			8/11/95	22.13	275.31
			9/15/95	dry[5]	----
			10/30/95	22.16	275.28
			11/21/95	19.68	277.76
			12/13/95	21.95	275.49
			1/10/96	20.24	277.20
			2/14/96	19.12	278.32
			3/14/96	19.53	277.91
			4/10/96	19.49	277.95
			5/20/96	22.09	275.35
			9/9/96	22.09	275.35
			2/11/97	18.66	278.78
			2/25/97	19.69	277.75
			3/11/97	17.77	279.67
			3/24/97	18.65	278.79
			4/7/97	19.88	277.56
			4/21/97	21.68	275.76
			6/13/97	22.12	275.32
			7/16/97	21.40	276.04
			8/13/97	21.88	275.56
			9/10/97	22.10	275.34

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			10/13/97	22.14	275.30
			11/10/97	22.09	275.35
			12/12/97	21.74	275.70
			1/13/98	15.84	281.60
94-3	263.5	264.94	3/18/94	38.29	226.65
			3/25/94	38.41	226.53
			3/30/94	38.29	226.65
			4/19/94	37.75	227.19
			5/19/94	37.08	227.86
			6/28/94	36.70	228.24
			8/1/94	36.95	227.99
			9/7/94	37.36	227.58
			10/5/94	37.69	227.25
			3/9/95	38.58	226.38
			3/13/95	38.29	226.65
			3/29/95	38.31	226.63
			4/26/95	37.80	227.14
			5/23/95	37.31	227.63
			6/22/95	37.11	227.83
			7/19/95	37.13	227.81
			8/11/95	37.33	227.61
			9/15/95	37.72	227.22
			10/30/95	38.24	226.70
			11/21/95	38.32	226.62
			12/13/95	38.32	226.62
			1/10/96	38.48	226.46
			2/14/96	37.96	226.98
			3/14/96	37.59	227.35
			4/10/96	37.31	227.63
			5/20/98	36.59	228.35
			9/9/96	37.10	227.84
		267.63	2/11/97	41.12	226.51
			2/25/97	41.14	226.49
			3/11/97	41.08	226.55
			3/24/97	41.20	226.43
			4/7/97	41.07	226.56
			4/21/97	40.52	227.11
			6/13/97	40.19	227.44
			7/16/97	40.20	227.43
			8/13/97	39.72	227.91
			9/10/97	39.16	228.47
			10/13/97	39.20	228.43
			11/10/97	39.57	228.06
			12/12/97	40.05	227.58
			1/13/98	40.17	227.46
94-4	270.5	272.09	3/18/94	60.00	212.09
			3/25/94	60.05	212.04
			3/30/94	59.98	212.11
			4/19/94	60.01	212.08

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			5/19/94	59.86	212.23
			6/28/94	59.74	212.35
			8/1/94	59.62	212.47
			9/7/94	59.71	212.38
			10/5/94	59.88	212.21
			3/9/95	60.39	211.70
			3/13/95	60.35	211.74
			3/29/95	60.33	211.76
			4/26/95	60.31	211.78
			5/23/95	60.20	211.89
			6/22/95	60.11	211.98
			7/19/95	59.99	212.10
			8/11/95	59.93	212.16
			9/15/95	59.98	212.11
			10/30/95	60.12	211.97
			11/21/95	60.10	211.99
			12/13/95	80.13	211.96
			1/10/96	60.22	211.87
			2/14/96	59.99	212.10
			3/14/96	59.77	212.32
			4/10/96	59.46	212.63
			5/20/96	58.81	213.28
			9/9/96	58.84	213.25
			2/11/97	59.86	212.23
			2/25/97	59.88	212.21
			3/11/97	59.91	212.18
			3/24/97	59.82	212.27
			4/7/97	59.82	212.27
			4/21/97	59.72	212.37
			6/13/97	59.56	212.53
			7/16/97	59.32	212.77
			8/13/97	59.04	213.05
			9/10/97	58.70	213.39
			10/13/97	61.32	210.77
			11/10/97	58.53	213.56
			12/12/97	58.79	213.30
			1/13/98	58.88	213.21
94-5	249.3	251.23	3/18/94	43.64	207.59
			3/25/94	43.66	207.57
			3/30/94	43.45	207.78
			4/19/94	43.17	208.06
			5/19/94	43.31	207.92
			6/28/94	43.83	207.40
			8/1/94	44.15	207.08
			9/7/94	44.42	206.81
			10/5/94	44.60	206.63
			3/9/95	44.19	207.04
			3/13/95	43.98	207.25
			3/29/95	43.66	207.57
			4/26/95	43.64	207.59

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			5/23/95	43.46	207.77
			6/22/95	43.85	207.38
			7/19/95	44.16	207.07
			8/11/95	44.39	206.84
			9/15/95	44.67	206.56
			10/30/95	44.94	206.29
			11/21/95	44.77	206.46
			12/13/95	44.61	206.62
			1/10/96	44.35	206.88
			2/14/96	43.27	207.96
			3/14/96	43.08	208.15
			4/10/96	42.81	208.42
			5/20/98	43.08	208.15
			9/9/96	44.33	206.90
			2/11/97	44.52	206.71
			2/25/97	44.20	207.03
			3/11/97	43.90	207.33
			3/24/97	43.77	207.46
			4/7/97	43.80	207.43
			4/21/97	43.73	207.50
			6/13/97	43.99	207.24
			7/16/97	43.79	207.44
			8/13/97	43.57	207.66
			9/10/97	43.88	207.35
			10/13/97	44.26	206.97
			11/10/97	44.52	206.71
			12/12/97	44.79	206.44
			1/13/98	44.40	206.83
94-6	245.0	246.77	3/18/94	42.21	204.56
			3/25/94	42.18	204.59
			3/30/94	42.13	204.64
			4/19/94	41.82	204.95
			5/19/94	41.79	204.98
			6/28/94	42.22	204.55
			8/1/94	42.47	204.30
			9/7/94	42.79	203.98
			10/5/94	43.05	203.72
			3/9/95	42.92	203.85
			3/13/95	42.78	203.99
			3/29/95	42.46	204.31
			4/26/95	42.27	204.50
			5/23/95	42.05	204.72
			6/22/95	42.29	204.48
			7/19/95	42.57	204.20
			8/11/95	42.78	203.99
			9/15/95	43.17	203.60
			10/30/95	43.38	203.39
			11/21/95	43.15	203.62
			12/13/95	43.07	203.70
			1/10/96	42.85	203.92

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/14/96	41.72	205.05
			3/14/96	41.24	205.53
			4/10/96	40.82	205.95
			5/20/96	40.84	205.93
			9/9/96	42.04	204.73
			2/11/97	42.58	204.19
			2/25/97	42.40	204.37
			3/11/97	42.20	204.57
			3/24/97	42.05	204.72
			4/7/97	43.80	202.97
			4/21/97	41.93	204.84
			6/13/97	41.98	204.79
			7/16/97	42.80	203.97
			8/13/97	41.20	205.57
			9/10/97	41.57	205.20
			10/13/97	41.98	204.79
			11/10/97	42.16	204.61
			12/12/97	41.96	204.81
			1/13/98	42.35	204.42
94-7	214.7	215.6	3/18/94	18.42	197.18
			3/25/94	18.54	197.06
			3/30/94	18.29	197.31
			4/19/94	18.28	197.32
			5/19/94	18.99	196.61
			6/28/94	19.38	196.22
			8/1/94	19.42	196.18
			9/7/94	19.59	196.01
			10/5/94	19.84	195.96
			3/9/95	18.33	197.27
			3/13/95	18.19	197.41
			3/29/95	18.50	197.10
			4/26/95	18.80	196.80
			5/23/95	18.95	196.65
			6/22/95	19.36	196.24
			7/19/95	19.53	196.07
			8/11/95	19.62	195.98
			9/15/95	26.25	189.35
			10/30/95	19.41	196.19
			11/21/95	18.87	196.73
			12/13/95	18.83	196.77
			1/10/96	18.58	197.02
			2/14/96	17.17	198.43
			3/14/96	17.62	197.98
			4/10/96	17.61	197.99
			5/20/96	18.48	197.12
			9/9/96	18.89	196.71
			2/11/97	17.64	197.96
			2/25/97	17.36	198.24
			3/11/97	17.29	198.31
			3/24/97	17.78	197.82

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			4/7/97	18.12	197.48
			4/21/97	18.26	197.34
			6/13/97	18.35	197.25
			7/16/97	18.24	197.36
			8/13/97	18.14	197.46
			9/10/97	18.60	197.00
			10/13/97	18.90	196.70
			11/10/97	18.62	196.98
			12/12/97	18.42	197.18
			1/13/98	17.32	198.28
94-8	218.3	220.26	3/18/94	17.17	203.09
			3/25/94	17.15	203.11
			3/30/94	16.92	203.34
			4/19/94	16.81	203.45
			5/19/94	17.36	202.90
			6/28/94	17.76	202.50
			8/1/94	18.04	202.22
			9/7/94	18.30	201.96
			10/5/94	18.45	201.81
			3/9/95	17.17	203.09
			3/13/95	17.06	203.20
			3/29/95	17.05	203.21
			4/26/95	17.22	203.04
			5/23/95	17.39	202.87
			6/22/95	17.72	202.54
			7/19/95	17.97	202.29
			8/11/95	18.15	202.11
			9/15/95	18.51	201.75
			10/30/95	18.46	201.80
			11/21/95	17.98	202.28
			12/13/95	17.96	202.30
			1/10/96	17.64	202.62
			2/14/96	16.22	204.04
			3/14/96	16.77	203.49
			4/10/96	16.74	203.52
			5/20/96	17.32	202.94
			9/9/96	18.11	202.15
			2/11/97	17.68	202.58
			2/25/97	17.26	203.00
			3/11/97	16.90	203.36
			3/24/97	17.03	203.23
			4/7/97	17.15	203.11
			4/21/97	17.35	202.91
			6/13/97	17.58	202.68
			7/16/97	17.40	202.86
			8/13/97	17.13	203.13
			9/10/97	17.58	202.68
			10/13/97	17.90	202.36
			11/10/97	18.08	202.18
			12/12/97	18.20	202.06

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			1/13/98	17.30	202.96
94-9	204.0	205.75	3/18/94	19.19	186.56
			3/25/94	19.56	186.19
			3/30/94	19.29	186.46
			4/19/94	19.28	186.47
			5/19/94	19.88	185.87
			6/28/94	20.26	185.49
			8/1/94	20.44	185.31
			9/7/94	20.65	185.10
			10/5/94	20.80	184.95
			3/9/95	19.93	185.82
			3/13/95	19.68	186.07
			3/29/95	19.90	185.85
			4/26/95	19.98	185.77
			5/23/95	20.08	185.67
			6/19/95	abandoned	----
94-10	237.0	238.60	3/18/94	41.29	197.31
			3/25/94	41.27	197.33
			3/30/94	41.14	197.46
			4/19/94	40.96	197.64
			5/19/94	40.82	197.78
			6/28/94	40.98	197.62
			8/1/94	41.16	197.44
			9/7/94	41.41	197.19
			10/5/94	41.59	197.01
			3/9/95	41.68	196.92
			3/13/95	41.50	197.10
			3/29/95	41.47	197.13
			4/26/95	41.24	197.36
			5/23/95	41.05	197.55
			6/5-6/1995	abandoned	----
94-11	276.3	278.15	3/18/94	78.78	199.37
			3/25/94	78.88	199.27
			3/30/94	78.83	199.32
			4/19/94	78.73	199.42
			5/19/94	78.68	199.47
			6/28/94	78.60	199.55
			8/1/94	78.64	199.51
			9/7/94	78.80	199.35
			10/5/94	78.93	199.22
			3/9/95	79.04	199.11
			3/13/95	78.84	199.31
			3/29/95	78.93	199.22
			4/26/95	78.82	199.33
			5/23/95	78.73	199.42
			6/6/95	abandoned	----
94-12	269.16	270.69	3/18/94	22.57	248.12

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/25/94	21.91	248.78
			3/30/94	21.71	248.98
			4/19/94	20.82	249.87
			5/19/94	26.60	244.09
			6/28/94	27.00	243.69
			8/1/94	26.39	244.30
			9/7/94	27.31	243.38
			10/5/94	25.06	245.63
			3/9/95	22.90	247.79
			3/13/95	22.56	248.13
			3/29/95	23.00	247.69
			4/26/95	22.80	247.89
			5/23/95	22.72	247.97
			6/22/95	23.05	247.64
			7/19/95	22.27	248.42
			8/11/95	21.72	248.97
			9/15/95	21.31	249.38
			10/30/95	21.78	248.91
			11/21/95	21.87	248.82
			12/13/95	21.55	249.14
			1/10/96	22.86	247.83
			2/14/96	22.74	247.95
			3/14/96	23.64	247.05
			4/10/96	23.16	247.53
			5/20/96	22.44	248.25
			9/9/96	22.38	248.31
			2/11/97	25.36	245.33
			2/25/97	25.16	245.53
			3/11/97	24.80	245.89
			3/24/97	25.20	245.49
			4/7/97	25.27	245.42
			4/21/97	24.85	245.84
			6/13/97	24.69	246.00
			7/16/97	23.77	246.92
			8/13/97	22.54	248.15
			9/10/97	abandoned	----
94-13	287.5	289.32	3/18/94	41.83	247.49
			3/25/94	41.78	247.54
			3/30/94	41.96	247.36
			4/19/94	42.04	247.28
			5/19/94	42.28	247.04
			6/28/94	42.34	246.98
			8/1/94	42.69	246.63
			9/7/94	43.42	245.90
			10/5/94	43.57	245.75
			3/9/95	42.91	246.41
			3/13/95	43.00	246.32
			3/29/95	42.77	246.55
			4/26/95	42.77	246.55
			5/23/95	42.80	246.52

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			6/22/95	42.78	246.54
			7/19/95	42.73	246.59
			8/11/95	42.69	246.63
			9/15/95	42.85	246.47
			10/30/95	42.69	246.63
			11/21/95	42.54	246.78
			12/13/95	42.60	246.72
			1/10/96	42.37	246.95
			2/14/96	42.15	247.17
			3/14/96	42.28	247.04
			4/10/96	42.25	247.07
			5/20/96	42.40	246.92
			9/9/96	42.32	247.00
			2/11/97	42.28	247.04
			2/25/97	42.30	247.02
			3/11/97	42.13	247.19
			3/24/97	42.10	247.22
			4/7/97	42.14	247.18
			4/21/97	42.02	247.30
			6/13/97	42.12	247.20
			7/16/97	42.23	247.09
			8/13/97	42.22	247.10
			9/10/97	42.03	247.29
			10/13/97	42.03	247.29
			11/10/97	41.75	247.57
			12/12/97	41.66	247.66
			1/13/98	41.57	247.75
94-14	280.1	282.11	3/18/94	dry	----
			3/25/94	dry	----
			3/30/94	dry	----
			4/19/94	dry	----
			5/19/94	dry	----
			6/28/94	dry	----
			8/1/94	dry	----
			9/7/94	dry	----
			10/5/94	dry	----
			3/9/95	dry	----
			3/13/95	dry	----
			3/29/95	dry	----
			4/26/95	dry	----
			11/21/95	dry	----
			12/13/95	dry	----
			1/10/96	dry	----
			Jan-Feb,1996	destroyed	----
94-15	286.4	288.43	3/18/94	55.61	232.82
			3/25/94	55.82	232.61
			3/30/94	55.78	232.65
			4/19/94	55.69	232.74
			5/19/94	55.61	232.82

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			6/28/94	55.65	232.78
			8/1/94	55.71	232.72
			9/7/94	55.84	232.59
			10/5/94	55.87	232.56
			3/9/95	56.27	232.16
			3/13/95	55.97	232.46
			3/29/95	56.04	232.39
			4/26/95	56.03	232.40
			5/23/95	55.96	232.47
			6/22/95	55.96	232.47
			7/19/95	56.00	232.43
			8/11/95	56.10	232.33
			9/15/95	56.14	232.29
			10/30/95	56.26	232.17
			11/21/95	56.24	232.19
			12/13/95	56.17	232.26
			1/10/96	56.24	232.19
			2/14/96	55.92	232.51
			3/14/96	55.83	232.60
			4/10/96	55.87	232.56
			5/20/96	55.49	232.94
			9/9/96	55.74	232.69
			2/11/97	56.02	232.41
			2/25/97	55.89	232.54
			3/11/97	55.87	232.56
			3/24/97	55.99	232.44
			4/7/97	61.52	226.91
			4/21/97	55.68	232.75
			6/13/97	55.64	232.79
			7/16/97	55.63	232.80
			8/13/97	55.46	232.97
			9/10/97	55.32	233.11
			10/13/97	55.30	233.13
			11/10/97	55.35	233.08
			12/12/97	55.53	232.90
			1/13/98	55.47	233.85
94-16	260.8	262.27	3/18/94	33.80	228.47
			3/25/94	34.14	228.13
			3/30/94	34.24	228.03
			4/19/94	34.07	228.20
			5/19/94	34.21	228.06
			6/28/94	34.26	228.01
			8/1/94	34.22	228.05
			9/7/94	34.16	228.11
			10/5/94	34.25	228.02
			3/9/95	34.62	227.65
			3/13/95	34.19	228.08
			3/29/95	34.53	227.74
			4/26/95	34.60	227.67
			5/23/95	34.60	227.67

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			6/22/95	34.50	227.77
			7/19/95	34.43	227.84
			8/11/95	34.44	227.83
			9/15/95	34.47	227.80
			10/30/95	34.60	227.67
			11/21/95	34.38	227.89
			12/13/95	34.25	228.02
			1/10/96	34.38	227.89
			2/14/96	34.00	228.27
			3/14/96	34.29	227.98
			4/10/96	34.78	227.49
			5/20/96	34.24	228.03
			9/9/96	33.81	228.46
			2/11/97	33.86	228.41
			2/25/97	33.82	228.45
			3/11/97	33.74	228.53
			3/24/97	34.16	228.11
			4/7/97	34.22	228.05
			4/21/97	33.83	228.44
			6/13/97	34.02	228.25
			7/16/97	34.20	228.07
			8/13/97	34.22	228.05
			9/10/97	34.09	228.18
			10/13/97	34.06	228.21
			11/10/97	33.98	228.29
			12/12/97	34.18	228.09
			1/13/98	33.88	228.39
94-17A	181.0	184.08	9/7/94	dry	----
			10/5/94	dry	----
			3/9/95	3.24	180.84
			3/13/95	3.42	180.66
			3/29/95	2.32	181.76
			4/26/95	4.45	179.63
			5/23/95	5.23	178.85
			6/22/95	6.51	177.57
			7/19/95	6.67	177.41
			8/11/95	6.72	177.36
			9/15/95	8.05	176.03
			10/30/95	6.57	177.51
			11/21/95	4.37	179.71
			12/13/95	4.43	179.65
			1/10/96	3.95	180.13
			2/14/96	3.29	180.79
			3/14/96	3.80	180.28
			4/10/96	4.17	179.91
			5/20/96	6.11	177.97
			9/9/96	5.89	178.19
			2/11/97	3.46	180.62
			2/25/97	3.24	180.84
			3/11/97	3.36	180.72

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/24/97	4.42	179.66
			4/7/97	4.18	179.90
			4/21/97	5.09	178.99
			6/13/97	4.59	179.49
			7/16/97	4.39	179.69
			8/13/97	4.76	179.32
			9/10/97	6.80	177.28
			10/13/97	7.92	176.16
			11/10/97	6.20	177.88
			12/12/97	5.45	178.63
			1/13/98	3.00	181.08
94-17B	181.4	183.36	9/7/94	23.14	160.22
			10/5/94	23.14	160.22
			3/9/95	22.24	161.12
			3/13/95	22.32	161.04
			3/29/95	22.20	161.16
			4/26/95	22.28	161.08
			5/23/95	22.51	160.85
			6/22/95	22.91	160.45
			7/19/95	23.22	160.14
			8/11/95	23.28	160.08
			9/15/95	23.64	159.72
			10/30/95	23.23	160.13
			11/21/95	23.02	160.34
			12/13/95	22.94	160.42
			1/10/96	22.61	160.75
			2/14/96	22.54	160.82
			3/14/96	22.49	160.87
			4/10/96	22.37	160.99
			5/20/96	22.76	160.60
			9/9/96	23.19	160.17
			2/11/97	22.48	160.88
			2/25/97	22.36	161.00
			3/11/97	22.34	161.02
			3/24/97	22.28	161.08
			4/7/97	22.21	161.15
			4/21/97	22.35	161.01
			6/13/97	22.46	160.90
			7/16/97	22.49	160.87
			8/13/97	22.44	160.92
			9/10/97	22.60	160.76
			10/13/97	22.72	160.64
			11/10/97	22.56	160.80
			12/12/97	22.44	160.92
			1/13/98	22.36	161.00
94-18	183.3	186.06	9/7/94	44.75	141.31
			10/5/94	43.56	142.50
			3/9/95	43.15	142.91
			3/13/95	43.08	142.98

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/29/95	42.86	143.20
			4/26/95	43.32	142.74
			5/23/95	43.62	142.44
			6/22/95	43.29	142.77
			7/19/95	43.35	142.71
			8/11/95	43.56	142.50
			9/15/95	44.04	142.02
			10/30/95	44.30	141.76
			11/21/95	44.09	141.97
			12/13/95	43.98	142.08
			1/10/96	43.68	142.38
			2/14/96	42.97	143.09
			3/14/96	43.02	143.04
			4/10/96	43.25	142.81
			5/20/96	43.53	142.53
			Aug.1996	paved over	----
			7/16/97	abandoned	----
94-19	231.3	233.25	9/7/94	36.77	196.48
			10/5/94	37.13	196.12
			3/9/95	35.62	197.63
			3/13/95	36.07	197.18
			3/29/95	36.38	196.87
			4/26/95	34.45	198.80
			5/23/95	34.00	199.25
			6/5/95	abandoned	----
94-20	211.3	213.77	9/7/94	18.46	195.31
			10/5/94	18.57	195.20
			3/9/95	18.02	195.75
			3/13/95	18.02	195.75
			3/29/95	18.02	195.75
			4/26/95	17.86	195.91
			5/23/95	17.83	195.94
			6/22/95	17.98	195.79
			7/19/95	18.04	195.73
			8/11/95	18.12	195.65
			9/15/95	18.28	195.49
			10/30/95	18.18	195.59
			11/21/95	17.91	195.86
			12/13/95	17.97	195.80
			1/10/96	17.91	195.86
			2/14/96	17.54	196.23
			3/14/96	17.61	196.16
			4/10/96	17.68	196.09
			5/20/96	17.88	195.89
			9/9/96	18.32	195.45
			2/11/97	18.23	195.54
			2/25/97	18.16	195.61
			3/11/97	18.40	195.37

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/24/97	18.19	195.58
			4/7/97	18.18	195.59
			4/21/97	18.23	195.54
			6/13/97	18.32	195.45
			7/16/97	18.34	195.43
			6/13/97	18.33	195.44
			9/10/97	18.45	195.32
			10/13/97	18.60	195.17
			11/10/97	18.64	195.13
			12/12/97	18.66	195.11
			1/13/98	18.33	195.44
94-21	241	244.38	9/7/94	32.99	211.39
			10/5/94	33.20	211.18
			3/9/95	32.78	211.60
			3/13/95	32.44	211.94
			3/29/95	32.65	211.73
			4/26/95	32.50	211.88
			5/23/95	32.77	211.61
			6/22/95	32.93	211.45
			7/19/95	32.98	211.40
			8/11/95	33.09	211.29
			9/15/95	33.37	211.01
			10/30/95	33.13	211.25
			11/21/95	32.91	211.47
			12/13/95	32.84	211.54
			1/10/96	32.91	211.47
			2/14/96	32.38	212.00
			3/14/96	32.74	211.64
			4/10/96	32.92	211.46
			5/20/96	32.61	211.77
			9/9/96	32.40	211.98
			2/11/97	32.62	211.76
			2/25/97	32.42	211.96
			3/11/97	32.40	211.98
			3/24/97	38.70	205.68
			4/7/97	32.80	211.58
			4/21/97	32.46	211.92
			6/13/97	32.33	212.05
			7/16/97	32.15	212.23
			8/13/97	31.86	212.52
			9/10/97	31.83	212.55
			10/13/97	31.90	212.48
			11/10/97	31.85	212.53
			12/12/97	32.05	212.33
			1/13/98	31.50	212.88
94-22	308.7	311.17	9/7/94	98.63	212.54
			10/5/94	98.80	212.37
			3/9/95	98.99	212.18
			3/13/95	98.61	212.56

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/29/95	98.75	212.42
			4/26/95	98.82	212.35
			5/23/95	98.79	212.38
			6/22/95	98.55	212.62
			7/19/95	98.54	212.63
			8/11/95	98.64	212.53
			9/15/95	98.77	212.40
			10/30/95	99.01	212.16
			11/21/95	98.76	212.39
			12/13/95	98.75	212.42
			1/10/96	98.82	212.35
			2/14/96	98.23	212.94
			3/14/96	98.45	212.72
			4/10/96	98.79	212.38
			5/20/96	98.38	212.79
			9/9/96	98.55	212.62
			2/11/97	98.88	212.29
			2/25/97	98.76	212.39
			3/11/97	98.52	212.65
			3/24/97	98.80	212.37
			4/7/97	98.80	212.37
			4/21/97	98.32	212.85
			6/13/97	98.45	212.72
			7/16/97	98.59	212.58
			8/13/97	98.60	212.57
			9/10/97	98.39	212.78
			10/13/97	98.52	212.65
			11/10/97	98.52	212.65
			12/12/97	98.85	212.32
			1/13/98	98.58	212.59
94-23	278.1	281.42	9/7/94	13.21	268.21
			10/5/94	13.36	268.06
			3/9/95	9.74	271.68
			3/13/95	10.23	271.19
			3/29/95	11.37	270.05
			4/26/95	11.74	269.68
			5/23/95	11.82	269.60
			6/22/95	12.54	268.88
			7/19/95	12.90	268.52
			8/11/95	13.06	268.36
			9/15/95	13.59	267.83
			10/30/95	13.54	267.88
			11/21/95	12.52	268.90
			12/13/95	12.97	268.45
			1/10/96	12.44	268.98
			2/14/96	11.00	270.42
			3/14/96	10.64	270.78
			4/10/96	11.19	270.23
			5/20/96	12.38	269.04
			9/9/96	13.06	268.36

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/11/97	11.76	269.66
			2/25/97	11.24	270.18
			3/11/97	11.40	270.02
			3/24/97	11.78	269.64
			4/7/97	11.94	269.48
			4/21/97	12.07	269.35
			6/13/97	12.15	269.27
			7/16/97	11.83	269.79
			8/13/97	11.80	269.62
			9/10/97	12.61	268.81
			10/13/97	13.38	268.04
			11/10/97	13.54	267.68
			12/12/97	13.57	267.85
			1/13/98	10.50	270.92
94-24	275.0	278.11	9/7/94	23.28	254.83
			10/5/94	23.36	254.75
			3/9/95	22.24	255.87
			3/13/95	22.40	255.71
			3/29/95	22.86	255.25
			4/26/95	22.74	255.37
			5/23/95	23.00	255.11
			6/22/95	23.11	255.00
			7/19/95	23.09	255.02
			8/11/95	23.05	255.06
			9/15/95	23.61	254.50
			10/30/95	23.05	255.06
			11/21/95	22.68	255.43
			12/13/95	22.68	255.43
			1/10/96	22.50	255.61
			2/14/96	22.16	255.95
			3/14/96	22.29	255.82
			4/10/96	22.51	255.60
			5/20/96	22.68	255.43
			9/9/96	22.84	255.27
			2/11/97	22.51	255.60
			2/25/97	22.38	255.73
			3/11/97	22.38	255.73
			3/24/97	22.56	255.55
			4/7/97	22.54	255.57
			4/21/97	22.41	255.70
			8/13/97	22.47	255.64
			7/16/97	22.45	255.66
			8/13/97	22.54	255.57
			9/10/97	22.58	255.53
			10/13/97	22.84	255.27
			11/10/97	22.65	255.46
			12/12/97	22.73	255.38
			1/13/98	22.05	256.06

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
94-25	346.3	350.04	9/7/94	64.88	285.16
			10/5/94	65.22	284.82
			3/9/95	65.69	284.35
			3/13/95	65.60	284.44
			3/29/95	65.23	284.81
			4/26/95	84.59	285.45
			5/23/95	64.32	285.72
			6/22/95	84.39	285.65
			7/19/95	84.72	285.32
			8/11/95	64.96	285.08
			9/15/95	65.38	284.68
			10/30/95	65.74	284.30
			11/21/95	65.75	284.29
			12/13/95	65.68	284.36
			1/10/96	65.49	284.55
			2/14/96	64.34	285.70
			3/14/96	62.99	287.05
			4/10/96	62.47	287.57
			5/20/96	62.23	287.81
			9/9/96	64.22	285.82
			2/11/97	65.38	284.68
			2/25/97	65.14	284.90
			3/11/97	64.79	285.25
			3/24/97	64.34	285.70
			4/7/97	63.94	286.10
			4/21/97	63.72	286.32
			6/13/97	63.75	286.29
			7/16/97	63.39	286.65
			8/13/97	73.92	276.12
			9/10/97	62.26	287.78
			10/13/97	62.92	287.12
			11/10/97	63.45	286.59
			12/12/97	64.03	286.01
			1/13/98	64.33	285.71
94-26	291.2	293.24	9/7/94	8.05	285.19
			10/5/94	7.93	285.31
			3/9/95	5.58	287.66
			3/13/95	5.89	287.35
			3/29/95	6.44	286.80
			4/26/95	6.04	287.20
			5/23/95	6.83	286.41
			6/22/95	6.47	286.77
			7/19/95	7.86	285.38
			8/11/95	7.29	285.95
			9/15/95	8.71	284.53
			10/30/95	7.13	286.11
			11/21/95	6.39	286.85
			12/13/95	6.60	286.64
			1/10/96	6.18	287.06
			2/14/96	6.02	287.22

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/14/96	5.96	287.28
			4/10/96	6.19	287.05
			5/20/96	7.03	286.21
			9/9/96	6.86	286.38
			2/11/97	6.03	287.21
			2/25/97	6.01	287.23
			3/11/97	6.16	287.08
			3/24/97	6.50	286.74
			4/7/97	6.44	286.80
			4/21/97	6.65	286.59
			6/13/97	6.34	286.90
			7/16/97	6.37	286.87
			8/13/97	6.80	286.44
			9/10/97	7.50	285.74
			10/13/97	8.14	285.10
			11/10/97	6.85	286.39
			12/12/97	6.00	287.24
			1/13/98	6.70	286.54
94-27	243.3	247.35	9/7/94	20.06	227.29
			10/5/94	19.92	227.43
			3/9/95	19.56	227.79
			3/13/95	19.66	227.69
			3/29/95	19.64	227.71
			4/26/95	19.65	227.70
			5/23/95	19.75	227.60
			6/22/95	19.87	227.48
			7/19/95	19.82	227.53
			8/11/95	19.74	227.61
			9/15/95	20.14	227.21
			10/30/95	19.75	227.60
			11/21/95	19.61	227.74
			12/13/95	19.74	227.61
			1/10/96	19.66	227.69
			2/14/96	19.58	227.77
			3/14/96	19.60	227.75
			4/10/96	19.55	227.80
			5/20/96	19.84	227.51
			9/9/96	17.56	229.79
			2/11/97	18.98	228.37
			2/25/97	18.92	228.43
			3/11/97	18.84	228.51
			3/24/97	18.86	228.49
			4/7/97	18.89	228.46
			4/21/97	18.90	228.45
			6/13/97	18.86	228.49
			7/16/97	18.80	228.55
			8/13/97	17.90	229.45
			9/10/97	18.37	228.98
			10/13/97	18.28	229.07
			11/10/97	18.21	229.14

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			12/12/97	18.38	228.97
			1/13/98	18.28	229.07
94-28	260.7	263.5	9/7/94	37.47	226.03
			10/5/94	37.41	226.09
			3/9/95	37.59	225.91
			3/13/95	37.44	226.06
			3/29/95	37.63	225.87
			4/26/95	37.56	225.94
			5/23/95	37.48	226.02
			6/22/95	37.49	226.01
			7/19/95	37.97	225.53
			8/11/95	37.38	226.12
			9/15/95	37.56	225.94
			10/30/95	37.61	225.89
			11/21/95	37.60	225.90
			12/13/95	37.52	225.98
			1/10/96	37.55	225.95
			2/14/96	37.28	226.22
			3/14/96	37.31	226.19
			4/10/96	37.29	226.21
			5/20/96	37.04	226.46
			9/9/96	36.92	226.58
			2/11/97	37.25	226.25
			2/25/97	37.18	226.32
			3/11/97	37.18	226.32
			3/24/97	37.28	226.22
			4/7/97	37.24	226.26
			4/21/97	37.05	226.45
			6/13/97	36.99	226.51
			7/16/97	36.99	226.51
			8/13/97	36.88	226.62
			9/10/97	36.82	226.68
			10/13/97	36.82	226.68
			11/10/97	36.74	226.76
			12/12/97	36.81	226.69
			1/13/98	36.73	226.77
94-29	251.2	253.86	9/7/94	52.87	200.99
			10/5/94	52.97	200.89
			3/9/95	53.13	200.73
			3/13/95	52.91	200.95
			3/29/95	53.02	200.84
			4/26/95	53.10	200.76
			between 5-11/95	damaged	----
			6/13/97	filled w/ dirt	----
94-30	261.7	262.31	10/5/94	53.91	208.40
			3/9/95	53.82	208.49
			3/13/95	53.59	208.72
			3/29/95	53.58	208.73

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			4/26/95	53.68	208.63
			5/23/95	53.50	208.81
			6/22/95	53.60	208.71
			7/19/95	53.68	208.63
			8/11/95	53.80	208.51
			9/15/95	53.95	208.36
			10/30/95	54.04	208.27
			11/21/95	53.81	208.50
			Dec. 1995	covered w/ dirt	----
			6/13/97	abandoned	----
94-31	266.5	270.55	10/5/94	55.89	214.66
			3/9/95	56.00	214.55
			3/13/95	55.74	214.81
			3/29/95	55.73	214.82
			4/26/95	55.90	214.65
			5/23/95	55.90	214.65
			6/22/95	55.68	214.87
			7/19/95	55.69	214.86
			8/11/95	55.65	214.90
			9/15/95	55.93	214.62
			10/30/95	56.09	214.46
			11/21/95	55.87	214.68
			12/13/95	55.91	214.64
			1/10/96	55.91	214.64
			2/14/96	55.27	215.28
			3/14/98	55.61	214.94
			4/10/96	55.82	214.73
			5/20/96	55.49	215.06
			9/9/96	not measured	----
			2/11/97	55.92	214.63
			2/25/97	55.80	214.75
			3/11/97	55.55	215.00
			3/24/97	55.70	214.85
			4/7/97	55.76	214.79
			4/21/97	55.30	215.25
			6/13/97	55.54	215.01
			7/16/97	55.63	214.92
			8/13/97	55.64	214.91
			9/10/97	55.40	215.15
			10/13/97	55.60	214.95
			11/10/97	55.60	214.95
			12/12/97	55.82	214.73
			1/13/98	55.67	214.88
94-32	286.3	288.11	10/5/94	16.54	271.57
			3/9/95	13.78	274.33
			3/13/95	13.78	274.33
			3/29/95	14.50	273.61
			4/26/95	14.23	273.88
			5/23/95	14.35	273.76

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			6/22/95	15.46	272.65
			7/19/95	15.73	272.38
			8/11/95	15.78	272.33
			9/15/95	16.22	271.89
			10/30/95	16.14	271.97
			11/21/95	15.11	273.00
			12/13/95	15.38	272.73
			1/10/96	14.87	273.24
			2/14/96	13.86	274.25
			3/14/96	13.70	274.41
			4/10/96	13.88	274.23
			5/20/96	14.84	273.27
			9/9/96	15.97	272.14
			2/11/97	15.63	272.48
			2/25/97	15.40	272.71
			3/11/97	15.22	272.89
			3/24/97	15.38	272.73
			4/7/97	15.42	272.69
			4/21/97	15.47	272.64
			6/13/97	15.43	272.68
			7/16/97	15.29	272.82
			8/13/97	15.18	272.93
			9/10/97	15.60	272.51
			10/13/97	15.98	272.13
			11/10/97	16.98	271.13
			12/12/97	16.26	271.85
			1/13/98	15.55	272.56
94-33	326.8	328.52	10/5/94	48.97	279.55
			3/9/95	49.03	279.49
			3/13/95	48.97	279.55
			3/29/95	48.70	279.82
			4/26/95	48.32	280.20
			5/23/95	48.10	280.42
			6/22/95	48.09	280.43
			7/19/95	48.34	280.18
			8/11/95	48.49	280.03
			9/15/95	48.73	279.79
			10/30/95	51.30	277.22
			11/21/95	48.99	279.53
			12/13/95	48.88	279.64
			1/10/96	48.74	279.78
			2/14/96	48.21	280.31
			3/14/96	47.49	281.03
			4/10/96	47.26	281.26
			5/20/96	47.44	281.08
			July-Sept,1997	bulldozed out	----
			6/13/97	abandoned	----
94-35	308.4	310.15	10/5/94	76.32	233.83
			3/9/95	76.13	234.02

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			3/13/95	76.21	233.94
			3/29/95	74.89	235.26
			4/26/95	75.45	234.70
			5/23/95	75.38	234.77
			6/22/95	75.06	235.09
			7/19/95	74.93	235.22
			8/11/95	73.05	237.10
			9/15/95	76.21	233.94
			10/30/95	76.33	233.82
			11/21/95	76.32	233.83
			12/13/95	76.33	233.82
			1/10/96	76.35	233.80
			2/14/96	73.51	236.64
			3/14/96	76.09	234.06
			4/10/96	76.16	233.99
			5/20/96	75.34	234.81
			9/9/96	75.68	234.47
			2/11/97	76.40	233.75
			2/25/97	76.45	233.70
			3/11/97	75.56	234.59
			3/24/97	76.18	233.97
			4/7/97	76.07	234.08
			4/21/97	73.95	236.20
			6/13/97	75.20	234.95
			7/16/97	76.27	233.88
			8/13/97	76.00	234.15
			9/10/97	72.62	237.53
			10/13/97	76.18	233.97
			11/10/97	76.36	233.79
			12/12/97	76.20	233.95
			1/13/98	75.75	234.40
94-36	304.3	306.02	10/5/94	20.30	285.72
			3/9/95	20.48	285.54
			3/13/95	20.04	285.98
			3/29/95	18.92	287.10
			4/26/95	18.61	287.41
			5/23/95	18.51	287.51
			6/22/95	18.91	287.11
			7/19/95	19.37	286.65
			8/11/95	19.74	286.28
			9/15/95	20.34	285.68
			10/30/95	26.50	279.52
			11/21/95	20.43	285.59
			12/13/95	20.18	285.84
			1/10/96	19.94	286.08
			2/14/96	16.73	289.29
			3/14/96	16.51	289.51
			4/10/96	16.23	289.79
			5/20/96	16.73	289.29
			9/9/96	19.18	286.84

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/11/97	19.54	286.48
			2/25/97	19.06	286.96
			3/11/97	18.26	287.76
			3/24/97	17.83	288.19
			4/7/97	17.81	288.21
			4/21/97	17.84	288.18
			6/13/97	18.22	287.80
			7/16/97	16.80	289.22
			8/13/97	15.78	290.24
			9/10/97	16.60	289.42
			10/13/97	17.66	288.36
			11/10/97	18.35	287.67
			12/12/97	19.02	287.00
			1/13/98	18.28	287.74
ExB3	263.9	----	9/7/94	abandoned	----
ExB4	261.3	----	9/7/94	abandoned	----
B1	283.3	----	9/7/94	abandoned	----
B2	273.3	----	9/7/94	abandoned	----
B3	317.7	----	9/7/94	abandoned	----
B4	319.4	----	9/7/94	abandoned	----
B5	265.9	----	9/7/94	abandoned	----
PZ-1	206.0	209.94	10/5/94	24.56	185.38
			3/9/95	21.02	188.92
			3/13/95	21.46	188.48
			3/29/95	22.05	187.89
			4/26/95	22.97	186.97
			5/23/95	22.51	187.43
			6/22/95	23.60	186.34
			7/19/95	24.00	185.94
			8/11/95	24.34	185.60
			9/15/95	24.54	185.40
			9/27/95	abandoned	----
PZ-2	186.8	192.31	10/5/94	11.80	180.51
			3/9/95	8.84	183.47
			3/13/95	9.76	182.55
			3/29/95	10.74	161.57
			4/26/95	10.15	182.16
			5/23/95	11.61	180.70
			6/22/95	11.73	180.58
			7/19/95	11.93	180.38
			8/11/95	11.80	180.51
			9/15/95	11.24	181.07
			10/30/95	8.55	183.76
			11/21/95	7.92	184.39
			12/13/95	7.65	184.66
			1/10/96	7.38	184.93

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/14/96	7.25	185.06
			3/14/96	7.42	184.89
			4/10/96	7.62	184.69
			5/20/96	7.21	185.10
			5/30/96	abandoned	---
PZ-3	196.1	199.27	10/5/94	19.19	180.08
			3/9/95	14.94	184.33
Piezometer PZ-3 was damaged by heavy equipment, repaired and resurveyed on 8/25/97 because it was the measuring point.			3/13/95	16.49	182.78
			3/29/95	17.58	181.69
			4/26/95	16.81	182.46
			5/23/95	18.20	181.07
			6/22/95	18.26	181.01
			7/19/95	19.04	180.23
			8/11/95	18.90	180.37
		195.76	9/15/95	13.31	182.45
			10/30/95	13.66	182.10
			11/21/95	13.17	182.59
			12/13/95	13.53	182.23
			1/10/96	13.18	182.58
			2/14/96	13.18	182.58
			3/14/96	13.13	182.63
			4/10/96	13.78	181.98
			5/20/96	14.93	180.83
			9/9/96	15.34	180.42
			2/11/97	13.18	182.58
			2/25/97	13.16	182.60
			3/11/97	13.48	182.28
			3/24/97	14.38	181.38
			4/7/97	14.46	181.30
			4/21/97	14.97	180.79
			6/13/97	14.60	181.16
			7/16/97	14.54	181.22
			8/13/97	14.40	181.36
			9/10/97	15.00	180.76
			10/13/97	15.40	180.36
			11/10/97	14.84	180.92
			12/12/97	13.44	185.83
			1/13/98	12.01	187.26
PZ-4	185.5	---	---	---	---
E-1	226.8	229.30	10/5/94	3.14	226.16
			3/9/95	3.06	226.24
			3/13/95	2.97	226.33
			3/29/95	3.04	226.26
			4/26/95	3.09	226.21
			5/23/95	3.07	226.23
			6/22/95	3.01	226.29
			7/19/95	3.04	226.26
			8/11/95	3.20	226.10

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			9/15/95	3.22	226.08
			10/30/95	3.24	226.06
			11/21/95	3.15	226.15
			12/13/95	3.09	226.21
			1/10/96	3.02	226.28
			2/14/96	2.31	226.99
			3/14/96	2.73	226.57
			4/10/96	4.71	224.59
			5/20/96	3.85	225.45
			9/9/96	2.65	226.65
			2/11/97	2.74	226.56
			2/25/97	2.70	226.60
			3/11/97	2.54	226.76
			3/24/97	2.74	226.56
			4/7/97	2.68	226.62
			4/21/97	2.59	226.71
			6/13/97	2.52	226.78
			7/16/97	1.55	227.75
			8/13/97	2.49	226.81
			9/10/97	2.44	226.86
			10/13/97	2.42	226.88
			11/10/97	2.38	226.92
			12/12/97	2.42	226.88
			1/13/98	2.32	226.98
DW-1	185.1	188.27	----	----	----
			3/13/95	21.25	167.02
			3/29/95	21.08	167.19
			4/26/95	21.16	167.11
			5/23/95	21.41	166.86
			6/22/95	21.73	166.54
			7/19/95	21.72	166.55
			8/11/95	21.87	166.40
			9/15/95	21.64	166.63
			9/27/95	abandoned	----
DW-2	194.3	----	----	----	----
04-1	239.2	241.53	3/18/94	11.03	230.50
			3/25/94	10.44	231.09
			3/30/94	10.18	231.35
			4/19/94	10.30	231.23
			5/19/94	10.51	231.02
			6/28/94	10.50	231.03
			8/1/94	10.65	230.88
			9/7/94	10.91	230.62
			10/5/94	10.81	230.72
			3/9/95	10.52	231.01
			3/13/95	10.63	230.90
			3/29/95	10.70	230.83
			4/26/95	10.50	231.03

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			5/23/95	10.61	230.92
			6/22/95	10.69	230.84
			7/19/95	10.65	230.88
			8/11/95	10.52	231.01
			9/15/95	11.16	230.37
			10/30/95	10.48	231.05
			11/21/95	10.37	231.16
			12/13/95	10.61	230.92
			1/10/96	10.71	230.82
			2/14/96	10.71	230.82
			3/14/96	10.78	230.75
			4/10/96	10.78	230.75
			5/20/96	10.99	230.54
			9/9/96	8.25	233.28
			2/11/97	8.78	232.75
			2/25/97	8.68	232.85
			3/11/97	8.60	232.93
			3/24/97	8.65	232.88
			4/7/97	8.58	232.95
			4/21/97	8.61	232.92
			6/13/97	8.40	233.13
			7/16/97	8.20	233.33
			8/13/97	7.66	233.87
			9/10/97	7.80	233.73
			10/13/97	7.88	233.65
			11/10/97	7.62	233.91
			12/12/97	7.92	233.61
			1/13/98	7.67	233.86
04-2	286.7	288.31	3/18/94	14.97	273.34
			3/25/94	15.33	272.98
			3/30/94	14.28	274.03
			4/19/94	14.46	273.85
			5/19/94	15.66	272.65
			6/28/94	16.17	272.14
			8/1/94	16.36	271.95
			9/7/94	16.69	271.62
			10/5/94	16.89	271.42
			3/9/95	14.07	274.24
			3/13/95	14.09	274.22
			3/29/95	14.86	273.45
			4/26/95	14.50	273.81
			5/23/95	15.22	273.09
			6/22/95	15.85	272.46
			7/19/95	16.10	272.21
			8/11/95	16.15	272.16
			9/15/95	15.99	272.32
			10/30/95	16.52	271.79
			11/21/95	15.44	272.87
			12/13/95	15.74	272.57
			1/10/96	15.21	273.10

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			2/14/96	14.20	274.11
			3/14/96	14.05	274.26
			4/10/96	14.27	274.04
			5/20/96	14.25	274.06
			9/9/96	16.35	271.96
			2/11/97	16.03	272.28
			2/25/97	15.80	272.51
			3/11/97	15.62	272.69
			3/24/97	15.80	272.51
			4/7/97	15.84	272.47
			4/21/97	15.86	272.45
			6/13/97	15.81	272.50
			7/16/97	15.70	272.61
			8/13/97	15.60	272.71
			9/10/97	16.02	272.29
			10/13/97	16.38	271.93
			11/10/97	16.50	271.81
			12/12/97	16.62	271.69
			1/13/98	15.94	272.37
04-5	206.6	208.37	3/18/94	23.15	185.22
			3/25/94	23.66	184.71
			3/30/94	22.75	185.62
			4/19/94	23.38	184.99
			5/19/94	24.34	184.03
			6/28/94	24.67	183.70
			8/1/94	24.84	183.53
			9/7/94	25.15	183.22
			10/5/94	25.34	183.03
			3/9/95	22.87	185.50
			3/13/95	23.03	185.34
			3/29/95	23.75	184.62
			4/26/95	23.41	184.96
			5/23/95	23.93	184.44
			8/22/95	25.07	183.30
			7/19/95	28.04	180.33
			8/11/95	28.65	179.72
			9/15/95	28.95	179.42
			10/30/95	28.92	179.45
			11/21/95	28.57	179.80
			12/13/95	28.32	180.05
			1/10/96	27.98	180.39
			2/14/96	27.71	180.66
			3/14/96	27.84	180.53
			4/10/96	28.67	179.70
			5/20/96	29.06	179.31
			9/9/96	29.00	179.37
			2/11/97	27.98	180.39
			2/25/97	27.74	180.63
			3/11/97	27.54	180.83
			3/24/97	28.04	180.33

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
			4/7/97	28.38	179.99
			4/21/97	28.62	179.75
			6/13/97	28.01	180.36
			7/16/97	28.40	179.97
			8/13/97	28.86	179.51
			9/10/97	29.56	178.81
			10/13/97	29.02	179.35
			11/10/97	28.56	179.81
			12/12/97	28.12	180.25
			1/13/98	27.62	180.75
04-6	239.8	241.35	3/18/94	33.68	207.67
			3/25/94	33.88	207.47
			3/30/94	33.63	207.72
			4/19/94	33.33	208.02
			5/19/94	33.86	207.49
			6/28/94	34.49	206.86
			8/1/94	34.77	208.58
			9/7/94	35.09	206.26
			10/5/94	35.28	206.07
			3/9/95	34.27	207.08
			3/13/95	34.00	207.35
			3/29/95	34.03	207.32
			4/26/95	34.09	207.26
			5/23/95	34.10	207.25
			6/22/95	34.69	206.66
			7/19/95	35.06	206.29
			8/11/95	35.37	205.98
			9/15/95	35.59	205.76
			10/30/95	35.83	205.52
			11/21/95	35.38	205.97
			12/13/95	35.33	206.02
			1/10/96	35.02	206.33
			Jan.-Feb.1996	bulldozed	----
			6/13/97	abandoned	----
04-7	184.8	186.91	3/18/94	7.44	179.47
			3/25/94	8.33	178.58
			3/30/94	4.78	182.13
			4/19/94	7.44	179.47
			5/19/94	13.86	173.05
			6/28/94	13.75	173.16
			8/1/94	13.88	173.03
			9/7/94	14.89	172.02
			10/5/94	15.31	171.60
			3/9/95	5.49	181.42
			3/13/95	7.09	179.82
			3/29/95	10.58	176.33
			4/26/95	8.15	178.76
			5/23/95	13.66	173.25
			6/13/97	abandoned	----

Monitoring Well/ Piezometer/Boring Identifier	Elevation of Land Surface (feet)	Elevation of Measuring Point (feet)	Date of Measurement	Depth to Water (ft BMP)	Relative Ground-Water Elevation (ft. AMSL)
C1-1	196.3	200.03	4/26/95	23.28	176.75
			5/23/95	22.37	177.66
			6/22/95	22.48	177.55
			7/19/95	22.60	177.43
			8/11/95	22.65	177.38
			9/1/95	abandoned	----
C1-1A	196.8	199.17	4/26/95	21.50	177.67
			5/23/95	21.17	178.00
			6/22/95	21.33	177.84
			7/19/95	21.50	177.67
			8/11/95	21.63	177.54
			9/1/95	abandoned	----
C1-2	190.9	194.57	4/26/95	23.54	171.03
			5/23/95	23.68	170.89
			6/22/95	23.83	170.74
			7/19/95	23.76	170.81
			8/11/95	23.47	171.10
			9/1/95	abandoned	----
C1-3	224.9	226.23	4/26/95	28.48	197.75
			5/23/95	28.34	197.89
			6/22/95	28.51	197.72
			7/19/95	28.95	197.28
			8/11/95	29.03	197.20
			9/1/95	abandoned	----
C1-4	234.2	238.11	4/26/95	40.72	197.39
			5/23/95	40.50	197.61
			6/5-6/95	abandoned	----
C1-5	211.3/211.22	215.19/215.20	4/26/95	13.60	201.59
			5/23/95	14.63	200.56
			6/22/95	15.05	200.14
			7/19/95	15.12	200.07
			8/11/95	15.11	200.08
			9/1/95	abandoned	----
11-A	263.9	265.48	4/26/95	26.07	239.41
			5/23/95	29.34	236.14
			6/6/95	abandoned	----

APPENDIX 2.6

FEDERAL AVIATION ADMINISTRATION (FAA) NOTIFICATIONS

11 West Court Square
Andalusia, AL 36420
Post Office Box 278
Andalusia, AL 36420
Tel (334) 222-9431
Fax (334) 222-4018

cdge.com

August 14, 2023

Mr. Jeff Powell
Airport Director
7601 Robert Cardinal Airport Road
Tuscaloosa, AL 35401

Re: NOTIFICATION OF LANDFILL EXPANSION
Black Warrior Landfill
Tuscaloosa County, Alabama

Dear Mr. Powell,

The Alabama Department of Environmental Management Code R. 335-13-4-.01(1)(c) and Title 40 code of Federal Regulations, Part 258.10, require that a municipal solid waste landfill (MSWLF) unit not be sited within 10,000 feet of any airport runway end, and that owners or operators proposing to site or expand an MSWLF unit located within a five-mile radius of any airport runway end must notify the affected airport and the Federal Aviation Administration (FAA).

Please accept this letter as notification, and request for concurrence, that the Black Warrior Solid Waste Disposal Authority is proposing to expand its facility boundary and waste disposal area to the East. The facility is within a five-mile radius of the runways of the Tuscaloosa Municipal Airport. Specifically, the southeast corner of the new facility boundary is located approximately 7,844 feet from the end of Runway 12-30. The previous facility boundary was located 10,100 feet from the departure end of Runway 12-30. The design of this facility includes waste fill operations that will extend vertically to a maximum elevation of approximately 480 feet MSL at a location 11,884 feet from the end of Runway 12-30. Attached is a color copy of the topographic showing the boundaries of the landfill as it relates to the airport runways.

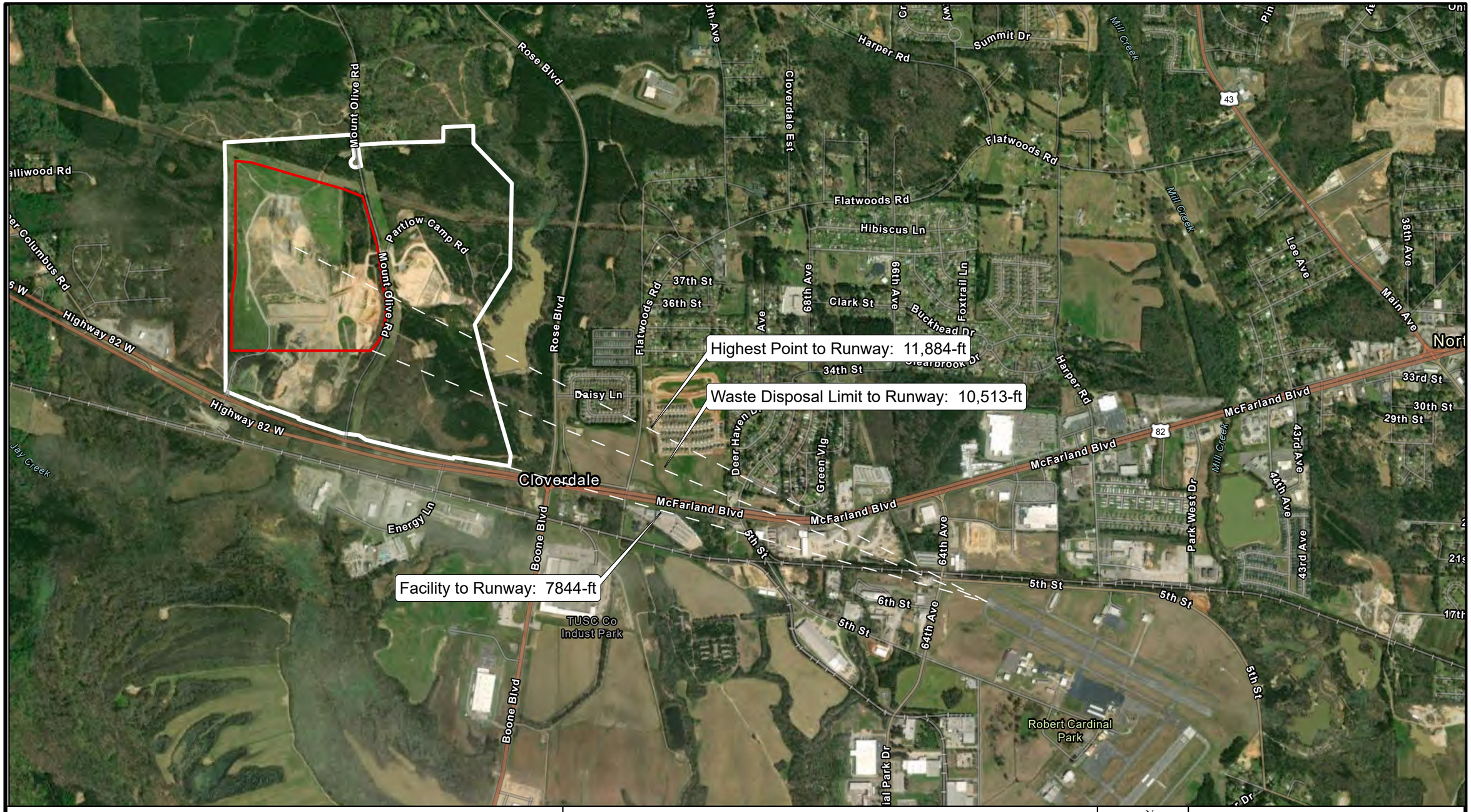
Should you have any questions, or need additional information please contact me.

Sincerely,

CDG, Inc.

Ashten J. Sanders

Gabby Sanders
Project Manager



AIRPORT VICINITY MAP

BLACK WARRIOR LANDFILL

Northport, AL

CDG

www.cdge.com

N

Sheet No. 1

Drawn By: JRA

Checked by: AGS

Date: AUGUST 2023

11 West Court Square
Andalusia, AL 36420
Post Office Box 278
Andalusia, AL 36420
Tel (334) 222-9431
Fax (334) 222-4018

cdge.com

August 14, 2023

Ms. Inez Williams
FAA Program Manager
Jackson Airports District Office
100 West Cross St., Suite B
Jackson, MS 39208-2307

Re: NOTIFICATION OF LANDFILL EXPANSION
Black Warrior Landfill
Tuscaloosa County, Alabama

Dear Ms. Williams,

The Alabama Department of Environmental Management Code R. 335-13-4-.01(1)(c) and Title 40 code of Federal Regulations, Part 258.10, require that a municipal solid waste landfill (MSWLF) unit not be sited within 10,000 feet of any airport runway end, and that owners or operators proposing to site or expand an MSWLF unit located within a five-mile radius of any airport runway end must notify the affected airport and the Federal Aviation Administration (FAA).

Please accept this letter as notification, and request for concurrence, that the Black Warrior Solid Waste Disposal Authority is proposing to expand its facility boundary and waste disposal area to the East. The facility is within a five-mile radius of the runways of the Tuscaloosa Municipal Airport. Specifically, the southeast corner of the new facility boundary is located approximately 7,844 feet from the end of Runway 12-30. The previous facility boundary was located 10,100 feet from the departure end of Runway 12-30. The design of this facility includes waste fill operations that will extend vertically to a maximum elevation of approximately 480 feet MSL at a location 11,884 feet from the end of Runway 12-30. Attached is a color copy of the topographic showing the boundaries of the landfill as it relates to the airport runways.

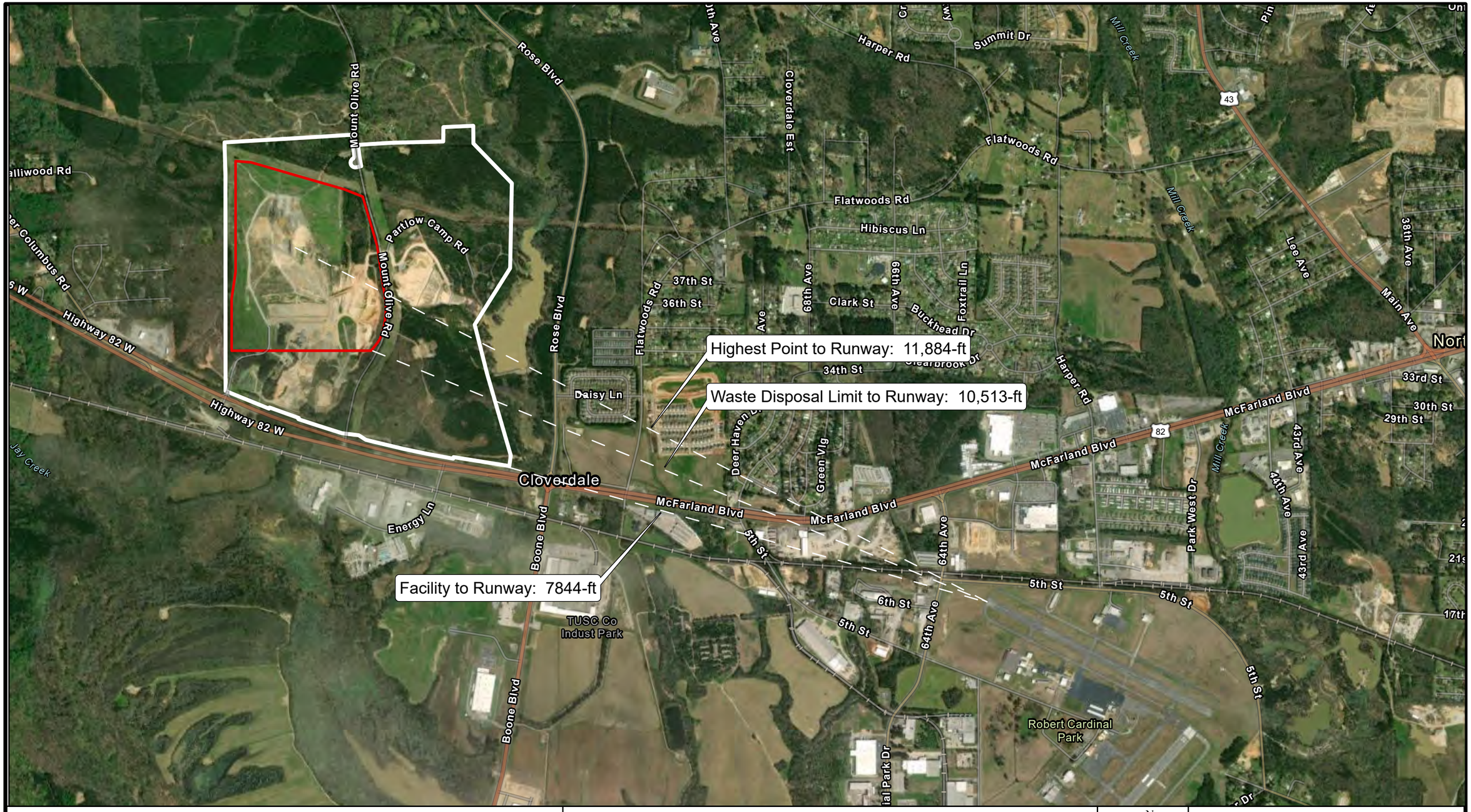
Should you have any questions, or need additional information please contact me.

Sincerely,

CDG, Inc.

Ashten G. Sanders

Gabby Sanders
Project Manager



AIRPORT VICINITY MAP

BLACK WARRIOR LANDFILL

Northport, AL

CDG

www.cdge.com

N

Sheet No. 1

Drawn By: JRA

Checked by: AGS

Date: AUGUST 2023

CARTER, DARNELL AND GRUBBS ENGINEERS, INC.
CONSULTING ENGINEERS LAND SURVEYORS

P.O. BOX 278
ANDALUSIA, ALABAMA 36420

1840 U.S. HIGHWAY 29 NORTH
(205) 222-9431

October 20, 1994

Mr. Rod Nicholson
FAA Airports District Office
120 North Hangar Drive; Suite B
Jackson, Mississippi 39208

RE: NOTIFICATION OF LANDFILL EXPANSION
Tuscaloosa County, Alabama

Dear Mr. Nicholson:

The Alabama Department of Environmental Management Administrative Code R. 335-13-4-.01(5) and Title 40 code of Federal Regulations, Part 258.10, require that a municipal solid waste landfill (MSWLF) unit not be sited within 10,000 feet of any airport runway end, and that owners or operators proposing to renew existing r site new MSWLF units located within a five-mile radius of any airport runway end must notify the affected port and the Federal Aviation Administration (FAA).

Please accept this letter as notification that the Black Warrior Solid Waste Disposal Authority is proposing to site new MSWLF units at the existing Coker Sanitary Landfill within a five mile radius of the runways of the Tuscaloosa Municipal Airport. Specifically, the southeast corner of the Coker Sanitary Landfill is located approximately 10,400 feet from the end of Runway 29. Attached is a color copy of the topographic map showing the boundaries of the landfill as it relates to the airport runways.

Should you have any questions, or need additional information please contact me.

Very truly yours,

CARTER, DARNELL & GRUBBS
ENGINEERS, INC.

Mark Pugh, P.E.
Project Engineer

MP/vf

closure
cc: Chairman Sammy Swindle
Mr. Ken Thrasher

v\c:letters\airport

CARTER, DARNELL AND GRUBBS ENGINEERS, INC.
CONSULTING ENGINEERS LAND SURVEYORS

P.O. BOX 278
ANDALUSIA, ALABAMA 36420

1840 U.S. HIGHWAY 29 NORTH
(205) 222-9431

October 20, 1994

Airport Manager
7601 Tuscaloosa Municipal Airport
Tuscaloosa, Alabama 35476

RE: NOTIFICATION OF LANDFILL EXPANSION
Tuscaloosa County, Alabama

Dear Sir:

The Alabama Department of Environmental Management Administrative Code R. 335-13-4-.01(5) and Title 40 code of Federal Regulations, Part 258.10, require that a municipal solid waste landfill (MSWLF) unit not be sited within 10,000 feet of any airport runway end, and that owners or operators proposing to renew existing site new MSWLF units located within a five-mile radius of any airport runway end must notify the affected port and the Federal Aviation Administration (FAA).

Please accept this letter as notification that the Black Warrior Solid Waste Disposal Authority is proposing to site new MSWLF units at the existing Coker Sanitary Landfill within a five mile radius of the runways of the Tuscaloosa Municipal Airport. Specifically, the southeast corner of the Coker Sanitary Landfill is located approximately 10,400 feet from the end of Runway 29. Attached is a color copy of the topographic map showing the boundaries of the landfill as it relates to the airport runways.

Should you have any questions, or need additional information please contact me.

Very truly yours,

CARTER, DARNELL & GRUBBS
ENGINEERS, INC.

Mark Pugh, P.E.
Project Engineer

MP/vf

closure
cc: Chairman Sammy Swindle
Mr. Ken Thrasher

vf\c:letters\airport

RECEIVED JAN 0 9 1995

U.S. Department
of Transportation
**Federal Aviation
Administration**

Airports District Office
120 North Hangar Drive, Suite B
Jackson, MS 39208-2306
(601) 965-4628 FAX: (601) 965-4632

January 4, 1995

Mr. Mark Pugh, P.E.
Project Manager
Carter, Darnell, and Grubbs Engineers, Inc.
Post Office Box 278
Andalusia, Alabama 36420

Dear Mr. Pugh:

We have no objection to the proposed municipal solid waste landfill expansion to be located approximately 10,400 feet northwest of Runway 29 at the **Tuscaloosa Municipal Airport, Tuscaloosa, AL,** described in your letter to this office dated October 20, 1994. This landfill should have no adverse effect on the safe and continued operation of this airport.

This approval does not imply FAA approval of the physical structure or the construction methods proposed. It also does not include the consideration of temporary construction equipment, such as cranes, pile drivers, etc., which may be used during actual construction. The use of this equipment must be coordinated with this office before construction begins. State and local codes and other rules and regulations are applicable.

Thank you for submitting the landfill proposal to this office for our review.

Sincerely,

Roderick T. Nicholson

Roderick T. Nicholson
Project Manager

cc:
Alabama Department of Aeronautics
Tuscaloosa Municipal Airport

CARTER, DARNELL AND GRUBBS ENGINEERS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERS LAND SURVEYORS

P.O. BOX 278
ANDALUSIA, ALABAMA 36420

1840 U.S. HIGHWAY 29 NORTH
(334) 222-9431

May 16, 1995

Airport Manager
7601 Tuscaloosa Municipal Airport
Tuscaloosa, Alabama 35476

RE: NOTIFICATION OF LANDFILL EXPANSION
Coker Sanitary Landfill
Project No. E941014.01

Dear Sir:

On October 20, 1994, our firm notified your office and the FAA of the intent of the Black Warrior Solid Waste Disposal Authority to site new municipal solid waste landfill (MSWLF) units at the existing Coker Sanitary Landfill. This notification was made under the state and federal requirements that owners or operators proposing to site new MSWLF units within a five-mile radius of any airport runway end notify the affected airport and the Federal Aviation Administration (FAA). This notification stated that the southeast corner of the Coker Sanitary Landfill is located approximately 10,400 feet from the end of Runway 29 at the **Tuscaloosa Municipal Airport, Tuscaloosa, Alabama.**

Although the FAA response dated January 4, 1995 concluded "This landfill should have no adverse effect on the safe and continued operation of this airport", our firm has completed the design of the facility and requests your review of the following information to ensure there will be no conflicts with the operation of the airport.

Specifically, the southeast corner of the property lies 10,100 feet from the departure end of Runway 29. The actual landfill operations will be performed in an area that begins approximately 10,400 feet from the departure end of Runway 29. These operations include the excavation, disposal, compaction, and covering of soil and municipal solid waste as well as the construction of associated facilities, such as liners, piping, buildings, etc. The design of this facility includes waste fill operations that will extend vertically to a maximum elevation of approximately 470 feet MSL at a location 11,700 feet from the end of Runway 29 as shown on the color copy of a topographic map. The existing topography in the area of the landfill extends to approximately 350 feet MSL.

vf\c:letters\tuscair

Should the increased height of this landfill affect the operations of the Tuscaloosa Municipal Airport, please contact me. Otherwise, the Black Warrior Solid Waste Disposal Authority will consider the FAA approval letter of January 4, 1995 to be applicable for fill to a maximum elevation of 470 MSL.

Also in accordance with the FAA letter, the use of temporary construction equipment such as cranes, pile drivers, etc. will be coordinated with both the FAA and your office before construction begins.

Thank you for your time and cooperation in this matter.

Yours truly,

CARTER, DARNELL & GRUBBS
ENGINEERS, INC.

Mark Pugh, P.E.
Project Engineer

MP/vf

vf\c:letters\tuscair

CARTER, DARNELL AND GRUBBS ENGINEERS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERS LAND SURVEYORS

P.O. BOX 278
ANDALUSIA, ALABAMA 36420

1840 U.S. HIGHWAY 29 NORTH
(334) 222-9431

May 16, 1995

Mr. Roderick T. Nicholson, Project Manager
FAA Airports District Office
120 North Hangar Drive, Suite B
Jackson, Mississippi 39208-2306

RE: NOTIFICATION OF LANDFILL EXPANSION
Coker Sanitary Landfill
Project No. E941014.01

Dear Mr. Nicholson:

On October 20, 1994, our firm notified your office of the intent of the Black Warrior Solid Waste Disposal Authority to site new municipal solid waste landfill (MSWLF) units at the existing Coker Sanitary Landfill. This notification was made under the state and federal requirements that owners or operators proposing to site new MSWLF units within a five-mile radius of any airport runway end notify the affected airport and the Federal Aviation Administration (FAA). This notification stated that the southeast corner of the Coker Sanitary Landfill is located approximately 10,400 feet from the end of Runway 29 at the **Tuscaloosa Municipal Airport, Tuscaloosa, Alabama.**

Although your response dated January 4, 1995 concluded "This landfill should have no adverse effect on the safe and continued operation of this airport", our firm has completed the design of the facility and requests your review of the following information to ensure there will be no conflicts with the operation of the airport.

Specifically, the southeast corner of the property lies 10,100 feet from the departure end of Runway 29. The actual landfill operations will be performed in an area that begins approximately 10,400 feet from the departure end of Runway 29. These operations include the excavation, disposal, compaction, and covering of soil and municipal solid waste as well as the construction of associated facilities, such as liners, piping, buildings, etc. The design of this facility includes waste fill operations that will extend vertically to a maximum elevation of approximately 470 feet MSL at a location 11,700 feet from the end of Runway 29 as shown on the color copy of a topographic map. The existing topography in the area of the landfill extends to approximately 350 feet MSL.

vf\c:letters\faa

Should the increased height of this landfill affect the operations of the Tuscaloosa Municipal Airport, please contact me. Otherwise, the Black Warrior Solid Waste Disposal Authority will consider your approval letter of January 4, 1995 to be applicable for fill to a maximum elevation of 470 MSL.

Also in accordance with your letter, the use of temporary construction equipment such as cranes, pile drivers, etc. will be coordinated with your office before construction begins.

Thank you for your time and cooperation in this matter.

Yours truly,

CARTER, DARNELL & GRUBBS ENGINEERS, INC.

Mark Pugh, P.E.
Project Engineer

MP/vf

vf\c:letters\faa

3 LEACHATE MANAGEMENT PLAN

3.1 LANDFILL LINER SYSTEM

The Black Warrior Solid Waste Facility shall be constructed with a composite liner system consisting of two feet of compacted clay overlain by a 60-mil HDPE liner. The compacted clay layer shall have a maximum permeability of $1x10^{-7}$ cm/sec. The HDPE liner shall have a maximum permeability of $1x10^{-12}$ cm/sec. The HDPE liner shall be installed in direct and uniform contact with the compacted soil component of the liner system.

Construction of the landfill liner system shall be performed in accordance with the QA/QC Plan outlined in Section 8 of this manual.

3.2 LEACHATE GENERATION

Rule 335-13-4.18 of the ADEM Administrative Code requires a leachate collection system be designed and constructed to maintain less than a 12-inch (30 cm) depth of leachate over the liner.

For the design of the leachate collection and transfer system at the Black Warrior Solid Waste Facility, leachate generation was evaluated using the Hydrologic Evaluation of Landfill Performance (HELP V. 4.0.1) computer model. The model is used to estimate the amount of runoff and leachate generated for a particular design. The model is also used to determine the maximum anticipated depth of leachate head over the liner system for compliance with ADEM Regulation 335-13-15-.04(e)1. For the design of the leachate collection and transfer system at the Black Warrior Solid Waste Facility, two scenarios were evaluated using the Hydrologic Evaluation of Landfill Performance (HELP V. 4.0.1) computer model.

The HELP Model allows the user to input design information to simulate leachate generation from a landfill during different phases of construction and operation. The basis of the leachate generation model assumes the peak leachate generation in a landfill occurs during the filling of the initial lift within a cell. No areas will have final cover and the majority of the cell will have daily cover. This is the scenario that has been evaluated to determine the maximum head on the liner to ensure that the proposed leachate collection system can maintain less than 12-inches (30 cm) of depth over the liner system.

The HELP Model for this facility was assessed using 1-acre of landfill disposal area. The cross section evaluated was configured by determining the flattest slope with the longest drainage length for two different conditions (1-Open & 2-Intermediate) for the flattest, longest distance that leachate would travel to the collection trench. This setup allows for leachate collection and storage design based on the worst conditions at any point in the life of the landfill. The drainage slope and length used in the model was 2.1% for 381 feet.

The first model (1-Open) simulates the landfill in open conditions with 8 feet of waste fill covered with 6 inches of daily cover protective soil. The second model (2-Intermediate) represented an intermediate condition with 50 feet of waste fill covered with 6 inches of intermediate cover protective soil.

The following is a listing of the materials and design parameters used for each layer from the top-down for each model.

Open Conditions:

The following describes the conditions for HELP Model files 'First Lift'. Below is a description of each layer:

Layer 1	Vertical Percolation Layer consisting of 6 inches of daily cover with a sat. hyd. conductivity of 1.7×10^{-5} cm/sec
Layer 2	Vertical Percolation Layer consisting of 8 feet (Open Conditions) of Municipal Solid Waste (MSW) (900 pcy)
Layer 3	18-inch Lateral Drainage Layer consisting of sand with a sat. hyd. conductivity of 1.0×10^{-3} cm/sec
Layer 4	Lateral Drainage Layer consisting of Double Sided Geocomposite Drainage Net with a sat. hyd. Conductivity of 1×10^{1} cm/sec
Layer 5	Textured 60-mil HDPE Flexible Membrane Liner
Layer 6	24-inch compacted clay layer with an effective sat. hyd. Conductivity of 1×10^{-7} cm/sec

Intermediate Conditions:

The following describes the conditions for HELP Model files '50 ft Lift'. Below is a description of each layer:

Layer 1	Vertical Percolation Layer consisting of 6 inches of daily cover with a sat. hyd. conductivity of 1.7×10^{-5} cm/sec
Layer 2	Vertical Percolation Layer consisting of 50 feet (Open Conditions) of Municipal Solid Waste (MSW) (900 pcy)
Layer 3	18-inch Lateral Drainage Layer consisting of sand with a sat. hyd. conductivity of 1.0×10^{-3} cm/sec
Layer 4	Lateral Drainage Layer consisting of Double Sided Geocomposite Drainage Net with a sat. hyd. Conductivity of 1×10^{1} cm/sec
Layer 5	Textured 60-mil HDPE Flexible Membrane Liner
Layer 6	24-inch compacted clay layer with an effective sat. hyd. Conductivity of 1×10^{-7} cm/sec

The model was ran for the time period of 10 years. The results were compared to obtain the maximum daily head over the bottom liner system. For each model, peak daily values for years 1 through 10 were used to estimate the accumulated head over the liner.

The maximum peak daily head over the bottom liner system was calculated by the HELP Model at 0.1587 inches during the initial lift, which is within ADEM regulations. See Table 3.2 for the maximum peak daily head over the bottom liner system for the conditions described above. Please refer to the HELP model runs, which are included in Appendix 3.1, for more information.

Table 3.1 MAXIMUM DAILY HEAD OVER THE BOTTOM LINER SYSTEM

	Head (inches)	Distance from Drain (feet)
1-Open	0.1587	3.26
2-Intermediate	0.1231	2.61

3.3 LEACHATE COLLECTION SYSTEM

Any liquid that has passed through or emerged from solid waste and contains soluble, suspended or miscible materials removed from the waste is called leachate. This includes rainwater that has fallen on the working face or area of exposed waste. The landfill has been designed and will be constructed with a composite liner system and a leachate collection system to intercept the flow of leachate and to collect, store, and remove the liquid from the facility while maintaining less than 12-inches (30 cm) of leachate head over the liner.

The leachate collection system consists of several components, listed below, that work together to prevent the migration of leachate from the site.

1. Although not specifically considered part of the leachate collection system, the composite liner discussed in Section 3.1 prevents the downward flow of leachate and is sloped to direct flow into the piping system.
2. An HDPE drainage net/filter fabric composite shall be installed directly onto the HDPE liner material over the entire base of the landfill to encourage the flow of leachate into the collection system.
3. Leachate collection trenches are to be constructed as a part of the liner and spaced throughout the entire base of the landfill as shown in the permit plan set. The trenches shall be constructed with a 12-inch-wide flat bottom, a depth of one foot and 4.5:1 side slopes.
4. Six-inch perforated HDPE collection pipes shall be installed in the leachate trenches.
5. The material chosen for use in the leachate collection and transfer pipe is HDPE, primarily due to

its resistance to a wide range of chemicals. The wall thickness is determined by evaluating the pipe deflection under earth loading. HDPE pipe with an SDR of 17 will be used throughout the project.

6. The leachate collection trenches shall be backfilled with non-angular, non-calcareous stone to a depth of twelve inches above the pipe and covered with filter fabric for a width of 14 feet. The leachate collection pipe shall drain toward a leachate gravity line.
7. A drainage layer shall be installed to a thickness of 18 inches above the drainage net composite material to further encourage the lateral flow of leachate into the collection system. This material shall consist of an on-site material having a permeability in the range of $1x10^{-3}$ to $6x10^{-4}$ cm/sec or greater.
8. Eight-inch solid HDPE transfer pipes shall be installed to carry leachate from the collection piping in the leachate trenches to the liner penetration at the perimeter of the cell. Piping from the liner penetration to the sewer line extension shall be HDPE dual containment pipe. This requirement applies to any leachate piping not underlain by the liner system.
9. The sewer line extension crosses Highway 82 and runs down the railroad right-of-way to the existing Tuscaloosa Wastewater Treatment pumping station. An agreement has been made between Tuscaloosa and The Authority on the treatment of the leachate.
10. To reduce the amount of leachate generated, a six-inch-thick protective soil layer shall be installed above the sand drainage layer to encourage the runoff of stormwater on unfilled areas. The materials shall be sand-clay material having a permeability of $1x10^{-5}$ cm/sec or less. This material shall be gradually removed and used as cover material immediately prior to filling operations.
11. The leachate collection system shall be inspected and cleaned as necessary by the Landfill Operator on an annual basis. The annual inspection and cleaning schedule shall include but will not be limited to jetting leachate piping and visual inspecting the condition of all pipe valves, valve seals, valve locks, exposed pipe joints, cleanouts, cleanout caps, pumps, connections etc., to ensure that no damage to the system has occurred.

APPENDIX 3.1

HELP MODEL

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Black Warrior Landfill **Simulated On:** 6/21/2021 15:57

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
C - Clay (Low Density)
Material Texture Number 15

Thickness	=	6	inches
Porosity	=	0.475	vol/vol
Field Capacity	=	0.378	vol/vol
Wilting Point	=	0.265	vol/vol
Initial Soil Water Content	=	0.2945	vol/vol
Effective Sat. Hyd. Conductivity	=	1.70E-05	cm/sec

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	96	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
LFS Loamy Fine Sand
Material Texture Number 5

Thickness	=	18	inches
Porosity	=	0.457	vol/vol
Field Capacity	=	0.131	vol/vol
Wilting Point	=	0.058	vol/vol
Initial Soil Water Content	=	0.2425	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 4

Type 2 - Lateral Drainage Layer
Drainage Net (0.5 cm)

Material Texture Number 20

Thickness	=	0.2	inches
Porosity	=	0.85	vol/vol
Field Capacity	=	0.01	vol/vol
Wilting Point	=	0.005	vol/vol
Initial Soil Water Content	=	0.186	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E+01	cm/sec
Slope	=	2.1	%
Drainage Length	=	381	ft

Layer 5

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.06	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	0.4	Holes/Acre
FML Installation Defects	=	0.5	Holes/Acre
FML Placement Quality	=	3	Good

Layer 6

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	90.1	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	11.2	acres
Evaporative Zone Depth	=	5	inches
Initial Water in Evaporative Zone	=	1.389	inches
Upper Limit of Evaporative Storage	=	2.375	inches
Lower Limit of Evaporative Storage	=	1.325	inches
Initial Snow Water	=	0	inches

Initial Water in Layer Materials	=	44.449	inches
Total Initial Water	=	44.449	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was calculated by HELP.

Evapotranspiration and Weather Data

Station Latitude	=	33.28	Degrees
Maximum Leaf Area Index	=	3.5	
Start of Growing Season (Julian Date)	=	30	days
End of Growing Season (Julian Date)	=	335	days
Average Wind Speed	=	6	mph
Average 1st Quarter Relative Humidity	=	70	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	76	%
Average 4th Quarter Relative Humidity	=	75	%

Note: Evapotranspiration data was obtained for Tuscaloosa County, Alabama

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
5.264601	4.882735	4.774435	4.056895	3.839271	4.118202
4.303914	3.964655	4.090563	3.906085	4.237248	4.35708

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
54.4	51.4	60.2	67.4	75.4	82.1
84.7	82.1	74.5	67	62.1	53.3

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68

Average Annual Totals Summary

Title: Black Warrior Landfill
Simulated on: 6/21/2021 15:58

	Average Annual Totals for Years 1 - 10*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	51.80	[7.44]	2,105,805.3	100.00
Runoff	8.489	[2.496]	345,125.2	16.39
Evapotranspiration	26.246	[3.708]	1,067,077.1	50.67
Subprofile1				
Lateral drainage collected from Layer 4	16.9823	[4.2754]	690,434.0	32.79
Percolation/leakage through Layer 6	0.000006	[0.000001]	0.2263	0.00
Average Head on Top of Layer 5	0.0149	[0.0037]	---	---
Water storage				
Change in water storage	0.0779	[1.5894]	3,168.8	0.15

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Black Warrior Landfill
Simulated on: 6/21/2021 15:58

	Peak Values for Years 1 - 10*		
	(inches)		(cubic feet)
Precipitation	3.54		143,771.5
Runoff	3.333		135,511.4
Subprofile1			
Drainage collected from Layer 4	0.2501		10,166.5
Percolation/leakage through Layer 6	0.000000		0.0022
Average head on Layer 5	0.0801		---
Maximum head on Layer 5	0.1587		---
Location of maximum head in Layer 4	3.26	(feet from drain)	
Other Parameters			
Snow water	4.2526		172,894.6
Maximum vegetation soil water	0.4713	(vol/vol)	
Minimum vegetation soil water	0.2650	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Black Warrior Landfill
Simulated on: 6/21/2021 15:58
Simulation period: 10 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	2.1759	0.3626
2	28.6705	0.2987
3	4.1208	0.2289
4	0.0134	0.0671
5	0.0000	0.0000
6	10.2480	0.4270
Snow water	0.0000	---

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Black Warrior Landfill **Simulated On:** 6/21/2021 11:32

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
C - Clay (Low Density)
Material Texture Number 15

Thickness	=	6	inches
Porosity	=	0.475	vol/vol
Field Capacity	=	0.378	vol/vol
Wilting Point	=	0.265	vol/vol
Initial Soil Water Content	=	0.3298	vol/vol
Effective Sat. Hyd. Conductivity	=	1.70E-05	cm/sec

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	600	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.2962	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
LFS Loamy Fine Sand
Material Texture Number 5

Thickness	=	18	inches
Porosity	=	0.457	vol/vol
Field Capacity	=	0.131	vol/vol
Wilting Point	=	0.058	vol/vol
Initial Soil Water Content	=	0.2423	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 4

Type 2 - Lateral Drainage Layer
Drainage Net (0.5 cm)

Material Texture Number 20

Thickness	=	0.2	inches
Porosity	=	0.85	vol/vol
Field Capacity	=	0.01	vol/vol
Wilting Point	=	0.005	vol/vol
Initial Soil Water Content	=	0.0525	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E+01	cm/sec
Slope	=	2.1	%
Drainage Length	=	381	ft

Layer 5

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.06	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	0.4	Holes/Acre
FML Installation Defects	=	0.5	Holes/Acre
FML Placement Quality	=	3	Good

Layer 6

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	90.1	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	10	acres
Evaporative Zone Depth	=	10	inches
Initial Water in Evaporative Zone	=	3.11	inches
Upper Limit of Evaporative Storage	=	5.534	inches
Lower Limit of Evaporative Storage	=	1.898	inches
Initial Snow Water	=	0	inches

Initial Water in Layer Materials	=	194.334	inches
Total Initial Water	=	194.334	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was calculated by HELP.

Evapotranspiration and Weather Data

Station Latitude	=	33.28	Degrees
Maximum Leaf Area Index	=	5	
Start of Growing Season (Julian Date)	=	49	days
End of Growing Season (Julian Date)	=	359	days
Average Wind Speed	=	6	mph
Average 1st Quarter Relative Humidity	=	70	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	76	%
Average 4th Quarter Relative Humidity	=	75	%

Note: Evapotranspiration data was obtained for Tuscaloosa County, Alabama

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
5.511398	4.784024	5.593036	4.283234	3.774188	3.981737
4.906202	3.878767	3.901602	2.369656	4.738118	3.480128

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
46.1	50.5	62.3	66.1	75.6	81.6
85.9	84.5	77.2	73.7	56.3	53.1

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.28/-87.68

Average Annual Totals Summary

Title: Black Warrior Landfill
Simulated on: 6/21/2021 11:32

	Average Annual Totals for Years 1 - 10*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	51.20	[7.28]	1,858,635.9	100.00
Runoff	4.840	[1.512]	175,700.5	9.45
Evapotranspiration	32.944	[3.969]	1,195,865.7	64.34
Subprofile1				
Lateral drainage collected from Layer 4	13.5372	[3.0569]	491,399.9	26.44
Percolation/leakage through Layer 6	0.000005	[0.000001]	0.1819	0.00
Average Head on Top of Layer 5	0.0119	[0.0027]	---	---
Water storage				
Change in water storage	-0.1193	[1.6895]	-4,330.4	-0.23

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Black Warrior Landfill
Simulated on: 6/21/2021 11:33

	Peak Values for Years 1 - 10*		
	(inches)		(cubic feet)
Precipitation	3.64		132,298.2
Runoff	2.300		83,490.2
Subprofile1			
Drainage collected from Layer 4	0.1937		7,030.2
Percolation/leakage through Layer 6	0.000000		0.0015
Average head on Layer 5	0.0620		---
Maximum head on Layer 5	0.1231		---
Location of maximum head in Layer 4	2.61	(feet from drain)	
Other Parameters			
Snow water	3.1958		116,008.7
Maximum vegetation soil water	0.4005	(vol/vol)	
Minimum vegetation soil water	0.1898	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Black Warrior Landfill
Simulated on: 6/21/2021 11:33
Simulation period: 10 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	2.2804	0.3801
2	176.2443	0.2937
3	4.3569	0.2420
4	0.0109	0.0547
5	0.0000	0.0000
6	10.2480	0.4270
Snow water	0.0000	---

4 STORMWATER MANAGEMENT PLAN

4.1 WATER QUALITY PROTECTION

The water quality protection standards outlined in Rule 335-13-4-.01 prohibit the discharge of pollutants (including fill material), or any other unpermitted discharge to the waters of the State as defined by the Alabama Water Pollution Control Act, Code of Alabama and the United States Environmental Protection Agency Clean Water Act, as amended. Protective measures have been incorporated into the design and operation of the Black Warrior Landfill including composite liners, leachate collection systems, composite closure caps, groundwater monitoring wells, and storm water run-on and run-off controls.

4.2 STORMWATER RUN-ON CONTROL

Stormwater control at the Black Warrior Landfill is necessary to minimize infiltration, ponding, sedimentation and erosion problems associated with storm water drainage. The diversion of off-site storm water is required by ADEM Administrative Code, Rule 335-13-4-.17(1). This rule requires that run-on drainage control structures be designed, constructed and maintained to prevent flow onto the active and/or closed portions of the landfill during the peak discharge from a 24-hour, 25 year storm.

Perimeter drainage ditches are being proposed for construction in the locations shown on the Permit Plans to intercept stormwater run-on before it passes over active or inactive landfill disposal areas. The proposed ditches will re-route stormwater around the disposal area as shown on the Permit Plans. Temporary and permanent rip-rap check structures and erosion control matting will be used in the drainage ditches on an as-needed basis to minimize erosion and sediment accumulation. Additional erosion and sediment control measures, such as silt fence, will be installed during construction in areas of the landfill which are susceptible to erosion and sedimentation, in accordance with the Facility's NPDES and Solid Waste Permit requirements.

4.3 STORMWATER RUN-OFF CONTROL

The control of stormwater water run-off from the site is required by ADEM Administrative Code, Rule 335-13-4-.17(2) and 335-3-4-.17(3). This rule requires that run-off control structures be designed, constructed and maintained to collect and control at least the water volume resulting from a 24-hour, 25-year storm. On-site drainage structures shall be designed to carry incident precipitation from the disposal site to minimize the generation of leachate, erosion, and sedimentation. Runoff from the active and/or closed portions of the landfill is proposed be routed to a permitted sediment control ponds prior to release onto adjacent properties or waters.

During construction of the Black Warrior Landfill, run-off will be maintained within the perimeter berm via temporary stormwater diversion ditches. These ditches will transport stormwater to the permitted Sediment Pond. The stormwater will pass through the sedimentation pond prior to discharging off site.

Additional erosion and sediment control measures will be installed during construction in accordance with the Facility's NPDES and Solid Waste Permit requirements.

4.4 SEDIMENTATION PONDS

There are ten (10) existing sedimentation pond located at the Black Warrior Solid Waste Facility. There will be one (1) additional pond constructed throughout the life of the facility. The pond design and layout can be reviewed in the permit plans and design calculations are located in Appendix 4.1 Sediment Pond Calculations.

4.5 NPDES STORMWATER PERMIT

Discharge of stormwater from the site will be in accordance with the Landfill's active NPDES (National Pollutant Discharge Elimination System) Permit. A copy of Permit, No. ALG160051, is located in Appendix B. Stormwater discharged from the landfill site will be monitored according to the permit. Following approval of the Major Modification, the Facility's NPDES Permit will be modified, if necessary, to include the additional stormwater controls and outfalls. Modifications to the permit will be obtained prior to installation of additional discharge points.

4.6 SEVERE WET WEATHER OPERATIONS

4.6.1 Heavy Rains, Severe Storms, and Hazardous Conditions

During periods of heavy rainfall or sustained wet weather, exposed soil surfaces, haul routes, and operational areas may become slick or unstable, creating hazardous driving and working conditions. Landfill personnel will utilize drainage controls, crushed stone, or other stabilizing materials on unpaved roads to maintain all=weather access and divert water away from critical operational areas. If rainfall washes out or degrades aggregate surfaces, repairs should be made promptly to restore safe travel conditions.

Intense or prolonged rains may impact drainage structures, soil cover, and vegetative areas. Following such storms, landfill personnel will inspect the site and implement corrective measures as needed to maintain environmental compliance and operational safety. If the National Weather Service issues a severe weather warning or if on-site conditions become unsafe due to rain, wind, or lightning, landfill operations may be temporarily suspended in whole or in part.

4.6.2 Severe Wet Weather Stoppages

Landfill operations may be halted, reduced, or adjusted during severe weather events when conditions create safety and/or equipment hazards. Weather related operational changes will be documented in the operating record, including the event, affected operations, reason for stoppage, and timing of shutdown and restart. Operations may resume once conditions are deemed safe by the Landfill Manager. Upon resumption of landfill activities, landfill personnel will inspect the disposal area and stormwater system for litter, ponded water, slope issues, or damage. If daily cover is delayed by severe weather, operators must cover the previous day's waste before disposing of new waste

APPENDIX 4.1

SEDIMENT POND CALCULATIONS

Stormwater Collection Ponds Report

Black Warrior Landfill
Coker, Alabama

Prepared By:

PO Box 278
Andalusia, AL 36420

July 2023

TABLE OF CONTENTS

1.0 Introduction....2
2.0 Methodology....2
3.0 Pond 1....2
4.0 Pond 2....3
5.0 Ponds 3 through 8....4
6.0 Pond 10....5
7.0 Pond 11....6
8.0 Pond 12....7

1.0 Introduction

The intent of this report is to document the engineering calculations and results for the storm water detention facilities at the Black Warrior Landfill in Coker, AL. Per ADEM solid waste regulations Section 335-13-4.17 run-on and run-off control systems should "collect and control at least the water volume resulting from a 24-hour, 25-year storm."

Black Warrior Landfill has eleven storm water ponds either constructed or planned for in the permit plans. Pond 9 is omitted from the construction plan. Below is documentation of the hydrologic and hydraulic calculations for each in support of the regulatory requirements.

2.0 Methodology

All hydrologic and hydraulic calculations were performed using the Bentley CivilStorm (10.03.04.53) software. Hydrologic calculations were performed using the TR-55 method for calculating storm water runoff. Contributing drainage areas of the landfill were calculated using the final closure configuration and given a CN value of 72. All areas calculated that were not within the landfill permit were assigned a CN value of 60 after consideration of landcover type and onsite soils.

Rainfall distribution for modeling purposes was based on the SCS Type-II storm. The total rainfall depth of 7.2-inches was used for this site based on the NOAA Atlas 14. All storms were modeled for a 24-hour duration.

3.0 Pond 1

3.1 Pond 1 Hydrology

Pond 1 has two main catchments that contribute flow to it. One being a portion of the landfill and the other being an area of minimum improvement. The below table shows the peak rainfall runoff values for each catchment.

Table 3.1 – Pond 1 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A101	72	61.8	385.07
A102	60	15.3	64.95

3.2 Pond 1 Hydraulics

Pond 1 has approximately 236,000 CF of storage with a normal pool elevation of 167-ft and an overtopping elevation of 174-feet.

Table 3.2 – Pond 1 Stage-Area

Elevation	Area *(SF)*
166	55,944
168	62,845
170	91,999
172	110,691
174	125,206

Pond 1 has a standard concrete rectangular outlet structure with a rectangular weir and has already been constructed at the time of this report. Specifics for the outlet structure can be seen in the permit assembly. The results from the 25-yr, 24-hr event can be seen below.

Table 3.3 – Pond 1 Hydraulic Results

Maximum Hydraulic Grade	172.48
Peak Discharge (cfs)	58.33

4.0 Pond 2

4.1 Pond 2 Hydrology

Pond 2 has two main catchments that contribute flow to it. One being a portion of the landfill and the other being an area of minimum improvement. The below table shows the peak rainfall runoff values for each catchment.

Table 4.1 – Pond 2 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A201	72	35.2	221.16
A202	60	23.9	101.19

4.2 Pond 2 Hydraulics

Pond 2 has approximately 688,000 CF of storage with a normal pool elevation of 174-ft and an overtopping elevation of 180-feet.

Table 4.2 – Pond 2 Stage-Area

Elevation	Area *(SF)*
167.00	28,816.730
170.00	51,595.370
172.00	63,664.960
174.00	72,224.110
176.00	82,479.210
178.00	97,468.950
180.00	120,516.750

Pond 2 has a standard concrete rectangular outlet structure with a rectangular weir and has already been constructed at the time of this report. Specifics for the outlet structure can be seen in the permit assembly. The results from the 25-yr, 24-hr event can be seen below.

Table 4.3 – Pond 2 Hydraulic Results

Maximum Hydraulic Grade	177.81
Peak Discharge (cfs)	83.82

5.0 Ponds 3 through 8

5.1 Ponds 3 through 8 Hydrology

Ponds 3 through 8 are built so as to allow flow to pass through each in series. Each pond has a portion of the landfill that contributes flow to it. The below table shows the peak rainfall runoff values for each catchment.

Table 5.1 – Ponds 3 through 8 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A401	72	0.27	1.65
A501	72	0.90	5.44
A701	72	1.24	7.48
A801	72	1.62	9.79

5.2 Ponds 3 through 8 Hydraulics

Ponds 3 through 8 each have a concrete baffle wall separating them. Each baffle wall has a series of orifices and a concrete weir to convey flow to the next pond in the series. These ponds are already constructed at the time of this report. Specifics for the outlet structure can be seen in the permit assembly. The ultimate discharge of the series is from Pond 3 and the results from the 25-yr, 24-hr event can be seen below.

Table 5.2 – Pond 3 Hydraulic Results

Maximum Hydraulic Grade	215.58
Peak Discharge (cfs)	10.05

6.0 Pond 10

6.1 Pond 10 Hydrology

Pond 10 has one main catchment that contributes flow to it. The below table shows the peak rainfall runoff values for each catchment.

Table 6.1 – Pond 10 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A1001	72	7.15	44.88

6.2 Pond 10 Hydraulics

Pond 10 has approximately 45,000 CF of storage with a normal pool elevation of 297-ft and an overtopping elevation of 304-feet.

Table 6.2 – Pond 10 Stage-Area

Elevation	Area *(SF)*
296.00	11,570.000
298.00	18,737.000
300.00	24,219.000
302.00	29,768.000
304.00	36,763.000

Pond 10 has a standard concrete rectangular outlet structure with a rectangular weir and has already been constructed at the time of this report. Specifics for the outlet structure can be seen in the permit assembly. The results from the 25-yr, 24-hr event can be seen below.

Table 6.3 – Pond 10 Hydraulic Results

Maximum Hydraulic Grade	298.75
Peak Discharge (cfs)	21.28

7.0 Pond 11

7.1 Pond 11 Hydrology

Pond 11 has two main catchments that contribute flow to it. One being a portion of the landfill and the other being an area of minimum improvement. The below table shows the peak rainfall runoff values for each catchment.

Table 7.1 – Pond 11 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A1101	72	24.82	155.60
A1102	60	7.50	31.72

7.2 Pond 11 Hydraulics

Pond 11 has approximately 43,000 CF of storage with a normal pool elevation of 249-ft and an overtopping elevation of 304-feet.

Table 7.2 – Pond 11 Stage-Area

Elevation	Area *(SF)*
249.00	4,045.640
250.00	4,570.150
252.00	5,739.670
254.00	7,069.860
256.00	8,560.730

Pond 11 has a concrete baffle wall as an outlet. The baffle wall has a series of orifices and a concrete weir to convey flow. This pond is already constructed at the time of this report. The results from the 25-yr, 24-hr event can be seen below.

Table 7.3 – Pond 11 Hydraulic Results

Maximum Hydraulic Grade	256.00
Peak Discharge (cfs)	23.38

8.0 Pond 12

8.1 Pond 12 Hydrology

Pond 12 has two main catchments that contribute flow to it. One being a portion of the landfill and the other being an area of minimum improvement. The below table shows the peak rainfall runoff values for each catchment.

Table 8.1 – Pond 12 Drainage Areas

Catchment	CN	Area (Acre)	Peak Runoff (cfs)
A1201	72	9.13	41.29
A1202	60	8.24	19.91

8.2 Pond 12 Hydraulics

Pond 12 has approximately 167,000 CF of storage with a normal pool elevation of 300-ft and a top elevation of 302-feet.

Table 8.2 – Pond 12 Stage-Area

Elevation	Area *(SF)*
296.00	20,631.000
298.00	25,540.000
300.00	30,740.000
302.00	36,232.000

Pond 12 has a single pipe that allows flow to leave the pond. The results from the 25-yr, 24-hr event can be seen below.

Table 8.3 – Pond 12 Hydraulic Results

Maximum Hydraulic Grade	301.95
Peak Discharge (cfs)	24.98

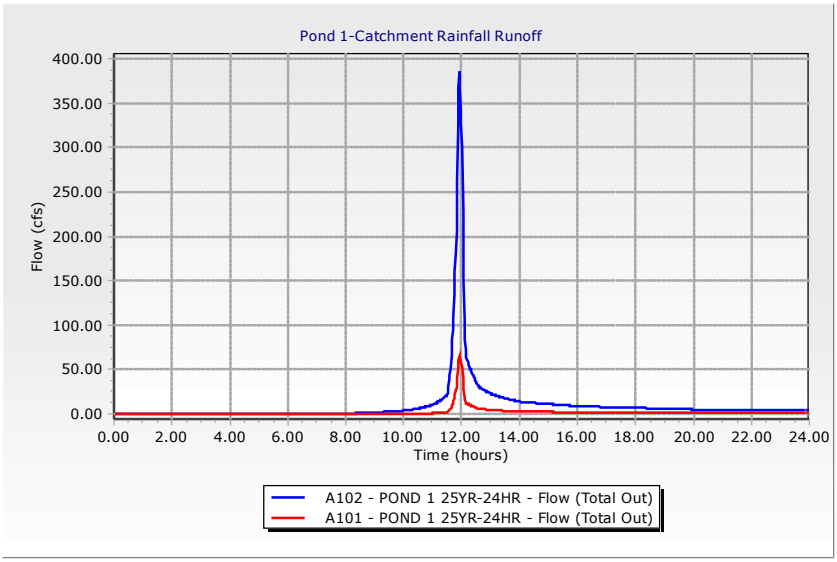
APPENDIX A

Pond 1 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A102	2,692,888.700	72.000	385.07
A101	669,342.040	60.000	64.95

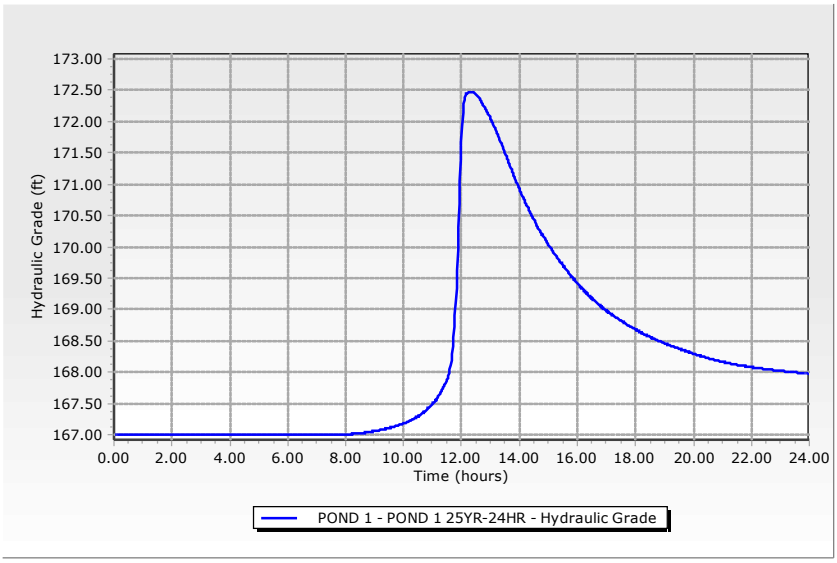


Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND 1	58.33	172.48	12.325	529,872.4

Pond Information

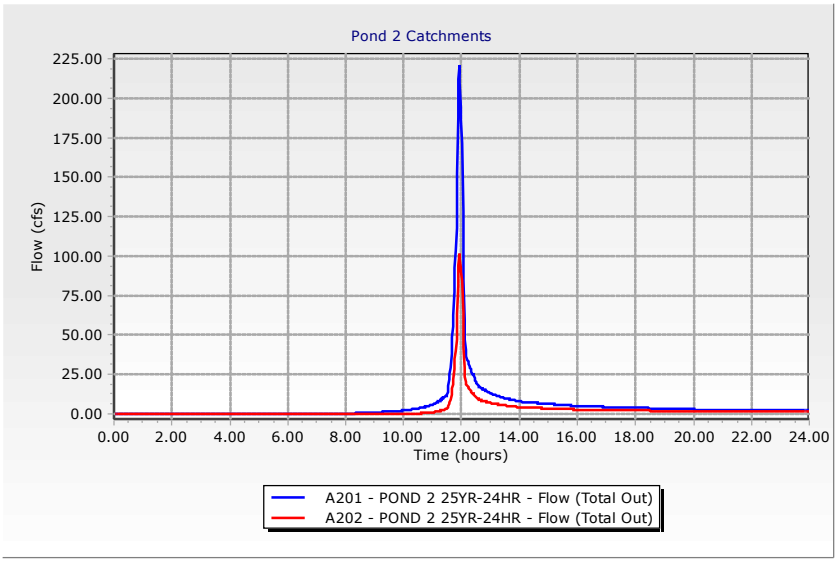


Pond 2 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A201	1,536,813.500	72.000	221.16
A202	1,042,827.160	60.000	101.19

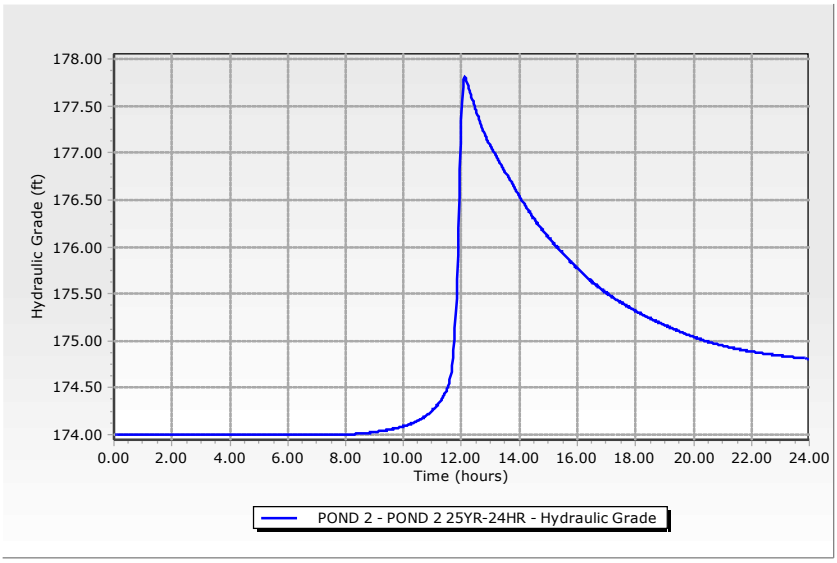


Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND 2	83.82	177.81	12.100	688,004.2

Pond Information

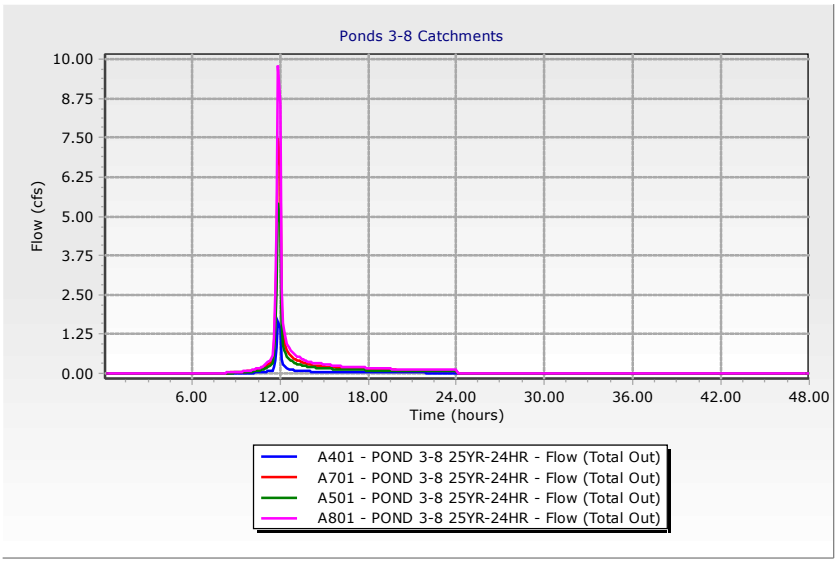


Ponds 3-8 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

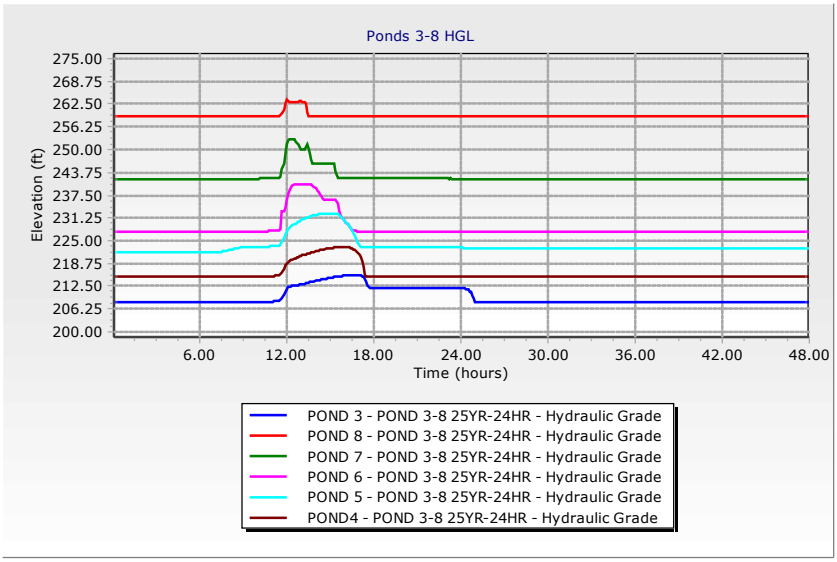
Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A401	11,932.330	72.000	1.65
A501	39,410.360	72.000	5.44
A701	54,183.300	72.000	7.48
A801	70,860.730	72.000	9.79



Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND 3	10.05	215.58	16.651	15,530.7
POND4	10.53	223.27	15.848	19,276.6
POND 5	15.14	232.32	14.517	36,712.3
POND 6	60.47	240.50	13.531	25,822.6
POND 7	2,496.89	252.91	12.434	18,084.9
POND 8	7.76	263.73	12.014	2,615.4

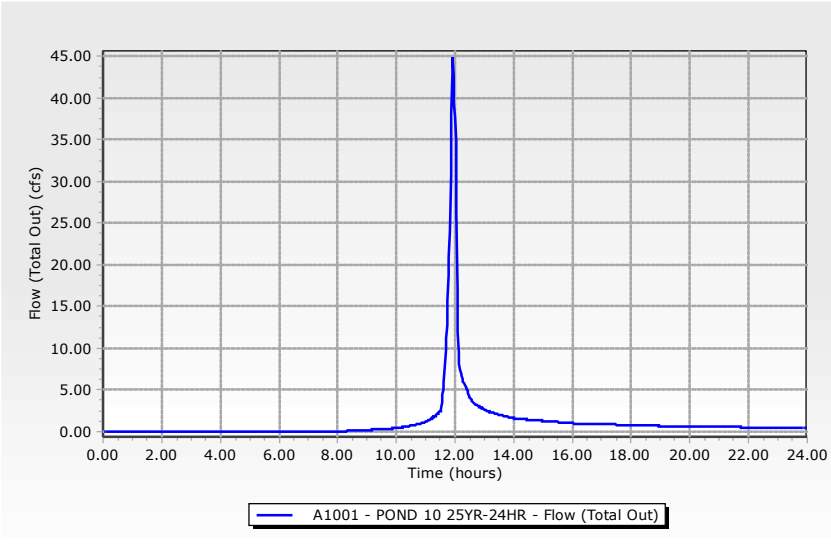


Ponds 10 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

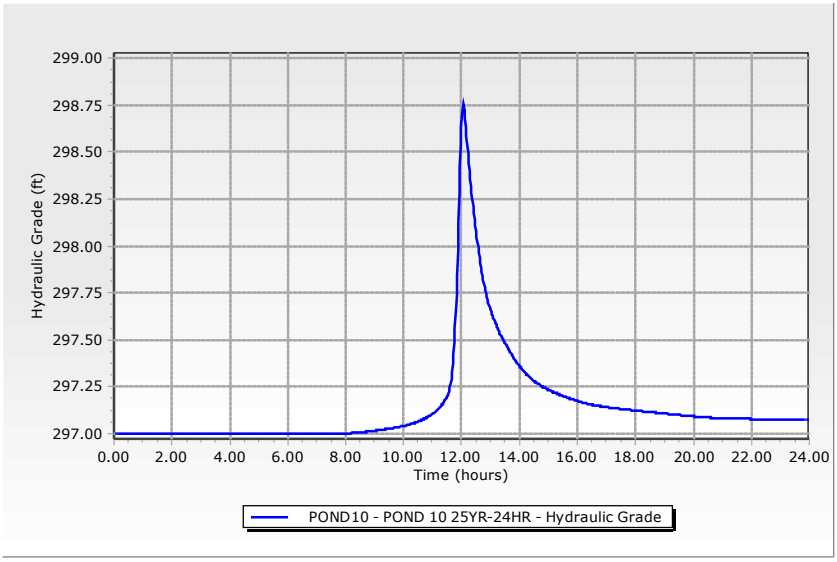
Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A1001	311,861.280	72.000	44.88



Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND10	21.28	298.75	12.075	45,183.3

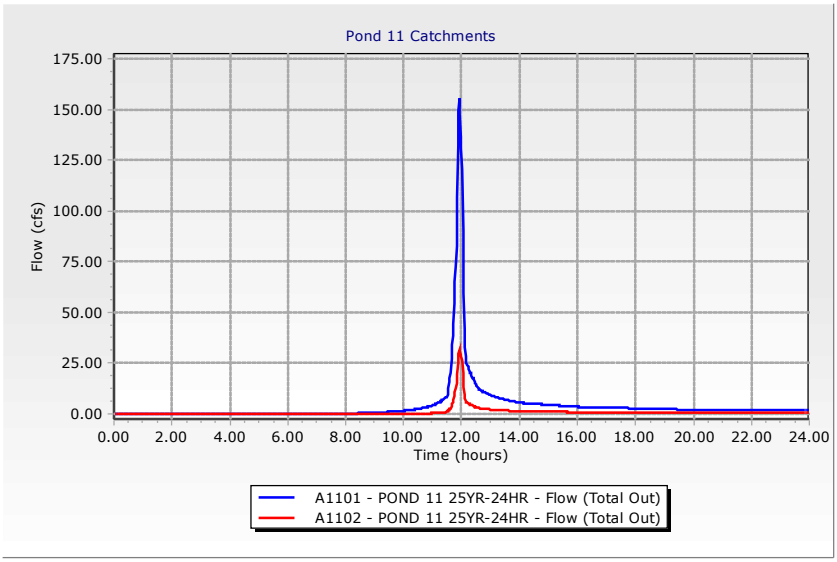


Ponds 11 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

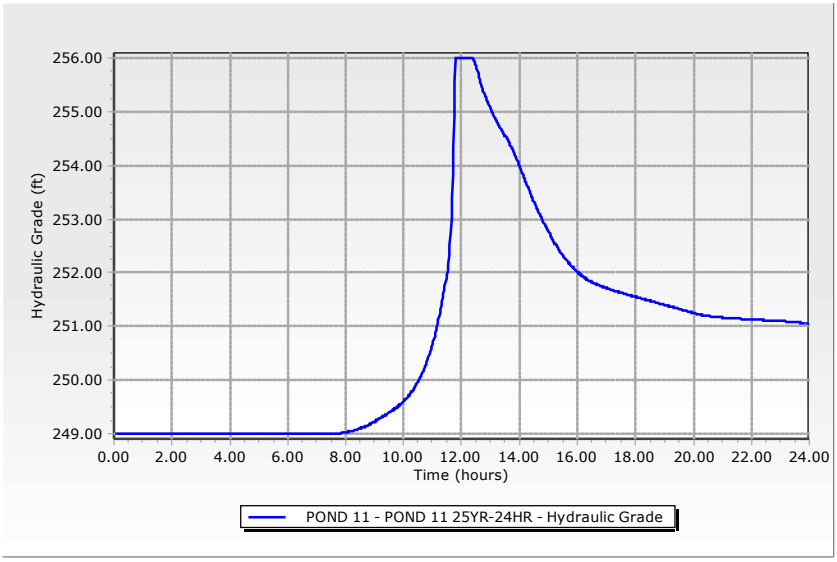
Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A1101	1,081,275.720	72.000	155.60
A1102	326,887.350	60.000	31.72



Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND 11	23.38	256.00	11.800	43,057.8

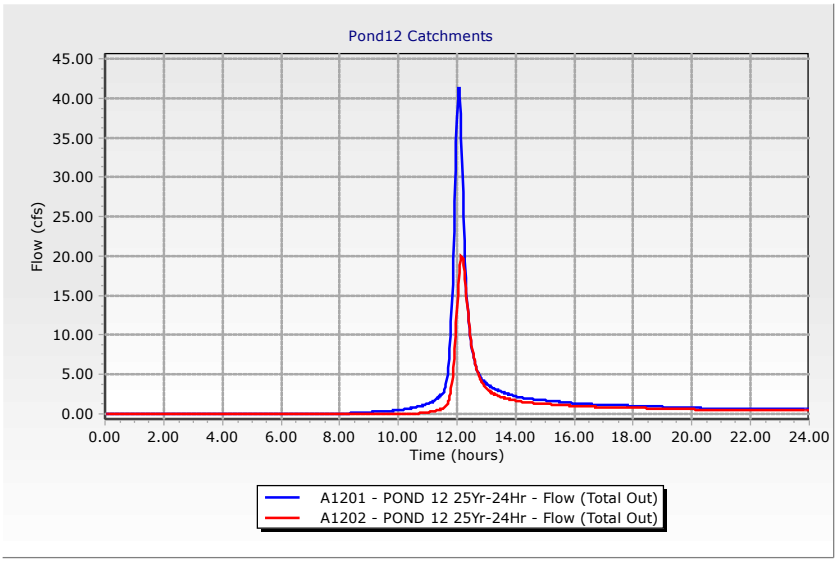


Ponds 12 Report

Catchment Information

Catchment Summary Table - Time: 0.00 hours

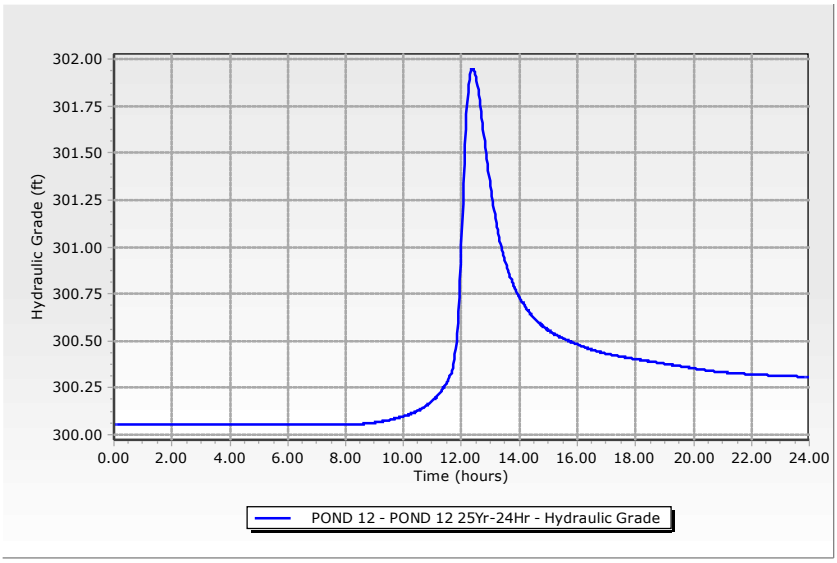
Label	Area (Unified) (ft²)	SCS CN (Composite)	Flow (Maximum) (cfs)
A1201	398,138.400	72.000	41.29
A1202	359,170.000	60.000	19.91



Pond Information

Pond Table - Time: 0.00 hours

Label	Flow (Out to Links Maximum) (cfs)	Hydraulic Grade (Maximum) (ft)	Time to Maximum Storage (hours)	Storage (Maximum) (ft³)
POND 12	24.98	301.95	12.375	167,501.8



5 GROUNDWATER MONITORING PLAN

REVISED GROUNDWATER MONITORING PLAN

BLACK WARRIOR SOLID WASTE AUTHORITY FACILITY
COKER, TUSCALOOSA COUNTY, ALABAMA
PERMIT NO: 63-01

Submitted to:

Black Warrior Solid Waste Authority
3301 Landfill Drive
Coker, Alabama 35452

Prepared by:

TTL, Inc.
3516 Greensboro Avenue
Tuscaloosa, Alabama 35401

Project No. 600107003.22 (Rev.3)

March 23, 2022

PREFACE

This Groundwater Monitoring Plan was initially issued as part of the facility Project Manual (Volume II, Section 10.0 Landfill Monitoring), dated October 1994, revised March 1995, and again in revised March 1998). The original Project Manual was prepared by Carter, Darnell and Grubbs Engineers, Inc. with contributions by TTL, Inc. This Groundwater Monitoring Plan has been revised and updated to reflect modifications to the original Groundwater Monitoring Plan.

CERTIFICATION

I certify that I am a qualified groundwater professional, demonstrated by an Alabama state license as a professional geologist. I have sufficient training and experience in groundwater hydrology and related fields to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that the data in this report has been prepared by me and/or a subordinate under my direction.

Name: J. Mark Tanner, P.G.
Senior Principal Geologist
Alabama License No. 247

TABLE OF CONTENTS

PREFACE I

CERTIFICATION I

1.0 LANDFILL MONITORING 1

1.1 Groundwater Monitoring System 1
1.1.1 Groundwater Monitoring Program 1
1.1.2 Sample Collection 1
1.1.3 Well Inspection 2
1.1.4 Monitoring Well Abandonment/Replacement 2
1.1.5 Sample Collection Procedures 2
1.1.6 Equipment Decontamination 3
1.1.7 Water-level Measurements 3
1.1.8 Well Evacuation/Purging 3
1.1.9 Sample Withdrawal & Collection 4
1.1.10 Sample Preservation & Shipment 4
1.1.11 Chain of Custody 4
1.1.12 Analytical Procedures 5
1.1.13 Practical Quantitation Limits (PQLs) 5
1.1.14 Quality Assurance & Quality Control 5
1.1.15 Detection Monitoring Parameters 5
1.1.16 Detection Monitoring Frequency 6
1.1.17 Inter-well Comparisons 6
1.1.18 Background Monitoring 6
1.1.19 Statistical Methods 7
1.1.20 Detection Verification Procedures 8
1.1.21 Assessment Monitoring 9
1.1.22 Corrective Action 9

APPENDICES

APPENDIX A: Figures

A-I Site Location & Topographic Map
A-II Site Location & Aerial Photograph

APPENDIX B: Field Information Form & ADEM Groundwater Monitoring Report Form

1.0 LANDFILL MONITORING

1.1 Groundwater Monitoring System

The revised Groundwater Monitoring Plan, dated March 1998, included a Groundwater Monitoring System comprised of nine groundwater monitoring wells (MW-1 through MW-9). The nine monitoring wells were installed in January of 1996 and were screened within the first zone of saturation underlying both the existing and proposed landfill cells. Since March of 2000, the measured depth to groundwater in monitoring well MW-3 has increased by 2.5 feet. On behalf of the Black Warrior Solid Waste Authority (BWSWA), TTL submitted a Proposed Limited Alternate Source Determination (ASD) Work Plan to the ADEM on December 21, 2019. The proposed Work Plan listed numerous field activities including, the replacement of monitoring well MW-3 with a new monitoring well designated MW-3R and the abandonment of monitoring well MW-3. Monitoring well MW-3 was ultimately abandoned on January 28, 2019 and replacement well MW-3R was installed on January 25 and 28, 2019.

The current groundwater monitoring system consists of nine groundwater monitoring wells, identified as MW-1, MW-2, MW-3R, and MW-4 through MW-9. In accordance with the permit and submitted request for minor modification, monitoring wells MW-1 and MW-2 are designated as “upgradient” and monitoring wells MW-3R, MW-4 through MW-9 as “downgradient” wells. Monitoring wells MW-1 and MW-2 are located immediately upgradient of landfill cell 4 and proposed landfill cell 12 in the northeast portion of the landfill. Monitoring wells MW-3R and MW-4 are located immediately west of landfill cells 2 and 3. Monitoring wells MW-5, MW-6, and MW7 are located immediately southwest of landfill cell 1 in the southwest portion of the landfill. In addition, MW-8 and MW-9 are located southeast of proposed landfill cells 11B and 15, respectively. It should be noted that monitoring wells MW-8 and MW-9 are located downgradient of the former location of the unlined pre-Subtitle D landfill. The locations of the groundwater monitoring wells are shown on Figure A-II (Appendix A) for reference.

1.1.1 Groundwater Monitoring Program

The groundwater monitoring program will comply with ADEM Administrative Code R 335-13-4-27 (7/26/96 revision). The program will, therefore, comply with the requirements for sample collection, sample preservation and shipment, analytical procedures, chain-of-custody control, quality assurance and quality control, statistical evaluation of groundwater monitoring data, detection monitoring, assessment monitoring, and corrective action. The program incorporates permanent and/or temporary monitoring elements to provide environmental protection during and after landfill development. The Black Warrior Solid Waste Authority is an existing Subtitle D landfill currently operated under permit number 63-01. This updated monitoring program supersedes earlier versions and is written to include monitoring of the existing wells.

1.1.2 Sample Collection

Environmental quality sampling at the site will be accomplished by personnel trained in sampling protocol and will be consistent with ADEM guidance and ASTM Standards. As site conditions change, activities related to monitoring at the site will be continually reviewed and scrutinized for completeness and integrity. In order to ensure the integrity of the collected groundwater samples, considerable effort will be directed toward optimizing the sampling protocol and refining it as more information becomes available. The protocol for collection of the groundwater sampled will be documented and reported to the ADEM with the analytical results.

1.1.3 Well Inspection

Prior to performing any purging or sampling, each monitoring well will be inspected to assess its integrity. The condition of each well will be evaluated for physical damage that may have been caused by site equipment or other vehicular traffic. The security of each well will be assessed to confirm that outside source contaminants have not been introduced into the well. Inspection information, as well as the date and time, general weather conditions, and sampling personnel identification, will be documented on a Field Information Form (Appendix C). The actual form that is utilized may vary in format. Field personnel will record, at a minimum, the following:

- Date, time, and sampler's name
- Well number, elevation of measuring point, well depth, and depth to water
- Well casing material and inside diameter
- Static water level prior to purging
- Sampling equipment used
- Volume of water purged prior to sampling
- Sampling equipment used
- Volume of water purged prior to sampling
- Sample container numbers, types, sizes, and preservatives
- pH, specific conductance, temperature, and turbidity of water samples
- Comments about sample color, odor, and unusual characteristics
- Comments about weather conditions
- Comments about accessibility and condition of well

1.1.4 Monitoring Well Abandonment/Replacement

If it is determined that a well should to be replaced for any reason, a Monitoring Well Abandonment and Replacement Plan (the Plan) will be prepared for submittal to ADEM within 60 days of making the determination. The Plan will include, at a minimum, consideration of the following:

- The appropriate method for abandonment.
- The need for relocation to protect the replacement well from future damage.
- The anticipated replacement well type, depth, screened interval, casing diameter and surface completion in accordance with ADEM Admin Code 335-13-4-.27(2)(c).
- The need for replicate sample collection and if required, the number of replicate samples and a schedule for completing sample collection.
- Statistical analysis to be used for groundwater quality data collected from the replacement well and a determination addressing pooling data from the abandoned well with the new well is appropriate.

Upon approval of the Plan and the replacement of the new well, a report documenting the abandonment and replacement activities will be prepared and submitted to ADEM along with a Minor Permit Modification request to update the facility Permit and include the newly installed well into the Permit compliance well network.

1.1.5 Sample Collection Procedures

For sample collection, each monitoring well in the groundwater monitoring system will be sampled with dedicated equipment and methodologies that minimize the potential for alteration or contamination of the sample and that are capable of cleaning sampling equipment on the ground or on any contaminated surface. Additionally, personnel who contact sampling equipment that may contact the

interior of the monitoring well or the groundwater will don powderless latex gloves. If applicable, non-contaminated well(s) or typically upgradient wells will be sampled prior to those wells which are known to be impacted (typically downgradient wells).

1.1.6 Equipment Decontamination

Although use of non-dedicated equipment is discouraged, any non-dedicated well equipment that may contact the interior of the well or groundwater will be decontaminated in the field immediately prior to use, or in the office/lab and protected using aluminum foil and/or plastic bags. However, for any sampling events requiring non-dedicated sampling equipment, decontamination procedures will consist of rinsing the equipment once with deionized or laboratory reagent-quality water, brushing the equipment with a laboratory-quality soap such as Liquinox, and triple rinsing the equipment with deionized or laboratory-reagent quality water.

1.1.7 Water-level Measurements

Prior to groundwater purging and sampling, water-level measurements will be made at each well location by utilizing a portable electronic water-level indicator, tape, or other suitable measuring device, capable of achieving an accuracy of 0.01 foot. Wells will be measured for depth to water on the same day and immediately prior to purging. The measuring device will be used in accordance with the manufacturer's recommendations and/or directions. Prior to measuring, equipment that may contact the groundwater will be decontaminated by triple rinsing with distilled or deionized water. Measurements of the depth to water from a surveyed reference datum (the top of the well casing) will be to the nearest 0.01 foot, and the values will be recorded on the ADEM Groundwater Monitoring Report Form (Appendix C). Total well depths shall be obtained as necessary if there is evidence of well tampering or siltation.

1.1.8 Well Evacuation/Purging

Immediately prior to sampling, the water within the well will be evacuated until measured water-quality parameters indicate that formation water has entered the well or to sufficient volume to assure that stagnant water has been purged from the well. The wells will be evacuated using the standard 3 to 5 well-volume purging method or by low-flow (minimal drawdown) sampling methods. Low-flow sampling methods are preferred. If low-flow methods are used, they will be in accordance with EPA/540/S-95/504, "Low-flow (Minimal Drawdown) Groundwater Sampling Procedures".

Purging may be considered complete when: Standard 3 to 5 well volume method - A minimum of three (3) well volumes (based upon well- construction records) have been evacuated from the well and two of the field measured parameters (pH, specific conductance, temperature, and turbidity) have stabilized, or to five (5) well volumes, or until the well is pumped/bailed dry; or
Low-flow - Two of the field measured water-quality parameters have stabilized (measured within 15% relative to previous measurements).

If three well volumes cannot be obtained due to the well being pumped or bailed dry, the well will be allowed to recover and then the samples will be collected. If sufficient water is not available for sampling within 24 hours of purging for slowly recovering wells, the well will be considered dry, and no sample will be collected.

Low-flow sampling will be performed only if dedicated pumps have been installed in each well. If low-flow (or minimal drawdown) techniques are used, purging will be with flow-control submersible bladder pumps. Purging rates will be monitored and depth to water measurements recorded to assure that evacuation rates do not induce a substantial lowering of the water within the well. Flow rates will vary

for each well, but rates of approximately 0.1 to 0.5 L/min are typical. Pump discharge lines will be purged prior to collecting field parameter samples for field analysis with appropriate meters.

1.1.9 Sample Withdrawal & Collection

Samples will be collected from each well using either a dedicated (or disposable) Teflon or polyethylene bailer or through the discharge of pumps used to evacuate the well. Samples will be collected at a rate that minimizes potential alteration of the sample due to agitation or oxidation. Pumping rates for collection of samples for volatiles analysis (VOA's, etc.) will be approximately 0.1 L/min or less, to the extent practical based on the sampling equipment. Pumping rates for collecting other samples may be increased, but will be adjusted to a rate that also prevents chemical alteration.

If low-flow sampling methods are employed, the sampling rate will not exceed the purging rate, with flow rates of approximately 0.1 to 0.5 L/min recommended (EPA/540/S-95/504). Sampling pumps will be operated in a continuous manner so that they do not produce samples that are aerated in the discharge tube. Groundwater samples will be collected as soon as possible after purging.

1.1.10 Sample Preservation & Shipment

Samples will be collected and containerized in the order of the volatilization sensitivity of the parameter (i.e., volatile organics, organic compounds, inorganic species, and major cations and anions). Sample containers of the appropriate size and type, and with the preservatives appropriate for the analytical tests to be performed from the sample, will be prepared and labeled by the independent testing laboratory utilized by the facility. The laboratory will specify the preservation methods based on knowledge of methods and procedures approved by ADEM and/or EPA. The facility owner/operator will contract for services with a laboratory that meets these requirements.

Holding times, storage conditions, and transport conditions are important elements of the sampling protocol. They will be identified from references such as the most recent edition of SW-846 (Test Methods for Evaluating Solid Waste; PhysicaVChemical Methods; EPA SW-846) and Standard Methods for the Examination for Water and Wastewater. Samples will be packaged securely in an iced cooler (kept at or bellows a temperature of 4 °C) and transported to the analytical laboratory following strict chain-of-custody protocol.

1.1.11 Chain of Custody

Each sample container will be individually identified as to sample number, date and time of collection, and source of sample. A chain-of custody record will be prepared for all samples that will include:

a) Name of the person collecting the samples;
b) Identity of each sample (soil or water);
c) Source of each sample (monitoring well identifier);
d) Preservation provisions for each sample;
e) Analytical requirements; and
f) Name of person accepting sample.

Custody transfers of samples will be recorded on the chain-of-custody form by signatures of the transferor (relinquisher) and the transferee (receiver). This procedure will be repeated, as necessary, until final delivery is made to the analytical laboratory.

1.1.12 Analytical Procedures

Groundwater samples will be analyzed for the constituents specified in the detection-monitoring program. Where appropriate, assessment monitoring may be required. No specific analytical methods are cited in the regulations although suggested analytical methods are listed. The suggested methods are those EPA-approved methods and procedures that are published in SW-846. The laboratory under contract to the facility shall use one of the approved methods.

1.1.13 Practical Quantitation Limits (PQLs)

BWSWA proposes to utilize laboratory-specific PQLs as the reporting limits of applicable low-detection analytes (especially organics). The USEPA developed the concept of the PQL to address the issue of analytical variability. The PQL concept was developed for compliance with the Safe Drinking Water Act (50FR46906, Nov. 13, 1985) where it is defined: "The PQL thus represents the lowest level achievable by good laboratories within specified limits during routine laboratory operating conditions." A nationally recognized analytical laboratory will be contracted to perform sample analysis and the laboratory will typically be capable of meeting the applicable ADEM water- quality standards.

1.1.14 Quality Assurance & Quality Control

A quality-assurance and quality-control program (QA/QC) will be part of the sampling protocol and a requirement for the laboratory chosen to provide analytical services. Field QA/QC per sampling event will require, at least, the collection of two types of blanks: trip blanks and equipment-rinsate blanks for non-dedicated equipment. Procedures for collecting and evaluating these blanks, as described in the EPA Handbook Groundwater; Volume II: Methodology (EPA/625/6- 90/01b), will be followed.

The laboratory QA/QC program will be a written program, a copy of which will be available to the owner/operator. This program will describe the precision, accuracy, and completeness of the laboratory data; the documentation of procedures for calibration and maintenance of laboratory equipment, for analysis of samples, for computing and validating test data, and for chain-of-custody control; and the control and security of all documentation. Laboratory QA/QC standards wills be initialed with the receipt of samples and will be maintained throughout the recordkeeping period.

1.1.15 Detection Monitoring Parameters

The initial detection monitoring parameters for the BWSWA will be the constituents in Appendix I to ADEM Administrative Code R. 335-13-4-27. The Landfill also may monitor groundwater for major leachate indicator parameters (such as total dissolved solids and alkalinity) and for major cations and ions (such as calcium, magnesium, sulfate, and carbonate). Further, the Landfill may collect and analyze leachate samples. Monitoring for the additional groundwater parameters and characterizing the leachate will be independent of the permit requirements.

ADEM Administrative Code R. 333-13-4-.27(3)(a)3 allows the Department to delete any of the detection monitoring parameters if it can be shown that the removed constituents are not reasonably expected to be contained in or derived from the waste contained in the unit. ADEM Administrative Code R. 333-13-4-.27(3)(a)4 allows the Department to establish an alternative list of inorganic indicator parameters in lieu of some or all of the heavy metals (constituents 1 through 16 in Appendix I) if the alternative parameters provide a reliable indication of inorganic releases from the municipal solid waste landfill (MSWLF) unit to the groundwater.

1.1.16 Detection Monitoring Frequency

Detection Monitoring will be performed in March and September of every year during the active life of the facility (including closure) and during the post-closure period unless the Department specifies an alternative monitoring frequency.

1.1.17 Inter-well Comparisons

Two general approaches to groundwater monitoring at waste disposal facilities are: (1) inter-well comparisons by which new downgradient monitoring measurements are compared to water-quality measurements obtained from wells that are hydraulically upgradient to the facility; and (2) intra-well comparisons by which new downgradient measurements are compared to their own history. In general, intra-well monitoring is preferable to inter-well monitoring because it eliminates the spatial component of natural groundwater chemistry variability. This spatial component comprises a significant portion of the total variability that must be accounted for by the statistical methodology. In accordance with Admin. Code r. 335-13-4-.27(2)(1) and the facility's current permit, the collected groundwater analytical data will be statistically evaluated using the inter-well comparison approach.

The compiled groundwater analytical data has been historically evaluated using the inter-well statistical approach in which downgradient compliance concentrations in a given well are compared to upgradient background concentrations. In accordance with ADEM Administrative Code R 335-13-4-.27(1)(3), a tolerance or prediction interval procedure will be used to evaluate groundwater monitoring data. An appropriate variation of this method will be used for each constituent. This method can be used for all constituents because it allows for the construction of either one-sided or two—sided intervals from either parametric or nonparametric distributions of data, and because various adaptations of the method account for varying percentages of data below the laboratory's PQL. This method will be used as long as the continuing assessment or groundwater monitoring data accumulated from the site supports its appropriateness. If the site data provides evidence that an alternative statistical method should be used, this evidence will be submitted to ADEM to justify the request for ADEM's approval to use another method.

1.1.18 Background Monitoring

After each new well is constructed, samples will be collected for a total of eight sampling events to specifically provide background groundwater quality data. Samples from the eight older wells (MW-1, MW-2, MW-4 through MW-9) will be collected concurrently with samples from new well(s) and evaluated as detection monitoring wells, in accordance with this monitoring plan. Additional background indicator data may be collected from the existing wells for further characterization as described in Section 1.1.14.

During background sample collection, the data will be examined for outliers, anomalies, and trends that might indicate a release. Outliers and anomalies are inconsistently large or small values that can occur due to sampling, laboratory, transportation or transcription errors, or even by chance alone. Significant trends indicate a source of systematic error or an actual contamination occurrence that must be evaluated and corrected before the detection monitoring program can be implemented. The inclusion of such values in the historical database used for statistical evaluation could cause misinterpretation of the data set, and result in an artificial increase in the magnitude of statistical limits, which could result in an increase in the false negative rate (i.e., a decrease in the sensitivity of the statistical procedure).

To remove the possibility of historical outliers and trends creating false statistical limits, the data for each well and each constituent will be tested for the existence of outliers. Outliers may be removed

from consideration during the establishment of all statistical limits. The statistical outlier and trend detection procedure will be performed for those wells that have had at least 5 measurements for a given constituent. Once the background database is established, the outlier procedure described above may be applied and appropriate statistical limits set in accordance with the appropriate statistical method.

1.1.19 Statistical Methods

Statistical analysis is required by the Rules of the ADEM, Solid Waste Management (Chapter 335-13-4-.27). The purpose of statistical analysis is to identify whether any monitored constituents are detected in amounts that constitute an statistically significant increase (SSI) relative to background concentrations. If a groundwater constituent is detected at a level determined to represent an SSI above background values and the SSI cannot be attributed to errors in sampling, laboratory analysis, statistical evaluation, or natural variation in groundwater quality, the facility is typically required to initiate (or continue) Assessment Monitoring, as required by ADEM Admin. Code r. 335-4-.27(3)(c)2.

In the application of statistics to groundwater monitoring data from this site, all data will be treated as independent and representative of the quality of the groundwater at the site. Statistical methods used, and their application to data from this site, meet the EPA standards referenced in *Statistical Analysis of Groundwater Monitoring Data Unified Guidance* document. The March 2009 Unified Guidance document provides guidance for the statistical analysis of groundwater monitoring data from RCRA facilities. It updates and replaces the earlier *1989 Interim Final Guidance* and the associated *July 1992 Addendum*.

If a constituent has been detected in a compliance monitoring well then it is required that statistical analysis for determination of an SSI be performed for that constituent/compliance well pair. However, before an SSI can be declared, the constituent/compliance well pair should be re-sampled to confirm (or disconfirm) the concentration value which prompted the initial indication of an SSI.

Typically, the first step in the statistical analysis process is that the entire dataset (background and compliance) is subjected to a distribution analysis to determine if the data is normally distributed or can be transformed (i.e., log-normal distribution). If data is not normal, or cannot be transformed, a non-parametric prediction limit statistical analysis method is recommended. If data is normal, or can be transformed, a parametric prediction limit statistical analysis method is recommended. However, when the data contains a significant percentage of non-detects (defined as greater than 10-15%), the validity of distribution tests are questionable and it is suggested that a non-parametric prediction limit method be used.

Parametric and non-parametric prediction limit statistical analysis methods can be performed as an inter-well test (utilizing sample data from a designated background well) or as an intra-well test (utilizing sample data from the historical results of the constituent/compliance well). In either case, a comparison is made of each individual compliance concentration for the most recent event to the maximum concentration in background samples. The non-parametric prediction limit method does not produce an actual limit, but simply a maximum value of the constituent concentration above which contamination is assumed. It should be noted that the Unified Guidance suggests that all non-detects should be replaced with one-half (½) of the RL for the purpose of identifying the prediction limit (i.e., maximum background concentration) for parametric prediction interval analysis. For the purpose of identifying the prediction limit for non-parametric prediction interval analysis, all non-detect values should be reduced to zero. For reporting purposes, the laboratory represents all non-detects as being less than the RL (e.g., ND<100) for each constituent. The reduction of non-detect values to zero would be necessary due to differences in RLs used throughout the monitoring history for the facility. By reducing the non-

detects to zero, the ChemStat program would use confirmed values as the prediction limit instead of the RL since it is unknown what values the non-detects truly represent.

The May 2009 Statistical Analysis of Groundwater Monitoring Data Unified Guidance recommends the use of confidence intervals as a general statistical strategy for comparing groundwater analytical data to Groundwater Protection Standards (GWPSs) to determine if groundwater concentrations statistically exceed established standards. A confidence interval around the mean is designed to estimate the true average of the underlying population, while at the same time accounting for variability in the sample data set. Confidence limit intervals [Upper Confidence Limits (UCLs) and Lower Confidence Limits (LCLs)] can be constructed around the population median (50th percentile) for constituent/compliance pair sample data. These limits define the range in which the true concentration should be expected to exist. The Unified Guidance recommends that the null hypothesis (i.e., the assumption that the compliance concentration is less than an established standard) is not true when the entire confidence interval, including the LCL, exceeds the established standard. Therefore, as long as the LCL for a specific constituent is less than or equal to the established standard, the constituent/well data indicates that no statistical exceedance of the GWPS has occurred. However, if the LCL for specific constituent/well data exceeds an established MCL or GWPS, then there is statistically significant evidence that the population median is greater than the GWPS and an ASD or an Assessment of Corrective Measures (ACM) may be warranted.

To calculate an LCL around the median with 99% confidence, a minimum of seven compliance point measurements are required in order to calculate a non-parametric confidence interval. Considering that generating LCLs involves an iterative testing procedure (i.e., ranking of analytical data from lowest to highest concentrations), laboratory non-detect values were set to zero (0) prior to any ranking of the data. Substituting zero (0) for non-detect values is performed to ensure that a non-detect value is never ranked higher than a detected value.

The Unified Guidance recommends using trend tests in detection monitoring to measure the extent and nature of an apparent concentration increase, especially to determine whether or not the increase occurs consistently over time. Trend tests graphically depict a positive or negative trends over a period of monitoring. By identifying a positive trend, one can show that contaminant levels have gotten worse in comparison to early measurements from the well being tested. Furthermore, by measuring the nature of the trend, including the average rate of increase per unit of time, one can estimate how rapidly concentrations leveled are increasing and the current mean or median-level magnitude of contamination. Trend Testing methods, as outlined in Chapter 17 of the Unified Guidance, for each statistical exceedance will be submitted with each groundwater monitoring report.

1.1.20 Detection Verification Procedures

If detection monitoring results is determined initially to be above the appropriate statistical level, the result with be verified. Verification re-sampling is an integral part of the statistical methodology described by U.S. EPA's Addendum to Interim Final Guidance Document - Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (July 1992). Without verification re-sampling, much larger statistical limits would be required to achieve site-wide false-positive rates of 5% or less. Furthermore, the resulting false-negative rate would be greatly increased. Only compounds that initially exceed their statistical limit will be sampled for verification purposes.

Volatile Organic Compounds (VOCs): If one or more VOCs are detected above their statistical limit (i.e., PQL), a minimum of one verification resample will be conducted. If two re-sampling events are conducted, the samples will be collected independently, no sooner than 30 days apart. A statistical exceedance will be recorded and alternate source identification or assessment monitoring initiated if any single VOC is measured above the PQL in each of the verification resamples. It should be noted

that based on the Alabama Groundwater Report Guidance for Solid Waste Facilities, dated March 2011, "the detection of any organic constituents is considered an SSI."

Inorganic Constituents: If one or more of the inorganic parameters are detected above their statistical limit (i.e., Shewart-CUSOM control chart computation value/prediction limit), a minimum of one verification resample will be collected at the next scheduled sampling event. If the exceedance is confirmed during the next event, a second verification re-sampling event may be completed within 30 days. A statistical exceedance will be recorded and alternate source identification of assessment monitoring initiated if verification of two or more elevated parameters is confirmed for each of the discrete verification resamples.

1.1.21 Assessment Monitoring

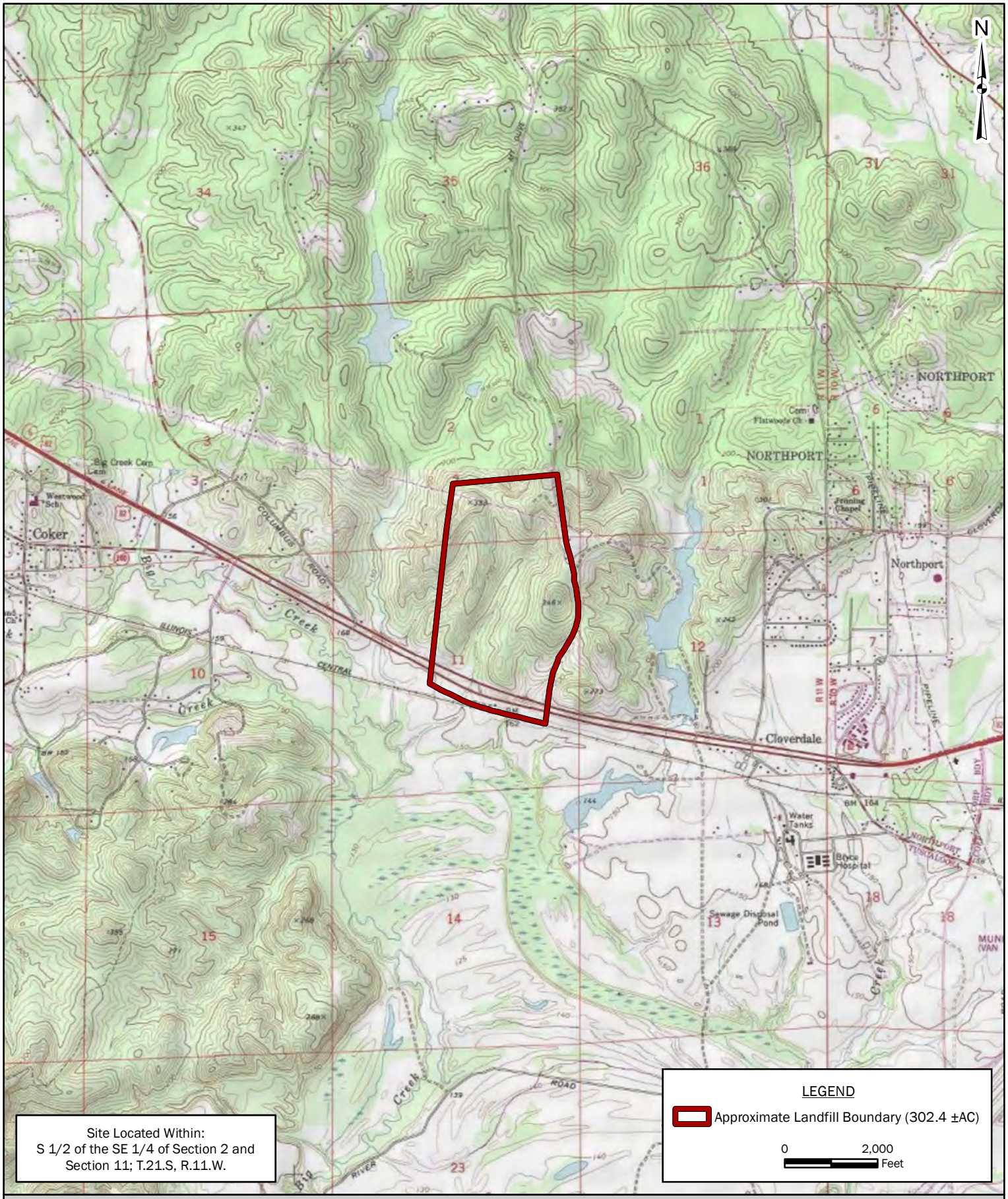
Assessment monitoring, if required, will be in accordance with ADEM Administrative Code R. 335-13-4-.27(4).

1.1.22 Corrective Action

Corrective action, if required, shall be conducted in accordance with ADEM Administrative Code R. 335-13 -4-.27(5).

APPENDIX A: Figures

Figure 1: Site Location & Topographic Map
Figure 2: Site Layout Map



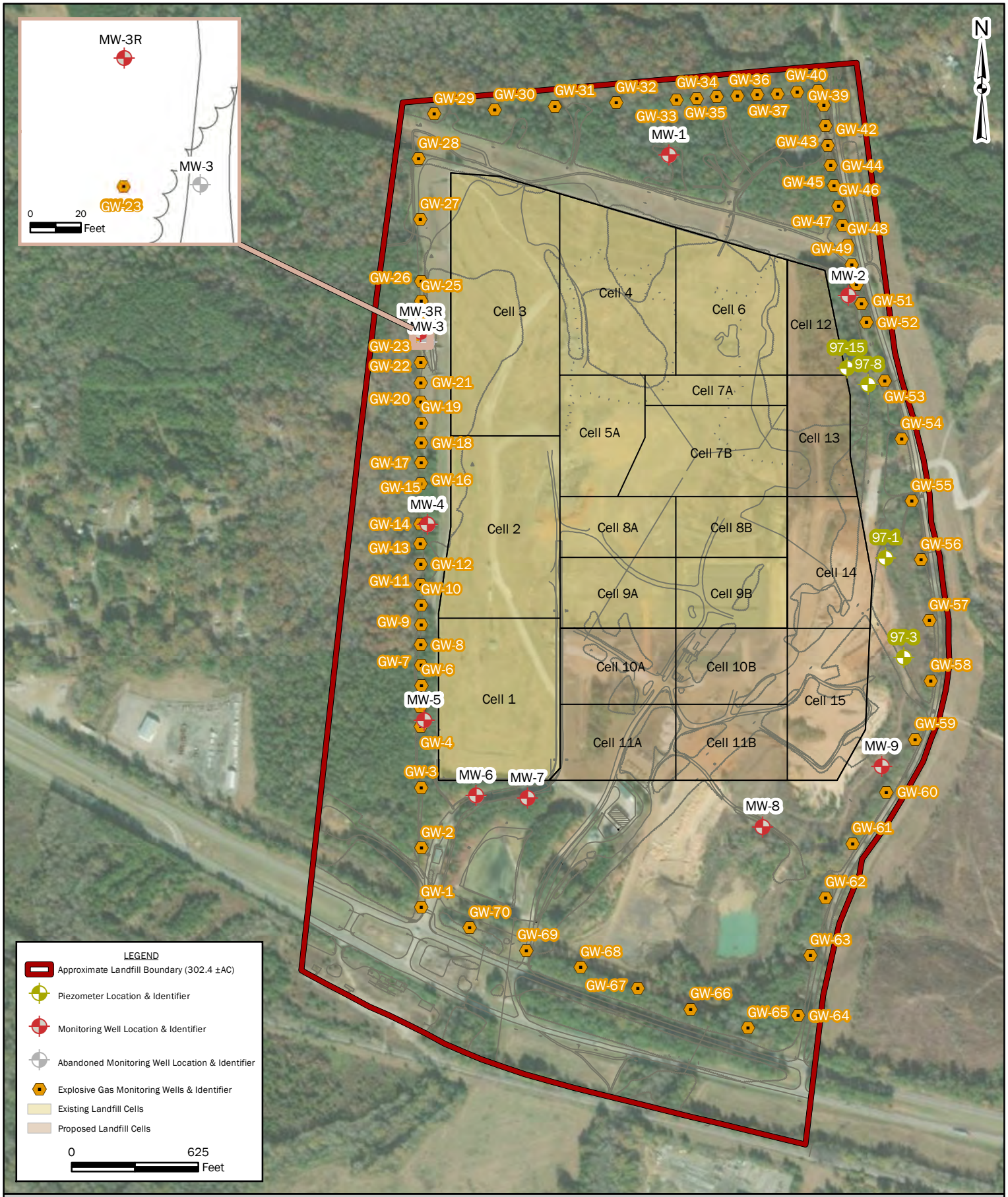
Site Located Within:
S 1/2 of the SE 1/4 of Section 2 and Section 11; T.21.S, R.11.W.

TTL

FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP
BLACK WARRIOR SOLID WASTE AUTHORITY
ADEM PERMIT NO.: 63-01

3301 LANDFILL DRIVE
COKER, TUSCALOOSA COUNTY, ALABAMA
BASEMAP: Lake Lurleen, Alabama USGS 7.5 Minute Quadrangle Map, 1978 (Photorevised 1982) and Coker, Alabama USGS 7.5 Minute Quadrangle Map, 1969 (Photorevised 1978)

DRAWN BY: AGW
CHECKED BY: JMT
DRAWING DATE: 6/24/2019
REVISION DATE: N/A
TTL JOB NO.: 600107003
Approximate Scale: 1" = 2,000'



TTL

FIGURE 2: SITE LAYOUT MAP
BLACK WARRIOR SOLID WASTE AUTHORITY
ADEM PERMIT NO.: 63-01

3301 LANDFILL DRIVE

COKER, TUSCALOOSA COUNTY, ALABAMA

BASEMAP: DigitalGlobe, 1/26/2017

DRAWN BY:	AGW
CHECKED BY:	JMT
DRAWING DATE:	12/19/2018
REVISION DATE:	12/9/2019
TTL JOB NO.:	600107003
Approximate Scale:	1" = 625'

APPENDIX B: Field Information Form & ADEM Groundwater Monitoring Report Form

GROUNDWATER MONITORING REPORT

Facility Name: _____ **TTL Project No.:** _____

Sample Date: _____ **Time:** _____ **Person Collecting Sample:** _____

Purge Date: _____ **Well Number:** _____ **Top of Casing Elevation (MSL):** _____

Diameter of Well Casing: _____ **inches** **Well Casing Material:** _____

Total Depth of Well (TD): _____ **feet** **Depth to Water (DW):** _____

One Well Volume: _____ **gal** **X3** _____ **gal** **X5** _____ **gal**

Purging Equipment: _____ **Sampling Equipment:** _____

Field Parameter Equipment (brand & SN): _____

Time												
Volume (gal.)												
Water Level (ft.)												
Temperature (°C)												
Sp. Cond. (µmhos)												
pH												
D.O.												
ORP												
Turbidity (NTU)												
Pump Setting												
Carbon Dioxide												
Iron II												
Alkalinity												
Sulfide												

Total Volume Purged: _____ **gal** **Color of Sample:** _____ **Odor of Sample:** _____

Weather Conditions: _____

Accessibility of Well: _____ **Condition of Well:** _____

Unusual Characteristics: _____

Other Comments: _____

GROUNDWATER MONITORING FORM

PROJECT NAME: _____ TTL PROJECT No: _____

SAMPLING DATE: _____ TIME: _____ PERSON COLLECTING SAMPLE: _____

WELL NUMBER: _____ TOP OF CASING ELEVATION (MSL): _____ ft

TOTAL DEPTH OF WELL: _____ ft BLS DEPTH TO WATER: _____ ft BMP

VOLUME REMOVED BEFORE SAMPLING: _____ gal.

INSIDE DIAMETER OF WELL CASING: _____ in. WELL CASING MATERIAL: PVC

SAMPLING EQUIPMENT: (BAILER, PUMP, ETC.): _____

Specific conductance	_____	(µmhos/cm)
pH	_____	(standard units)
Temperature	_____	(degrees in F or C)
Turbidity	_____	(NTUs)
Odor of sample	_____	
Unusual characteristics	_____	
Filter size, if filtered	_____	
Weather Conditions	_____	
Accessibility of well	_____	
Condition of well	_____	
Other comments	_____	

_____
Field Representative

6 EXPLOSIVE GAS MONITORING AND REPORTING PLAN

The explosive gas monitoring locations identified at the facility shall be monitored for explosive gas levels during the active life, closure, and post-closure care period in accordance with ADEM requirements and this explosive gas monitoring plan.

The generation of explosive gases, especially methane (CH4) can occur when organic wastes at the landfill decompose. Landfill gas migration can result in vegetation damage (i.e. landfill cover vegetation) and can even result in explosions if concentrations exceed the Lower Explosive Limits (LEL) of 5% by volume. Permanent explosive gas monitoring points are located at the facility for monitoring explosive gas levels during the active life, closure, and post-closure care period as required by ADEM and shall be located at the site as follows:

6.1 EXPLOSIVE GAS MONITORING POINTS

Permanent explosive gas monitoring points will be located as shown in the permit plans. The monitoring point are no more than 300 feet apart, and no more than 100 feet apart in areas where a dwelling is within 1000 feet of the landfill property boundary. The gas monitoring points shall be monitored utilizing existing PVC monitoring locations and the barhole punch method penetrating to a depth of at least 4 feet where necessary. In addition to the monitoring points, other monitoring locations shall include on-site structures, culverts, drop inlets, and other locations which are conducive to gas accumulation.

6.2 EXPLOSIVE GAS MONITORING PROCEDURES

Explosive Gas Monitoring will be conducted at the facility on a quarterly basis, or as otherwise specified by ADEM, at each permanent explosive gas monitoring point. The existing permanent vents and/or barhole punch method will be utilized by the facility to monitor these locations at a minimum depth of 4 feet. A standard portable gas detection instrument for monitoring landfill gas will be used in accordance with the manufacturer's recommendations, to detect the methane gas concentrations in each monitoring location at the facility. In addition to the explosive gas locations, other monitoring locations including on-site structures, culverts, drop inlets, and other locations conducive to gas accumulation shall be monitored on a quarterly basis.

6.3 EXPLOSIVE GAS REPORTING PLAN

The levels of gas detected in each well and any other monitoring locations will be reported in percent methane by volume and percent of Lower Explosive Limit (LEL) on an Explosive Gas Monitoring Report. Copies of the monitoring report shall be submitted to ADEM and placed in the Operating Record of the facility within 30 days of the monitoring event.

6.3.1 Interpretation of Data

The LEL of the methane is 5% by volume. Per ADEM regulations, explosive gas levels should not exceed the lower explosive limit at the facility boundary and should not exceed 25% of the lower explosive limit in facility structures. Should explosive gas levels detected at the facility monitoring locations exceed the respective limits, the Landfill Operator shall immediately take necessary steps to ensure the protection of human health and property, notify ADEM of the findings and proceed with a Remediation Plan as outlined below.

6.3.2 Remediation Plan

Within 7 days of detection, the Landfill Operator shall place in the Operating Record, the explosive gas levels detected, and the initial steps taken to protect human health and property. During the initial 7 day period, the facility will conduct additional explosive gas readings to delineate the extents of detectable concentrations in the vicinity of the monitored exceedance. For delineation, the Facility will conduct triangulated bar-hole punch readings at a depth of 4 feet, at a distance of 10, 25, and 50 ft from the monitored exceedance.

Within 20 days of detection, the Landfill Operator shall submit to ADEM the results of the delineation monitoring event and a plan for the continued monitoring and remediation of explosive gas . This plan shall describe the nature and extent of the problem and the proposed remedy. The plan shall be implemented upon approval by ADEM within 60 days of detection. Within this 60-day period, a copy of the plan shall be placed in the Operating Record and ADEM shall be notified of the plan's implementation.

6.4 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

The facility currently has an active landfill gas collection and conveyance system in-place to voluntarily collect, and control landfill gas being generated. The system currently consists of 63 vertical wells. As new cells are constructed, the system is expanded to collect the gas from each cell by installing horizontal wells with each new lift. Once the landfill has been closed, the system will be expanded to include all areas of the waste footprint.

7 WASTE INSPECTION PLAN

7.1 HAZARDOUS AND RESTRICTED WASTE DETECTION PLAN

Hazardous and restricted wastes which are unacceptable at the Black Warrior Solid Waste Facility, include but are not limited to the following: wet paint, used oil, free liquids (unless solidified prior to disposal, see 6.22), batteries, untreated medical waste, hazardous waste, regulated PCB wastes. In addition, bulk or non-containerized liquid, and containers capable of holding liquids are not acceptable at this landfill. Lists of acceptable and unacceptable waste streams for the MSW disposal area will be posted at the scale house and will be made available to all landfill personnel.

The following plan shall be implemented by the Landfill Operator to detect and prevent the disposal of hazardous and restricted wastes at the landfill facility. This plan shall include at a minimum the implementation of the following:

1. Landfill personnel must inspect all suspicious waste loads and random inspections of waste during the day. All waste load inspections shall be supervised by trained personnel and shall be performed in a designated area of the facility. The results of each inspection will be recorded on a Waste Load Inspection Form and filed at the landfill office. The information recorded from each inspection shall include the waste origin, the waste transporter, and any certifications provided by the waste generator. Copies of the Waste Load Inspection Forms shall be included in the Operating Record.
2. The Landfill Operator will collect the ADEM waste approval forms from the generator/hauler prior to allowing disposal. All waste approval forms are to be kept on file.
3. Upon discovering restricted wastes, the Landfill Operator must immediately notify the generator and/or transporter that the material is restricted from disposal in a MSWLF facility and must contact ADEM for the appropriate action to be taken.
4. The Landfill Operator shall notify ADEM's Solid Waste Branch and the transporter of the waste, if any hazardous or restricted waste is discovered.
5. The Landfill Operator shall notify ADEM prior to allowing the disposal of any questionable waste stream in the MSW disposal area.
6. If there are questions regarding any incoming waste stream, the facility personnel have been instructed to notify ADEM's Solid Waste Branch at (334) 271-7700 prior to allowing the disposal of the waste at the landfill.
7. The landfill personnel shall receive training from the Landfill Operator or solid waste organization's training programs to detect hazardous or restricted waste.

The Landfill Operator or landfill personnel will make random inspections of the waste and may reject any waste brought in for disposal that violates the waste restrictions.

8 CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL

8.1 CONCEPTS AND OVERVIEW OF THE QA/QC PLAN

The quality assurance and quality control (QA/QC) plan for the construction of the liner, leachate-collection, and final-cover systems for the Black Warrior Solid Waste Authority will ensure that construction of these systems conforms to the project design specifications and to the design requirements of ADEM Administration Code R.336-13-4. Guidance for the preparation of the QA/QC plan was provided by a document developed by the US Environmental Protection Agency: *Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities* (EPA/600/R/182, September 1993).

As part of each construction project, specifications will be prepared to accompany the construction plans. The specifications will be used to supplement this QA/QC plan.

8.1.1 Definitions

Differences between QA and QC of manufactured materials, and between QA and QC for construction of the systems are explained by the following definitions:

- *Manufacturing Quality Control (MQC)* – A planned system of inspection that is used to directly monitor and control the manufacture of a material which is factory originated. MQC is normally performed by the manufacturer of geosynthetic materials and is necessary to ensure minimum (or maximum) specified values in the manufactured product. MQC refers to measures taken by the manufacturer to determine compliance with the requirements for materials and workmanship as stated in certification documents and contract plans.

- *Manufacturing Quality Assurance (MQA)* – A planned system of activities that provide assurance that the materials were constructed as specified in the certification documents and contract plans. MQA includes manufacturing facility inspections, verifications, audits, and evaluation of the raw materials and geosynthetic products to assess the quality of the manufactured materials. MQA refers to measures taken by the MQA organization to determine if the manufacturer is in compliance with the product certification and contract plans for approval.

- *Construction Quality Control (CQC)* – A planned system of inspections that is used to directly monitor and control the quality of a construction project (EPA, 1986). Construction quality control is normally performed by the Geosynthetics Installer, or for natural soil materials by the Earthwork Contractor, and is necessary to achieve quality in the constructed or installed system. CQC refers to measures taken by the installer or contractor to determine compliance with the requirements for materials and workmanship as stated in the plans and specifications for the project.

- *Construction Quality Assurance (CQA)* – A planned system of activities that provides the owner and permitting agency assurance that the facility was constructed as specified in the design (EPA, 1986). Construction quality assurance includes inspections, verifications, audits, and evaluations of materials and workmanship necessary to determine and document the quality of the constructed facility. CQA refers to measures taken by the CQA organization to assess if the installer or contractor is in compliance with the plans and specifications for a project.

8.1.2 Responsibility and Authority

Many individuals will be involved directly or indirectly in MQC/CQC and MQA/CQA activities for the Black Warrior Solid Waste Authority. Responsibilities and authority of principal organizations and individuals are described by the following:

Permitting Agency. The permitting agency is the Alabama Department of Environmental Management (ADEM). ADEM will review the permit application for compliance with the Department's regulations and will issue a permit based on this review. ADEM will review all MQA/CQA documentation.

Owner and Owner's Representative. The Owner or "permittee" of the Black Warrier Solid Waste Facility is the Black Warrior Solid Waste Authority. The Owner shall be responsible for complying with ADEM's requirements, awarding bids; coordinating communication for the project; initiating the implementation, preconstruction and progress meetings; and submitting of all QA/QC documentation. The Owner may, for all or portions of the work, designate an individual or party to act as the Owner's representative. All references to Owner in this document implicitly include the Owner's representative.

Design Engineer. The Design Engineer for the Black Warrior Solid Waste Facility is CDG, Inc. The Design Engineer also may be designated as the Owner's representative who will be responsible for the project design, including engineering plans and specifications; and for review, generation, and approval of all design and/or specification modifications and clarifications which may occur prior to and/or during construction.

Earthwork Contractor. The Earthwork Contractor shall be responsible for the proper construction of the earthwork related portions of the landfill lining and/or final cover systems. This may include site preparation, backfilling placement and compaction of soil components, placement of granular soils, and placement of vegetative cover. The Earthwork Contractor shall provide all equipment necessary to complete the construction in accordance with the project design (engineering plans and specifications).

Construction Quality Assurance Consultant. The CQA Consultant will be responsible for the implementation of this QA/QC plan and construction specifications.

During implementation of the QA/QC plan, the CQA Consultant shall be responsible for observing, documenting, and reporting the daily project activities. In addition, the CQA Consultant shall be responsible for the soil and/or geosynthetic material sampling and testing necessary to comply with the QA/QC plan.

The CQA Consultant shall report to the Owner any activities, observations or test results that indicate that construction activities are not in conformance with the project design (engineering plans and specifications). The CQA Consultant is responsible for development and issuance of the final report which shall be sealed and signed by a Professional Engineer, registered in the State of Alabama.

Geosynthetics Manufacturer. The Geosynthetics Manufacturer shall be responsible for manufacturing and supplying various geosynthetic materials that meet or exceed the requirements of the work, as set forth

in the project design. The Geosynthetic Manufacturer shall provide the required documentation as set forth in this QA/QC plan.

Geosynthetics Installer. The Geosynthetics Installer shall be responsible for the proper installation of the geosynthetics components of the lining and/or final cover systems. This work may include the deployment, welding, sewing, repair, and testing of geosynthetic materials. The Geosynthetics Installer shall provide all materials, equipment, and labor necessary to complete the installation of the geosynthetics in compliance with the project design. The Geosynthetics Installer shall be responsible for the performance of all geomembrane nondestructive testing and for the testing of the trial welds. This portion of the work shall also include assistance in preparation of a record drawing which indicates the panel layout, destructive test locations, and other pertinent data concerning the installation of the geomembrane liner.

Licensed Surveyor. The individual or firm designated as the Licensed Surveyor shall be responsible for providing surveying services and field data (i.e., survey notes, computer disks) as required by the project design (engineering plans and specifications). The Licensed Surveyor shall be licensed in the State of Alabama.

8.1.3 Meetings

Prior to the initiation of any construction activities, a preconstruction meeting shall be conducted. This meeting shall be attended by the Owner, Design Engineer, Earthwork Contractor, Geosynthetics Installer, and CQA Consultant. Other parties may be invited to attend based upon their responsibilities and authority. Issues to be addressed during this meeting shall be:

- Responsibilities of all parties as defined in these specifications;
- Project schedule;
- Appropriate lines of communication;
- Testing frequencies and procedures;
- Modifications to the project design and/or QA/QC plan;
- Coordination of Earthwork Contractor and Geosynthetics Installer activities;
- Soil subgrade acceptance procedures;
- Level of QA monitoring required for nondestructive testing;
- Procedures for final acceptance of geomembrane prior to completion;
- Proposed and acceptable construction/installation methods.

This meeting shall be documented by the CQA Consultant. Minutes of the meeting shall be prepared and provided to all parties in attendance.

8.2 SOIL COMPONENTS

The soil components generally consist of the soil subgrade, a compacted soil infiltration layer, and a drainage layer. The soil components of the final cover system consist of a soil infiltration layer, an erosion

control layer comprised of general earth fill, and a topsoil layer. These specifications address only the soil components (excluding the topsoil layer) of the system and general earth fill. Specifications for material not related to soils are provided in other sections and attachments.

8.2.1 Construction Specifications

8.2.1.1 General Equipment Requirements

The Earthwork Contractor shall provide sufficient equipment to construct the work in accordance with the project plans, specifications, and schedule. The CQA Consultant shall approve the compaction equipment to be used for the project.

8.2.1.2 Construction Methods

Construction methods for the various soil components are described in the following paragraphs:

General Earthfill. The general earthfill shall consist of earthen material that will meet the site-specific design specifications. Except for the erosion control layer in the final cover system, general earthfill shall be used only in those areas not included in the permitted disposal area and berms of the landfill. This general earthfill shall be placed and compacted in accordance with the project specifications and design criteria.

Compacted Soil Infiltration Layer. The installation of the compacted clay liner shall be under the supervision of a soils engineer who shall certify to the Department that the infiltration layer was installed in accordance with the approved plans. The compacted soil infiltration layer shall be placed in lifts that are no more than six (6) inches thick. Soil clods larger than six (6) inches shall be broken down. If necessary, moisture conditioning shall be conducted to achieve a relatively uniform moisture content throughout the soil. Moisture conditioning may include wetting, followed with discing to raise moisture content; or discing to facilitate drying to lower moisture content. The scarifying prior to placement of the next loose lift should be at a depth of at least 1 inch.

The soil infiltration layer shall be placed and compacted to meet the design requirements as specified in Table 9-2. Each lift shall be thoroughly and uniformly compacted. Each compacted lift shall be scarified prior to the placement of the next loose lift.

In areas where heavy equipment cannot be used for compaction, soil shall be placed in maximum of 4-inch loose lifts and compacted using a manually operated, motorized tamper. If equipment other than the specified above, or an increased lift thickness (up to 6 inches) is used, the Earthwork Contractor must first demonstrate that the process will meet project specifications. Areas where moisture/density field testing indicates non-conforming placement or compaction of soils shall be corrected by the Earthwork Contractor to the satisfaction of the project specifications and CQA Consultant.

During cold weather construction, the Earthwork Contractor shall protect the compacted clay liner from the weather by performing the following:

Removing all ice, snow and/or frozen soil prior to placing a lift and not placing a lift utilizing frozen soil, and

Scarifying (or discing) and recompacting any soil lift that has been subject to a freeze and thaw cycle.

During warm weather construction, the Earthwork Contractor shall protect the compacted soil infiltration layer from desiccation cracking by performing some or all of the following as necessary:

Sprinkling the infiltration layer with water, as necessary;

Working a smaller area;

Removing and replacing or reconditioning any soil that has experienced excess desiccation cracking prior to placement and compaction of the next lift;

Overbuilding the infiltration layer and grading to design specifications.

Measurement of base layer thickness and slope shall be verified by elevation checks of the final surface of the compacted clay liner by a Licensed Surveyor, on a fifty (50) foot grid with a tolerance of +0.0 ft to +0.3 ft.

Drainage Layer. If the design requires a drainage layer, the material shall be free of organic material and debris. The Earthwork Contractor shall place the material in such a manner as to achieve a hydraulic conductivity equal to or greater than the permeability specified in Table 9-3. The drainage layer thickness shall be measured by surveying the elevation of the final surface of the drainage layer. The survey shall be conducted by a Licensed Surveyor on a 50-foot grid, and will have a vertical tolerance of +0.0 to +0.3 ft.

8.2.2 Preconstruction Evaluation of Soil Materials

Prior to construction, the CQA Consultant will identify, sample, and test materials to be used for soil fill for the compacted clay liner and for the drainage layer. Sampling and testing shall conform to the parameters as specified in Tables 9-1 and 9-3. Preconstruction tests of materials which are later used for construction may be used to meet the CQA testing frequency. If alternative borrow sources are identified, preconstruction testing and evaluation of each source will be required. Unless modified by site specific addenda, the general criteria for soil materials procured for this project are the following:

Soil fill shall consist of granular or cohesive soil from an approved borrow source to be used as a fill prior to placement of the compacted soil infiltration layer materials. The material shall be free of organics (less than 3 percent by volume), trash, clods or rocks larger than 6 inches, and other deleterious material.

Compacted soil infiltration layer materials shall consist of a clean, select soil free of organic, trash, excessive silt, or other deleterious material. The soil shall be capable of achieving the permeability required by the project specifications, and other project specific design criteria. Clods or rocks larger than

six (6) inches shall not be acceptable. For the top six (6) inches of the compacted clay liner, rocks or stones larger than ½ inch shall not be acceptable.

Drainage layer material shall consist of granular, non-cohesive permeable materials that contain ≤ fifteen (15) percent (dry weight) passing the No. 200 Standard U.S. sieve. The placed material shall have a coefficient of permeability greater than 5.0×10^{-4} cm/sec.

8.2.3 Subgrade

The subgrade shall be compacted to the minimum Standard Proctor Density (ASTM D698) as required by the project specification. Optimum moisture content shall be within plus or minus 3 percent determined by Standard Proctor density (ASTM D698). In-place density shall be determined by sand cone (ASTM D1556), nuclear density (ASTM D2422), soil density gauge (ASTM 7830), or drive tube (ASTM D2931) method at a minimum rate of 1 test per 20,000 square feet per six (6) inch lift.

Prior to placement of the compacted clay liner, the subgrade shall be proof rolled and examined visually to identify areas containing large rocks or boulders in excess of six (6) inches in any dimension. Such identified areas shall be undercut and replaced with soil in accordance with the specific design criteria.

Before placement of the compacted clay liner system, the final elevation of the prepared subgrade shall be verified by a Licensed Surveyor to assure that the proper design elevations have been attained. The survey shall be conducted on a fifty (50) foot grid, and will have a vertical tolerance of +0.0 to -0.2 ft.

8.2.4 Laboratory Testing

The laboratory test results shall be evaluated and compared with the field test results to confirm that the materials being placed, and the installation procedures used are in accordance with the project specifications. The CQA Consultant shall verify that the required testing frequencies are satisfied. Soils placed which do not meet the specifications shall not be accepted. Testing frequencies and material properties are listed in Table 9-2.

Permeability testing shall be conducted on all materials placed during construction which have permeability requirements specified in the design. Test methods and material properties of the compacted clay liner and drainage layer materials are listed in Tables 9-1, 9-2, and 9-3.

8.2.5 Field Testing

Nuclear density or other approved test methods shall be used to determine the in-place moisture/density of the placed soils. If the nuclear density method is used, the nuclear gauge should be calibrated and checked in accordance with the manufacturer's recommendations on a daily basis. A periodic accuracy check shall be performed once per 20 nuclear density tests, or at least 1 per week, using the sand cone (ASTM D1556), drive cylinder (ASTM D2937), or balloon (ASTM D2167) method. Field testing frequencies are listed in Tables 9-2 and 9-3.

If field testing results indicate densities or moisture contents not in accordance with the project specifications, the failing areas shall be reworked to meet project specifications.

8.2.5.1 Field Testing Sample Locations

Grids shall be based on a 100-foot grid system superimposed on the construction plans. Grid patterns shall have line spacing of 100 feet. Grids and stations shall be clearly marked, and the perimeter markers surveyed. Sample locations shall be selected at random, and coordinates identified on a daily field test result form and a reduced scale site plan. Samples shall be randomly located within a grid sub-section and varied with each lift. Elevations or lift number shall be identified.

8.3 GEOSYNTHETIC COMPONENTS

This section includes the specifications of materials and installation of a geosynthetic clay liner (GCL), a high-density polyethylene (HDPE) geomembrane liner, geotextile, and geonet as indicated in the project design.

8.3.1 Pre-Qualification

Pre-qualification requirements of the Geosynthetic Manufacturer are the following:

The Geosynthetics Manufacturer quality control manual plan.

The Geosynthetics Manufacturer shall submit a list of at least 10 projects, totaling a minimum of 2,000,000 square feet, for which he has produced a similar geosynthetic material. For each project, the following information shall be provided: name, location, date of project, name of designer, installer, owner, and the owner's contact person.

The Geosynthetics Manufacturer shall submit information on the resin used to manufacture the specific geomembrane provided for the project.

The Geosynthetics Manufacturer shall submit a list of the resin material properties. The applicable resin properties for this project are listed in Table 9-4.

Pre-qualification requirements of the Geosynthetics Installer are as follows:

The Geosynthetics Installer shall submit a Quality Control Procedures Manual and plan for the installation of the geosynthetics on the project.

Provide information on personnel, daily production rates, and applicable field testing of geosynthetics.

8.3.2 Preconstruction Submittals

8.3.2.1 Geomembrane Manufacturer

The Contractor shall submit the following information to the Owner, Engineer, and CQA Consultant not less than 1 week prior to use of the material on the project.

The Contractor shall submit a copy of each of the Resin Quality Control Certificates issued by the Resin Supplier for the specific geomembrane material provided for the project, including the extrusion welding rod or extrusion welding beads. The Geomembrane Manufacturer shall perform and submit the results of quality assurance testing which he has conducted on the resin used in manufacturing the specific material for this project. This testing shall also be performed at a minimum frequency of one per resin lot or batch. The resin testing performed shall meet or exceed the requirements for the applicable product listed in Table 9-4.

The Contractor will also submit a copy of the Geomembrane Roll Quality Control Certificates. These certificates shall be supplied at a frequency of 1 per every 100,000 square feet of geomembrane material produced and supplied to the project. These certificates shall be issued only for the geomembrane rolls sampled and tested by the Geomembrane Manufacturer and, at a minimum, shall include thickness, density, carbon black content, carbon black dispersion, and tensile properties. The properties should meet or exceed those listed in Table 9-5.

8.3.2.2 Geotextile Manufacturer

The Contractor shall submit to the Owner not less than 1 week prior to use of the material a copy of each of the geotextile roll Quality Control Certificates. These certificates shall be provided at a minimum frequency of 1 per every 100,000 square feet of geotextile material produced for the project. These certificates shall be issued only for the geotextile rolls sampled and tested by the Geotextile Manufacturer and, at a minimum, shall include the property values and test methods for thickness, mass per unit area, grab strength and elongation, trapezoidal tear strength, burst strength, and puncture strength. The geotextiles should meet or exceed the properties in Table 9-6.

8.3.2.3 Geonet Manufacturer

The Contractor shall submit not less than 1 week prior to use of the material a copy of each of the resin Quality Control Certificates issued by the Resin Supplier for the geonet material to be supplied for the project. These certificates shall be provided at a minimum frequency of 1 per resin lot or batch. The Geonet Manufacturer shall perform and submit the results of quality assurance testing which he has conducted on the resin used in manufacturing the specific material for this project. The resin testing performed for the resin and the geonet will meet or exceed the properties and test methods detailed in Table 9-4.

The Geonet Manufacturer shall submit a copy of the Geonet Roll Quality Control Certificates. These certificates shall be supplied at a minimum frequency of 1 per 40,000 square feet of geonet material

produced and supplied to the project. Tests will include the following properties: thickness, mass per unit area, density, carbon black content, and melt index. The geonets should meet or exceed the properties in Table 9-7.

8.3.2.4 GCL Manufacturer

The GCL Manufacturer shall submit to the Owner not less than 1 week prior to use of the material a copy of each of the GCL roll Quality Control Certificates. These certificates shall be provided at a minimum frequency of 1 per every 100,000 square feet of GCL material produced and supplied to the project. These certificates shall be issued only for the individual geotextile rolls sampled and tested by the GCL Manufacturer and, at a minimum, shall include the property values and test methods for thickness, mass per unit area, grab strength and elongation, shear resistance, and permeability The GCL should meet or exceed the properties in Table 9-8.

8.3.2.5 Geosynthetics Installer

All preconstruction submittals required of the Contractor shall be received by the Owner not less than 1 week before the start of geosynthetic material installation. The Contractor shall provide an installation schedule for the project. The Contractor shall submit a drawing of the proposed GCL and geomembrane panel layouts. These drawings shall illustrate the general location/orientation of GCL and geomembrane seams.

8.3.3 Installation Submittals

The Geosynthetics Installer or Contractor shall be responsible for submitting the following information during the installation process. Daily reports will be submitted detailing work activities, including seaming logs, panel placement logs, trial weld logs; personnel present onsite; signed subgrade acceptance certificates for each of the areas to be covered by GCL; and any other required quality control documentation.

8.3.4 Project Completion Requirements

The Geosynthetics Installer shall supply the following information at the completion of the project:

- A warranty for the geosynthetic materials obtained from the Geosynthetic Manufacturer;
- Certificate(s) of acceptance of the soil subgrade surface;
- Geomembrane seam strength destructive test results.

The Geosynthetics Installer will assist in providing a record drawing detailing geomembrane panel placement with corresponding panel identification, panel repairs and locations, and destructive test locations.

8.3.5 Protection of Geosynthetics

Placement of the drainage layer on geosynthetics shall not damage the underlying geosynthetics. Placement requirements are as follows:

Equipment shall not be operated directly on a geosynthetic. A minimum of 1 foot of the drainage layer will be in place prior to operating low ground pressure (< 5 psi) equipment. Heavier track-mounted and light weight rubber-tired equipment and vehicles shall be operated only when a minimum of 2 feet of material lies over the geosynthetic. Heavy rubber-tired equipment, such as scrapers and dump trucks, shall only be operated in areas where a minimum of 3 feet of material has been placed over the geosynthetic.

The placement of drainage material will be performed so as not to induce excessive stresses in the geosynthetics.

The placement of drainage material will be performed in such a manner so as to minimize wrinkles.

The storage of geosynthetic material at the project site is the responsibility of the Contractor from the time the materials are off-loaded until the time the completed installation is accepted by the Owner. The materials shall be stored in an area agreed to by the Contractor and the Owner during the Preconstruction Meeting.

The Contractor is responsible for protection of the materials from the elements. The geosynthetic rolls shall be protected from dirt, mud, dust and damage at all times prior to deployment. The Contractor is responsible for any damage to the material resulting from improper storage techniques such as poor or incorrect storage area subgrade, improper stacking of the material, and exposure of the materials to the elements.

The geosynthetics will be stored in accordance with the Geosynthetics Installer's Installation Quality Control Procedures Manual and the Geosynthetic Manufacturer's recommendations. If site specific conditions warrant, the material may require the application and maintenance of a proper cover, which shall be the responsibility of the Contractor.

8.3.6 GCL Transportation, Handling, and Storage

8.3.6.1 Transportation

The transportation of the GCL rolls is the responsibility of the Geosynthetics Installer (or other party as assigned by contract and designated in the Preconstruction Meeting). The designated party is responsible for all damages to the materials incurred prior to and during transportation to the project site. This includes, but is not limited to, physical damage to the material resulting from improper handling, exposure to the elements, and loss of or illegible labeling. The Geosynthetics Installer shall inform the Owner of GCL shipment, a minimum of 24 hours in advance of its arrival on site.

8.3.6.2 Handling

The handling of the GCL is the responsibility of the Geosynthetics Installer from the time the materials arrive on site, including off-loading until the time the completed installation is accepted by the Owner. The handling of the GCL material shall be performed in accordance with the Geosynthetics Installer's Installation Quality Control Procedures Manual.

Handling of rolls of geotextile shall be done in a competent manner such that damage does not occur to the product. In this regard, ASTM D4873 (Standard Guide for Identification, Storage, and Handling of Geotextiles) shall be followed. The Geosynthetics Installer shall be responsible for all damage incurred to the materials during handling. This includes, but is not limited to, physical damage to the material resulting directly from equipment during off-loading, site transport, and deployment processes, or indirectly from the leakage or spillage of any fluids associated with the Geosynthetics Installer's activities.

Severely damaged geotextile rolls, as determined by the CQA Consultant, may be rejected by the Owner and, if so, will be required to be removed from the project site and replaced at no expense to the Owner. Any materials, or portion thereof, exposed to leaking hydrocarbon fluids, shall be removed from the project site and/or disposed of and replaced at no expense to the Owner.

8.3.6.3 On-Site Storage.

The storage of GCL material at the project site is the responsibility of the Geosynthetics Installer from the time the materials are off-loaded until the time the completed installation is accepted by the Owner. The materials shall be stored in an area agreed to by the Geosynthetics Installer and the Owner during the Preconstruction Meeting.

The Geosynthetics Installer is responsible for the protection of the materials from the elements. The GCL rolls shall be protected from dirt, mud, dust, and damage at all times prior to deployment. The Geosynthetics Installer is responsible for any damages to the material resulting from improper storage techniques such as poor or incorrect storage area subgrade, improper stacking of the material, and exposure of the materials to the elements. The GCL rolls shall not be stacked more than 2 high, to protect against damaging when being removed from the stockpile. Also, the rolls shall be stacked in such a way that access for roll identification and conformance testing is possible. The integrity and legibility of roll labels must be maintained during storage.

The GCL materials shall be stored in accordance with the Geosynthetics Installer's Installation Quality Control Procedures Manual, the GCL Manufacturer's recommendations, and ASTM D4873 (Standard Guide for Identification, Storage, and Handling of GCL). If site specific conditions warrant, the materials are to be protected from the elements, dirt, and debris by the application and maintenance of a proper cover, which shall be the responsibility of the Geosynthetics Installer.

Excessive damage to the GCL due to the improper transportation, storage, or handling of the material shall be sufficient reason for the rejection of a roll, or portion of a roll, by the Owner.

8.3.7 Soil Subgrade Surface Preparation

8.3.7.1 Soil Subgrade.

The area of subgrade which is to be prepared for the installation of GCL shall be large enough such that the Geosynthetics Installer is not delayed, without exposing large areas of prepared subgrade to the elements for prolonged periods of time. It is the responsibility of the Earthworks Contractor to maintain the prepared subgrade prior to the acceptance of the area by the Geosynthetics Installer.

The surface on which the geotextile is to be placed shall be reasonably free of protrusions, cavities, and irregularities which may potentially jeopardize the integrity of the GCL. The required subgrade soil strength, as well as the maximum allowable desiccation crack dimensions and the maximum allowable rock particle size are to be specified by the Design Engineer in advance of the Preconstruction Meeting. The subgrade and subgrade surface are to be constructed in accordance with these specifications as well as the Geosynthetics Installer's Installation Quality Control Procedures Manual. If no such specifications are provided from either of these two sources, the following specifications will be enforced. The surface to be lined shall be free of desiccation cracks larger than ¼-inch in width and 4 inches in depth. The uppermost lift of the subgrade shall be reasonably free of angular particles greater than ½-inch, measured in the largest dimension. Verification of the subgrade strength is included in the scope of work for earthworks.

If the prepared soil subgrade is a granular soil layer, the maximum size and the angularity of the allowable particles will be governed by the specifications for that material.

It shall be the responsibility of the CQA Consultant to observe and document that the subgrade surface is in compliance with these specifications. Areas which are not in compliance shall be repaired or removed and replaced at no cost to the Owner.

After the surface of subgrade layer has been accepted by the Geosynthetics Installer, it shall be his responsibility to indicate to the Owner any area which is no longer acceptable as a result of a change in conditions (erosion features, ponded water, etc.). Any damage to the subgrade caused by installation activities shall be repaired at the Geosynthetics Installer's expense.

8.3.8 Deployment Specifications

8.3.8.1 Weather Conditions.

The Geosynthetics Installer shall not attempt the deployment of GCL during precipitation events, on slopes with frost or precipitation accumulation without prior authorization of the Owner and proper safety precautions.

8.3.8.2 Method of Placement.

If the geotextile is to be deployed directly over the subgrade, the Geosynthetics Installer shall submit a signed subgrade acceptance form to the Owner prior to covering the area. Subgrade acceptance should

consider the impact of subgrade conditions on geosynthetics overlying the GCL. The procedures for approval and acceptance of subgrade are set forth in Section 8.3.7.1.

GCL panels shall be placed in a controlled manner, such as pulling, hoisting, or rolling. Uncontrolled placement methods, such as "free fall" shall not be allowed. The method of placement to be employed by the Geosynthetics Installer shall be agreed upon by the Owner prior to use. The panels shall be placed in such a manner that the GCL is not damaged, and that the deployment process does not damage any other materials. Any such damage shall be repaired or replaced by and at the expense of the Geosynthetics Installer.

Personnel working on the GCL shall not smoke, wear damaging shoes, or engage in other activities which could damage the material. The Geosynthetics Installer shall provide adequate protection to the GCL from any equipment or concentrated personnel traffic associated with construction. Any damage to the GCL resulting from such activities will, as directed by the Owner, be repaired or removed, disposed of and replaced by, and at the expense of, the Geosynthetics Installer. The Geosynthetic Installer's Installation Quality Control Procedures Manual shall address the safety precautions to be taken and the safety equipment to be used while deploying and seaming GCL.

GCL panels shall be deployed in such a manner as to be reasonably flush with the material directly beneath it and preclude folds and wrinkles which may become folds. Any wrinkle or fold that may manifest itself into other geosynthetic layers shall be removed.

GCL panels placed on slopes greater than or equal to 10 percent shall have, at most, 1 end to end overlap (cross seam) along the slope length and shall have continuous GCL panels installed immediately adjacent on both sides, unless otherwise approved by the Owner. In any case, GCL panels on slopes shall extend a minimum of 5 feet beyond the toe.

If lightly colored GCL is used, precautions shall be taken to avoid "snow blindness" of personnel.

The GCL shall be cut with a device approved by the Owner. Unshielded razor knives are generally not acceptable.

The GCL shall be free of mud, dust, dirt, and debris that could damage any of the geosynthetic layers. The Geosynthetics Installer shall clean the work area daily by removing scrap material and other debris associated with GCL installation activities and disposing of it in proper receptacles.

8.3.8.3 Inspection of GCL

The GCL shall be visually inspected by the CQA Consultant during deployment from the roll to identify unacceptable areas of material. Any irregularities in the GCL material identified during the visual inspection shall be marked for repair in accordance with the procedures detailed in Sections 8.3.9 and 8.3.10 of this chapter. If an area is flawed or defective and, in the judgment of the CQA Consultant, is indicative of unacceptable material, the panel or the damaged portion of the panel shall be removed and replaced by, and at the expense of, the Geosynthetics Installer.

8.3.8.4 Temporary Loading

The Geosynthetics Installer is responsible for the temporary loading of the GCL during installation. The Geosynthetics Installer shall use sandbags or other means to restrain the GCL without damage and to prevent the material from being pulled out of the anchor trench until the designed permanent anchoring system is employed. Damage or pullout caused by improper or insufficient temporary loading shall, as determined by the CQA Consultant and directed by the Owner, be repaired or removed, disposed of and replaced by, and at the expense of, the Geosynthetics Installer.

8.3.8.5 Permanent Anchoring

The party responsible for the permanent anchorage of the GCL will be designated prior to the bid. Permanent anchorage shall be installed in accordance with the project design (engineering plans and specifications), and as soon as practicable following repairs and testing of the GCL material and the installation of overlying layers. Care shall be taken in backfilling anchor trenches. Any damage to the GCL which results from backfilling the anchor trench shall be repaired by, and at the expense of, the party responsible for backfilling.

8.3.9 Seaming Specifications

End-roll and edge-roll overlaps should be avoided on slopes greater than ten (10) percent, and in the case in which soil or granular materials are to be placed over the GCL, all seams shall have a minimum edge-roll overlap of 6 inches. End-roll overlaps shall be a minimum of 24 inches. GCL panels on slopes greater than ten (10) percent shall have, at most, one (1) end to end overlap (cross seam) along the slope length and shall have continuous GCL panels installed immediately adjacent on both sides, unless otherwise approved by the Owner.

Bentonite-enhanced seams are constructed between the overlapping adjacent panels as follows. The underlying edge of the longitudinal overlap is exposed and then a continuous bead of granular sodium bentonite is applied along a zone defined by the edge of the underlying panel and the 6-inch (150-mm) line. The granular bentonite shall be applied at a minimum application rate of one quarter pound per lineal foot (0.25 lb/ft). A similar bead of granular sodium bentonite is applied at the end-of-roll overlap.

If the GCL is employed as a structural element of the design (reinforcement), the Design Engineer shall specify the acceptable seaming method(s) and/or a minimum seam strength requirement. In such cases, the Design Engineer shall also specify the method of inspection and testing.

Seaming shall not be attempted in the presence of frost, condensation, or any precipitation events unless approved by the Owner and proper safety precautions are implemented by the Geosynthetics Installer.

The Geosynthetics Installer shall take measures to prevent soil, granular materials, or foreign materials from entering or becoming trapped beneath the GCL both during and following installation. The Geosynthetics Installer's Installation Quality Control Procedures Manual shall address the safety equipment and procedures to be employed during seaming operations on slopes.

8.3.10 Repairs

Holes or tears in and damage to the GCL shall be repaired by manufacturer's recommendations. Patches shall be made from the same geotextile material as that used for panels. All repairs shall be made by sewing, with the exception of those required in areas in which thermal seam bonding is allowed by this QA/QC plan and/or approved by the Owner.

Patches to be sewn into place shall extend a minimum of 12 inches in all directions beyond the defect area. Patches shall be continuously sewn into place. The seam type, stitch type and location, and the thread shall be the same as that specified in Section 8.3.9 for GCL panel seaming.

8.3.11 Geomembrane Deployment Specifications

8.3.11.1 Proposed Panel Layout

The geomembrane panels shall be placed in accordance with the Proposed Panel Layout Drawing submitted to the Owner prior to the commencement of the installation. The Proposed Panel Layout Drawing shall, at a minimum, include the approximate location of geomembrane seams, the intended general sequential order of geomembrane panel placement.

Any modifications to the panel layout, or the proposed sequential order of panel placement, shall be brought to the attention of the CQA Consultant and the Owner at the earliest possible time and prior to the actual placement of the panels which do not conform to the intent of the Proposed Panel Layout Drawing. Any significant changes to the proposed panel layout require review by the CQA Consultant and the approval of the Owner prior to implementation.

8.3.11.2 Panel Identification

The Geosynthetics Installer will be responsible for labeling geomembrane panels as they are installed. The label shall be made using an acceptable marker. The labels shall include: a panel number which indicates the sequence of deployment, the roll number from which the panel was obtained, and the date the panel was placed. The Owner may refuse to accept any panel, portion of panel, or roll which is not properly labeled. Any portion of a geomembrane roll remaining after the deployment of panels shall be promptly labeled with the roll number such that the material can be positively identified prior to subsequent use.

8.3.11.3 Weather Conditions

Deployment of geomembrane generally will not be performed at ambient temperatures below 32^0 or above 105^0 degrees Fahrenheit. The ambient temperature shall be measured at a location agreed upon by all parties during the Preconstruction Meeting.

The Geosynthetics Installer shall not attempt the deployment of geosynthetics membrane during precipitation events, including heavy fog; in the presence of excessive winds; over ponded water; or over frozen subgrade. However, the Owner may allow deployment during precipitation events if adequate shelter is provided which results in acceptable conditions.

8.3.11.4 Method of Placement

The Geosynthetics Installer shall not deploy more geomembrane panels than can reasonably be welded or seamed during that same day. The Geosynthetics Installer shall further limit the deployment of panels during periods of impending inclement weather such that only 1 panel per seaming device is unwelded at any given time. In the presence of excessive winds, the Geosynthetics Installer shall temporarily load all deployed panels along the edges of the entire length and width, such that the geomembrane is protected against uplift. Further, the panels shall be placed such that their overlap will minimize the potential for uplifting by wind or damage to the subgrade.

Geosynthetic panels shall be placed in a controlled manner, such as pulling, hoisting, or rolling. Uncontrolled placement methods, such as "free fall" shall not be allowed. The method of placement to be employed by the Geosynthetics Installer shall be agreed upon by the Owner prior to use. Geomembrane panels shall be placed in such a manner that the geomembrane is not scratched or crimped. Any such damage shall be repaired in accordance with the procedures described in the QA/QC Manual or disposed of and replaced by the Geosynthetics Installer and at no expense to the Owner.

Personnel working on geosynthetics shall not smoke, wear damaging shoes, or engage in other activities which could damage the material. The Geosynthetics Installer shall provide adequate protection to the geosynthetics from any equipment or concentrated personnel traffic associated with construction. Any damage to the geosynthetics resulting from such activities will, as directed by the Owner, be repaired or removed, disposed of and replaced by, and at the expense of the Geosynthetics Installer. Geomembrane panels shall be deployed in such a manner as to reduce wrinkles or fishmouths.

Geomembrane panels placed on slopes greater than or equal to 10 percent shall have no cross seams and shall extend a minimum of 5 feet beyond the toe.

The geosynthetics shall be free of mud, dust, dirt, and debris that could damage any of the geosynthetic layers. The Geosynthetics Installer shall clean the work area daily by removing scrap material and other debris associated with geosynthetic installation activities.

8.3.11.5 Inspection of Geosynthetics

The geosynthetics will be visually inspected by the CQA Consultant during deployment from the roll to identify unacceptable areas of material. Irregularities in the geosynthetics material identified during the visual inspection shall be marked for repair. If an area is flawed or defective and, in the judgment of the CQA Consultant, is indicative of unacceptable material, the panel or the damaged portion of the panel shall be removed and replaced by the Geosynthetics Installer and at no expense to the Owner.

8.3.12 Geosynthetic Seaming Specifications

8.3.12.1 Seaming Method

The principle seaming method to be employed shall be the dual-track fusion seaming process. Repairs, appurtenances, and short segments of seam which would be impractical for fusion seaming may be welded using the extrusion seaming process. The limiting seam length for use of the fusion or extrusion method will be agreed upon in the Preconstruction Meeting.

The Geosynthetics Installer shall maintain at least one spare seaming unit of each type of device employed on the project site at all times.

8.3.12.2 Seam Orientation and Location

The number of seams shall be minimized, and the orientation shall be parallel to the line of slope. No cross seams shall be placed on slopes steeper than 10 horizontal to 1 vertical. Cross seams must be a minimum of 5 feet from changes in grade, such as the toe of slope.

Generally, panels shall be overlapped such that the upslope panels overlie those downslope. The minimum overlap before fusion seaming shall be specified by the manufacturer but in any case, shall be no less than 4 inches. The overlap before seaming for extrusion welding shall be a minimum of 3 inches.

8.3.12.3 Weather Conditions

Seaming of the geomembrane generally shall not be performed at ambient temperatures below 32^0 or above 105^0 degrees Fahrenheit. The ambient temperature shall be measured at a predetermined location agreed upon by all parties during the Preconstruction Meeting.

Geomembrane seaming shall not be performed during precipitation events or during periods of excessive humidity unless adequate protection is provided, and the method is approved in advance by the Owner. Geomembrane seaming may be performed at lower ambient temperatures provided the requirements of QA/QC Cold Weather Seaming Plan are met; and the Owner has approved of the seaming methods and procedures. Increased quality control and quality assurance measures may be necessary for cold weather seaming.

8.3.12.4 Trial Seams

Each welding technician shall qualify to operate on a daily basis, by performing a trial seam prior to the beginning of each seaming period. These trial seams are required to be performed using each type of welding device to be employed by the seaming technician and on each type of geomembrane material to be utilized during that period. Additionally, a trial seam shall be made by each seaming device prior to seaming activities as well as at mid-day or at an interval of no greater than 5 hours, whichever is less. Under inclement weather conditions, the additional conditions of the QA/QC Cold Weather Seaming Plan shall also apply.

Trial seams shall be performed on pieces of geomembrane that are 12 inches in width by 5 feet in length for fusion seams or 3 feet in length for extrusion seams, with the appropriate overlap. All trial seams shall be performed under the same conditions as production seaming. The Geosynthetics Installer shall cut a minimum of 4 specimens from the completed trial seam. The specimens shall be obtained by die or template, to a predetermined width and configuration (1-inch-wide strips). 3 of the specimens shall be tested for peel adhesion (peel) and the fourth specimen shall be tested for bonded seam strength (shear). The remaining portion of the trial seam shall be labeled by the Geosynthetics Installer with the date and time, a unique trial seam number, welding device identification number and operating temperature(s), welding technician, and test results. This labeled portion of the trial seam shall be retained and delivered to the Owner for archiving at the completion of the project.

All trial seam specimens shall be tested by the Geosynthetics Installer in the field using an electrically operated tensiometer. The Geosynthetics Installer shall provide documentation certifying that the tensiometer has been calibrated within the past calendar year.

If any one of the four specimens fails, the entire trial seam is considered failing. Shear test specimens shall meet or exceed a strength of 100 percent of the rated strength of the parent geomembrane material and shall not fail within the weld. If either of these shear test criteria are not met, the specimen shall be considered failing. Peel test specimens shall not fail within the weld. Both tracks of dual-seam fusion welds shall be tested for peel adhesion. If either track fails within the weld, the test specimen is considered failing.

In the event that a trial seam fails, the entire trial seam procedure shall be repeated after the appropriate adjustments to the welding device and/or operator have been made. If a second trial seam fails, then two additional consecutive trial seams must achieve successful test results prior to the device and welding technician performing production field seaming. Alternatively, if successful trial seams are not achieved, the welding device and/or the welding technician shall be rejected and shall not be used for seaming until such time as the deficiencies are resolved and verification of the resolution is provided.

The CQA Consultant shall record the results of all trial seaming. The record shall consist of a trial seam number, welding technician, welding device identification number, operating temperature, ambient temperature, date, time, and test results.

8.3.12.5 Seam Preparation and Seaming

General seam preparation procedures, temporary bonding procedures, general equipment settings, including acceptable extrudate or wedge temperatures, rate or advancement, etc., and seaming procedures shall be specified in the Geosynthetics Installer's Installation Quality Control Procedures Manual.

Areas to be seamed shall be cleaned and free of moisture, debris, dirt, and any markings on the geomembrane. No solvents or adhesives shall be used as a temporary bond. Abrasion of geomembrane seam areas, as required for extrusion seaming shall be substantially confined to that area to be covered

by extrudate. The seam area shall be cleaned prior to abrasion and all abraded areas will be covered with extrudate. The seam area to be extrusion welded shall be abraded no more than 1 hour in advance of welding. All seams shall be welded and repaired through the entire length, including that portion to be buried in the anchor trench.

8.3.12.6 Repairs

All seam and non-seam areas of the geomembrane shall be visually inspected for signs of damage, blisters, punctures, undispersed raw materials, and any sign of contamination by foreign matter. Any defective or flawed areas observed shall be marked, repaired and tested, or re-evaluated in accordance with this QA/QC Plan. Each deficiency will be assigned a number so that the repair and testing of it can be adequately tracked and documented. Unless otherwise approved by the Owner, all air channels produced by the dual track fusion welding process shall be sealed at both ends and at any location where the air channel is severed and made discontinuous.

Patches shall be used to repair defects such as holes, tears, or cracks which penetrate the entire geomembrane thickness and areas where 3 or more panels come together to form a “Y” joint. Patches shall extend a minimum of 6 inches beyond the limits of the defect or joint and all corners of patches shall be rounded. Patches shall follow the contour of the defect area and remain free of dirt, moisture, debris and markings. Patches shall be temporarily bonded by heat welding; chemical adhesives and tape will not be allowed. The perimeter of the patch shall be abraded with a handheld grinder to produce a "beveled" edge. Patches shall be temporarily installed by heat welding along the entire perimeter of the patch and defective areas. The patch shall be installed flat along all edges with no wrinkles or folds. The patch seam area shall be abraded no more than 1 hour in advance of permanent welding. Patches must be permanently extrusion welded on the same workday in which they are installed.

8.3.12.7 Capping

Capping may be used to repair failed seams. Caps will extend a minimum of 6 inches beyond the defective seam.

8.3.12.8 Non-Destructive Seam Testing

All seams, including repairs and caps, shall be non-destructively tested over their entire length. Non-destructive test methods include air pressure testing of dual-track fusion seams, and vacuum testing or spark testing of extrusion seams. Other non-destructive test methods may be used by the Geosynthetics Installer only with prior authorization of the Owner.

The non-destructive testing equipment shall have been calibrated within the past calendar year and prior to use on the project site. Documentation of such calibration shall be provided by the Contractor.

Non-destructive testing shall generally be performed as production seaming operations progress. The Geosynthetics Installer shall record the following information on the geomembrane surface at the specific test location or at the beginning and/or end of a tested seam length:

Pressure Test: date, time at the beginning of the test; time at the end of the test, beginning test pressure (psi), ending test pressure (psi), technician's initials, and notation on the outcome of the test (pass or fail). Dual-track fusion seams shall be non-destructively tested using the pressure testing method in accordance with Geosynthetics Research Institute (GRI) test method GM6.

Air Pressure Inflation Schedule for HDPE and Coextruded Polyethylene Geomembranes
(both smooth and textured types)

Geomembrane Thickness		Minimum Pressure		Maximum Pressure	
(mm)	(mil)	(kPa)	(lb/in^2)	(kPa)	(lb/in^2)
1.0	40	165	24	205	30
1.5	60	185	27	205	30
2.0	80	205	30	205	35
2.5	100	205	30	205	35

- Vacuum Test: date, technician's initials, and notation on the outcome of the test (pass or fail).
- Spark Test: date; technician's initials, and notation on the outcome of the test (pass or fail).

Areas failing non-destructive testing shall be repaired according to the procedures outlined in the QA/QC Manual.

8.3.12.9 Destructive Testing: Location and Frequency

Destructive samples will be obtained from seams at a minimum average frequency of 1 per 500 linear feet of weld per operator. The Owner or CQA Consultant reserves the right to increase the seam destructive test sampling frequency beyond the minimum based upon actual welding conditions and the failure rate of other samples obtained on the project.

The CQA Consultant will select the sample locations as welding progresses. The Geosynthetics Installer will not be informed in advance of seam destructive test locations. The Geosynthetics Installer is responsible for obtaining all destructive samples. The sample location must be repaired according to the procedures detailed in the QA/QC Manual.

Each destructive test sample shall be labeled with the following information: a sample number, seam number, welding device number, date, and time. Destructive test sample locations shall be identified by the Geosynthetics installer and CQA Consultant on the record drawings.

8.3.12.10 Destructive Testing in the Field

Three geomembrane samples will be tested in the field for peel adhesion and shear by the Geosynthetics Installer in accordance with NSF Standard 54.

The results of the field testing shall be documented by the CQA Consultant. If either of the two field specimens fails, the entire destructive test is considered to be failing and additional destructive test samples shall be located by the CQA Consultant.

8.3.12.11 Destructive Testing in the Laboratory

The destructive seam testing will be performed in an on-site or off-site laboratory. The Owner's CQA Consultant will be responsible for selecting an approved laboratory and delivering the destructive samples to the laboratory. The results of these tests are to be reported within 48 hours of the time the samples were removed from the geomembrane. Specimens shall be tested in accordance with NSF Standard 54.

Peel and shear specimens for destructive test samples obtained from geomembrane seams shall have values that meet or exceed those listed in Tables 9-5. The seam shear strength shall be equal to or greater than 95 percent of the rated tensile strength of the geomembrane sheet at yield. The seam peel strength shall be equal to or greater than 65 percent of the rated tensile strength of the geomembrane sheet at yield.

8.3.12.12 Procedures for Destructive Test Failure

The following procedures shall apply whenever a sample fails the field destructive test. The Installer shall have two options:

The Installer shall reconstruct the seam between the failed location and any passed test location.

The Installer shall retrace the welding path to an intermediate location (at 10 ft minimum from the location of the failed test) and take a small sample for an additional field test. If this additional sample passes the test, then the seam shall be reconstructed between that location and the original failed location. If this sample fails, then the process shall be repeated.

In any case, all acceptable seams shall be bounded by 2 passed test locations (i.e., the above procedure shall be followed in both directions from the original failed location), and 1 sample for destructive testing shall be taken within the reconstructed area.

In the event that a sample fails a laboratory destructive test, then the above procedures shall be followed considering laboratory tests exclusively. Since the final seam must be bounded by 2 passed test locations, it may then be necessary to take 1 or more new samples for laboratory testing in addition to the one required in the reconstructed seam area.

Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and/or welding apparatus or welded since the last test seam. This will be done if, in the inspector's judgment, the cause of the failure is the welder's technique or the welding apparatus.

8.3.12.13 Geomembrane Cold Weather Seaming Plan

The following items should be followed when seaming is conducted in cold weather:

Surface temperatures of the geomembrane are to be determined immediately prior to welding.

Trial seams are to be performed immediately prior to field seaming in the morning and at increments not to exceed 5 hours in length during seaming operations.

Additional trial seams are to be performed for every 5^0 F change in ambient temperature when performing seaming at temperatures below 40^0 F.

Additional destructive tests will be performed at every 250 feet of seam length.

If temperatures fall below 32^0 F, extrusion welds shall be performed in an enclosed heated structure.

Extrusion welding shall be performed only with a hot air pre-heating element approved by the CQA Consultant.

Destructive testing may be increased based on the observations and determinations of the CQA Consultant.

Seaming operations will not be permitted at temperatures below 10^0 F.

8.3.13 Geocomposite Specifications

8.3.13.1 Deployment

The geocomposite shall be deployed in such a manner as to ensure that it is not damaged. On slopes the geocomposite shall be firmly anchored and rolled down the slope in a manner which keeps constant tension on the sheet. After unrolling, the sheet shall be positioned by hand, if necessary, to minimize wrinkles.

In windy conditions, geocomposites shall be weighted by sandbags to prevent wind uplift. Precaution shall be taken to prevent any damage to underlying materials during the placement of composites. Care shall also be taken not to entrap stones or dirt below or within the geocomposite. A visual inspection of the geotextile portion of the geocomposite shall be made to ensure that no harmful foreign objects are present.

8.3.13.2 Seams and Overlays

No horizontal seams shall be allowed on slopes. Adjacent panels of geocomposite shall be overlapped by at least 4 inches on the geonet portion and by at least 3 inches on the geotextile portion.

The geonet overlap shall be tied with plastic fasteners. Plastic ties shall be white or yellow to allow for easy inspection. Tying shall be every 5 feet along the slope, every 6 inches in the anchor trench, and every 6 inches along butt seams.

The geotextile shall be seamed by thermal bonding. Particular attention shall be paid to ensure that no cover material could penetrate the seam and potentially clog the system.

8.3.13.3 Repairs

Damaged areas of the geocomposite shall be repaired as follows:

If the geonet is undamaged but the geotextile is damaged, a geotextile patch shall be placed and thermally bonded with a minimum overlap of 12 inches in all directions.

If the geonet is damaged, the damaged geonet shall be removed and replaced with a minimum 6 inches overlap and ties placed every 6 inches. The geotextile shall be patched and thermally bonded with a minimum overlap of 12 inches.

If the damaged area is judged to be large by the CQA Consultant, that area of the geocomposite shall be replaced.

8.4 LEACHATE COLLECTION SYSTEM

The installation of the leachate collection system should follow the manufacturer's Installation Guide. Additional installation items are as follows:

Be sure that the surfaces of the fusion tools, pipe, and fittings are free of contaminants.

Heat the surfaces to be joined–both the pipe and the fittings–simultaneously at a prescribed temperature for a specified time.

Remove the heater and bring the melted surfaces together.

Hold until solidified.

Before beginning fusing, these items should be followed:

All heater surfaces have a thin layer of non-stick coating that is easily scratched or scraped off. This coating prevents melted polyethylene from adhering firmly to the heater surfaces, but occasionally it also must be cleaned.

Metal tools should NEVER be used to clean the heater surfaces because they scratch and remove the coating.

Wooden implements and clean, dry, lint-free rags are recommended for cleaning. All-cotton rags are recommended because rags containing a substantial number of synthetic fibers may melt and char against the heater surface.

If the non-stick coating becomes worn or scratched, the heating unit should be recoated.

Melted polyethylene adheres firmly to the heating iron and is more difficult to remove at places where the coating has been scraped off. In addition, since the coating acts as an insulator, heat transfer in these uncoated areas is greater and local overheating can occur.

Just before using, wipe heaters to remove dirt and foreign material. As soon as possible after use, clean heaters with wooden implements and clean rags to remove melted or charred plastic.

At the end of every heating cycle, quickly observe the parts to be joined to insure sufficient and uniform melting parts.

Join parts within 3 seconds.

If a non-uniform pattern is obtained, allow the pipe to cool, cut off the pipe ends, and repeat the procedure.

Check heater surface temperature at least once a day with a surface pyrometer or crayon indicators for proper fusion surface temperature. The heater thermometer will probably read higher temperature.

8.5 MONITORING OF THE WORK

The installation activities shall be monitored by the CQA Consultant, during which the following work will be performed:

Observation of construction progress;

Visual examination of the subgrade for unacceptable areas;

Lift thickness of soil materials;

Observation of equipment operation;

Conformance testing;

Field and laboratory testing of materials;

Observation and documentation of geomembrane panel locations and compliance of the installation with the Proposed Panel Layout provided by the Geosynthetics Installer;

Observation and documentation of geomembrane;

Observation and documentation of the locations of geomembrane tears, cuts, holes, and the repair of deficiencies.

8.6 FINAL REPORT

Upon completion of the work, the CQA Consultant shall submit a final report. The report shall indicate that the work has been constructed in substantial compliance with the project design (engineering plans and specifications) and shall be signed and sealed by the Professional Engineer representing the CQA Consultant and registered in the State of Alabama. The final report shall provide all necessary supporting documentation compiled during the implementation of the CQA Plan.

The final report shall include, at a minimum, the following information:

- Summary of the project, observations, and sampling/testing procedures and criteria;
- Daily Reports;
- Quality Control data;
- Laboratory test results;
- Conformance test data summaries;
- A summary of material seams;
- Resin and roll certificates of analysis;
- Other documentation of quality control data provided by manufacturer;
- Geomembrane destructive and non-destructive test results;
- As built drawings;
- Data regarding the installation and testing of geosynthetics;
- A certification statement that the installation has been completed in substantial compliance with the project design.

Table 8.1 COMPACTED CLAY LINER SPECIFICATIONS

TEST	METHOD	SPECIFICATION
Unified Soil Classification	ASTM D2487	CL, CH, SC, ML, MH
Permeability	ASTM D5084	$<1 \times 10^{-5}$ cm/sec
Atterberg Limits	ASTM D4318	LL >30 PI >15
Grain Size	ASTM D422	>30% Passing No. 200 Sieve

Table 8.2 CONSTRUCTION TESTING OF COMPACTED CLAY LINER

TEST	TEST METHOD	TESTING FREQUENCY	PROJECT SPECIFICATION
Unified Soil Classification	ASTM D2487	1 test per acre or visual change in soil	CL, CH, SC, *ML, MH*
Atterberg Limits	ASTM D4318	1 test per acre or visual change in soil	LL $\geq$ 30[(1)] PI $\geq$ 15
Grain Size Distribution	ASTM D1140	1 test per acre or visual change in soil	>30% passing No. 200[(2)]
Standard Proctor Density	ASTM D698	1 test per acre or visual change in soil	
Permeability	ASTM D5094	1 test per acre or visual change in soil texture	$\leq 1 \times 10^{-7}$ cm/sec[(3)] $\leq 1 \times 10^{-5}$ cm/sec[(4)]
Field Moisture Content	D4944, D2937 ASTM D3017 or D4643	1 test per 20,000 sq. ft. per lift	+0.0 to 4.0 above optimum moisture content[(5)]
Field Density	ASTM D2922, D2937, D1556, or D2167	1 test per 20,000 sq. ft. per lift, and at least 3 per day or lift	$\geq$98% of maximum dry density (ASTM D698)

Note:

1., 2. There are no Atterberg Limits or grain size requirements for an alternate 1-foot soil liner system.

3. For a 2-foot soil liner system.

4. For a 1-foot alternate soil liner system.

5. Moisture requirements for an alternate 1-foot soil liner system should be -1.0 to 3.0 above optimum moisture content as determined by ASTM D698.

Table 8.3 CONSTRUCTION TESTING OF DRAINAGE LAYER

TEST	TEST METHOD	TESTING FREQUENCY	SPECIFICATION
Unified Soil Classification	ASTM D2487	1 test per visual change	SM, SW, SP, GW, GM, or GP
Grain Size Distribution	ASTM D1140	1 test per visual change	≤15% passing the No. 200 sieve
Permeability	ASTM D5084	1 test per visual change	5×10^{-4} cm/sec

Table 8.4 RESIN PROPERTIES

PROPERTY	TEST RESULT	TEST METHOD	UNITS	VALUE
Density	Minimum	D1505/D792 Method B	g/cc	0.932
Melt Index	Maximum	D1238	g/10 minutes	<1.0

Table 8.5 HDPE GEOMEMBRANE ROLL MATERIAL PROPERTIES (TEXTURED)

PROPERTY	TEST RESULT	TEST METHOD	UNITS	VALUE		COMMENT
				40 mil	60 mil	
Thickness		ASTM D5994	percent	-10%	-10%	
	Minimum Avg.	ASTM D5994	percent	-5%	-5%	
Density	Minimum	ASTM D1505/D792	g/cc	0.94	0.94	
Yield Strength	Typical	ASTM D6693 Type IV	lb/in width	84	126	
Break Strength	Typical	ASTM D6693 Type IV	lb/in width	60	90	
Elongation at Yield	Typical	ASTM D6693 Type IV	percent	12	12	
Elongation at Break	Typical	ASTM D6693 Type IV	percent	100	100	
Tear Resistance	Min. Ave.	ASTM D1004	lb	28	42	@ 45,000 Lb.
Puncture Resistance	Min. Ave.	ASTM D4833	lb	60	90	@ 45,000 Lb.
Carbon Black Content	Range	ASTM D1603	percent	2.0 – 3.0%		
Carbon Black Dispersion	Rating	ASTM D5596	N/A	9 in Categories 1		1 or 2 and in Category 3
Asperity (3) Height	Min. Ave	GM 12	mil	10	10	Every 2nd Roll
Oxidative Induction Time **(a) Standard OIT** **Or** **(b) High Pressure OIT**	Min. Ave	ASTM D3895 ASTM D5885	minutes	100 400	100 400	@200,000 Lb.
Oven Aging at 85°C (7), (8)	Min. Ave	ASTM D5721 ASTM D3895	percent	55	55	per each formulation

(a) Standard OIT - %retained after 90 days Or (b) High Pressure OIT - % retained after 90 days		ASTM D5885		80	80	
UV Resistance (9) (a) Standard OIT Or (b) High Pressure OIT - % retained after 1600 hrs (11)	Min. Ave	GM11 ASTM D3895 ASTM D5885	N.R.(10) percent	N.R.(10) 50	N.R.(10) 50	per each formulation

Table 8.6 SEAM REQUIREMENTS

Seaming Requirements (60 mil)		Hot Wedge Seams	Extrusion Fillet Seams
Shear Strength	lb/in	120	120
Shear Elongation at Break	%	50	50
Peel Strength	lb/in	91	78
Peel Separation	%	0	0

Note:

1) 4 out of 5 of the 1" specimens must meet or exceed the requirements above. The 5th specimen must meet 80% of the values specified.
2) Break must occur outside the weld.
3) 8 of 10 > 7 mils, lowest > 5 mils

Table 8.7 GEOTEXTILE ROLL MATERIAL PROPERTIES

PROPERTY	TEST METHOD	UNITS	TEST RESULT	NOMINAL WEIGHT (oz/yd^2)			
				4	6	8	10
Thickness	D1777	mils	Minimum	48	55	70	90
Trapezoidal Tear Strength	D4533	lbs	Minimum	50	60	80	95
Grab Strength	D4632	lbs	Minimum	130	150	200	235
Grab Elongation	D4632	%	Minimum	50	50	50	50
Puncture Strength	D4833	lbs	Minimum	60	75	100	125
Mullen Burst Strength	D3786	psi	Minimum	160	220	320	380
Apparent Opening Size	D4751	Sieve size	Minimum	50	60	70	70
Permeability	D4491	cm/sec	Minimum	0.2	0.2	0.2	0.2
Permittivity	D4491	1/sec	Minimum	2.3	1.70	1.30	1.07
Water Flow Rate	D4491	gpm/ft^2	Minimum	170	90	80	70

Table 8.8 FINISHED GEOCOMPOSITE

PROPERTY	TEST METHODS	UNITS	VALUE	QUALIFIER	TEST FREQUENCY
		Resin			
Density	ASTM D1505	g/cm³	0.94	MAV	lot
Melt Flow Index	ASTM D1238	g/10min	1.0	MAX	lot
		Geonet Core			
Structure		Tri-axial			
Geonet Cross-Rib Spacing	Calibered	inch (mm)	0.43 (11.0)	MAX	50,000 sf
Geonet Main-Rib Spacing	Calibered	inch (mm)	0.47 (12.0)	Typical	50,000 sf
Unsupported Aperture Area		inch² (mm²)	0.3 (195)	MAX	50,000 sf
Tensile Strength – MD	ASTM D7179	lb/in (kN/m)	55 (17.5)	±10 %	50,000 sf
Creep Reduction Factor	GRI-GC8				
@25,000 psf, 20° C			1.3		
@ 15,000 psf, 40° C			1.2		
Thickness	ASTM D5199	mil (mm)	250 (7.6)	±10 %	50,000 sf
Carbon Black	ASTM D4218	%	2-3	Range	50,000 sf
Geotextile[1]					
U.V. Resistance (500 hrs)	ASTM D7238	%	70		Per formula
Serviceability Class	AASHTO M-288		Class 2		
Grab Tensile	ASTM D4632	lbs (N)	225 (712)	MARV	100,000 sf
Grab Elongation	ASTM D4632	%	50	MARV	100,000 sf
Tear Strength	ASTM D4533	lbs (N)	90 (267)	MARV	100,000 sf
Puncture Resistance	ASTM D6241	lbs (N)	600 (378)	MARV	100,000 sf
AOS	ASTM D4751	US Sieve (mm)	80 (0.212)	MaxARV	500,000 sf
Permittivity	ASTM D4491	sec^{-1}	1.1	MARV	500,000 sf
Geocomposite					
Roll Sizes	12.5 ft x 200 ft (3.8 m x 61 m)				
Peel Adhesion – MD	ASTM D7005	lb/in (g/in)	1.0 (454)	MAV	100,000 sf
Transmissivity – MD (m²/sec) Gradient/Load	ASTM D4716 GRI – GC8	1,000 psf (48 kPa)	15,000 psf (720 kPa)		
0.1		$4.0*10^{-3}$	$2.0* 10^{-3}$	MAV	200,000 sf
0.02		$7.0* 10^{-3}$	$3.5* 10^{-3}$	MAV	200,000 sf

(1) The geonet portion of the finished geocomposite drainage net shall meet the transmissivity requirements when tested under the following conditions:

Boundary Conditions:

Finished geocomposite samples shall be bound below by a textured sixty (60) mil HDPE liner and bound on top by 6" of sand meeting specifications in *Table 1-3, Section 02300-Earthwork.*

Hydraulic Gradient: 0.02
Normal Stress: 15,000 psf
Seating Time: 100 hours

Table 8.9 GEOSYNTHETIC CLAY LINER PROPERTIES

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY FT² (m²)	REQUIRED VALUES	QUALIFIER
Bentonite Swell Index	ASTM D 5890	1 per 50 tonnes	24 ml/2g	Min.
Bentonite Fluid Loss	ASTM D 5891	1 per 50 tonnes	18 ml	Max
Bentonite Mass/Area	ASTM D 5993	40,000 ft² (4,000 m²)	0.75 lb/ft² (3.6 kg/m²)	Min.
GCL Grab Strength	ASTM D 6768	200,000 ft² (20,000 m²)	30lbs/in (53 N/cm)	MARV
GCL Peel Strength	ASTM D 6496	40,000 ft² (4,000 m²)	3.5 lbs/in (6.1 N/cm)	Min.
GCL Index Flux	ASTM D 5887	Weekly	1×10^{-8} m³/m²/sec	Max
GCL Hydraulic Conductivity	ASTM D 5887	Weekly	5×10^{-9} cm/sec	Max
GCL Hydrated Internal Shear Strength	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typ @ 200 psf	Min.

(1) The properties of the geotextile(s) and/or the geomembrane components of the GCL shall be as specified by the GCL Manufacturer and/or the Design Engineer.
(2) The moisture content shall be that of the bentonite clay in the GCL product. As determined by the GCL Manufacturer, it shall be at the manufacturing facility; as determined by others, it shall be as delivered to the project site.
(3) The moisture content is to be reported as the weight of water divided by the wet weight of bentonite clay sample.
(4) Unless otherwise authorized by the Owner, the bentonite clay loading (mass/unit area) shall be determined as normalized to a moisture content of fifteen (15) percent. The analysis therefore becomes:

$$\left(\frac{mass\ of\ bentonite\ clay\ sample}{area\ of\ bentonite\ clay\ sample}\right) \times \left[\frac{(1 + normalized\ moisture\ content)}{(1 + bentonite\ clay\ field\ sample\ moisture\ content)}\right]$$

(5) The hydraulic conductivity shall be specified by the Design Engineer and measured at a normal load of seventy (70) psi.
(6) The thickness shall be that of the GCL product delivered to the project, measured dry.

9 CLOSURE AND POST-CLOSURE PLAN

9.1 CLOSURE

9.1.1 INTERMEDIATE COVER SYSTEM

The outer slopes of the landfill that have reached their final closure elevations will be covered with an intermediate cover until the landfill closes and the final cover system is installed.

The intermediate cover shall consist of 12 inches of soil cover, graded to prevent ponding of surface water, and prepared for the establishment of a vegetative cover. Preparation for a vegetative cover shall include, but not be limited to the placement of appropriate species of grass seed as specified in Section 9.1.4, fertilizer, mulch, and watering such that germination can be anticipated.

9.1.2 FINAL GRADING

The Closure Plan for the landfill includes a final contour and drainage plan as required by ADEM Administrative Code, Rule 335-13-4-.20. The regulations require that the final soil cover be graded so that:

1) Surface water does not pond over the landfill unit.
2) The final grade does not exceed 25 percent or as specified by ADEM to minimize erosion.
3) Slopes longer than 25 feet shall require horizontal terraces, of sufficient width for equipment operation, for every 20-foot rise in elevation or utilize other erosion control measures approved by ADEM.
4) The final grade for the disposal facility shall not be less than 5 percent or as specified by ADEM to minimize ponding.
5) Final grading shall be provided within 90 days after the last known receipt of waste.

As the landfill slopes approach their final grades, the Landfill Operator should have a survey crew establish the elevations and slopes on site to ensure that the final grades of each constructed phase of this facility will corresponds with the Permit Plan. Any deviation from the proposed grades will only create future operational problems and must be corrected as soon as discovered. Intermediate cover will be placed on all slopes as they reach the final slope grade.

9.1.3 FINAL COVER

The Landfill Operator must install a final cover over the landfill within 90 days after its receipt of final waste. The final cover system shall consist of the following elements:

1. A gas migration layer consisting of 12 inches of sand that provides a path of flow for landfill gas to migrate to the series of landfill gas vent.
2. A clay infiltration layer constructed of 18 inches of sand-clay material having a

permeability not to exceed 1 x 10^{-7} cm/sec. The material used in the infiltration layer shall be free of oversized particles, such as rocks, roots, limbs, and other foreign substances that would alter the design integrity of the material. The material shall be classified with the Unified Soil Classification System (ASTM Standard D2 487-69).

3. A 40-mil thick Low-Density Polyethylene (LDPE) Membrane manufactured of new first quality resigns and manufactured specifically for the purpose of liquid containment. The membrane shall be installed in accordance with the Design Plans and specifications as well as with the Quality Assurance/Quality Control Plan in Section 9 of this manual.
4. A 12-inch thick drainage layer of sand material shall be installed on top of the composite drainage net.
5. An erosion layer consisting of a minimum of 6 inches of earthen material that is capable of sustaining native plant growth.
6. A vegetative cover established on the erosion layer in accordance with the following section.

9.1.4 VEGETATION PLAN

Upon completion of the final cover system, the erosion layer shall be fully vegetated by preparing the topsoil, then seeding and mulching. The ground should be cultivated to a loose depth of two inches in such a manner as to break up all lumps and clods. All boulders, stumps, large roots or other particles should be removed to provide a smooth, uniform seed bed.

Samples should be taken of the topsoil and analyzed to determine the correct proportions of fertilizer and agricultural lime to be added to the soil. As an alternative to sampling, two tons of agricultural limestone and 1500 pounds of grade 8-8-8 fertilizer should be applied per acre to the site.

A seed mixture must then be sown over the prepared ground using mechanical seeders. The seed mix to be used shall be as specified below for the appropriate period of the year.

<u>December through February</u>

Kentucky 31 or Alta Fescue	15 lbs. per acre
Pensacola Bahia grass	25 lbs. per acre
Reseeding Crimson Clover	30 lbs. per acre
Bermudagrass (Unhulled)	25 lbs. per acre
Annual Ryegrass	20 lbs. per acre

<u>March through August</u>

Pensacola Bahia grass	20 lbs. per acre
Bermudagrass (Hulled)	25 lbs. per acre
Kobe Lespedeza	40 lbs. per acre

September through November	
Kentucky 31 or Alta Fescue	15 lbs. per acre
Pensacola Bahia grass	25 lbs. per acre
Reseeding Crimson Clover	30 lbs. per acre
Bermudagrass (Unhulled)	30 lbs. per acre

Within 48 hours following seeding, the seeded areas shall be mulched with hay or straw mulch material and crimped. A roller-type crimper shall be used to embed the mulch to a minimum depth of two (2) inches into the prepared ground.

A second application of fertilizer shall be applied as a top dressing of ammonium nitrate to provide at least 67 pounds of nitrogen per acre (200 pounds of 33.5% ammonium nitrate, for example). This second application should be made after the grass has shown growth that is normally about 40 days. The vegetative cover shall be established within 30 days after completion of the final grading of each cell. Landfill personnel shall water and maintain the vegetative cover such that germination of grass can be reasonably anticipated.

9.1.5 NOTICE OF INTENT TO CLOSE

A notice of intent will be submitted to ADEM to complete final closure of the facility, and a copy of the notice will be recorded in the Operating Record at the facility.

9.1.6 FINAL CLOSURE SCHEDULE

Upon notifying the Department that the Owner intends to complete final closure of the landfill, a final closure schedule that provides approximate dates of completing final closure requirements will be submitted to ADEM for approval. This Closure Schedule will become effective 30 days after the final receipt of waste occurs at the landfill facility. The Operator must then begin closure as soon as the waste is no longer received in the unit and must complete closure activities within the following 180 days.

If the facility has remaining capacity and it is likely that the landfill will receive additional waste, the Closure Schedule will become effective one year after the last known receipt of waste has occurred. An extension beyond the one-year deadline for beginning closure may be granted by ADEM if landfill has the capacity to receive additional wastes and the landfill supervisor takes the necessary steps to prevent threats to human health and the environment which could result from the unclosed landfill. The Closure Schedule becomes effective 30 days after the final receipt of waste occurs at the landfill facility.

9.1.7 MAXIMUM INVENTORY OF WASTE

Upon final closure of this facility, the Landfill Operator shall submit to the Department an estimate of the maximum amount of waste that has been disposed in the Landfill. This will be accomplished through the use of volume reports completed during the active life of the landfill, and through a comparison of the initial and final contours of the facility.

9.1.8 ENGINEER'S CERTIFICATION

During closure of each landfill phase, the Engineer shall insure that closure activities are being performed in accordance with the appropriate approved Revised Design Plans. Upon completion of all closure activities at the facility, the Engineer shall review the site and certify that the final closure requirements have been accomplished in accordance with the Revised Design Plans. This certification shall then be placed in the public records along with the deed information stated below.

9.1.9 DEED RECORD AND ENVIRONMENTAL COVENANT

Within 90 days after closure requirements are achieved, the Owner shall record a notation onto the land deed or onto some other legal instrument that is normally examined during a title search, that will in perpetuity, notify any potential purchaser of the property that:

1. The land has been used as a solid waste disposal facility.

2. Post-closure use of the property must never be allowed to disturb the integrity of the final cover or the function of the monitoring systems, unless ADEM determines that the activities will not increase the potential threat to human health or the environment; or the activities are necessary to reduce the threat to human health or the environment.

3. The locations and dimensions of the disposal facility with respect to permanently surveyed benchmarks and section corners have been placed on a plat prepared and sealed by a land surveyor.

4. The Permittee of the Black Warrior Solid Waste Facility is the Black Warrior Solid Waste Authority, and the facility was utilized for the disposal of municipal solid waste.

5. Certification by an Engineer or Land Surveyor that all closure requirements have been completed as determined by the Department.

Upon completion of the deed recording requirements, the Owner shall submit a certified copy of the recording instrument to the Department and place a copy in the Operating Record. Additionally, ADEM must be notified within 120 days after permit expiration that the notation has been recorded and a copy placed in the Operating Record.

In addition to the deed notation, ADEM now requires an environmental covenant to be filed for the property. Below are the steps required for filing the covenant:

- The covenant will be prepared and then signed by the property owner and mailed to ADEM.
- ADEM will review and sign the covenant and return to the property owner.
- The covenant is then to be recorded at the County Courthouse and signed by the County Clerk.
- A final copy of the covenant is to be submitted to ADEM.

9.2 POST-CLOSURE

9.2.1 POST-CLOSURE CARE PERIOD

The Landfill Permittee must maintain the landfill and continue monitoring requirements throughout the post-closure care period. The post-closure maintenance and monitoring period shall continue for 30 years or for a period that has otherwise been determined by ADEM.

The length of the post-closure care period may be decreased by the ADEM, if the landfill supervisor demonstrates that a reduced period is sufficient to protect human health and the environment, and the demonstration is approved by the Department.

The length of the post-closure care period may also be increased, if ADEM determines that the lengthened period is necessary to protect human health and the environment.

9.2.2 FACILITY MAINTENANCE

The Landfill Permittee shall maintain the landfill property for the post-closure care period as determined by ADEM. The Permittee shall inspect the facility on a monthly basis and after major storm events to identify problems with vector control, erosion, cracks, ponding, settlement, and other such deficiencies.

Eroded areas shall be filled with suitable soil cover, compacted, graded, and revegetated in accordance with the Vegetative Plans located in Section 9.1.4. Areas that allow surface water ponding due to settlement shall also be filled, graded, and vegetated. Extensive surface cracks must be identified and corrected to prevent the infiltration of surface water.

The Permittee shall also ensure inspection and maintenance of all access control structures. Signs will continue to be posted at the facility throughout post-closure, which state that the facility is closed and provide the location of the nearest permitted landfill. Any waste dumped at the facility following final closure shall be moved to an approved landfill by the permittee, the operating agency, or the owner.

9.2.3 FINAL COVER MAINTENANCE

Throughout the post-closure care period, the final cover system will require attention and maintenance. After the landfill is closed, the Landfill Permittee shall make monthly inspections of the entire cover system to detect problems, such as erosion and settlement that could reduce the effectiveness of the cap.

The Landfill Permittee should mow the entire landfill at least once a year to reduce the growth of woody plants. The volunteer growth of any trees should be prevented on the final cover. An inspection immediately following mowing could detect the beginning of erosion or the settlement of the cover. The erosion layer or topsoil is constructed to protect the LLDPE liner. It is imperative that erosion problems be identified and corrected to prevent damage to the cap, which may result in washout of waste materials

and increased infiltration. Any eroded areas must be filled, compacted, and re-grassed. Periodically lime and fertilizer will have to be added to the cover to maintain an adequate vegetative cover.

Due to decomposition of waste, and compaction of the waste by overburden, the landfill surface will be subject to settlement and the potential for rainwater ponding. Inspections should detect settled areas. These areas must be filled, compacted, and re-grassed to prevent ponding and encourage runoff, while maintaining a minimum grade of 5 percent.

The Permittee shall inspect all surface water control structures including concrete inlets, storm sewers, culverts, sediment pond outlets, berms, ditches, and terraces to ensure the integrity of the surface water control system remains intact. Any damage due to settlement, erosion, or caused by maintenance equipment shall be promptly repaired.

9.2.4 LEACHATE COLLECTION SYSTEM MAINTENANCE

The Landfill Permittee shall continue collecting and treating leachate throughout the post-closure care period. Monthly inspections must be made to detect any leaks in the dual containment piping leading to the leachate transfer system. All joints and fittings must also be inspected for leaks. Should any leaks be identified, then the Landfill Permittee must immediately have the leak repaired and the system opened to flow as soon as possible thereafter.

9.2.5 GROUNDWATER MONITORING

The Landfill Permittee must continue detection monitoring at all groundwater monitoring wells on a semi-annual basis. Samples from each well must be collected and analyzed for the constituents outlined in the permit. The requirements for groundwater monitoring and record-keeping apply throughout the post-closure care period. The Landfill Permittee should refer to Section 5 of this Manual for specific groundwater requirements. All groundwater monitoring wells must be maintained and any wells that are damaged or destroyed by equipment, etc., should be immediately replaced in accordance with the details and the Groundwater Monitoring Plan shown in Section 5 of this Manual.

9.2.6 LANDFILL GAS MONITORING

All explosive gas monitoring wells and gas collection and conveyance system infrastructure must be maintained throughout post-closure. Any structures damaged or destroyed by equipment, etc. must be immediately replaced in accordance with the details shown on the Permit Plans. Landfill gases that could potentially migrate off-site must continue to be monitored on a quarterly basis, throughout the post-closure care period, and results placed in the Operating Record. Specific monitoring requirements are outlined in Section 6 of this Manual.

9.2.7 STORMWATER MONITORING

Stormwater monitoring shall occur in accordance with a current NPDES Permit for a period of time specified by the Department.

9.2.8 POST-CLOSURE CERTIFICATION

Following the completion of the post-closure care period of this facility, the Permittee will submit to the Department a certification, signed by an independent registered professional engineer verifying that the post-closure care has been completed in accordance with the post-closure plan. A copy of the certification will also be placed in the Operating Record.

9.2.9 POST-CLOSURE LAND USE

Post-closure use of the property must never be allowed to disturb the integrity of the final cover or any component of the monitoring systems. Maintenance or post-closure use with equipment shall only be performed during dry periods to prevent damage to the final cover system.

Post-closure land uses of the Black Warrior Solid Waste Facility should be limited to agricultural purposes that rely on the use of short-rooted grasses. Due to the potential for settlement, the construction of buildings should be limited. If the Landfill Owner or Permittee, upon final closure of the facility, has future post-closure plans to utilize any portion of the landfill property, ADEM will be notified.

The Permittee or Owner, or any subsequent owner of the land upon which a landfill facility is located must request approval from the Department if they wish to remove waste, waste residues, the liner, or any contaminated soil. The owner may also ask permission to remove the notation from the recording instrument, if all the waste and contaminated soils are removed from the property and no unpermitted discharges to waters have occurred.

9.2.10 POST-CLOSURE CARE CONTACTS

Black Warrior Solid Waste Authority
Fred Rogers
3301 Landfill Drive
Coker, Alabama 35452
Phone: (205) 523-3914
frogers@bwswa.com

Alabama Department of Environmental Management
Solid Waste Branch
P.O. Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700

Three Notch Group, Inc.
R. Daniel Wells, P.E.
P.O. Box 278
Andalusia, Alabama 36420
(334) 222-9431
daniel.wells@3notch.com

APPENDIX A

ACTIVE SOLID WASTE DISPOSAL FACILITY PERMIT

Lance R. LeFleur
Director

Kay Ivey
Governor

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

February 3, 2025

Mr. Fred Rogers
Black Warrior Solid Waste Disposal Authority
3301 Landfill Drive
Coker, Alabama 35452

Re: Permit Modification
Black Warrior Solid Waste Disposal Facility
Permit No. 63-01

Dear Mr. Rogers:

Enclosed is the Solid Waste Disposal Facility Permit for the Black Warrior Solid Waste Disposal Facility, Permit No. 63-01. This permit is effective February 3, 2025, and the expiration date will remain October 6, 2032.

If you should have any questions, please contact Hunter Baker of the Solid Waste Engineering Section at 334-270-5607.

Sincerely,

Jason Wilson, Chief
Solid Waste Branch
Land Division

JW/hb

Birmingham Office
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Office
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Coastal Office
1615 South Broad Street
Mobile, AL 36605
(251) 450-3400
(251) 479-2593 (FAX)

FINAL DETERMINATION

PERMIT MODIFICATION
Black Warrior Solid Waste Disposal Authority
3301 Landfill Drive
Coker, Alabama 35452

Black Warrior Solid Waste Disposal Facility
Permit No. 63-01

February 3, 2025

CDG Engineers & Associates, on behalf of Black Warrior Solid Waste Disposal Authority has submitted to the Alabama Department of Environmental Management (ADEM) an application to modify the Solid Waste Disposal Facility Permit for the Black Warrior Solid Waste Disposal Facility (Permit No. 63-01). The permit modification includes expanding the facility and waste disposal boundaries, and addition of VERDAC Landfill Cover Pellets as an alternate daily cover material. The size of the facility will increase from 226.48 acres to 459.64 acres, and the disposal area will increase from 127.96 acres to 142.24 acres. All other permit conditions will remain the same.

The Black Warrior Solid Waste Disposal Facility is located in Sections 2 and 11, Township 21 South, Range 11 West in Tuscaloosa County, Alabama.

A public comment period was announced by ADEM on November 5, 2024, and ended on December 10, 2024. The proposed permit and application were available for inspection at the Alabama Department of Environmental Management and on ADEM's website. All timely submitted comments were considered and the appropriate responses have been prepared.

The Land Division has determined that the permit modification meets the applicable requirements of ADEM's Administrative Code Division 13 regulations.

Technical Contact:

Hunter Baker
Solid Waste Engineering Section
Land Division

Alabama Department of Environmental Management

SOLID WASTE DISPOSAL FACILITY PERMIT

PERMITTEE:	**Black Warrior Solid Waste Disposal Authority**
FACILITY NAME:	**Black Warrior Solid Waste Disposal Facility**
FACILITY LOCATION:	**Sections 2 and 11, Township 21 South, Range 11 West, in Tuscaloosa County, Alabama, comprising 459.64 acres with a disposal area of 142.24 acres.**
PERMIT NUMBER:	**63-01**
WASTE APPROVED FOR DISPOSAL:	**Nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, dried sludge, ashes, paper and other similar type materials. Special waste approved by ADEM may also be accepted.**
APPROVED WASTE VOLUME:	**Maximum Average Daily Volume of 1,500 tons per day**
APPROVED SERVICE AREA:	**State of Alabama**

In accordance with and subject to the provisions of the Alabama Solid Wastes and Recyclable Materials Management Act, as amended, Code of Alabama 1975, SS 22-27-1 to 22-27-27 ("SWRMMA"), the Alabama Environmental Management Act, as amended, Code of Alabama 1975, SS 22-22A-1 to 22-22A-15, and rules and regulations adopted thereunder, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to dispose of the above-described solid wastes at the above-described facility location.

ISSUANCE DATE:	**October 7, 2022**
EFFECTIVE DATE:	**October 7, 2022**
MODIFICATION DATE:	**February 3, 2025**
EXPIRATION DATE:	**October 6, 2032**

Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SOLID WASTE PERMIT

Permittee:	Black Warrior Solid Waste Disposal Authority 3301 Landfill Drive Coker, Alabama 35452
Landfill Name:	Black Warrior Solid Waste Disposal Facility
Landfill Location:	Sections 2 and 11, Township 21 South, Range 11 West Tuscaloosa County, Alabama
Permit No.	63-01
Landfill Type:	Municipal Solid Waste

Pursuant to the Solid Wastes and Recyclable Materials Management Act, Code of Alabama 1975, §§22-27-1, et seq., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM), this permit is issued to Black Warrior Solid Waste Disposal Authority (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the Black Warrior Solid Waste Disposal Facility.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions set forth herein (including those in all attachments), and the applicable regulations contained in Chapters ADEM Admin. Code 335-13-1 through 335-13-16 of the ADEM Administrative Code (referred to as the "ADEM Admin. Code"). Rules cited are set forth in this document for the purpose of Permittee reference. A Rule that is cited incorrectly in this document does not constitute grounds for noncompliance on the part of the Permittee. Applicable ADEM Administrative Codes are those that are in effect on the date of issuance of this permit or the revisions approved after permit issuance.

This permit is based on the information submitted to ADEM on October 1, 2021 for permit renewal, and on September 22, 2023 for permit modification, and as amended, and is hereby known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform ADEM of deviations from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

This permit is effective as of **October 7, 2022,** and modified on **February 3, 2025** and shall remain in effect until **October 6, 2032,** unless suspended or revoked.

Alabama Department of Environmental Management

2/3/2025
Date Signed

SECTION I. STANDARD CONDITIONS.

A. Effect of Permit. The Permittee is allowed to dispose of nonhazardous solid waste in accordance with the conditions of this permit and ADEM Admin. Code ADEM Admin. Code 335-13. Issuance of this permit does not convey property rights of any sort or an exclusive privilege, nor does it authorize the injury to persons or property, the invasion of other private rights, or the infringement of state or local laws or regulations. Except for actions brought under Code of Alabama 1975, §§22-27-1, *et seq.*, as amended, compliance with the conditions of this permit shall be deemed to be compliance with applicable requirements in effect as of the date of issuance of this permit and future revisions.

B. Permit Actions. This permit may be suspended, revoked or modified for cause. The filing of a request for a permit modification or the notification of planned changes or anticipated noncompliance on the part of the Permittee, and the suspension or revocation does not stay the applicability or enforceability of permit condition.

C. Severability. The provisions of this permit are severable, and if a provision of this permit, or the application of a provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

D. Definitions. For the purpose of this permit, terms used herein shall have the same meaning as those in Admin. Code 335-13, unless this permit specifically provides otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. "EPA" means the United States Environmental Protection Agency.

2. "Permit Application" means all permit application forms, design plans, operational plans, closure plans, technical data, reports, specifications, plats, geological and hydrological reports, and other materials which are submitted to ADEM in pursuit of a solid waste disposal permit.

E. Duties and Requirements.

1. Duty to Comply. The Permittee must comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by a variance granted by ADEM. A permit noncompliance, other than noncompliance authorized by a variance, constitutes a violation of Code of Alabama 1975, §§22-27-1 et seq., as amended, and is grounds for enforcement action, permit suspension, revocation, modification, and/or denial of a permit renewal application.

2. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The renewal application must be submitted to ADEM at least 180 days before this permit expires.

3. Permit Expiration. This permit and all conditions therein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application as required by Section I.E.2., and, through no fault of the Permittee, ADEM has not made a final decision regarding the renewal application.

4. Need to Halt or Reduce Activity Not A Defense. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

5. Duty to Mitigate. In the event of noncompliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

6. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with the conditions of this permit.

7. Duty to Provide Information. If requested, the Permittee shall furnish to ADEM, within a reasonable time, the information that ADEM may reasonably need to determine whether cause exists for denying, suspending, revoking, or modifying this permit, or to determine compliance with this permit. If requested, the Permittee shall also furnish ADEM with copies of records kept as a requirement of this permit.

8. Inspection and Entry. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the employees of ADEM or their authorized representative to:

   a. Enter at reasonable times the Permittee's premises where the regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.

   b. Have access to and copy, at reasonable times, the records that must be kept under the conditions of this permit.

   c. Inspect, at reasonable times, the facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.

   d. Sample or monitor, at reasonable times, the substances or parameters at a location for the purposes of assuring permit compliance or as otherwise authorized by Code of Alabama 1975, §§22-27-1 *et seq*.

9. Monitoring, Corrective Actions, and Records.

   a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from ADEM Admin. Code ADEM Admin. Code 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), other appropriate EPA methods, or as specified in the Application. All field tests must be conducted using approved EPA test kits and procedures.

   b. The Permittee shall retain records, at the location specified in Section I.I., of all monitoring, or corrective action information, including all calibration and maintenance records, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record or for periods elsewhere specified in this permit. These periods may be extended by the request of ADEM at any time and are automatically extended during the course of an unresolved enforcement action regarding this facility.

   c. Records of monitoring and corrective action information shall include.

      i. The exact place, date, and time of sampling or measurement.

      ii. The individual(s) and company who performed the sampling or measurements.

      iii. The date(s) analyses were performed.

      iv. The individual(s) and company who performed the analyses.

v. The analytical techniques or methods used.

vi. The results of such analyses.

d. The Permittee shall submit all monitoring and corrective action results at the interval specified elsewhere in this permit.

10. Reporting Planned Changes. The Permittee shall notify ADEM, in the form of a request for permit modification, at least 120 days prior to a change in the permitted service area, increase in the waste received, or change in the design or operating procedure as described in this permit, including planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

11. Transfer of Permit. This permit may be transferred to a new owner or operator. All requests for transfer of permits shall be in writing and shall be submitted on forms provided by ADEM. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of this permit.

12. Certification of Construction. The Permittee may not commence disposal of waste in a new cell or phase until the Permittee has submitted to ADEM, by certified mail or hand delivery, a letter signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with the permit. An engineer must attest or certify that the installation, seaming, etc., as proposed or as depicted on the plan or layout specified above would meet the standards or criteria prescribed, or required by the manufacturers of the components and ADEM's regulations, and that the panels or components would be expected to perform satisfactorily, without failure, to the required standards over a normally expected lifetime or performance period for typical panels or components. ADEM must inspect the constructed cells or phases before the owner or operator can commence waste disposal unless the Permittee is notified that ADEM will waive the inspection.

13. Compliance Schedules. Reports of compliance or noncompliance with or progress reports on interim and final requirements contained in a compliance schedule required and approved by ADEM shall be submitted no later than 14 days following each schedule date.

14. Other Noncompliance. The Permittee shall report all instances of noncompliance with the permit at the time monitoring reports are submitted.

15. Other Information. If the Permittee becomes aware that information required by the Application was not submitted or was incorrect in the Application or in a report to ADEM, the Permittee shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to ADEM, within a reasonable time, information related to compliance with the permit.

F. Design and Operation of Facility. The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or an unplanned sudden or nonsudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

G. Inspection Requirements.

1. The Permittee shall comply with all requirements set forth under ADEM Admin. Code 335-13.

2. The Permittee shall conduct random inspections of incoming loads.

3. Records of all inspections shall be included in the operating record.

H. Recordkeeping and Reporting.

1. The Permittee shall maintain a written operating record at the location specified in Section I.I. The operating record shall include:

   a. Documentation of inspection and maintenance activities.

   b. Daily Volume reports.

   c. Personnel training documents and records.

   d. Solid/Hazardous Waste Determination Forms for Industrial Wastes, and associated ADEM disposal approval correspondence for special wastes, industrial wastes, etc.

   e. Groundwater monitoring records.

   f. Explosive gas monitoring records.

   g. Surface water and leachate monitoring records. Leachate monitoring must be performed before transporting to a publicly owned treatment works. Monitoring is subject to applicable conditions of Section VII. of the permit.

   h. Copies of this Permit and the Application.

   i. Copies of all variances granted by ADEM, including copies of all approvals of special operating conditions (such as approvals for open burning,).

2. Quarterly Volume Report. Beginning with the effective date of this permit, the Permittee shall submit, within thirty (30) days after the end of each calendar quarter, a report summarizing the daily waste receipts for the previous (just ended) quarter. Copies of the quarterly reports shall be maintained in the operating record.

3. Monitoring and Corrective Action Reports. The Permittee shall submit reports on all monitoring and corrective activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year and the reports shall be submitted at least semi-annually. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be submitted on a quarterly basis, and the reports should be submitted to ADEM and placed in the operating record within 30 days of the monitoring event. Copies of the semi-annual groundwater and quarterly explosive gas monitoring reports shall be maintained in the operating record.

4. Availability, Retention, and Disposition of Records.

   a. All records, including plans, required under this permit or ADEM Admin. Code 335-13 must be furnished upon request, and made available at reasonable times for inspection by an officer, employee, or representative of ADEM.

   b. All records, including plans, required under this permit or ADEM Admin. Code 335-13 shall be retained by the Permittee for a period of at least three years. The retention period for all records is extended automatically during the course of an unresolved enforcement action regarding the facility, or as requested by ADEM.

   c. A copy of records of waste disposal locations and quantities must be submitted to ADEM and local land authority upon closure of the facility.

I. Documents to be Maintained by the Permittee. The Permittee shall maintain at Black Warrior Solid Waste Disposal Facility the following documents and amendments, revisions and modifications to these documents until an engineer certifies closure:

1. Operating record.

2. Closure Plan.

J. Mailing Location. All reports, notifications, or other submissions which are required by this permit should be sent via signed mail (i.e. certified mail, express mail delivery service, etc.) or hand delivered to:

1. Mailing Address.
Chief, Land Division
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

2. Physical Address.
Chief, Land Division
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, Alabama 36110-2400

K. Signatory Requirement. All applications, reports or information required by this permit, or otherwise submitted to ADEM, shall be signed and certified by the owner as follows:

1. If an individual, by the applicant.

2. If a city, county, or other municipality or governmental entity, by the ranking elected official, or by a duly authorized representative of that person.

3. If a corporation, organization, or other legal entity, by a principal executive officer, of at least the level of Vice President, or by a duly authorized representative of that person.

L. Confidential Information. The Permittee may claim information submitted as confidential pursuant to ADEM Admin. Code 335-1-1-.06.

M. State Laws and Regulations. Nothing in this permit shall be construed to preclude the initiation of a legal action or to relieve the Permittee from the responsibilities, liabilities, or penalties established pursuant to an applicable state law or regulation.

SECTION II. GENERAL OPERATING CONDITIONS.

A. Operation of Facility. The Permittee shall operate and maintain the disposal facility consistent with the Application, this permit, and ADEM Admin. Code 335-13.

B. Open Burning. The Permittee shall not allow open burning without prior written approval from ADEM and other appropriate agencies. A burn request should be submitted in writing to ADEM outlining why that burn request should be granted. This request should include, but not be limited to, specifically what areas will be utilized, types of waste to be burned, the projected starting and completion dates for the project, and the projected days and hours of operation. The approval, if granted, shall be included in the operating record.

C. Prevention of Unauthorized Disposal. The Permittee shall follow the approved procedures for the detecting and preventing the disposal of free liquids, regulated hazardous waste, PCB's, and medical waste at the facility.

D. Unauthorized Discharge. The Permittee shall operate the disposal facility in such a manner that there will be no water pollution or unauthorized discharge. A discharge from the disposal facility or practice thereof may require a National Pollutant Discharge Elimination System permit under the Alabama Water Pollution Control Act.

E. Industrial and Medical Waste Disposal. The Permittee shall dispose of industrial process waste as required by ADEM Admin. Code 335-13, and as specified in the Application. The Permittee, prior to disposal of industrial waste and/or medical waste, shall obtain from each generator a written certification that the material to be disposed does not contain free liquids, regulated hazardous wastes, regulated medical waste, or regulated PCB wastes.

F. Boundary Markers. The Permittee shall ensure that the facility is identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

G. Certified Operator. The Permittee shall be required to have an operator certified by the Department on-site during hours of operation, in accordance with the requirements of ADEM Admin. Code 335-13-12.

SECTION III. SPECIFIC MSW LANDFILL REQUIREMENTS.

A. Waste Identification and Management.

1. Subject to the terms of this permit, the Permittee may dispose of the nonhazardous solid wastes listed in Section III.B. Disposal of other waste streams is prohibited, except waste that is granted a temporary or one-time waiver by the Director.

2. The permitted facility boundary for the Black Warrior Solid Waste Disposal Facility is approximately 459.64 acres with a solid waste disposal area of 142.24 acres.

3. The maximum average daily volume of waste disposed at the facility, as contained in the permit application, shall not exceed 1500 tons/day. Should the average daily volume exceed this value by 20% or 100 tons/day, whichever is less, for two (2) consecutive quarters the permittee shall be required to modify the permit in accordance with ADEM Admin. Code 335-13-5-.06(2)(b)2. An increase in maximum average daily volume shall not be approved by ADEM unless the permittee has received local approval for the increased maximum average daily volume. The average daily volume shall be computed as specified by ADEM Admin. Code 335-13-4-.22(2)(g).

B. Waste Streams. The Permittee may accept for disposal nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, dried sludge, ashes, paper and other similar type materials. Special waste approved by ADEM may also be accepted.

C. Service Area. The service area for this landfill shall be all counties in Alabama.

D. Special Waste. The Permittee may dispose of special wastes in accordance with ADEM Admin. Code 335-13.

1. Asbestos Waste. The Permittee shall dispose of asbestos waste in accordance with ADEM Admin. Code 335-13-4-.26.

2. Foundry Sand. The Permittee shall dispose of foundry waste in accordance with ADEM Admin. Code 335-13-4-.26.

3. Petroleum Contaminated Waste. The Permittee shall dispose of petroleum contaminated waste in accordance with ADEM Admin. Code 335-13-4-.26.

4. Municipal Solid Waste Ash. The Permittee shall dispose of municipal solid waste ash in accordance with ADEM Admin. Code 335-13-4-.26.

E. Liner Requirements. The Permittee shall install a composite liner system as described in the Application consisting of a minimum of two feet of clay with a hydraulic conductivity of 1×10^{-7} cm/sec of less, overlain by a textured 60 mil. High Density Polyethylene (HDPE). The 60 mil. HDPE will be overlain with either an HDPE drainage net overlain with a geotextile filter fabric and two feet of on site soil cover or with one foot of sand with a hydraulic conductivity of 2×10^{-2} cm/sec or greater and one foot of on site material. The base of the composite liner system shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-.4-.11(2)a.

F Septic Tank Pumpings and Sewage Sludge. The Permittee shall not dispose of septic tank pumpings and/or sewage sludge unless specifically approved in writing by ADEM.

G. Large Dead Animals and Highly Putrescible Wastes. The Permittee shall handle the disposal of large dead animals and/or highly putrescible waste as required by ADEM Admin. Code 335-13-4-.22(1)(j). Disposal is allowed only in the municipal solid waste disposal area.

H. Cover Requirements. The Permittee shall cover all wastes as required by ADEM Admin. Code 335-13. The Permittee has been approved to utilize commercial tarp systems (See Section X., 2.) and non-hazardous solid waste clarifier sludge, cooling tower sludge, steckle dust all generated from NUCOR Steel Tuscaloosa, Inc., and VERDac Landfill Cover Pellets as alternate daily cover (See Section X., 3.). The Permittee shall be required to cover the active cell with six inches of earthen cover at the conclusion of each week's activities.

I. Waste Compaction. All waste shall be thoroughly compacted with adequate landfill equipment before the daily or weekly cover is applied. A completed daily cell shall not exceed fifteen feet in vertical thickness measured perpendicular to the slope of the preceding cell (See Section X., 1.).

J. Daily Cells. All waste shall be confined to an area as small as possible within a single working face and spread to a depth not exceeding two feet prior to compaction, and such compaction shall be accomplished on a face slope not to exceed 4 to 1or as otherwise approved by ADEM.

K. Security. The Permittee shall provide artificial and/or natural barriers, which prevent entry of unauthorized vehicular traffic to the facility.

L. All Weather Access Roads. The Permittee shall provide an all-weather access road to the dumping face that is wide enough to allow passage of collection vehicles.

M. Adverse Weather Disposal. The Permittee shall provide for disposal activities in adverse weather conditions.

N. Personnel. The Permittee shall maintain adequate personnel to ensure continued and smooth operation of the facility.

O. Equipment. The Permittee shall provide the landfill equipment as required by ADEM Admin. Code 335-13-4-.22(1)(f).

P. Environmental Monitoring and Treatment Structures. The Permittee shall provide protection and proper maintenance of environmental monitoring and treatment structures.

Q. Vector Control. The Permittee shall provide for vector control as required by ADEM Admin. Code 335-13.

R. Bulk or Noncontainerized Liquid Waste. The Permittee shall not dispose of bulk or noncontainerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin. Code 335-13-4-.22(1)(k) are met.

S. Empty Containers. The Permittee shall render empty containers larger than normally found in household waste unsuitable for holding liquids prior to delivery to the landfill unit unless otherwise approved by ADEM.

T. Other Requirements. ADEM may enhance or reduce the requirements for operating and maintaining the landfill as deemed necessary by the Land Division.

U. Other Permits. The Permittee shall operate the landfill according to this and other applicable permits.

V. Scavenging and Salvaging Operations. The Permittee shall prevent scavenging and salvaging operations, except as part of a controlled recycling effort.

W. Signs. The Permittee shall provide a sign outlining instructions for use of the site. The sign shall be posted and have the information required by ADEM Admin. Code 335-13-4-.22(1)(i).

X. Litter Control. The Permittee shall control litter.

Y. Fire Control. The Permittee shall provide fire control measures.

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS.

A. The Permittee shall install and/or maintain a groundwater monitoring system, as specified below.

1. The permittee shall maintain the groundwater monitoring wells and piezometers identified in Table 1 at the locations specified in the Application, and any other groundwater monitoring wells which are added during the active life and the post closure care period.

2. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of a plume of contamination or as otherwise deemed necessary to maintain compliance with the ADEM Admin. Code 335-13.

3. Prior to installing additional groundwater monitoring wells, the Permittee shall submit a report to ADEM with a permit modification request specifying the design, location and installation of additional monitoring wells. This report shall be submitted within one hundred and twenty (120) days prior to the installation which, at a minimum, shall include.

    a. Well construction techniques including proposed casing depths, proposed total depth, and proposed screened interval of well(s);

    b. Well development method(s);

    c. A complete analysis of well construction materials;

    d. A schedule of implementation for construction; and

    e. Provisions for determining the lithologic characteristics, hydraulic conductivity and grain-size distribution for the applicable aquifer unit(s) at the location of the new well(s).

B. Groundwater Monitoring Requirements.

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer identified in Table 1 each time the well or piezometer is sampled and at least semi-annually throughout the active life and post-closure care period.

2. The Permittee shall determine the groundwater flow rate and direction in the first zone of saturation at least annually or each time groundwater is sampled and submit as required by ADEM Admin. Code 335-13.

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample, and analyze for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27, in all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code 335-13-4-.27(2)(j) and ADEM Admin. Code 335-13-4-.27(2)(a)(1). The records and results of this sampling and analysis activity shall be submitted to ADEM, within sixty (60) days of the date of sampling.

4. The Permittee shall sample, and analyze all monitoring wells identified in Table 1 for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27(3), on a semi-annual basis throughout the active life of the facility and the post-closure care period in accordance with ADEM Admin. Code 335-13-4-.27(3). Sampling shall be conducted during March and September of each year, beginning with the effective date of this permit. . The records and results of this sampling and analysis activity shall be submitted to ADEM, within ninety (90) days of the date of sampling.

5. In addition to the requirements of Sections IV., B.1., B.2., B.3. and B.4., the Permittee shall record water levels, mean sea level elevation measuring point, depth to water, and the results of field tests for pH and specific conductance at the time of sampling for each well.

6. The Permittee is approved for inter-well statistical methods as described by the Revised Groundwater Monitoring Plan, dated March 23, 2022.

C. Sampling and Analysis Procedures. The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Section IV.A. to provide a reliable indication of the quality of the groundwater.

1. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Application. Monitoring wells shall be bailed or pumped to remove at least four times the well volume of water. Slow recharge wells shall be bailed until dry. Wells shall be allowed to recharge prior to sampling.

2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.

3. Samples shall be tracked and controlled using the chain-of-custody and QA/QC procedures specified of the Application.

D. Recordkeeping and Reporting Requirements.

1. Recording of Results. For each sample and/or measurement taken pursuant to the requirements of this permit, the Permittee shall record the information required by Section I.E.9.c.

2. Recordkeeping. Records and results of all groundwater monitoring, sampling, and analysis activities conducted pursuant to the requirements of this permit shall be included in the operating record required by Section I.I.1.

E. Permit Modification. If the Permittee or ADEM determines that the groundwater monitoring system no longer satisfies the requirements of ADEM Admin. Code 335-13-4-.14 or Section IV.A. of this permit, the

Permittee must, within 120 days, submit an application for a permit modification to make necessary and/or appropriate changes to the system.

TABLE 1
GROUNDWATER MONITORING WELLS.

Monitoring Well Number	Top of Casing (feet msl)	Part Monitoring
	Upgradient Wells	
MW-1	280.92	Entire Landfill
MW-2R	324.60	Entire Landfill
	Downgradient Wells	
MW-3R	272.25	Entire Landfill
MW-4	196.88	Entire Landfill
MW-5	225.02	Entire Landfill
MW-6	191.62	Entire Landfill
MW-7	199.56	Entire Landfill
MW-8	217.84	Entire Landfill
MW-9	270.14	Entire Landfill
MW-10	293.93	Entire Landfill

SECTION V. GAS MONITORING REQUIREMENTS.

The Permittee must install and maintain an explosive gas monitoring system in accordance with ADEM Admin. Code Division 13.

SECTION VI. MUNICIPAL SOLID WASTE LANDFILL AIR EMISSIONS.

This landfill may be subject to ADEM Admin. Code Division 3 and the Federal Clean Air Act. Contact the ADEM Air Division for applicable requirements and permits.

SECTION VII. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS.

The Permittee must collect and dispose of the leachate that is generated at the facility. The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner. Prior to initial disposal, the permittee shall provide the Department with a letter from the receiving publicly or privately owned treatment works, approving the acceptance of the leachate. Discharges to publicly or privately owned treatment works may be subject to the requirements of the ADEM Water Division's State Indirect Discharge (SID) Program. The permittee shall construct and maintain run-on and run-off control structures. Surface water discharges from drainage control structures shall be permitted through the ADEM Water Division's National Pollutant Discharge Elimination System (NPDES) Program.

SECTION VIII. CLOSURE AND POST- CLOSURE REQUIREMENTS.

The Permittee shall close the landfill and perform post-closure care of the landfill in accordance with ADEM Admin. Code 335-13.

A. Final Cover. The landfill shall be closed in accordance with the approved application and ADEM Admin. Code 335-13.

B. Vegetative Cover. The Permittee shall establish a vegetative or other appropriate cover within 90 days after completion of final grading requirements in the Application. Preparation of a vegetative cover shall include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

C. Notice of Intent. The Permittee shall place in the operating record and notify ADEM of their intent to close the landfill prior to beginning closure.

D. Completion of Closure Activities. The Permittee must complete closure activities of each landfill unit in accordance with the Closure Plan within 180 days of the last known receipt of waste.

E. Certification of Closure. Following closure of each unit, the Permittee must submit to ADEM a certification, signed by an engineer, verifying the closure has been completed according to the Closure Plan.

F. Post-Closure Care Period. Post-closure care activities shall be conducted after closure of each unit throughout the life of this permit and continuing for a period of thirty (30) years following closure of the facility. ADEM may shorten or extend the post-closure care period applicable to the solid waste disposal facility. The Permittee shall reapply in order to fulfill the post-closure care requirements of this permit.

G. Post-Closure Maintenance. The Permittee shall provide post closure maintenance of the facility to include regularly scheduled inspections. This shall include maintenance of the cover, vegetation, monitoring devices and pollution control equipment and correction of other deficiencies that may be observed by ADEM. Monitoring requirements shall continue throughout the post closure period as determined by ADEM unless all waste is removed and no unpermitted discharge to waters of the State have occurred.

H. Post-Closure Use of Property. The Permittee shall ensure that post closure use of the property never be allowed to disturb the integrity of the final cover, liner, or other components of the containment system. This shall preclude the growing of deep-rooted vegetation on the closed area.

I. Certification of Post-Closure. Following post-closure of each unit, the Permittee must submit to ADEM a certification, signed by an engineer, verifying the post-closure has been completed according to the Post-Closure Plan.

J. Notice in Deed to Property. The Permittee must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code 335-5 and shall record a notation onto the land deed containing the property utilized for disposal within 90 days after permit expiration, revocation or when closure requirements are achieved as determined by ADEM as stated in the Application. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility and beginning and closure dates of the disposal activity.

K. Recording Instrument. The Permittee shall submit a certified copy of the recording instrument to ADEM within 120 days after permit expiration, revocation, or as directed by ADEM as described in the Application.

L. Removal of Waste. If the Permittee or other person(s) wishes to remove waste, waste residues, the liner, or any contaminated soils, the owner must request and receive prior approval from ADEM.

SECTION IX. FINANCIAL ASSURANCE

A. The Permittee shall maintain detailed written cost estimates, in current dollars, at the landfill office and on file with ADEM in accordance with ADEM Admin. Code 335-13-4-.28.

B. All cost estimates must be updated annually as required by ADEM Admin. Code 335-13-4-28.

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code 335-13-4-28. into the landfill operating record and submitted to ADEM before the initial receipt of waste in the case of closure, post-closure care, or no later than 120 days after corrective action remedy has been selected.

D. The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed.

E. The financial assurance mechanisms must be legally valid, binding, and enforceable under state and federal law.

F. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code 335-13-4-28. by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in the financial assurance mechanism must be approved by the Department.

G. The Permittee shall increase the closure, post-closure or corrective action cost estimates and the amount of financial assurance if changes in the closure, post-closure or correction action plans or landfill conditions increase the maximum cost.

H. The Permittee may reduce the amount of financial assurance by submitting justification and a revised estimate to ADEM for approval.

SECTION X. VARIANCES AND SPECIAL CONDITIONS.

1. A variance is granted for the Black Warrior Solid Waste Disposal Facility from Rule ADEM Admin. Code 335-13-4-.22(1)(c) which states that a completed daily cell shall not exceed eight feet in vertical thickness measured perpendicular to the slope of the preceding cell. Under this variance, a completed cell shall not exceed fifteen feet in vertical thickness measured perpendicular to the slope of the preceding cell (See Section III., I.).

2. The Permittee has been granted approval to utilize commercial tarp systems as an alternate daily cover. The commercial tarp system must be approved by the manufacturer for landfill use and the Permittee shall be required to follow manufacturer's recommendations for installation and removal of the tarp system. At the conclusion of each week's operation, the Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth. (See Section III., H.)

3. The Permittee has been granted approval to utilize non-hazardous solid waste clarifier sludge, cooling tower sludge, steckle dust all generated from NUCOR Steel Tuscaloosa, Inc., and VERDac Landfill Cover Pellets as alternate daily cover. The clarifier sludge, cooling tower sludge, steckle dust, and VERDac Landfill Cover Pellets may only be used to cover interior slopes of the cells. All exterior slopes shall be covered with soil in accordance with the approved plans and permit. A minimum of six inches of clarifier sludge, cooling tower sludge, or steckle dust shall be applied as cover. Alternate daily cover must be applied in accordance with applicable manufacturer's specifications and the Application. The Permittee shall be required to cover the active cell with six inches of earthen cover at the conclusion of each week's activities. (See Section III., H.)

Any variance granted by the Department may be terminated by the Department whenever the Department finds, after notice and opportunity for hearing, that the petitioner is in violation of any requirement, condition, schedule, limitation or any other provision of the variance, or that operation under the variance does not meet the minimum requirements established by state and federal laws.

APPENDIX B

NPDES PERMIT

LANCE R. LEFLEUR
DIRECTOR

KAY IVEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ■ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ■ FAX (334) 271-7950

January 11, 2023

ROBERT (BOB) LEWIS
CHAIRMAN OF THE BOARD OF DIRECTORS
BLACK WARRIOR SOLID WASTE DISPOSAL AUTHORITY
3301 LANDFILL DRIVE
COKER, AL 35452

RE: Black Warrior SWD Authority
3301 Landfill Drive
Coker, AL 35452
Tuscaloosa County, 125

Dear Chairman Lewis:

Based on your request, as evidenced by the submittal of a Notice of Intent, and on the information contained in the Notice of Intent coverage under **General NPDES Permit Number ALG160051** has been modified. The effective date of coverage modification is February 01, 2023.

Coverage under this permit does not authorize the discharge of any pollutant or wastewater that is not specifically identified in the permit and by the Notice of Intent which resulted in the granting of coverage. **The Receiving Water for certain outfalls changed from and Unnamed Tributary to Tater Hill Creek to Partlow Lake Upper.** The new discharges identified in the NOI are:

Outfall ID	Receiving Water	Notes
0011	**Unnamed Tributary to Big Creek via Storm Sewer**	**This outfall's discharge requires monitoring per the general permit requirements.**
0012	Unnamed Tributary to Big Creek	This outfall's discharge is represented by Outfall ID 0011.
0013	Unnamed Tributary to Big Creek	This outfall's discharge is represented by Outfall ID 0011.
0014	Unnamed Tributary to Big Creek	This outfall's discharge is represented by Outfall ID 0011.
0015	**Unnamed Tributary to Tater Hill Creek via Storm Sewer**	**This outfall's discharge requires monitoring per the general permit requirements.**
0016	**Partlow Lake Upper**	**This outfall's discharge requires monitoring per the general permit requirements.**
0017	Partlow Lake Upper	This outfall's discharge is represented by Outfall ID 0016.
0018	Partlow Lake Upper	This outfall's discharge is represented by Outfall ID 0016.
0031	**Unnamed Tributary to Big Creek via Storm Sewer**	**This outfall's discharge requires monitoring per the general permit requirements.**

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Branch
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
3664 Dauphin Street, Suite B
Mobile, AL 36608-1211
(251) 304-1176
(251) 304-1189 (FAX)

You are responsible for compliance with all provisions of the permit including but not limited to, the performance of any monitoring, the submittal of any reports, and the preparation and implementation of any plans required by the permit.

Discharge Monitoring Reports (DMRs) must be submitted electronically via the Alabama Environmental Permitting and Compliance System (AEPACS) in accordance with Permit Condition I. C. **ADEM will not provide paper DMR forms due to the electronic reporting requirements.**

If you discharge to an impaired waterway, additional Best Management Practices (BMPs) will be required. The Alabama Department of Environmental Management encourages you to exercise pollution prevention practices and alternatives at your facility. Pollution prevention will assist you in complying with effluent limitations and permit regulations.

A copy of the General NPDES Permit under which coverage of your discharges has been granted is enclosed. If you have any questions concerning this permit, please contact Monique Miles either by email at mmm@adem.alabama.gov or by phone at (334) 271-7853.

Sincerely,

Jeffery W. Kitchens

Jeffery W. Kitchens, Chief
Water Division

Enclosures: Permit

File: NOI/ 1849

ADEM
Alabama Department of Environmental Management

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT

DISCHARGE AUTHORIZED: DISCHARGES OF STORM WATER (**NOT** CONTAINING LEACHATE) FROM ACTIVE AND INACTIVE LANDFILLS, TRANSFER STATIONS, AND LAND DISTURBANCE ACTIVITIES ASSOCIATED WITH OPENING AND CLOSING CELLS AT LANDFILLS; DISCHARGES OF VEHICLE AND EQUIPMENT EXTERIOR WASH WATER; AND DISCHARGES OF STORM WATER FROM FUELING, PETROLEUM STORAGE AND HANDLING, EQUIPMENT STORAGE, AND MAINTENANCE AREAS

AREA OF COVERAGE: THE STATE OF ALABAMA

PERMIT NUMBER: ALG160051

RECEIVING WATERS: ALL WATERS OF THE STATE NOT DESIGNATED OUTSTANDING NATIONAL RESOURCE WATERS OR OUTSTANDING ALABAMA WATERS

In accordance with and subject to the provisions of Federal Water Pollution Control Act, as amended, 33 U.S.C. §§1251-1388 (the "FWPCA"), the Alabama Water Pollution Control Act, as amended, ***Code of Alabama 1975,*** *§§22-22-1 to 22-22-14 (the "AWPCA"), the Alabama Environmental Management Act, as amended,* ***Code of Alabama 1975****, §§22-22A-1 to 22-22A-17, and rules and regulations adopted thereunder, and subject further to the terms and conditions set forth in this permit, the dischargers covered by this permit are hereby authorized to discharge into the above receiving waters.*

ISSUANCE DATE: November 10, 2021

EFFECTIVE DATE: February 1, 2022

EXPIRATION DATE: January 31, 2027

Jeffery W. Kitchen

Alabama Department of Environmental Management

TABLE OF CONTENTS

PART I: DISCHARGE LIMITATIONS, CONDITIONS, AND REQUIREMENTS 1

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS 1

DSN001: Discharges of storm water (NOT containing leachate) from active or inactive landfills, transfer stations, and land disturbance activities associated with opening and closing cells at landfills. 1

DSN002: Discharges of storm water from petroleum storage and fueling areas[7] 2

DSN003: Discharges of uncontaminated storm water from fueling, petroleum storage and handling, equipment storage, and maintenance areas. 3

DSN004: Discharges from vehicle and equipment exterior washing operations that DO NOT use solvents and have NOT come in direct contact with solid waste at the landfill facility. [3] 4

Discharge Monitoring Requirements applicable to all storm water discharges. 5

B. DISCHARGE MONITORING AND RECORD KEEPING REQUIREMENTS 6

1. Representative Sampling 6
2. Test Procedures 6
3. Recording of Results 6
4. Records Retention and Production 7
5. Monitoring Equipment and Instrumentation 7

C. DISCHARGE REPORTING REQUIREMENTS 7

1. Reporting of Monitoring Requirements 7
2. Noncompliance Notification 9

D. OTHER REPORTING AND NOTIFICATION REQUIREMENTS 10

1. Anticipated Noncompliance 10
2. Termination of Discharge 10
3. Updating Information 10
4. Duty to Provide Information 10
5. New or Increased Discharges 10

E. SCHEDULE OF COMPLIANCE 10

PART II: OTHER REQUIREMENTS, RESPONSIBILITIES, AND DUTIES 11

A. REQUIREMENTS FOR COVERAGE UNDER THIS GENERAL PERMIT 11

1. Notice of Intent 11
2. Content of Notice of Intent 11

B. OPERATIONAL AND MANAGEMENT REQUIREMENTS 11

1. Facilities Operation and Maintenance 11
2. Best Management Practices 11
3. Spill Prevention, Control, and Management 12

C. OTHER RESPONSIBILITIES 12

1. Duty to Mitigate Adverse Impacts 12
2. Right of Entry and Inspection 12

D. BYPASS AND UPSET 12

1. Bypass 12
2. Upset 13

E. DUTY TO COMPLY WITH PERMIT, RULES, AND STATUTES 13

1. Duty to Comply 13
2. Removed Substances 13
3. Loss or Failure of Treatment Facilities 14
4. Compliance with Statutes and Rules 14

TABLE OF CONTENTS (CONTINUED)

F. PERMIT TRANSFER, MODIFICATION, SUSPENSION, REVOCATION, REISSUANCE, AND TERMINATION 14

1. Duty to Reapply or Notify of Intent to Cease Discharge 14
2. Change in Discharge 14
3. Transfer of Permit or Change in Name 15
4. Permit Modification, Revocation and Reissuance (of Modified General or Individual), and Termination 15
5. Issuance by the Director of an Individual NPDES Permit to a Person Eligible for Coverage or Covered by This General Permit. 16
6. Request for an Individual NPDES Permit by a Person Covered Under This General Permit. 17
7. Request for Permit Action Does Not Stay Any Permit Requirement 17

G. COMPLIANCE WITH TOXIC POLLUTANT STANDARD OR PROHIBITION 17

H. DISCHARGE OF WASTEWATER GENERATED BY OTHERS 18

PART III: OTHER PERMIT CONDITIONS 19

A. CIVIL AND CRIMINAL LIABILITY 19

1. Tampering 19
2. False Statements 19
3. Permit Enforcement 19
4. Relief from Liability 19

B. OIL AND HAZARDOUS SUBSTANCE LIABILITY 19

C. PROPERTY AND OTHER RIGHTS 19

D. AVAILABILITY OF REPORTS 19

E. COMPLIANCE WITH WATER QUALITY STANDARDS 20

F. GROUNDWATER 20

G. DEFINITIONS 20

H. SEVERABILITY 22

PART IV: ADDITIONAL REQUIREMENTS, CONDITIONS, AND LIMITATIONS 23

A. STORM WATER MEASUREMENT AND SAMPLING 23

1. Storm Water Measurement 23
2. Storm Water Sampling 23

B. BEST MANAGEMENT PRACTICES (BMP) PLAN 23

1. Plan Content for Landfill Activities 23
2. Plan Content for Construction Activities 24
3. Compliance Schedule 24
4. Department Review 25
5. Administrative Procedures 25

C. DISCHARGE(S) TO IMPAIRED WATERS REQUIREMENTS 25

1. Requirements Applicable to a Facility Eligible for Coverage, or Covered, under this Permit with Discharge(s) to 303(d) Listed Waters 25
2. Requirements Applicable to a Facility Eligible for Coverage, or Covered, under this Permit with Discharges into Waters with EPA-Approved or EPA-Established TMDLs 26
3. Requirements for New or Revised BMP Plans 26

PART I: DISCHARGE LIMITATIONS, CONDITIONS, AND REQUIREMENTS

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from the following point source(s) outfall(s), described more fully in the permittee's Notice of Intent (NOI):

DSN001: Discharges of storm water (NOT containing leachate) from active or inactive landfills, transfer stations, and land disturbance activities associated with opening and closing cells at landfills.

Such discharge shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	UNITS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [1,2,3]	
		Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
Rainfall	inches	–	Monitor	1/6 months	[4]
pH	s.u.	Monitor	Monitor	1/6 months	Grab
Biochemical Oxygen Demand, 5-day	mg/l	–	Monitor	1/6 months	Grab
Chemical Oxygen Demand	mg/l	–	Monitor	1/year	Grab
Cadmium, Total	mg/l	–	Monitor	1/6 months	Grab
Chromium, Total	mg/l	–	Monitor	1/6 months	Grab
Copper, Total	mg/l	–	Monitor	1/6 months	Grab
Oil and Grease	mg/l	–	15	1/6 months	Grab
Settleable Solids [5,7]	mg/l	–	Monitor	1/6 months [7]	Grab
Total Dissolved Solids	mg/l	–	Monitor	1/6 months	Grab
Total Suspended Solids	mg/l	–	Monitor	1/6 months	Grab
Downstream Turbidity [5,6,7]	NTU	–	[6]	1/6 months [7]	Grab
Upstream Turbidity [5,6,7]	NTU	–	Monitor	1/6 months [7]	Grab

THERE SHALL BE NO DISCHARGE OF DEBRIS. THE DISCHARGE SHALL HAVE NO SHEEN, AND THERE SHALL BE NO DISCHARGE OF VISIBLE OIL, FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS

Notes:

1 Samples collected to comply with the monitoring requirements specified above shall be collected et the following location: At the nearest accessible location just prior to discharge and after final treatment.

2 Semiannual monitoring shall be performed during the first complete January – June, or July – December period following authorization under this permit and during each subsequent six (6) month period. The annual parameter may be taken during the first or second six months of the monitoring period, but must be taken if there is a full six month period or more remaining in the monitoring period. The annual parameter result is reported on the semiannual form that is applicable to the date the annual parameter sample was taken. For the six months period that the facility did not sample the annual parameter, the facility must code the annual parameter on the semiannual electronic report as *9 or on the semiannual hardcopy report as "NODI=9" (monitoring is conditional not required this period). Quarterly monitoring shall be performed during the first complete January – March, April-June, July-September, or October – December period following authorization under this permit and during each subsequent three (3) month period. Monitoring reports shall be submitted semiannually so that they arrive at the Department no later than the 28th day of the month following the six (6) month monitoring period (no later than January 28 and July 28).

3 A storm event is defined as 0.1 inch or greater rainfall and at least 72 hours from the previously measureable (greater than 0.1 inch rainfall) storm event. Monitoring shall be performed during the first thirty minutes of discharge (or as soon thereafter as practicable).

4 See Part IV.A. of the permit.

5 To be monitored only when land disturbance activities (associated with opening and closing cells at landfills) are occurring. These land disturbance activities may include digging for cover material within the permitted landfill area, but not outside of that permitted area. If no such land disturbance activities are occurring, then the landfill must code the discharge monitoring report (DMR) for that period as "NODI=9" (monitoring is conditional not required this period).

6 Downstream turbidity shall not exceed 50 NTUs above the upstream turbidity.

7 If the permittee discharges to impaired waters as identified by an EPA-approved or EPA established TMDL and/or on the State of Alabama's 303(d) list, then settleable solids, downstream turbidity, and upstream turbidity must be monitored quarterly instead of semi-annually. ADEM reserves the right to require the permittee to obtain an individual permit for any of the reasons listed in Part II. F. 5. a. (1) through (9) of the permit.

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from the following point source(s) outfall(s), described more fully in the permittee's NOI:

DSN002: Discharges of storm water from petroleum storage and fueling areas[7]

Such discharge shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	UNITS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [1]	
		Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
Rainfall	inches	–	Monitor	1/quarter	[2]
pH	s.u.	Monitor	Monitor	1/quarter	Grab
Benzene [3]	µg/l	–	15.5	1/quarter	Grab
Ethylbenzene [4]	µg/l	–	1,244	1/quarter	Grab
Toluene [5]	µg/l	–	8,723	1/quarter	Grab
Xylene	µg/l	–	Monitor	1/quarter	Grab
Naphthalene [6]	µg/l	–	620	1/quarter	Grab
Oil and Grease	mg/l	–	15	1/quarter	Grab
MTBE (Methyl Tertiary Butyl Ether)	µg/l	–	Monitor	1/quarter	Grab

THERE SHALL BE NO DISCHARGE OF DEBRIS. THE DISCHARGE SHALL HAVE NO SHEEN, AND THERE SHALL BE NO DISCHARGE OF VISIBLE OIL, FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS

Notes:

[1] Samples collected to comply with the monitoring requirements specified above shall be collected at the following location: At the nearest accessible location just prior to discharge and after final treatment.

[2] See Part IV.A.

[3] The limit for benzene shall be 1.12 µg/l if the discharge is to a body of water which is designated as a public water supply or within a 24-hour travel time to a body of water designated as a PWS.

[4] The limit for ethylbenzene shall be 448 µg/l if the discharge is to a body of water which is designated as a public water supply or within a 24-hour travel time to a body of water designated as a PWS.

[5] The limit for toluene shall be 1,206 µg/l if the discharge is to a body of water which is designated as a public water supply or within a 24-hour travel time to a body of water designated as a PWS.

[6] To be monitored only at facilities which handle diesel fuel.

[7] If fueling operations are the only industrial activities occurring within the drainage area, then DSN003 applies for the discharge, unless the Department deems it necessary to require monitoring under DSN002 in addition to DSN003.

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from the following point source(s) outfall(s), described more fully in the permittee's NOI:

DSN003: Discharges of uncontaminated storm water from fueling, petroleum storage and handling, equipment storage, and maintenance areas.

DISCHARGES UNDER DSN003 MAY NOT MIX WITH OTHER DISCHARGES UNLESS THOSE DISCHARGES ARE PERMITTED.

All discharges from DSN003 shall meet the following conditions:

1. The facility will have a valid Spill Prevention, Control, and Countermeasures (SPCC) plan, if required, pursuant to 40 CFR 112.
2. Best Management Practices (BMP) will be used to prevent pollution of storm water by spillage or leakage during petroleum handling and fueling operations and from equipment maintenance and storage areas. The BMP shall include at a minimum:
   a. Twice per week inspections of the area and removal of any leaked petroleum product;
   b. Immediate cleanup of spilled or leaked petroleum product during handling operations, including fueling; and
   c. All cleanup activities shall be conducted using dry sweep or other approaches that do not result in the creation of polluted wastewater or storm water runoff.
3. Records shall be maintained in the form of a log and shall contain the following information, at a minimum:
   a. Date and time of inspections;
   b. Any cleanup accomplished as a result of the inspection;
   c. Time the cleanup was initiated and the time it was completed;
   d. The signature of person making visual inspection and performing any cleanup; and
   e. Description of any spillage occurring during petroleum handling, which shall include the date and time of the spill, estimated volume of spill, name of the person observing the spill, date and time the spill was cleaned up, and name of the person cleaning up the spill.
4. Best Management Practices (BMP) are used in draining the diked area. BMP is defined as use of a portable oil skimmer or similar device or the use of absorbent material to remove oil and grease (as indicated by the presence of a sheen) immediately prior to draining.
5. Monitoring records for dike drainage shall be maintained in the form of a log and shall contain the following information, as a minimum:
   a. Date and time of discharge;
   b. Estimated volume of discharge;
   c. Initials of person making visual inspection and authorizing discharge.
6. The discharge shall have no sheen, and there shall be no discharge of visible oil, floating solids or visible foam in other than trace amounts.
7. The permittee shall submit an **Annual Certification DMR** by January 28th of each year (but no earlier than January 1st) that reports whether all discharges were in accordance with the conditions of this permit for the previous calendar year.

DMR Reporting Instructions

The Annual Certification DMR should be marked "0" (zero) if operations had not changed and all discharges were in accordance with the conditions of the permit. If conditions had changed or all discharges were not in accordance with the conditions of the permit, the DMR should be marked "1" and the facility should contact the department regarding any changes in conditions or discharge/permit noncompliance. Any noncompliance should also be reported in accordance with Part I.C.2.

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from the following point source(s) outfall(s), described more fully in the permittee's NOI:

DSN004: Discharges from vehicle and equipment exterior washing operations that DO NOT use solvents and have NOT come in direct contact with solid waste at the landfill facility. [3]

Such discharge shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	UNITS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [1]	
		Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
Flow	gal/day	–	Monitor	1/month	Instantaneous [2]
pH	s.u.	6.0	8.5	1/month	Grab
Oil and Grease	mg/l	–	15	1/month	Grab
Phosphorus, Total	mg/l	–	1.0	1/month	Grab
Total Suspended Solids	mg/l	–	50	1/month	Grab

THERE SHALL BE NO DISCHARGE OF DEBRIS. THE DISCHARGE SHALL HAVE NO SHEEN, AND THERE SHALL BE NO DISCHARGE OF VISIBLE OIL, FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS

Notes:

1 Samples collected to comply with the monitoring requirements specified above shall be collected at the following location: At the nearest accessible location just prior to discharge and after final treatment.

2 If flows are intermittent, the flow volume may be estimated.

3 This permit does not allow for the discharge of landfill wastewater as defined by 40 CFR Part 445.2(f).

A. Discharge Limitations and Monitoring Requirements

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from the following point source(s) outfall(s), described more fully in the permittee's NOI:

Discharge Monitoring Requirements applicable to all storm water discharges.

Monitoring of one storm water outfall within a designed drainage area as representative of the remaining outfalls, may be allowed if the applicant submits certification that the discharges are essentially the same. If at a later date the discharges are determined to be dissimilar or if pollutant concentrations are such that water quality standards are contravened, then monitoring of all discharges may be required.

This permit does not allow for the discharge of landfill wastewater as defined by 40 CFR Part 445.2(f).

B. Discharge Monitoring and Record Keeping Requirements

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge and shall be in accordance with the provisions of this permit.

2. Test Procedures

For the purpose of reporting and compliance, permittees shall use one of the following procedures:

a. For parameters with an EPA established Minimum Level (ML), report the measured value if the analytical result is at or above the ML and report "0" for values below the ML. Test procedures for the analysis of pollutants shall conform to 40 CFR Part 136 and guidelines published pursuant to §304(h) of the FWPCA, 33 U.S.C. §1314(h). If more than one method for analysis of a substance is approved for use, a method having a minimum level lower than the permit limit shall be used. If the minimum level of all methods is higher than the permit limit, the method having the lowest minimum level shall be used and a report of less than the minimum level shall be reported as zero and will constitute compliance, however, should EPA approve a method with a lower minimum level during the term of this permit the permittee shall use the newly approved method.

b. For pollutants parameters without an established ML, an interim ML may be utilized. The interim ML shall be calculated as 3.18 times the Method Detection Level (MDL) calculated pursuant to 40 CFR Part 136, Appendix B.

   Permittees may develop an effluent matrix-specific ML, where an effluent matrix prevents attainment of the established ML. However, a matrix specific ML shall be based upon proper laboratory method and technique. Matrix-specific MLs must be approved by the Department, and may be developed by the permittee during permit issuance, reissuance, modification, or during compliance schedule.

   In either case the measured value should be reported if the analytical result is at or above the ML and "0" reported for values below the ML.

c. For parameters without an EPA established ML, interim ML, or matrix-specific ML, a report of less than the detection limit shall constitute compliance if the detection limit of all analytical methods is higher than the permit limit. For the purpose of calculating a monthly average, "0" shall be used for values reported less than the detection limit.

   The Minimum Level utilized for procedures A and B above shall be reported on the permittee's DMR. When an EPA approved test procedure for analysis of a pollutant does not exist, the Director shall approve the procedure to be used.

3. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The facility name and location, point source number, date, time and exact place of sampling;

b. The name(s) of person(s) who obtained the samples or measurements;

c. The dates and times the analyses were performed;

d. The name(s) of the person(s) who performed the analyses;

e. The analytical techniques or methods used, including source of method and method number; and

f. The results of all required analyses.

4. Records Retention and Production

a. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the above reports or the NOI for this permit, for a period of at least three years from the date of the sample measurement, report or NOI. This period may be extended by request of the Director at any time. If litigation or other enforcement action, under the AWPCA and/or the FWPCA, is ongoing which involves any of the above records, the records shall be kept until the litigation is resolved. Upon the written request of the Director or his designee, the permittee shall provide the Director with a copy of any record required to be retained by this paragraph. Copies of these records shall not be submitted unless requested.

b. All records required to be kept for a period of three years shall be kept at the permitted facility or an alternate location approved by the Department in writing and shall be available for inspection. A complete copy of the permit, the Best Management Practices (BMP) Plan, most recent BMP inspection records, and, if applicable, a Spill Prevention, Control, and Countermeasures (SPCC) Plan shall be maintained at the facility. The past three years of DMRs, laboratory records, and historical BMP inspection and training records may be kept at an alternate Alabama location if approved by the Department.

5. Monitoring Equipment and Instrumentation

All equipment and instrumentation used to determine compliance with the requirements of this permit shall be installed, maintained, and calibrated in accordance with the manufacturer's instructions or, in the absence of manufacturer's instructions, in accordance with accepted practices. At a minimum, flow measurement devices shall be calibrated at least once every 12 months.

C. DISCHARGE REPORTING REQUIREMENTS

1. Reporting of Monitoring Requirements

a. This permit requires weekly, monthly, quarterly, semiannual, and annual self-monitoring. The permittee shall conduct the required monitoring in accordance with the following schedule:

MONITORING REQUIRED MONTHLY AND MORE FREQUENTLY THAN MONTHLY shall be conducted during the first full month following the effective date of initial coverage under this permit and every month thereafter.

QUARTERLY MONITORING shall be conducted at least once during each calendar quarter. Calendar quarters are the periods of January through March, April through June, July through September, and October through December. The permittee shall conduct the quarterly monitoring during the first full quarter following the effective date of initial coverage and each quarter thereafter.

SEMI-ANNUAL MONITORING shall be conducted at least once during the period of January through June and at least once during the period of July through December. The permittee shall conduct the semi-annual monitoring during the first complete six-month period following the effective date of initial coverage and each six-month period thereafter.

ANNUAL MONITORING shall be conducted at least once during the period of January through December. If six or more months are remaining in the first monitoring period after initial coverage the annual monitoring shall be conducted and then once each twelve month period thereafter.

b. The permittee shall submit discharge monitoring reports (DMRs) in accordance with the following schedule:

REPORTS OF MORE FREQUENTLY THAN MONTHLY, MONTHLY, QUARTERLY, AND SEMI-ANNUAL MONITORING shall be submitted on a semiannual basis. The semiannual reports shall be submitted so that they are received by the Department no later than the 28th day of July and the 28th day of January, unless otherwise directed by the Department. Each submittal shall report results of all testing performed during the six-month period preceding the reporting month. For example, the semiannual report due on January 28 should report the results of testing conducted during the months of July through December.

c. Except as allowed by Provision I.C.1.c.(1) or (2), the permittee shall submit all Discharge Monitoring Reports (DMRs) required by Provision I.C.1.b. by utilizing the Department's web-based system.

(1) If the permittee is unable to complete the electronic submittal of DMR data due to technical problems originating with the Department's web-based system (this could include entry/submittal issues with an entire set of DMRs or individual parameters), the permittee is not relieved of their obligation to submit DMR data to the Department by the date specified in Provision I.C.1.b., unless otherwise directed by the Department.

If the Department's web-based system is down on the 28th day of the month in which the DMR is due or is down for an extended period of time, as determined by the Department, when a DMR is required to be submitted, the permittee may submit the data in an alternate manner and format acceptable to the Department. Preapproved alternate acceptable methods include faxing, e-mailing, mailing, or hand-delivery of data such that they are received by the required reporting date. Within five calendar days of the Department's web-based system resuming operation, the permittee shall enter the data into the Department's web-based system, unless an alternate timeframe is approved by the Department.

(2) The permittee may submit a request to the Department for a temporary electronic reporting waiver for DMR submittals. The waiver request should include the permit number; permittee name; facility/site name; facility address; name, address, and contact information for the responsible official or duly authorized representative; a detailed statement regarding the basis for requesting such a waiver; and the duration for which the waiver is requested. Approved electronic reporting waivers are not transferrable.

Permittees with an approved electronic reporting waiver for DMRs may submit hard copy DMRs for the period that the approved electronic reporting waiver request is effective. The permittee shall submit the Department-approved DMR forms to the address listed in Provision I.C.1.e.

(3) If a permittee is allowed to submit a hard copy DMR, the DMR must be legible and bear an original signature. Photo and electronic copies of the signature are not acceptable and shall not satisfy the reporting requirements of this permit.

(4) If the permittee, using approved analytical methods as specified in Provision I.B.2, monitors any discharge from a point source for a limited substance identified in Provision I.A. of this permit more frequently than required by this permit, the results of such monitoring shall be included in the calculation and reporting of values on the DMR and the increased frequency shall be indicated on the DMR.

(5) In the event no discharge from a point source identified in Provision I.A. of this permit and described more fully in the permittee's NOI occurs during a monitoring period, the permittee shall report "No Discharge" for such period on the appropriate DMR.

d. All reports and forms required to be submitted by this permit, the AWPCA and the Department's Rules and Regulations, shall be electronically signed (or, if allowed by the Department, traditionally signed) by a "responsible official" of the permittee as defined in ADEM Administrative Code Rule 335-6-6-.09 or a "duly authorized representative" of such official as defined in ADEM Administrative Code Rule 335-6-6-.09 and shall bear the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision In accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibiiity of fine and imprisonment for knowing violations."

e. Discharge Monitoring Reports required by this permit, the AWPCA, and the Department's Rules that are being submitted in hard copy shall be addressed to:

Alabama Department of Environmental Management
Permits and Services Division
Environmental Data Section
Post Office Box 301463
Montgomery, Alabama 36130-1463

Certified and Registered Mail containing Discharge Monitoring Reports shall be addressed to:

Alabama Department of Environmental Management
Permits and Services Division
Environmental Data Section
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

f. All other correspondence and reports required to be submitted by this permit, the AWPCA, and the Department's Rules shall be addressed to:

Alabama Department of Environmental Management
Water Division
Post Office Box 301463
Montgomery, Alabama 36130-1463

Certified and Registered Mail shall be addressed to:

Alabama Department of Environmental Management
Water Division
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

2. Noncompliance Notification

a. If for any reason, the permittee's discharge (1) does not comply with any daily minimum or maximum discharge limitation for an effluent characteristic specified in Provision I. A. of this permit which is denoted by an "(X)", (2) threatens human health or welfare, fish or aquatic life, or water quality standards, (3) does not comply with an applicable toxic pollutant effluent standard or prohibition established under Section 307(a) of the FWPCA, 33 U.S.C. Section 1317(a), (4) contains a quantity of a hazardous substance which has been determined may be harmful to public health or welfare under Section 311(b)(4) of the FWPCA, 33 U.S.C. Section 1321(b)(4), (5) exceeds any discharge limitation for an effluent characteristic as a result of an unanticipated bypass, upset, (6) is an unpermitted direct or indirect discharge of a pollutant to a water of the state (unpermitted discharges properly reported to the Department under any other requirement are not required to be reported under this provision), the permittee shall orally report the occurrence and circumstances of such discharge to the Director within 24-hours after the permittee becomes aware of the occurrence of such discharge. In addition to the oral report, the permittee shall submit to the Director electronically a report (or if acceptable to the Department a written report) as provided in Provision I. C. 2. c. no later than five (5) days after becoming aware of the occurrence of such discharge.

b. If for any reason, the permittee's discharge does not comply with any limitation of this permit, the permittee shall submit to the Director a report as provided in Provision I. C. 2. c. below, such report shall be submitted with the next Discharge Monitoring Report required to be submitted by Provision I. C. 1. of this permit after becoming aware of the occurrence of such noncompliance.

c. Any electronic report (or if acceptable to the Department a written report) required to be submitted to the Director by Provision I. C. 2 a. or b. shall be submitted using a copy of the Department's Noncompliance Notification Form and shall include the following information:

(1) A description of the discharge and cause of noncompliance;

(2) The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

(3) A description of the steps taken and/or being taken to reduce or eliminate the noncomplying discharge and to prevent its recurrence.

D. Other Reporting and Notification Requirements

1. Anticipated Noncompliance

The permittee shall give the Director written advance notice of any planned changes or other circumstances regarding a facility, which may result in noncompliance with permit requirements. This information must be submitted electronically unless acceptable to the Department to submit otherwise.

2. Termination of Discharge

The permittee shall notify the Director, when any point source discharges authorized by this permit have permanently ceased, by submitting a permit termination request electronically through the Department's web-based system. This notification shall serve as sufficient cause for instituting procedures for termination of the permittee's authority to discharge under this General Permit.

3. Updating Information

a. The permittee shall inform the Director of any change in the permittee's mailing address or telephone number or in the permittee's designation of a facility contact or office having the authority and responsibility to prevent and abate violations of the AWPCA, the Department's Rules and the terms and conditions of this permit, in writing, no later than ten (10) days after such change. Upon request of the Director or his designee, the permittee shall furnish the Director with an update of any information provided in the NOI.

b. If the permittee becomes aware that it failed to submit any relevant facts in the NOI, or submitted incorrect information in the NOI; or in any report to the Director, it shall promptly submit such facts or information with a written explanation for the mistake and/or omission. This information must be submitted electronically unless acceptable to the Department to submit otherwise.

4. Duty to Provide Information

a. Any permittee shall furnish to the Director, within a reasonable time, any information which the Director or his designee may request to determine whether cause exists for suspending or revoking the permittee's authorization to discharge under this General Permit, in whole or in part, or to determine compliance with this permit or to determine if the permittee should be required to apply for an individual permit.

b. Any or all permittees shall furnish to the Director, within a reasonable time, any information which the Director or his designee may request to determine whether cause exists for modifying or terminating this permit.

5. New or Increased Discharges

If there is an increase in pollution potential of the discharges from the permittee's facility the permittee must notify the Director in writing. The Director may at his discretion determine under Part II.F. of this permit what action if any will be taken.

E. Schedule Of Compliance

1. The permittee shall achieve compliance with the discharge limitations specified in Provision I. A. in accordance with the following schedule:

COMPLIANCE SHALL BE ACHIEVED ON THE EFFECTIVE DATE OF COVERAGE UNDER THIS PERMIT

2. If required, no later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement. This information must be submitted electronically unless acceptable to the Department to submit otherwise.

PART II: OTHER REQUIREMENTS, RESPONSIBILITIES, AND DUTIES

A. REQUIREMENTS FOR COVERAGE UNDER THIS GENERAL PERMIT

1. Notice of Intent

Any person wishing to be permitted to discharge under this General Permit shall submit a Notice of Intent (NOI) to be covered by this General Permit at least 30 days prior to the date of desired coverage. No discharge authorized under this General Permit may commence until the discharger receives the Director's acknowledgement of the NOI and approval of the coverage of the discharge by this General Permit. The Director's acknowledgement shall include a copy of this General Permit.

The permittee must complete and submit all Departmental forms, including the NOI, utilizing the Department's web-based system unless the permittee submits in writing valid justification as to why the electronic submittal process cannot be utilized and the Department approves in writing utilization of hard copy submittals. For approved hard copy submissions, the Departmental forms are available on ADEM's webpage at http://adem.alabama.gov/DeptForms/default.cnt.

Any person discharging to a municipal storm sewer, sanitary sewer or combination sewer must notify the municipality by letter of the discharge.

2. Content of Notice of Intent

a. A description of the process generating the discharge for which coverage is desired. This description shall be in sufficient detail to allow the Director to determine that the discharge is included in the category permitted by this General Permit;

b. The latitude and longitude of the discharge points for each discharge and the name of the waterbody receiving each discharge for which coverage under this General Permit is desired; and

c. A contact person, address and phone number for the facility or activity to be covered under this General Permit;

(1) The NOI shall be electronically signed (or if acceptable to the Department traditionally signed) by a person meeting the requirements for signatories to permit application under ADEM Administrative Code Rule 335-6-6-.09 and the person signing the NOI shall make the certification required for submission of documents under ADEM Administrative Code Rule 335-6-6.09.

(2) Signatories to reports, discharge monitoring reports and any other submissions required by this General Permit shall be signed in accordance with the requirements of ADEM Administrative Code Rule 335-6-6.09.

B. OPERATIONAL AND MANAGEMENT REQUIREMENTS

1. Facilities Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities only when necessary to achieve compliance with the conditions of the permit.

2. Best Management Practices

a. Dilution water shall not be added to achieve compliance with discharge limitations except when the Director or his designee has granted prior written authorization for dilution to meet water quality requirements.

b. The permittee shall prepare, implement, and maintain a Spill Prevention, Control and Countermeasures (SPCC) Plan in accordance with 40 CFR Part 112 if required thereby.

c. The permittee shall prepare and implement a Best Management Practices (BMP) Plan according to Part IV of this permit.

3. Spill Prevention, Control, and Management

The permittee shall provide spill prevention, control, and/or management sufficient to prevent any spills of pollutants from entering a water of the state or a publicly or privately owned treatment works. Any containment system used to implement this requirement shall be constructed of materials compatible with the substance(s) contained and which shall prevent the contamination of groundwater and such containment system shall be capable of retaining a volume equal to 110 percent of the capacity of the largest tank for which containment is provided.

C. OTHER RESPONSIBILITIES

1. Duty to Mitigate Adverse Impacts

The permittee shall promptly take all reasonable steps to mitigate and minimize or prevent any adverse impact on human health or the environment resulting from noncompliance with any discharge limitation of this permit, including such accelerated or additional monitoring of the discharge and/or the receiving waterbody as necessary to determine the nature and impact of the noncomplying discharge.

2. Right of Entry and Inspection

The permittee shall allow the Director, or an authorized representative, upon the presentation of proper identification to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the AWPCA, any substances or parameters at any location.

D. BYPASS AND UPSET

1. Bypass

a. Any bypass is prohibited except as provided in b. and c. below:

b. A bypass is not prohibited if:

(1) It does not cause any discharge limitation specified in Provision I. A. of this permit to be exceeded;

(2) It is necessary for essential maintenance of a treatment or control facility or system to assure efficient operation of such facility or system; or

(3) It is part of the storm water control system when the intention of the design, as approved by the Director, is to contain the first flush only.

c. A bypass is not prohibited and need not meet the discharge limitations specified in Provision I. A. of this permit if:

(1) It is unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime (this condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable

engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance); and

(3) The permittee submits a written request for authorization to bypass to the Director at least ten (10) days prior to the anticipated bypass (if possible), the permittee is granted such authorization, and the permittee complies with any conditions imposed by the Director to minimize any adverse impact on human health or the environment resulting from the bypass. This request must be submitted electronically unless acceptable to the Department to submit otherwise.

d. The permittee has the burden of establishing that each of the conditions of Provision II. D. 1. b. or c. have been met to qualify for an exception to the general prohibition against bypassing contained in a. and an exemption, where applicable, from the discharge limitations specified in Provision I. A. of this permit.

2. Upset

a. A discharge which results from an upset need not meet the discharge limitations specified in Provision I. A. of this permit if:

(1) No later than 24-hours after becoming aware of the occurrence of the upset, the permittee orally reports the occurrence and circumstances of the upset to the Director or his designee; and

(2) No later than five (5) days after becoming aware of the occurrence of the upset, the permittee furnishes the Director with evidence, including properly signed, contemporaneous operating logs, or other relevant evidence, demonstrating that (i) an upset occurred; (ii) the permittee can identify the specific cause(s) of the upset; (iii) the permittee's facility was being properly operated at the time of the upset; and (iv) the permittee promptly took all reasonable steps to minimize any adverse impact on human health or the environment resulting from the upset.

b. The permittee has the burden of establishing that each of the conditions of Provision II D. 2. a. of this permit have been met to qualify for an exemption from the discharge limitations specified in Provision I. A. of this permit.

E. DUTY TO COMPLY WITH PERMIT, RULES, AND STATUTES

1. Duty to Comply

a. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the AWPCA and the FWPCA and is grounds for: enforcement action, termination, or suspension of authorization under this permit; denial of a permit reissuance NOI; a requirement that permittee submit an NOI for an individual NPDES permit.

b. The necessity to halt or reduce production or other activities in order to maintain compliance with the conditions of the permit shall not be a defense for a permittee in an enforcement action.

c. The discharge of a pollutant from a source not specifically identified in the NOI to be covered under this General Permit and not specifically included in the description of an outfall in this permit is not authorized and shall constitute noncompliance with this permit.

d. The permittee shall take all reasonable steps, including cessation of production or other activities, to minimize or prevent any violation of this permit or to minimize or prevent any adverse impact of any permit violation.

2. Removed Substances

Solids, sludges, filter backwash, or any other pollutant or other waste removed in the course of treatment or control of storm waters and/or process water shall be disposed of in a manner that complies with all applicable Department Rules.

3. Loss or Failure of Treatment Facilities

Upon the loss or failure of any treatment facility, including but not limited to the loss or failure of the primary source of power of the treatment facility, the permittee shall, where necessary to maintain compliance with the discharge limitations specified in Provision I. A. of this permit, or any other terms or conditions of this permit, cease, reduce, or otherwise control production and/or all discharges until treatment is restored.

4. Compliance with Statutes and Rules

a. This permit has been issued under ADEM Administrative Code, Chapter 335-6-6. All provisions of this chapter, that are applicable to this permit, are hereby made a part of this permit. A copy of this chapter may be obtained on the Department's website or for a small charge from the Office of General Counsel, Alabama Department of Environmental Management, 1400 Coliseum Boulevard, Montgomery, AL 36110.

b. This permit does not authorize the noncompliance with or violation of any Laws of the State of Alabama or the United States of America or any regulations or rules implementing such laws. FWPCA, 33 U.S.C. Section 1319, and Code of Alabama 1975, Section 22-22-14.

F. Permit Transfer, Modification, Suspension, Revocation, Reissuance, and Termination

1. Duty to Reapply or Notify of Intent to Cease Discharge

a. The permittee authorized to discharge under this General Permit, who wishes to continue to discharge upon the expiration of this permit, shall submit an NOI to request reissuance of coverage under the reissued General Permit. Such NOI shall be submitted at least 90 days prior to the expiration date of this General Permit. The permittee shall electronically submit the NOI utilizing the Department's web-based system, unless the permittee submits in writing valid justification as to why the electronic submittal process cannot be utilized, and the Department approves in writing the utilization of hard copy submittals.

b. Failure of the permittee to submit the appropriate NOI material for reauthorization under this permit at least 90 days prior to the permit's expiration will void the automatic continuation of the authorization to discharge under this permit as provided by ADEM Administrative Code Rule 335-6-6-.06. Should the permit not be reissued for any reason prior to its expiration date, permittees who failed to meet the 90-day submittal deadline will be illegally discharging without a permit after the expiration date of the permit.

2. Change in Discharge

a. The permittee shall give notice to the Director at least 90 days in advance of any facility expansion, production increase, process change, or other action that could result in:

(1) The discharge of additional pollutants;

(2) The increase in the quantity of any discharge such that existing permit limitations would be exceeded;

(3) Or that could result in an additional discharge point.

This requirement applies to pollutants that are or that are not subject to discharge limitations in this permit. No new or increased discharge may begin until the Director has reviewed the information and taken appropriate action to authorize the discharge under this General Permit, or until such time as an appropriate action has been taken to authorize the discharge under an individual permit.

b. The permittee shall notify the Director as soon as it is known or there is reason to believe:

(1) That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following notification levels:

(a) One hundred micrograms per liter;

(b) Two hundred micrograms per liter for acrolein and acrylonitrile; five hundred micrograms per liter for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter for antimony;

(c) Five times the maximum concentration value reported for that pollutant in the permit NOI; or

(2) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

(a) Five hundred micrograms per liter;

(b) One milligram per liter for antimony;

(c) Ten times the maximum concentration value reported for that pollutant in the permit NOI.

3. Transfer of Permit or Change in Name

This permit may not be transferred or the name of the permittee changed without notice to the Director and subsequent modification or revocation and reissuance of the permit to identify the new permittee and to incorporate any other changes as may be required under the FWPCA or AWPCA.

a. In the case of a change in ownership or control of the permittee's premises only, a request for permit transfer must be submitted electronically through the Department's web-based system at least 30 days prior to the change.

b. In the case of a change in ownership or control of the permittee's premises accompanied by a change or proposed change in effluent characteristics, a complete NOI is required to be submitted to the Director electronically through the Department's web-based system at least 90 days prior to the change.

c. In the case of a change in Permittee Name or Facility Name only, a request for permit name change must be submitted electronically through the Department's web-based system at least 30 days prior to the change.

Whenever the Director is notified of a change in ownership or control, he may decide not to modify the existing permit and require the submission of a new permit NOI.

4. Permit Modification, Revocation and Reissuance (of Modified General or Individual), and Termination

a. During the term of this General Permit the Director may, for cause, and subject to the public notice procedure of ADEM Administrative Code, Rule 335-6-6-.21, modify or revoke and reissue this General Permit, or terminate it and require all those authorized under it to apply for individual NPDES permits. The causes for this action include but are not limited to the causes listed below:

(1) There are material and substantial alterations or additions to the facility or activity generating the discharges which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit;

(2) When the Director receives any information that was not available at the time of permit issuance and that would have justified the application of different permit conditions at the time of issuance;

(3) When the standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued;

(4) Upon the failure of the state to notify, as required by Section 402(b)(3) of the FWPCA, another state whose waters may be affected by a discharge;

(5) When the level of discharge of any pollutant which is not limited in the permit exceeds the level which can be achieved by the technology based treatment requirements appropriate to discharge under 40 CFR 125.3(c);

(6) To correct technical mistakes, such as errors in calculation, clerical errors or mistaken interpretations of law made in determining permit conditions;

(7) If the permit limitations are found not to be protective of water quality standards;

(8) To incorporate an applicable 307(a) FWPCA toxic effluent standard or prohibition;

(9) When required by the reopener conditions in this permit, and

(10)For any applicable cause set forth in ADEM Administrative Code Rule 335-6-6-.17.

b. Subject to the public notice procedures of ADEM Administrative Code Rule 335-6-6-.21, the Director may terminate this General Permit during its term for any of the causes for modification listed in Part II.F.4.a.

c. The Director may terminate authorization to discharge under this General Permit for cause. Cause shall include but not be limited to:

(1) Noncompliance with the permit;

(2) Noncompliance with Department Rules;

(3) A finding that this General Permit does not control the discharges sufficiently to protect water quality or comply with treatment based limits applicable to the discharge;

(4) The permittee's misrepresentation or failure to disclose fully all relevant facts in the permit NOI or during the permit issuance process or the permittee's misrepresentation of any relevant facts at any time;

(5) Materially false or inaccurate statements or information in the permit NOI or the permit;

(6) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(7) The permittee's discharge threatens human life or welfare;

(8) Permanent closure of the facility generating the wastewater permitted to be discharged by this permit or permanent cessation of wastewater discharge; and

(9) New or revised requirements of any applicable standard or limitation that is promulgated under Sections 301(b)(2)(C),(D),(E),and (F), and 307(a)(2) of the FWPCA that the Director determines cannot be complied with by the permittee.

d. If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance of this General Permit under ADEM Administrative Code Rule 335-6-6-.23 (7), or termination and issuance of an individual permit under ADEM Administrative Code Rule 335-6-6-.23 (9) the permittee must report such information to the Permit Issuing Authority. The submittal of a new NOI may be required of the permittee. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned change, anticipated noncompliance or application for an individual permit, does not stay any permit condition.

5. Issuance by the Director of an Individual NPDES Permit to a Person Eligible for Coverage or Covered by This General Permit.

a. The Director may require any person, otherwise eligible for coverage under this General Permit, to apply for an individual NPDES permit by notifying that person that an application is required. Notification shall consist of a written description of the reason(s) for the decision, appropriate permit application forms and directions, a statement informing the person that upon issuance of the individual permit coverage by this General permit shall automatically terminate. Reasons for this requirement may be:

(1) Noncompliance with the General Permit;

(2) Noncompliance with Department Rules;

(3) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the wastewater being discharged;

(4) Effluent guidelines are promulgated for a point source(s) covered by the General Permit;

(5) A water quality management plan applicable to the wastewater being discharged under this General Permit;

(6) Circumstances have changed since the time of the request to be covered so that the discharger is no longer appropriately controlled under this General Permit or either a temporary reduction or permanent reduction or elimination of the authorized discharge is necessary;

(7) Standards for sewage sludge use or disposal have been promulgated for the sludge use or disposal practice covered by this General Permit;

(8) The discharge(s) is a significant contributor of pollutants. In making this decision the Director may consider:

(a) the location of the discharges with respect to waters of the state,

(b) the size of the discharger, and

(c) the quantity and nature of the pollutants discharged to waters of the state.

(9) A determination that the water of the state receiving the discharge is not meeting applicable water quality standards.

6. Request for an Individual NPDES Permit by a Person Covered Under This General Permit.

a. Any person covered by this General Permit may apply for termination of coverage by applying for an individual NPDES permit.

b. A permit NOI submitted voluntarily or at the direction of the Director for the purpose of termination of coverage by this General Permit shall be processed in accordance with the rules found in ADEM Administrative Code 335-6-6 applicable to individual permits.

c. Any person may petition the Director for withdrawal of this General Permit authority from a discharger. The Director shall consider the information submitted by the petitioner and any other information he may be aware of and may obtain additional information from the discharger and through inspections by Department staff and shall decide if coverage should be withdrawn. The petitioner shall be informed of the Director's decision and shall be provided a summary of the information considered.

7. Request for Permit Action Does Not Stay Any Permit Requirement

The filing of a request by the permittee for any permit action such as termination, or application for individual permit or any other action, does not stay any permit term or condition.

G. Compliance with Toxic Pollutant Standard Or Prohibition

If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the FWPCA, 33 U.S.C. Section 1317(a), for a toxic pollutant discharged by the permittee and such standard or prohibition is more stringent than any discharge limitation on the pollutant specified in Provision I. A. of this permit, or controls a pollutant not limited in Provision I. A. of this permit, this permit shall be modified to conform to the toxic pollutant effluent standard or prohibition and the permittee shall be notified of such modification. If this permit has not been modified to conform to the toxic pollutant effluent standard or prohibition before the effective date of such standard or prohibition, the permittee shall attain compliance with the requirements of the standard or prohibition within the time period required by the standard or prohibition and shall continue to comply with the standard or prohibition until this permit is modified or reissued.

H. DISCHARGE OF WASTEWATER GENERATED BY OTHERS

The discharge of wastewater, generated by any process, facility, or by any other means not under the operational control of the permittee or not identified in the NOI for this permit or not identified specifically in the description of an outfall in this permit is not authorized by this permit.

PART III: OTHER PERMIT CONDITIONS

A. CIVIL AND CRIMINAL LIABILITY

1. Tampering

Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained or performed under the permit shall, upon conviction, be subject to penalties as provided by the AWPCA.

2. False Statements

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be subject to penalties as provided by the AWPCA.

3. Permit Enforcement

a. Any NPDES permit issued or reissued by the Department is a permit for the purpose of the AWPCA and the FWPCA and as such any terms, conditions, or limitations of the permit are enforceable under state and federal law and as described under Rule 335-6-6-.18.

b. Any person required to have a NPDES permit pursuant to ADEM Administrative Code Chapter 335-6-6 and who discharges pollutants without said permit, who violates the conditions of said permit, who discharges pollutants in a manner not authorized by the permit, or who violates applicable orders of the Department or any applicable rule or standard of the Department, is subject to any one or combination of the following enforcement actions under applicable state statutes.

(1) An administrative order requiring abatement, compliance, mitigation, cessation, clean-up, and/or penalties;

(2) An action for damages;

(3) An action for injunctive relief; or

(4) An action for penalties.

4. Relief from Liability

Except as provided in Provision II. D. 1. (Bypass) and Provision II. D. 2. (Upset), nothing in this permit shall be construed to relieve the permittee of civil or criminal liability under the AWPCA or FWPCA for noncompliance with any term or condition of this permit.

B. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the FWPCA, 33 U.S.C. Section 1321.

C. PROPERTY AND OTHER RIGHTS

This permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, or any infringement of federal, state, or local laws or regulations, nor does it authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any waters of the state or of the United States.

D. AVAILABILITY OF REPORTS

Except for data determined to be confidential under Code of Alabama 1975, Section 22-22-9(c), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential.

E. COMPLIANCE WITH WATER QUALITY STANDARDS

1. The permittee may be required by the Director to apply for an individual permit, if the Director determines that discharge under this General Permit causes a violation of a water quality standard or stream use classification.

2. Compliance with permit terms and conditions notwithstanding, if the permittee's discharge(s) from point sources identified in Provision I. A. of this permit cause or contribute to a condition in contravention of state water quality standards, the Department may require the permittee to take abatement action or apply for an individual permit pursuant to the Department's Rules, or both.

3. If the Department determines, on the basis of a notice provided pursuant to this permit or any investigation, inspection or sampling, that a modification of this permit is necessary to assure maintenance of water quality standards or compliance with other provisions of the AWPCA or FWPCA, the Department may require such modification.

F. GROUNDWATER

Unless specifically authorized under this permit, this permit does not authorize the discharge of pollutants to groundwater. Should a threat of groundwater contamination occur, the Director may require groundwater monitoring to properly assess the degree of the problem and the Director may require that the permittee undertake measures to abate any such discharge and/or contamination.

G. DEFINITIONS

1. *Authorization* – means granted the privilege of discharging under the terms of this General Permit.

2. *Average monthly discharge limitation* - means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month (zero discharge days shall not be included in the number of "daily discharges" measured and a less than detectable test result shall be treated as a concentration of zero if the most sensitive EPA approved method was used).

3. *Average weekly discharge limitation* - means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week (zero discharge days shall not be included in the number of "daily discharges" measured and a less than detectable test result shall be treated as a concentration of zero if the most sensitive EPA approved method was used).

4. *AWPCA* - means the Alabama Water Pollution Control Act.

5. *Bypass* - means the intentional diversion of waste streams from any portion of a treatment facility.

6. *Daily discharge* - means the discharge of a pollutant measured during any consecutive 24 hour period in accordance with the sample type and analytical methodology specified by the discharge permit.

7. *Daily maximum* - means the highest value of any individual sample result obtained during a day.

8. *Daily minimum* - means the lowest value of any individual sample result obtained during a day.

9. *Day* - means any consecutive 24-hour period.

10. *Department* - means the Alabama Department of Environmental Management.

11. *Director* - means the Director of the Department.

12. *Discharge* - means "[t]he addition, introduction, leaking, spilling or emitting of any sewage, industrial waste, pollutant or other waste into waters of the state". Code of Alabama 1975, Section 22-22-1(b)(8).

13. *Discharge monitoring report (DMR)* - means the form approved by the Director to accomplish reporting requirements of an NPDES permit.

14. *EPA* - means the United States Environmental Protection Agency.

15. *FWPCA* - means the Federal Water Pollution Control Act.

16. *Landfill Wastewater*, as defined by 40 CFR Part 445.2 (f), means all wastewater associated with, or produced by, landfilling activities except for sanitary wastewater, non-contaminated storm water, contaminated ground water, and wastewater from recovery pumping wells. Landfill wastewater includes, but is not limited to, leachate, gas collection condensate, drained free liquids, laboratory derived wastewater, contaminated storm water and contact washwater from washing truck, equipment, and railcar exteriors and surface areas which have come in direct contact with solid waste at the landfill facility.

17. *Notice of Intent* – means forms and additional information that are required by ADEM Administrative Code Rule 335-6-6-.23 and applicable permit fees.

18. *Permit application* - means forms and additional information that is required by ADEM Administrative Code Rule 335-6-6-.08 and applicable permit fees.

19. *Point source* - means "any discernible, confined and discrete conveyance, including but not limited to any pipe, channel, ditch, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." Section 502(14) of the FWPCA, 33 U.S.C. Section 1362(14).

20. *Pollutant* - includes for purposes of this permit, but is not limited to, those pollutants specified in Code of Alabama 1975, Section 22-22-1(b)(3) and those effluent characteristics specified in Provision I. A. of this permit.

21. *Qualified Credentialed Professional* or *QCP* means a professional engineer (PE), or a Certified Professional in Erosion and Sediment Control (CPESC) as determined by CPESC, Inc. Other registered or certified professionals such as registered landscape architect, registered land surveyor, registered geologist, registered forester, Registered Environmental Manager as determined by the National Registry of Environmental Professionals (NREP), or Certified Professional and Soil Scientist (CPSS) as determined by ARCPACS, and other Department accepted professional designations, certifications, and/or accredited university programs that can document requirements regarding proven training, relevant experience, and continuing education, that can enable recognized individuals to prepare CBMPP's to makes sound professional judgments regarding Alabama NPDES rules, the requirements of this chapter, planning, design, implementation, maintenance, and inspection of construction sites, receiving waters, BMPs, remediation/cleanup of accumulated offsite pollutants from the regulated site, and reclamation or effective stormwater quality remediation of construction associated land disturbances, that meet or exceed recognized technical standards and guidelines, effective industry standard practices, and the requirements of this chapter. The QCP shall be in good standing with the authority granting the registration or designation. The design and implementation of certain structural BMPs may involve the practice of engineering and require the certification of a professional engineer pursuant to Alabama law.

22. *Severe property damage* - means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

23. *Shock chlorination* – means the periodic use of chlorine in cooling water systems as a biocide.

24. *Upset* - means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit discharge limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

25. *Waters* - means "[a]ll waters of any river, stream, watercourse, pond, lake, coastal, ground or surface water, wholly or partially within the state, natural or artificial. This does not include waters which are entirely confined and retained completely upon the property of a single individual, partnership or corporation unless such waters are used in interstate commerce." Code of Alabama 1975, Section 22-22-1(b)(2). Waters "include all navigable waters" as defined in Section 502(7) of the FWPCA, 22 U.S.C. Section 1362(7), which are within the State of Alabama.

26. *Week* - means the period beginning at twelve midnight Saturday and ending at twelve midnight the following Saturday.

H. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

PART IV: ADDITIONAL REQUIREMENTS, CONDITIONS, AND LIMITATIONS

A. STORM WATER MEASUREMENT AND SAMPLING

1. Storm Water Measurement

a. All storm water samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches.

b. The storm water event must be monitored, including the date and rainfall (in inches) for the storm event(s) sampled. The duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event must be a minimum of 72 hours. This information must be recorded as part of the sampling procedure and records retained according to Part I.B.4.b. of this permit.

c. During the sampling storm event, rainfall must be reported and may be measured using a rain guage. This information must be recorded as part of the sampling procedure and records retained according to Part I.B.4.b. of this permit.

2. Storm Water Sampling

a. A grab sample, if required by this permit, shall be taken during the first thirty minutes of the discharge (or as soon thereafter as practicable); and a flow weighted composite sample, if required by this permit, shall be taken for the entire event or for the first three hours of the event.

b. All test procedures will be in accordance with Part I.B.2. of this permit.

B. BEST MANAGEMENT PRACTICES (BMP) PLAN

1. Plan Content for Landfill Activities

The permittee shall prepare (or as required have a QCP prepare) and implement a best management practices (BMP) plan which shall:

a. Provide control sufficient to prevent or control pollution of storm water by soil particles to the degree required to prevent violation of the turbidity water quality standard applicable to the waterbody receiving the discharge;

b. Prevent the spillage or loss of fluids, oil, grease, gasoline, etc. from vehicle and equipment maintenance and repair activities and thereby prevent the contamination of storm water from these substances;

c. Prevent or minimize the storm water contact with material stored on site;

d. Designate by position or name the person or persons responsible for the day to day implementation of the BMP;

e. Provide for at a minimum, two inspections a week, on days during which the facility is manned, of any structures that function to prevent storm water pollution or to remove pollutants from storm water and of the facility in general to ensure that the BMP is continually implemented and effective;

f. If spillage is a factor during loading and unloading of bulk material, provide for prevention of the mixing of spillage with discharged storm water;

g. Include a diagram of the facility showing the direction of the storm water flow, the discharge point(s), and the locations of any structures or other mechanisms intended to prevent pollution of storm water or to remove pollutants from storm water, the locations of any collection and handling systems. The site map should also identify the location, size, and contents of any tanks.

h. Prevent the pollution of storm water by animal wastes;

i. Bear the signature of the landfill manager or corporate official;

j. The permittee must implement measures to ensure permanent revegetation or cover of all disturbed areas. The permittee shall perform regular clean-up and proper disposal of floating or submerged trash and garbage resulting from activities authorized by this permit;

k. The permittee shall implement, as necessary, a system for the collection, storage, treatment, and disposal of sewage and other putrescible wastes;

l. Appropriate measures must be taken to prevent the deposition of airborne pollutants such as spray paint, herbicides, excessive road dust, etc. from entering any waterbody.

2. Plan Content for Construction Activities

a. A Qualified Credentialed Professional must prepare the BMP Plan that addresses the land disturbance activities. Permittee shall implement a BMP Plan describing structural and non-structural practices which will be implemented and maintained to prevent/minimize the discharge of all sources of pollution (i.e., sediment, trash, garbage, debris, oil & grease, chemicals, materials, etc.) to State waters in storm water runoff. The Plan must be designed to address the following goals: (1) to divert upslope water around the site; (2) to limit the exposure of disturbed areas to precipitation to the shortest amount of time possible; (3) to minimize the amount of surface area that is disturbed; and (4) to remove sediment, nutrients, and other pollutants from the storm water before it leaves the site.

b. The BMP Plan means implementation and continued maintenance of effective structural and non-structural practices and management strategies to prevent and minimize the introduction of pollutants to stormwater and to treat stormwater to remove pollutants prior to discharge. The Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas, Alabama Soil and Water Conservation Committee (ASWCC) March 2009 edition and current industry standards shall be used as necessary to maintain compliance.

c. Dilution water shall not be added to achieve compliance with discharge limitations except when the Director or his designee has granted prior written authorization for dilution to meet water quality requirements.

d. The permittee must implement measures to ensure permanent revegetation or cover of all disturbed areas. The permittee shall perform regular clean-up and proper disposal of floating or submerged trash and garbage resulting from activities authorized by this permit.

e. The permittee shall implement, as necessary, a system for the collection, storage, treatment, and disposal of sewage and other putrescible wastes.

f. All construction and worker debris (e.g., trash, garbage, etc.) must be immediately removed and disposed on in an approved manner. No rubbish, trash garbage, refuse, or other such materials shall be discharged into waters of the State of Alabama.

g. Appropriate measures must be taken to prevent the deposition of airborne pollutants such as spray paint, herbicides, excessive road dust, etc. from entering any waterbody.

h. All materials used as fill for construction purposes must be non-toxic, non-acid forming and free of solid waste or other debris unless approved by the Department.

i. Include a diagram of the facility showing the direction of the storm water flow, the discharge point(s), and the locations of any structures or other mechanisms intended to prevent pollution of storm water or to remove pollutants from storm water, the locations of any collection and handling systems. The site map should also identify the location, size, and contents of any tanks.

j. Bear the signature of the landfill manager or corporate official.

3. Compliance Schedule

The permittee shall have prepared and fully implemented the BMP upon the date coverage is granted.

4. Department Review

a. When requested by the Director or his designee, the permittee shall make the BMP available for Department review.

b. The Director or his designee may notify the permittee at any time that the BMP is deficient and require correction of the deficiency.

c. The permittee shall correct any BMP deficiency identified by the Director or his designee within 30 days of receipt of notification and shall certify to the Department that the correction has been made and implemented.

5. Administrative Procedures

a. A copy of the BMP shall be maintained at the landfill and shall be available for inspection by representatives of the Department.

b. A log of the twice per week inspections required above shall be maintained at the landfill and shall be available for inspection by representatives of the Department. The log shall contain records of all inspections performed and any corrective actions taken for the last three years and each entry shall be signed by the person performing the inspection.

c. The permittee shall provide training for any personnel required to implement the BMP and shall retain documentation of such training at the facility. This documentation shall be available for inspection by representatives of the Department. Training shall be performed prior to the date that implementation of the BMP is required.

d. BMP Plan Modification. The permittee shall amend the BMP plan whenever there is a change in the facility or change in operation of the facility which materially increases the potential for the ancillary activities to result in a discharge of significant amounts of pollutants.

C. DISCHARGE(S) TO IMPAIRED WATERS REQUIREMENTS

1. Requirements Applicable to a Facility Eligible for Coverage, or Covered, under this Permit with Discharge(s) to 303(d) Listed Waters

This permit does not authorize new sources or new dischargers of pollutants of concern to impaired waters unless consistent with an EPA-approved or EPA-established Total Maximum Daily Load (TMDL) and applicable State law. Impaired waters are those that do not meet applicable water quality standards and are identified by an EPA-approved or EPA-established TMDL and/or on the State of Alabama's 303(d) list. Pollutants of concern are those pollutants for which the water body is listed as impaired and which contribute to the listed impairment.

a. The facility eligible for coverage, or covered, under this permit must determine whether its discharge(s) contributes directly or indirectly to a waterbody that is included on the latest 303(d) list or otherwise designated by the Department as impaired or is included in an EPA-approved or EPA-established TMDL. If the facility has discharges meeting this criterion, it must comply with Part IV.C., if its discharge does not meet this criterion, Part IV.C. does not apply to the facility.

b. Facilities that discharge into a receiving water which is listed on the State of Alabama's 303(d) list of impaired waters, and with discharges that contain the pollutant(s) for which the waterbody is impaired, must by April 30th of the following year or within 6 months of such approval of the 303(d) list or applicable TMDL or establishment of TMDL by EPA (whichever is longer), document in its BMP plan how the BMPs will control the discharge of the pollutant(s) of concern, and must ensure that there will be no increase of the pollutants of concern. A monitoring plan to assess the effectiveness of the BMPs in achieving the allocations must also be included in the BMP plan.

c. If the facility discharges to a waterbody described above, it must also determine whether a total maximum daily load (TMDL) has been developed and approved or established by EPA for the listed waterbody. If a TMDL is approved or established during this permit cycle by USEPA for any waterbody into which the facility discharges, the facility must review the applicable TMDL to see if it includes requirements for control of storm water

discharges. By April 30th of the following year or within 6 months of such approval of the 303(d) list or applicable TMDL or establishment of TMDL by EPA (whichever is longer), the facility must notify the Department on how it will modify its BMP plan to include best management practices specifically targeted to achieve the allocations prescribed by the TMDL. Revised BMP plans must be submitted to the Department for review. The facility must include a monitoring component in the BMP plan to assess the effectiveness of the BMPs in achieving the allocations. If the facility cannot ensure its discharges will not cause or contribute to impairment, then the facility must apply for and obtain permit coverage under an individual permit.

2. Requirements Applicable to a Facility Eligible for Coverage, or Covered, under this Permit with Discharges into Waters with EPA-Approved or EPA-Established TMDLs

a. The facility must determine whether the EPA-approved or EPA-established TMDL is for a pollutant likely to be found in discharges from its facility.

b. The facility must determine whether the TMDL includes a pollutant allocation or other performance requirements specifically for discharges from its facility.

c. If, after the determinations above have been made and if it is determined that the facility must implement specific allocations provisions of the TMDL, then the facility must assess whether the allocations are being met through implementation of existing control measures or if additional control measures are necessary.

d. The facility must document all control measures currently being implemented or planned to be implemented, to include a schedule of implementation for all planned controls, and must document calculations or other evidence showing that the allocations will be met. Revised BMP plans must be submitted to the Department for review.

e. If a TMDL contains requirements for control of pollutants from the facility's discharges, then the BMP plan must include BMPs specifically targeted to achieve the allocations prescribed by the TMDL. A monitoring plan to assess the effectiveness of the BMPs in achieving the allocations must also be included in the BMP plan. Implementation of the monitoring plan in accordance with Part IV.C.2 will determine whether the controls are adequate to meet the TMDL allocations. If the facility cannot comply with the requirements of the TMDL, then the facility must apply for and obtain permit coverage under an individual permit.

f. If the evaluation shows that additional or modified controls are necessary, the facility must describe the type and schedule for the control additions/revisions in the BMP plan. The facility must also continue Paragraphs IV.C.2.d.-f. until two continuous monitoring cycles, as defined in the monitoring plan in accordance with Part IV.C.2., show that the TMDL allocations are being met or that water quality (WQ) standards are being met.

3. Requirements for New or Revised BMP Plans

New or revised BMP plans developed in accordance with Parts IV.C.1 and IV.C.2 above must be submitted to the Department for review by April 30th of the year following EPA approval of the 303(d) list or EPA establishment/approval of applicable TMDL or within 6 months of such approval of the 303(d) list or applicable TMDL or establishment of TMDL by EPA (whichever is longer).

Digitally signed by:
AEPACS
Date: 2022.12.28 09:04:51 -06:00
Reason: Submission Data
Location: State of Alabama

NPDES General Permit - Landfills (ALG160000) - Mod/Reissue - (Form 384)

version 3.3

(Submission #: HPM-Q3GW-NF651, version 2)

Details

Submission ID HPM-Q3GW-NF651

Form Input

General Instructions

Notice Of Intent ◆ NPDES General Permit Number ALG160000 (Form 384) - Modification/Reissuance

NPDES General Permit Number ALG160000, which is the general permit authorizing discharges associated with storm water runoff, not containing leachate, from active and inactive landfills and from transfer stations including storm water runoff from maintenance operations and expansion construction activities at landfills; vehicle and equipment washwater; and storm water associated with fueling, petroleum storage and handling, equipment storage, and maintenance areas.

This form should be used to submit the following permit requests:

- Permit Transfers
- Permittee/Facility Name Changes
- Modifications
- Reissuances (Reissuance of a permit on or after the current permit◆s expiration date)

Please complete all questions and attach all necessary documentation as prompted throughout the application process. Incomplete or incorrect information will delay processing.

Applicable Fees:

- Permit Transfers and/or Permittee/Facility Name Changes
o $800
- Modifications
o $800
- Reissuances
o $1,385
For assistance, please click here to determine the permit staff responsible for the site or call (334) 271-7799/(334) 274-4203.

Processing Information

Purpose of Application (Select all that apply):
Modification

Action Type
Modification

Why are you requesting to modify your permit? Please briefly describe what changes are included in this modification request:
Designate DSN001-6 as the representative outfall location for discharges from DSN001-6 through DSN001-8. DSN001-1 will remain the designated representative outfall location for discharges from DSN001-1 through DSN001-4. Changing DSN001-5 outfall as the designated representative outfall for discharges of itself. Correct the receiving stream identification for DSN001-5 through 8 (no change to discharge coordinates). Changing Fred Rogers as the Responsible Official for the facility.

Industrial Activity Information

For each industrial activity listed, please select 'Yes' if discharges from the activity will continue to need coverage under this permit or if you are requesting coverage be added for discharges under the activity:

Industrial Activity	Continue/Add Permit Coverage
DSN001: Storm Water Discharges Associated with Landfill Operations	Yes
DSN002 and DSN003: Storm Water Discharges Associated with Fueling, Petroleum Storage and Handling, Equipment Storage, and Maintenance Areas	Yes
DSN004: Discharges Associated with Vehicle and Equipment Exterior Washing Operations	No

Are any discharges above combined?
Yes

Please indicate which discharges are combined:
Stormwater from petroleum handling operations mixes with stormwater to outfall DSN001-1/DSN003-1

Does any discharge or runoff from the facility reach an Outstanding Alabama Water or Outstanding Natural Resource Water stream segment as defined by ADEM Administrative Code r. 335-6-11-.02?
No

Does the storm water contain any leachate?
No

Is treated or untreated water from tank bottoms or water draws discharged on site?
No

Is hydrostatic testing of petroleum handling equipment done on site?
No

Description of industrial activity and land use at the facility:
Solid Waste Disposal Facility

Permit Information

Permit Number
ALG160051

Current Permittee Name
Black Warrior Solid Waste Disposal Facility

NOTE *(CREATED)*
Legal Business Name

The legal business name as it appears on the Alabama Secretary of State Listing is Black Warrior Solid Waste Disposal Authority and not Black Warrior Solid Waste Authority. Please see attachment.
Created on 10/20/2022 4:31 PM by **Monique Miles**

To look up your company's legal business name, please refer to the Secretary of State's website:
Click here

Permittee

Permittee Name (Legal Business Name)
Black Warrior Solid Waste Disposal Authority

Mailing Address

3301 Landfill Drive

Coker, AL 35452

Per ADEM Admin. Code r. 335-6-6-.09 (1), a Responsible Official is defined as CEO, President, any position at a level of Vice President or higher, Owner, Partner, Managing Member (LLC), or ranking elected official. Please provide the contact information for the person meeting this definition.

Do NOT enter information for a person that is/will be a Duly Authorized Representative (DAR). A person that is a Duly Authorized Representative is NOT considered a RESPONSIBLE OFFICIAL.

Responsible Official

Prefix
Mr.

First Name	**Last Name**
Fred	*Rogers*

Title
Executive Director

Organization Name
Black Warrior Solid Waste Disposal Authority

Phone Type	**Number**	**Extension**
Business	205-339-7330	

Email
frogers@bwswa.com

Fax
NONE PROVIDED

Mailing Address

3301 Landfill Drive

Coker, AL 35452

CORRECTION REQUEST *(CORRECTED)*
Responsible Official

Per the definition of a Responsible Official...i.e. President, Vice President, CEO, Owner, CFO, or ranking elected official . Only these titles can be listed in this section. Please remove Daniel Swartz from this section as his title is Operations Manager. Please list the Responsible Official (i.e Vice President or higher) in this section.
Created on 10/20/2022 4:37 PM by **Monique Miles**

Does the Responsible Official intend to delegate signatory authority to an individual (or to a company position) as a duly authorized representative (DAR) for this site?
No

CORRECTION REQUEST *(CORRECTED)*
DAR

Since Jonnie Swartz electronically signed and submitted this application, he should be listed as the Duly Authorized Representative (DAR). Also, please attach the Delegation Letter signed by the VP or higher which gives Jonnie Swartz the authority to sign.
Created on 10/20/2022 4:43 PM by **Monique Miles**

Existing Permit Contacts

Affiliation Type	Contact Information	Remove?
Permittee	Black Warrior Solid Waste Disposal Facility	NONE PROVIDED
Responsible Official,Notification Recipient	Ken Thrasher	Remove

DMR Contact(s) (1 of 1)

DMR Contact

Prefix
Mr.

First Name	Last Name
Fred	*Rogers*

Title
Executive Director

Phone Type	Number	Extension
Business	205-339-7330	

Email
frogers@bwswa.com

Address
3301 Landfill Drive
Coker, AL 35452

Facility/Site Information

Current Facility/Site Name
Black Warrior SWD Facility

Permittee Organization Type
Corporation

Facility/Site Contact

Prefix
Mr.

First Name	Last Name
Fred	*Rogers*

Title
Executive Director

Organization Name
Black Warrior Solid Waste Disposal Authority

Phone Type	Number	Extension
Business	205-339-7330	

Email
frogers@bwswa.com

Facility/Site Address or Location Description
3301 Landfill Drive
Coker, AL 35452

Please indicate if any changes are needed to the Facility/Site Address:
NONE PROVIDED

Facility/Site County
Tuscaloosa

Facility/Site Front Gate Latitude and Longitude
33.23804400000000,-87.65510600000000

3301 Landfill Drive, Coker, AL

If the facility coordinates are not correct, please provide the correct coordinates and provide any other information necessary:
NONE PROVIDED

SIC Code(s) [Please select your primary SIC code first]:
9511-Air and Water Resource and Solid Waste Management

NAICS Code(s) [Please select your primary NAICS code first]:
562212-Solid Waste Landfill

Has the facility been issued an NPDES INDIVIDUAL permit?
No

Has the facility been issued a State Indirect Discharge (SID) Permit?
No

Are any outfalls being added to this general permit that will be discharging to a municipal storm sewer?
No

Date facility started operations:
01/01/1994

What is the size of the site in acres?
299

Do you discharge to any waters of the State that are impaired (303(d) or TMDL)?
No

A list of the 303(d) impaired waters can be found at: http://adem.alabama.gov/programs/water/303d.cnt and waters subject to a TMDL can be found at: http://adem.alabama.gov/programs/water/approvedTMDLs.htm

Does any discharge or runoff from the facility reach a public water supply stream segment as defined by ADEM Administrative Code r. 335-6-11-.02?
No

Please indicate which of the following control measures the facility has to prevent pollution. Check all that apply or select ◆None◆.
Structural control measures (basins, etc.)

Do you have additional contacts associated with this site?
No

Best Management Practices (BMP) Plan

Note

This permit requires the development and implementation of a Best Management Practices (BMP) Plan. This includes maintaining inspection and training records.

BMP Acknowledgment
I acknowledge that a BMP plan developed in accordance with Part IV of the General Permit is being implemented.

Provide the date the BMP plan was last updated.
09/15/2022

Attach BMP Plan (optional)
NONE PROVIDED
Comment
NONE PROVIDED

DSN001: Storm Water Discharges Associated with Landfill Operations (1 of 8)

Outfall: 0011

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0011

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23786700000000, -87.65413100000001

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
No

DSN001: Storm Water Discharges Associated with Landfill Operations (2 of 8)

Outfall: 0012

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0012

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24432500000000, -87.65526900000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls

(i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (3 of 8)

Outfall: 0013

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0013

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24808900000000, -87.65548600000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (4 of 8)

Outfall: 0014

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0014

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24899700000000, -87.65305800000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (5 of 8)

Outfall: 0015

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0015

Receiving Stream
Tater Hill Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23694400000000, -87.65074700000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
No

DSN001: Storm Water Discharges Associated with Landfill Operations (6 of 8)

Outfall: 0016

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0016

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24132200000000, -87.64196900000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
No

DSN001: Storm Water Discharges Associated with Landfill Operations (7 of 8)

Outfall: 0017

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0017

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24031400000000, -87.64225000000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls

(i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0016

DSN001: Storm Water Discharges Associated with Landfill Operations (8 of 8)

Outfall: 0018

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0018

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23952500000000, -87.64179700000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0016

DSN001: Related Information

Has storm water runoff from the facility been analyzed for presence of any known pollutants?
Yes

Are there any known impacts on the receiving water as a result of any discharges under DSN001?
No

Are any raw materials, finished products, waste products or chemicals exposed to storm water currently or in the last three years?
No

Were there any past industrial activities on the site that would contribute to storm water contamination?
No

Please select the option that best describes the site.
Landfill (may include a transfer station)

Is the landfill closed?
No

DSN002 and DSN003: Storm Water Discharges Associated with Fueling, Petroleum Storage and Handling, Equipment Storage, and Maintenance Areas (1 of 1)

Outfall: 0031

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN003

Outfall Identifier
0031

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23786700000000, -87.65413100000001

Are the current location coordinates accurate for this outfall?
Yes

DSN002 and DSN003: Related Information

Does the facility have any Aboveground Storage Tanks to include under this DSN?
Yes

Please identify the Aboveground Storage Tanks (AST) present at the facility. (Note: You may group tanks with the same type, size, contents, and containment on the same row.)

Type	Size (gallons)	Number of Tanks	Contents	Double-walled?	Secondary containment?	Total Volume
AST	3,000	1	Diesel	Yes	Yes	3,000
AST	300	1	Hydraulic Oil	No	Yes	300
AST	300	1	Diesel	No	No	300
						Sum: 3,600

Can the secondary containment hold 110% of the contents of the largest tank?
No

Are the walls and floors of the secondary containment relatively impermeable to the stored substance(s)?
No

The permit requires that tanks containing petroleum products either be double-walled or have secondary containment. You have listed one or more tanks that do not have either control measure. Please explain why neither control measure is in place. If the facility plans to install secondary containment, please include the date the secondary containment will be completed.
The 300-gallon Diesel AST is a mobile AST which is not subject to secondary containment; however, the 3,000-gallon diesel AST and the 300-gallon hydraulic oil AST do have either secondary containment and/or are double-walled which can hold 110% of the contents of the largest tank and the walls and floors of the secondary containment are relatively impermeable to the stored substances.

Does the facility have any Underground Storage Tanks to include under this DSN?
No

Has storm water runoff from the facility been analyzed for presence of any known pollutants?
No

Are there any known impacts on the receiving water as a result of any discharges under DSN002 and DSN003?
No

Have any leaks, spills or other instances of storm water contamination occurred within the last 3 years?
No

From which outfalls listed for DSN002 and DSN003 (e.g. 0021, 002A, etc.) is uncontaminated storm water from secondary containment areas discharged (for above ground storage tanks only)?
DSN003-1

Were there any past industrial activities on the site that would contribute to storm water contamination?
No

Does the facility handle leaded fuels?
No

Does the facility handle aviation fuel, jet fuel, or diesel fuel?
Yes

Are any trucks or equipment fueled at this facility?
Yes

Is your fueling area protected from storm water, including flowing water?
Yes

Please explain:
Fuel tank and dike are situated beneath a canopy

Is storm water from the fueling/loading area treated (oil/water separator, etc.) prior to discharge?
No

Spill Prevention, Control and Countermeasures (SPCC)
A facility is covered by 40 CFR Part 112 if it has an aggregate above ground oil storage capacity greater than 1,320 U.S. gallons or a completely buried storage capacity greater than 42,000 U.S. gallons and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines. Such facilities must prepare, implement, and maintain a Spill Prevention, Control and Countermeasures (SPCC) Plan in accordance with 40 CFR §112. In accordance with 40 CFR §112.5 (b), such facilities must complete a review and evaluation of the SPCC Plan at least once every five years. Certain on-site changes may require more frequent reviews and amendment(s). Except as provided by §112.6, a professional engineer must certify any technical amendments to the plan in accordance with Section 112.3 (d). Please also be aware that, according to 40 CFR §112.2, any above ground tanks that are not in use and are permanently closed should meet the following conditions to not be included in the Spill Prevention, Control, and Countermeasures (SPCC) requirement: (1) All liquid and sludge has been removed from each container and connecting line; and (2) All connecting lines and piping have been disconnected from the container and blanked off, all valves (except for ventilation valves) have been closed and locked, and conspicuous signs have been posted on each container stating that it is a permanently closed container and noting the date of closure.
Blue Brochure

Is this facility subject to the requirement to prepare and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan under 40 CFR Part 112?
Yes

What is the status of your SPCC plan?
I have an existing SPCC plan.

On what date was the SPCC Plan last certified?
7/6/2022

Is storm water from fueling areas allowed to mix with storm water from other industrial activities?
Yes

NOI Preparer

NOI Preparer

Prefix
Ms.

First Name	Last Name
Shelley	*Gordon*

Title
Project Professional

Phone Type	Number	Extension
Business	205-345-0816	

Email
sgordon@ttlusa.com

Address
3516 Greensboro Avenue
Building B
Tuscaloosa, AL 35401

Revisions

Revision	Revision Date	Revision By
Revision 1	9/15/2022 8:14 AM	Shelley Gordon
Revision 2	11/29/2022 11:17 AM	Shelley Gordon

Agreements and Signature(s)

SUBMISSION AGREEMENTS

- ☑ I am the owner of the account used to perform the electronic submission and signature.
- ☑ I have the authority to submit the data on behalf of the facility I am representing.
- ☑ I agree that providing the account credentials to sign the submission document constitutes an electronic signature equivalent to my written signature.
- ☑ I have reviewed the electronic form being submitted in its entirety, and agree to the validity and accuracy of the information contained within it to the best of my knowledge.

I certify under penalty of lawthat this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine or imprisonment for knowing violations.

Signed By Fred Rogers on 12/28/2022 at 8:58 AM

Digitally signed by:
GlobalSign RSA OV SSL CA 2018
Date: 2022.10.11 12:35:37 -05:00
Reason: Submission Data
Location: State of Alabama

NPDES General Permit - Landfills (ALG160000) - Mod/Reissue - (Form 384)

version 3.3

(Submission #: HPM-Q3GW-NF651, version 1)

Details

Submission ID HPM-Q3GW-NF651

Form Input

General Instructions

Notice Of Intent • NPDES General Permit Number ALG160000 (Form 384) - Modification/Reissuance

NPDES General Permit Number ALG160000, which is the general permit authorizing discharges associated with storm water runoff, not containing leachate, from active and inactive landfills and from transfer stations including storm water runoff from maintenance operations and expansion construction activities at landfills; vehicle and equipment washwater; and storm water associated with fueling, petroleum storage and handling, equipment storage, and maintenance areas.

This form should be used to submit the following permit requests:

- Permit Transfers
- Permittee/Facility Name Changes
- Modifications
- Reissuances (Reissuance of a permit on or after the current permit•s expiration date)

Please complete all questions and attach all necessary documentation as prompted throughout the application process. Incomplete or incorrect information will delay processing.

Applicable Fees:

- Permit Transfers and/or Permittee/Facility Name Changes
o $800
- Modifications
o $800
- Reissuances
o $1,385
For assistance, please click here to determine the permit staff responsible for the site or call (334) 271-7799/(334) 274-4203.

Processing Information

Purpose of Application (Select all that apply):
Modification

Action Type
Modification

Why are you requesting to modify your permit? Please briefly describe what changes are included in this modification request:
Designate DSN001-6 as the representative outfall location for discharges from DSN001-6, DSN001-7, and DSN001-8. DSN001-1 will remain the designated representative outfall location for discharges from DSN001-1 through -5. Correct the receiving stream identification for DSN001-5 through 8 (no change to discharge coordinates).

Industrial Activity Information

For each industrial activity listed, please select 'Yes' if discharges from the activity will continue to need coverage under this permit or if you are requesting coverage be added for discharges under the activity:

Industrial Activity	Continue/Add Permit Coverage
DSN001: Storm Water Discharges Associated with Landfill Operations	Yes
DSN002 and DSN003: Storm Water Discharges Associated with Fueling, Petroleum Storage and Handling, Equipment Storage, and Maintenance Areas	Yes
DSN004: Discharges Associated with Vehicle and Equipment Exterior Washing Operations	No

Are any discharges above combined?
Yes

Please indicate which discharges are combined:
Stormwater from petroleum handling operations mixes with stormwater to outfall DSN001-1/DSN003-1

Does any discharge or runoff from the facility reach an Outstanding Alabama Water or Outstanding Natural Resource Water stream segment as defined by ADEM Administrative Code r. 335-6-11-.02?
No

Does the storm water contain any leachate?
No

Is treated or untreated water from tank bottoms or water draws discharged on site?
No

Is hydrostatic testing of petroleum handling equipment done on site?
No

Description of industrial activity and land use at the facility:
Solid Waste Disposal Facility

Permit Information

Permit Number
ALG160051

Current Permittee Name
Black Warrior Solid Waste Disposal Facility

To look up your company's legal business name, please refer to the Secretary of State's website:
Click here

Permittee

Permittee Name (Legal Business Name)
Black Warrior Solid Waste Authority

Mailing Address

3301 Landfill Drive

Coker, AL 35452

Per ADEM Admin. Code r. 335-6-6-.09 (1), a Responsible Official is defined as CEO, President, any position at a level of Vice President or higher, Owner, Partner, Managing Member (LLC), or ranking elected official. Please provide the contact information for the person meeting this definition.

Do NOT enter information for a person that is/will be a Duly Authorized Representative (DAR). A person that is a Duly Authorized Representative is NOT considered a RESPONSIBLE OFFICIAL.

Responsible Official

Prefix
Mr.

First Name	Last Name
Daniel	*Swartz*

Title
Operations Manager

Organization Name
Black Warrior Solid Waste Authority

Phone Type	Number	Extension
Business	205-339-7330	

Email
dswartz@bwswa.com

Fax
NONE PROVIDED

Mailing Address

3301 Landfill Drive

Coker, AL 35452

Does the Responsible Official intend to delegate signatory authority to an individual (or to a company position) as a duly authorized representative (DAR) for this site?
No

Existing Permit Contacts

Affiliation Type	Contact Information	Remove?
Permittee	Black Warrior Solid Waste Disposal Facility	NONE PROVIDED
Responsible Official,Notification Recipient	Ken Thrasher	Remove

DMR Contact(s) (1 of 1)

DMR Contact

Prefix
Mr.

First Name	Last Name
Daniel	*Swartz*

Title
Operations Manager

Phone Type	Number	Extension
Business	205-339-7330	

Email
dswartz@bwswa.com

Address

3301 Landfill Drive

Coker, AL 35452

Facility/Site Information

Current Facility/Site Name
Black Warrior SWD Facility

Permittee Organization Type
Corporation

Facility/Site Contact

Prefix
Mr.

First Name	Last Name
Daniel	*Swartz*

Title
Operations Manager

Organization Name
Black Warrior Solid Waste Authority

Phone Type	Number	Extension
Business	205-339-7330	

Email
dswartz@bwswa.com

Facility/Site Address or Location Description
3301 Landfill Drive
Coker, AL 35452

Please indicate if any changes are needed to the Facility/Site Address:
NONE PROVIDED

Facility/Site County
Tuscaloosa

Facility/Site Front Gate Latitude and Longitude
33.23804400000000,-87.65510600000000

3301 Landfill Drive, Coker, AL

If the facility coordinates are not correct, please provide the correct coordinates and provide any other information necessary:
NONE PROVIDED

SIC Code(s) [Please select your primary SIC code first]:
9511-Air and Water Resource and Solid Waste Management

NAICS Code(s) [Please select your primary NAICS code first]:
562212-Solid Waste Landfill

Has the facility been issued an NPDES INDIVIDUAL permit?
No

Has the facility been issued a State Indirect Discharge (SID) Permit?
No

Are any outfalls being added to this general permit that will be discharging to a municipal storm sewer?
No

Date facility started operations:
01/01/1994

What is the size of the site in acres?
299

Do you discharge to any waters of the State that are impaired (303(d) or TMDL)?
No

A list of the 303(d) impaired waters can be found at: http://adem.alabama.gov/programs/water/303d.cnt and waters subject to a TMDL can be found at: http://adem.alabama.gov/programs/water/approvedTMDLs.htm

Does any discharge or runoff from the facility reach a public water supply stream segment as defined by ADEM Administrative Code r. 335-6-11-.02?
No

Please indicate which of the following control measures the facility has to prevent pollution. Check all that apply or select ⊘None⊘.
Structural control measures (basins, etc.)

Do you have additional contacts associated with this site?
No

Best Management Practices (BMP) Plan

Note

This permit requires the development and implementation of a Best Management Practices (BMP) Plan. This includes maintaining inspection and training records.

BMP Acknowledgment
I acknowledge that a BMP plan developed in accordance with Part IV of the General Permit is being implemented.

Provide the date the BMP plan was last updated.
09/15/2022

Attach BMP Plan (optional)
NONE PROVIDED
Comment
NONE PROVIDED

DSN001: Storm Water Discharges Associated with Landfill Operations (1 of 8)

Outfall: 0011

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0011

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23786700000000, -87.65413100000001

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
No

DSN001: Storm Water Discharges Associated with Landfill Operations (2 of 8)

Outfall: 0012

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0012

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24432500000000, -87.65526900000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (3 of 8)

Outfall: 0013

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0013

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24808900000000, -87.65548600000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (4 of 8)

Outfall: 0014

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0014

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24899700000000, -87.65305800000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (5 of 8)

Outfall: 0015

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0015

Receiving Stream
Tater Hill Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23694400000000, -87.65074700000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0011

DSN001: Storm Water Discharges Associated with Landfill Operations (6 of 8)

Outfall: 0016

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0016

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24132200000000, -87.64196900000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
No

DSN001: Storm Water Discharges Associated with Landfill Operations (7 of 8)

Outfall: 0017

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0017

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.24031400000000, -87.64225000000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0016

DSN001: Storm Water Discharges Associated with Landfill Operations (8 of 8)

Outfall: 0018

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN001

Outfall Identifier
0018

Receiving Stream
Partlow Lake Upper

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
NONE PROVIDED

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23952500000000, -87.64179700000000

Are the current location coordinates accurate for this outfall?
Yes

For the purposes of monitoring, if outfalls from similar industrial activities have storm water runoff with characteristics that are essentially the same, the applicant can request that the monitoring of an outfall be representative of other storm water outfalls (i.e. monitoring would only be required for the representative storm water outfall(s)).

Is discharge from this location monitored by a representative outfall?
Yes

Please select the Representative Outfall ID
0016

DSN001: Related Information

Has storm water runoff from the facility been analyzed for presence of any known pollutants?
Yes

Are there any known impacts on the receiving water as a result of any discharges under DSN001?
No

Are any raw materials, finished products, waste products or chemicals exposed to storm water currently or in the last three years?
No

Were there any past industrial activities on the site that would contribute to storm water contamination?
No

Please select the option that best describes the site.
Landfill (may include a transfer station)

Is the landfill closed?
No

DSN002 and DSN003: Storm Water Discharges Associated with Fueling, Petroleum Storage and Handling, Equipment Storage, and Maintenance Areas (1 of 1)

Outfall: 0031

Please click below if this discharge no longer exists or is no longer required:
NONE PROVIDED

Feature Type
DSN003

Outfall Identifier
0031

Receiving Stream
Big Creek

Does the discharge enter the named receiving water via an unnamed tributary and/or a storm sewer system? Please also indicate if the storm sewer system is under an MS4 permit.
Unnamed Tributary
MS4
Via Storm Sewer

For help on how to place a point on the map, click here.

Location of the Point Where Each Discharge Exits the Property
33.23786700000000, -87.65413100000001

Are the current location coordinates accurate for this outfall?
Yes

DSN002 and DSN003: Related Information

Does the facility have any Aboveground Storage Tanks to include under this DSN?
Yes

Please identify the Aboveground Storage Tanks (AST) present at the facility. (Note: You may group tanks with the same type, size, contents, and containment on the same row.)

Type	Size (gallons)	Number of Tanks	Contents	Double-walled?	Secondary containment?	Total Volume
AST	3,000	1	Diesel	Yes	Yes	3,000
AST	300	1	Hydraulic Oil	No	Yes	300
AST	300	1	Diesel	No	No	300
						Sum: 3,600

Can the secondary containment hold 110% of the contents of the largest tank?
No

Are the walls and floors of the secondary containment relatively impermeable to the stored substance(s)?
No

The permit requires that tanks containing petroleum products either be double-walled or have secondary containment. You have listed one or more tanks that do not have either control measure. Please explain why neither control measure is in place. If the facility plans to install secondary containment, please include the date the secondary containment will be completed.
The 300-gallon Diesel AST is a mobile AST which is not subject to secondary containment; however, the 3,000-gallon diesel AST and the 300-gallon hydraulic oil AST do have either secondary containment and/or are double-walled which can hold 110% of the contents of the largest tank and the walls and floors of the secondary containment are relatively impermeable to the stored substances.

Does the facility have any Underground Storage Tanks to include under this DSN?
No

Has storm water runoff from the facility been analyzed for presence of any known pollutants?
No

Are there any known impacts on the receiving water as a result of any discharges under DSN002 and DSN003?
No

Have any leaks, spills or other instances of storm water contamination occurred within the last 3 years?
No

From which outfalls listed for DSN002 and DSN003 (e.g. 0021, 002A, etc.) is uncontaminated storm water from secondary containment areas discharged (for above ground storage tanks only)?
DSN003-1

Were there any past industrial activities on the site that would contribute to storm water contamination?
No

Does the facility handle leaded fuels?
No

Does the facility handle aviation fuel, jet fuel, or diesel fuel?
Yes

Are any trucks or equipment fueled at this facility?
Yes

Is your fueling area protected from storm water, including flowing water?
Yes

Please explain:
Fuel tank and dike are situated beneath a canopy

Is storm water from the fueling/loading area treated (oil/water separator, etc.) prior to discharge?
No

Spill Prevention, Control and Countermeasures (SPCC)
A facility is covered by 40 CFR Part 112 if it has an aggregate above ground oil storage capacity greater than 1,320 U.S. gallons or a completely buried storage capacity greater than 42,000 U.S. gallons and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines. Such facilities must prepare, implement, and maintain a Spill Prevention, Control and Countermeasures (SPCC) Plan in accordance with 40 CFR ◆112. In accordance with 40 CFR ◆112.5 (b), such facilities must complete a review and evaluation of the SPCC Plan at least once every five years. Certain on-site changes may require more frequent reviews and amendment(s). Except as provided by ◆112.6, a professional engineer must certify any technical amendments to the plan in accordance with Section 112.3 (d). Please also be aware that, according to 40 CFR ◆112.2, any above ground tanks that are not in use and are permanently closed should meet the following conditions to not be included in the Spill Prevention, Control, and Countermeasures (SPCC) requirement: (1) All liquid and sludge has been removed from each container and connecting line; and (2) All connecting lines and piping have been disconnected from the container and blanked off, all valves (except for ventilation valves) have been closed and locked, and conspicuous signs have been posted on each container stating that it is a permanently closed container and noting the date of closure.
Blue Brochure

Is this facility subject to the requirement to prepare and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan under 40 CFR Part 112?
Yes

What is the status of your SPCC plan?
I have an existing SPCC plan.

On what date was the SPCC Plan last certified?
7/6/2022

Is storm water from fueling areas allowed to mix with storm water from other industrial activities?
Yes

NOI Preparer

NOI Preparer

Prefix
Ms.

First Name	Last Name
Shelley	*Gordon*

Title
Project Professional

Phone Type	Number	Extension
Business	205-345-0816	

Email
sgordon@ttlusa.com

Address
3516 Greensboro Avenue
Building B
Tuscaloosa, AL 35401

Agreements and Signature(s)

SUBMISSION AGREEMENTS

- ☑ I am the owner of the account used to perform the electronic submission and signature.
- ☑ I have the authority to submit the data on behalf of the facility I am representing.
- ☑ I agree that providing the account credentials to sign the submission document constitutes an electronic signature equivalent to my written signature.
- ☑ I have reviewed the electronic form being submitted in its entirety, and agree to the validity and accuracy of the information contained within it to the best of my knowledge.

I certify under penalty of lawthat this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine or imprisonment for knowing violations.

Signed By Johnnie Swartz on 09/20/2022 at 2:07 PM

From: Miles, Monique M
Sent: 12/14/2022 7:28:23 AM
To: "Goodson, Gary A" <gary.goodson@adem.alabama.gov>
Cc: "Warren, Lee" <DLW@adem.alabama.gov>
Subject: Permit 63-01 and NPDES Permit ALG160051 Black Warrior
Attachments: 221117 WBR Ltr to Monique Miles at ADEM Water Division re Fred Rogers auth to sign docs.pdf

From: Shelley Gordon <sgordon@ttlusa.com>
Sent: Thursday, December 1, 2022 1:09 PM
To: Michelle Fason <mfason@rosenharwood.com>; Miles, Monique M <MMM@adem.alabama.gov>
Cc: Brad Roane <broane@rosenharwood.com>; 'Daniel Wells (dwells@cdge.com)' <dwells@cdge.com>; 'Bob Lewis (r.g.lewis@att.net)' <r.g.lewis@att.net>; Fred Rogers <frogers@bwswa.com>; Stacey Tarrant <starrant@ttlusa.com>
Subject: RE: BWSWDA - Permit 63-01 and NPDES Permit ALG160051

Monique,

Will this letter work for you?

Thanks,

Shelley Gordon
Project Professional
Office: 205.345.0816 | Cell: 205.200.0577
3516 Greensboro Ave., Tuscaloosa, AL 35401
www.ttlusa.com

From: Michelle Fason <mfason@rosenharwood.com>
Sent: Thursday, December 1, 2022 12:57 PM
To: mmm@adem.alabama.gov
Cc: Brad Roane <broane@rosenharwood.com>; 'Daniel Wells (dwells@cdge.com)' <dwells@cdge.com>; 'Bob Lewis (r.g.lewis@att.net)' <r.g.lewis@att.net>; Fred Rogers <frogers@bwswa.com>; Shelley Gordon <sgordon@ttlusa.com>
Subject: [External] RE: BWSWDA - Permit 63-01 and NPDES Permit ALG160051

Ms. Miles:

Here is an updated letter with Mr. Roane's title included below his signature.

Best regards,

Michelle

MICHELLE FASON
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401
(205) 344-5000 (firm)
(205) 469-1159 (direct)
(205) 758-8358 (fax)
mfason@rosenharwood.com
ROSENHARWOOD.COM

ROSEN HARWOOD
ATTORNEYS AT LAW

CONFIDENTIAL: ATTORNEY-CLIENT PRIVILEGED; ATTORNEY WORK PRODUCT
The information contained in this message and any attachment is attorney-client privileged and/or confidential Information and is protected from disclosure. The information is intended for the use of the individual(s) or entity named above. If you are not the intended recipient, you are hereby notified that any use, disclosure, dissemination, distribution or copying of this message and any attachment is strictly prohibited. Please reply to the sender that you received this transmission in error and then delete it.

From: Shelley Gordon <sgordon@ttlusa.com>
Sent: Thursday, December 1, 2022 11:35 AM
To: Michelle Fason <mfason@rosenharwood.com>; mmm@adem.alabama.gov
Cc: Brad Roane <broane@rosenharwood.com>; 'Daniel Wells (dwells@cdge.com)' <dwells@cdge.com>; 'Bob Lewis (r.g.lewis@att.net)' <r.g.lewis@att.net>; Fred Rogers <frogers@bwswa.com>
Subject: RE: BWSWDA - Permit 63-01 and NPDES Permit ALG160051

CAUTION: This email originated outside of Rosen Harwood. Do not click on links or open attachments unless you recognize the sender, or expect the email.

Michelle,

I believe Mrs. Miles needs Mr. Roane's title underneath his signature also.

Thanks,

Shelley Gordon
Project Professional
Office: 205.345.0816 | Cell: 205.200.0577
3516 Greensboro Ave., Tuscaloosa, AL 35401
www.ttlusa.com

TTL

From: Michelle Fason <mfason@rosenharwood.com>
Sent: Thursday, December 1, 2022 10:46 AM
To: mmm@adem.alabama.gov
Cc: Brad Roane <broane@rosenharwood.com>; 'Daniel Wells (dwells@cdge.com)' <dwells@cdge.com>; Shelley Gordon <sgordon@ttlusa.com>; 'Bob Lewis (r.g.lewis@att.net)' <r.g.lewis@att.net>; Fred Rogers <frogers@bwswa.com>
Subject: [External] BWSWDA - Permit 63-01 and NPDES Permit ALG160051

Ms. Miles:

Please see the attached letter from Mr. Roane. If you have any issues opening the attachment, please let me know.

Best regards,
Michelle

ROSEN HARWOOD
ATTORNEYS AT LAW

MICHELLE FASON
2200 Jack Warner Parkway, Suite 200
Tuscaloosa, Alabama 35401
(205) 344-5000 (firm)
(205) 469-1159 (direct)
(205) 758-8358 (fax)
mfason@rosenharwood.com
ROSENHARWOOD.COM

CONFIDENTIAL: ATTORNEY-CLIENT PRIVILEGED; ATTORNEY WORK PRODUCT
The information contained in this message and any attachment is attorney-client privileged and/or confidential Information and is protected from disclosure. The information is intended for the use of the individual(s) or entity named above. If you are not the intended recipient, you are hereby notified that any use, disclosure, dissemination, distribution or copying of this message and any attachment is strictly prohibited. Please reply to the sender that you received this transmission in error and then delete it.

Private and confidential as detailed here (https://www.ttlusa.com/privacy-policy). The disclaimer contains important limitations on use and reliance. If you cannot access hyperlink, please e-mail sender.

Private and confidential as detailed here (https://www.ttlusa.com/privacy-policy). The disclaimer contains important limitations on use and reliance. If you cannot access hyperlink, please e-mail sender.

ATTACHMENT NAME:

221117 WBR Ltr to Monique Miles at ADEM Water Division re Fred Rogers auth to sign docs.pd

ATTACHMENT TYPE:

Adobe Portable Document Format (PDF) compound image

GORDON ROSEN (1921 - 2014)
R. BERNARD HARWOOD, JR.
JAMES J. SLEDGE
**BLAKE A. MADISON
†♦W. BRADFORD ROANE, JR.
FOSTER C. ARNOLD
††MATTHEW Q. TOMPKINS
TERRI OLIVE TOMPKINS
JENNIFER T. CRABTREE
††JANE L. CALAMUSA
KRISTOFOR D. SODERGREN
ANN L. REARDON
††ROBIN E. PATE
††LORI C. BAIRD
††JILLIAN L. GUIN WHITE
*EMILEE H. SCHEEFF

ROSEN HARWOOD
ATTORNEYS AT LAW

ALLIE S. MONTGOMERY
TAYLER G. HANSFORD

OF COUNSEL:
ALYCE M. SPRUELL

*LL.M. in Taxation
**Certified Information Privacy Professional
†Also admitted in Florida
††Also admitted in Mississippi
♦Also admitted in Georgia

Writer's Email Address:
broane@rosenharwood.com

November 17, 2022

VIA U.S. MAIL AND EMAIL mmm@adem.alabama.gov

Ms. Monique M. Miles
Environmental Scientist Sr.
Industrial General Permit Section
Water Division
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, AL 36110-2400

RE: Black Warrior Solid Waste Disposal Facility, Permit 63-01
NPDES Permit ALG160051
Fred Rogers as authorized designated representative.
Robert (Bob) Lewis, Chairman of the Board of Directors

Dear Ms. Miles:

We represent the Black Warrior Solid Waste Disposal Authority regarding the Black Warrior Solid Waste Disposal Facility, Permit 63-01 and NPDES Permit ALG160051. Today, at its regularly scheduled monthly meeting, the Board of Directors passed the following resolutions:

> Mr. Lewis made a motion, seconded by Mr. Ennis, to authorize Fred Rogers as Executive Director of the Authority to sign any and all reports, and documents and the like for ADEM on behalf of the Authority, including NPDES Permit ALG160051. All members present voted in favor of the motion.

Fred Rogers contact information: Cell (205) 523-3914 frogers@bwswa.com

Please let me know if you have any questions or need anything further regarding the above.

Sincerely,

W. Bradford Roane, Jr.
Shareholder

WBR:db

cc: Daniel Wells, CDG Engineers, via email
Shelly Gordon, TTL, via email sgordon@ttlusa.com
Bob Lewis via email
Fred Rogers via email

APPENDIX C

MAJOR SOURCE OPERATING PERMIT

Alabama Department of Environmental Management

MAJOR SOURCE OPERATING PERMIT

PERMITTEE:	BLACK WARRIOR SOLID WASTE AUTHORITY
FACILITY NAME:	BLACK WARRIOR SOLID WASTE FACILITY
FACILITY/PERMIT NO.:	413-0084
LOCATION:	COKER, ALABAMA

In accordance with and subject to the provisions of the Alabama Air Pollution Control Act of 1971, Ala. Code §§ 22-28-1 to 22-28-23, as amended, the Alabama Environmental Management Act, Ala. Code §§ 22-22A-1 to 22-22A-17, as amended, and rules and regulations adopted there under, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to construct, install and use the equipment, device or other article described above.

*Pursuant to the **Clean Air Act of 1990**, all conditions of this permit are federally enforceable by EPA, the Alabama Department of Environmental Management, and citizens in general. Those provisions which are not required under the **Clean Air Act of 1990** are considered to be state permit provisions and are not federally enforceable by EPA and citizens in general. Those provisions are contained in separate sections of this permit.*

Issuance Date:	February 15, 2023
Effective Date:	February 15, 2023
Expiration Date:	February 14, 2028

Alabama Department of Environmental Management

TABLE OF CONTENTS

GENERAL PERMIT PROVISOS **4**

1. Transfer *4*
2. Renewals *4*
3. Severability Clause *4*
4. Compliance *4*
5. Termination for Cause *4*
6. Property Rights *5*
7. Submission of Information *5*
8. Economic Incentives, Marketable Permits, and Emissions Trading *5*
9. Certification of Truth, Accuracy, and Completeness *5*
10. Inspection and Entry *5*
11. Compliance Provisions *6*
12. Compliance Certification *6*
13. Reopening for Cause *7*
14. Additional Rules and Regulations *7*
15. Equipment Maintenance or Breakdown *7*
16. Operation of Capture and Control Devices *8*
17. Obnoxious Odors *8*
18. Fugitive Dust *9*
19. Additions and Revisions *9*
20. Recordkeeping Requirements *9*
21. Reporting Requirements *9*
22. Emission Testing Requirements *10*
23. Payment of Emission Fees *11*
24. Other Reporting and Testing Requirements *11*
25. Title VI Requirements (Refrigerants) *11*
26. Chemical Accidental Prevention Provisions *11*
27. Display of Permit *12*
28. Circumvention *12*
29. Visible Emissions *12*
30. Fuel-Burning Equipment *12*
31. Process Industries – General *13*
32. Averaging Time for Emission Limits *13*
33. Open Burning *13*

SPECIFIC PROVISOS: BLACK WARRIOR SOLID WASTE FACILTY FEDERAL RULES **14**

Summary Page *14*
Unit Specific Provisos *15*
1. Applicability 15
2. Emission Standards 15
3. Compliance and Performance Test Methods and Procedures 17
4. Emission Monitoring 17
5. Recordkeeping and Reporting Requirements 18

SPECIFIC PROVISOS: BLACK WARRIOR SOLID WASTE FACILTY STATE RULES 20

Summary Page 20
Unit Specific Provisos..... 21
1. Applicability 21
2. Emission Standards 21
3. Compliance and Performance Test Methods and Procedures.....23
4. Emission Monitoring 23
Recordkeeping and Reporting Requirements.....23

SPECIFIC PROVISOS: BLACK WARRIOR SOLID WASTE FACILTY ASBESTOS NESHAP.26

Summary Page 26
Unit Specific Provisos..... 27
1. Applicability 27
2. Emission Standards 27
3. Recordkeeping and Reporting Requirements 27

SPECIFIC PROVISOS: FACILITY-WIDE FUGITIVE DUST PLAN 29

Summary Page 29
Unit Specific Provisos..... 30
1. Applicability 30
2. Emission Standards 30
3. Compliance and Performance Test Methods and Procedures.....30
4. Emission Monitoring 31
5. Recordkeeping and Reporting Requirements 31

General Permit Provisos

Federally Enforceable Provisos	Regulations
1. Transfer	
This permit is not transferable, whether by operation of law or otherwise, either from one location to another, from one piece of equipment to another, or from one person to another, except as provided in Rule 335-3-16-.13(1)(a)5.	Rule 335-3-16-.02(6)
2. Renewals	
An application for permit renewal shall be submitted at least six (6) months, but not more than eighteen (18) months, before the date of expiration of this permit.	Rule 335-3-16-.12(2)
The source for which this permit is issued shall lose its right to operate upon the expiration of this permit unless a timely and complete renewal application has been submitted within the time constraints listed in the previous paragraph.	
3. Severability Clause	
The provisions of this permit are declared to be severable and if any section, paragraph, subparagraph, subdivision, clause, or phrase of this permit shall be adjudged to be invalid or unconstitutional by any court of competent jurisdiction, the judgment shall not affect, impair, or invalidate the remainder of this permit, but shall be confined in its operation to the section, paragraph, subparagraph, subdivision, clause, or phrase of this permit that shall be directly involved in the controversy in which such judgment shall have been rendered.	Rule 335-3-16-.05(e)
4. Compliance	
(a) The permittee shall comply with all conditions of ADEM Admin. Code 335-3. Noncompliance with this permit will constitute a violation of the Clean Air Act of 1990 and ADEM Admin. Code 335-3 and may result in an enforcement action; including but not limited to, permit termination, revocation and reissuance, or modification; or denial of a permit renewal application by the permittee.	Rule 335-3-16-.05(f)
(b) The permittee shall not use as a defense in an enforcement action that maintaining compliance with conditions of this permit would have required halting or reducing the permitted activity.	Rule 335-3-16-.05(g)
5. Termination for Cause	
This permit may be modified, revoked, reopened, and reissued, or terminated for cause. The filing of a request by the permittee for a permit	Rule 335-3-16-.05(h)

General Permit Provisos

Federally Enforceable Provisos	Regulations
modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance will not stay any permit condition.	
6. Property Rights	
The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.	Rule 335-3-16-.05(i)
7. Submission of Information	
The permittee must submit to the Department, within 30 days or for such other reasonable time as the Department may set, any information that the Department may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. Upon receiving a specific request, the permittee shall also furnish to the Department copies of records required to be kept by this permit.	Rule 335-3-16-.05(j)
8. Economic Incentives, Marketable Permits, and Emissions Trading	
No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes that are provided for in this permit.	Rule 335-3-16-.05(k)
9. Certification of Truth, Accuracy, and Completeness:	
Any application form, report, test data, monitoring data, or compliance certification submitted pursuant to this permit shall contain certification by a responsible official of truth, accuracy, and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.	Rule 335-3-16-.07(a)
10. Inspection and Entry	
Upon presentation of credentials and other documents as may be required by law, the permittee shall allow authorized representatives of the Alabama Department of Environmental Management and EPA to conduct the following:	Rule 335-3-16-.07(b)
(a) Enter upon the permittee's premises where a source is located or emissions-related activity is conducted, or where records must be kept pursuant to the conditions of this permit;	

General Permit Provisos

Federally Enforceable Provisos	Regulations
(b) Review and/or copy, at reasonable times, any records that must be kept pursuant to the conditions of this permit;	
(c) Inspect, at reasonable times, this facility's equipment (including monitoring equipment and air pollution control equipment), practices, or operations regulated or required pursuant to this permit;	
(d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this permit or other applicable requirements.	
11. Compliance Provisions	
(a) The permittee shall continue to comply with the applicable requirements with which the company has certified that it is already in compliance.	Rule 335-3-16-.07(c)
(b) The permittee shall comply in a timely manner with applicable requirements that become effective during the term of this permit.	
12. Compliance Certification	
A compliance certification shall be submitted annually within 60 days of the anniversary date of issuance of this permit, or within an alternative timeline approved by the Director.	Rule 335-3-16-.07(e)
(a) The compliance certification shall include the following:	
(1) The identification of each term or condition of this permit that is the basis of the certification;	
(2) The compliance status;	
(3) The method(s) used for determining the compliance status of the source, currently and over the reporting period consistent with Rule 335-3-16-.05(c) (Monitoring and Recordkeeping Requirements);	
(4) Whether compliance has been continuous or intermittent;	
(5) Such other facts as the Department may require to determine the compliance status of the source;	
(b) The compliance certification shall be submitted to the Air and EPCRA Enforcement Branch at EPA, Region IV through the Compliance and Emissions Data Reporting Interface (CEDRI)	

Federally Enforceable Provisos	Regulations
located on EPA's Central Data Exchange (CDX), and should also be mailed to the Alabama Department of Environmental Management's Air Division at P.O. Box 301463, Montgomery, AL 36130-1463.	
13. Reopening for Cause	
Under any of the following circumstances, this permit will be reopened prior to the expiration of the permit:	Rule 335-3-16-.13(5)
(a) Additional applicable requirements under the Clean Air Act of 1990 become applicable to the permittee with a remaining permit term of three (3) or more years. Such a reopening shall be completed not later than eighteen (18) months after promulgation of the applicable requirement. No such reopening is required if the effective date of the requirement is later than the date on which this permit is due to expire.	
(b) Additional requirements (including excess emissions requirements) become applicable to an affected source under the acid rain program. Upon approval by the Administrator, excess emissions offset plans shall be deemed to be incorporated into this permit.	
(c) The Department or EPA determines that this permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of this permit.	
(d) The Administrator or the Department determines that this permit must be revised or revoked to assure compliance with the applicable requirements.	
14. Additional Rules and Regulations	
This permit is issued on the basis of Rules and Regulations existing on the date of issuance. In the event additional Rules and Regulations are adopted, it shall be the permit holder's responsibility to comply with such rules.	§22-28-16(d), Code of Alabama 1975, as amended
15. Equipment Maintenance or Breakdown	
(a) In the case of shutdown for more than one (1) hour of air pollution control equipment (which operates pursuant to any permit issued by the Director) for necessary scheduled maintenance, the intent to shut down such equipment shall be reported to the Director at least twenty-four (24) hours prior to	Rule 335-3-1-.07(1), (2)

Federally Enforceable Provisos	Regulations
the planned shutdown, unless such shutdown is accompanied by the shutdown of the source which such equipment is intended to control. Such prior notice shall include, but is not limited to the following: (1) Identification of the specific facility to be taken out of service as well as its location and permit number; (2) The expected length of time that the air pollution control equipment will be out of service; (3) The nature and quantity of emissions of air contaminants likely to occur during the shutdown period; (4) Measures such as the use of off-shift labor and equipment that will be taken to minimize the length of the shutdown period; (5) The reasons that it would be impossible or impractical to shut down the source operation during the maintenance period. (b) In the event that there is a breakdown of equipment or upset of process for a period exceeding one (1) hour in such a manner as to cause, or is expected to cause, increased emissions of air contaminants which are above an applicable standard, the person responsible for such equipment shall notify the Director within 24 hours or the next working day and provide a statement giving all pertinent facts, including the estimated duration of the breakdown. The Director shall be notified when the breakdown has been corrected.	
16. <u>Operation of Capture and Control Devices</u> All air pollution control devices and capture systems for which this permit is issued shall be maintained and operated at all times in a manner so as to minimize the emissions of air contaminants. Procedures for ensuring that the above equipment is properly operated and maintained so as to minimize the emission of air contaminants shall be established.	§22-28-16(d), Code of Alabama 1975, as amended
17. <u>Obnoxious Odors</u> This permit is issued with the condition that, should obnoxious odors arising from the plant operations be verified by Air Division inspectors, measures to abate the odorous emissions shall be taken upon a determination by the Alabama Department of Environmental	Rule 335-3-1-.08

Federally Enforceable Provisos	Regulations
Management that these measures are technically and economically feasible.	
18. Fugitive Dust	
Reasonable precautions to prevent fugitive dust shall be taken so that provisions of the Department's rules and regulations shall not be violated.	Rule 335-3-4-.02
19. Additions and Revisions	
Any modifications to this source shall comply with the modification procedures in Rules 335-3-16-.13 or 335-3-16-.14.	Rule 335-3-16-.13 and .14
20. Recordkeeping Requirements	
(a) Records of required monitoring information of the source shall include the following:	Rule 335-3-16-.05(c)2
(1) The date, place, and time of all sampling or measurements;	
(2) The date analyses were performed;	
(3) The company or entity that performed the analyses;	
(4) The analytical techniques or methods used;	
(5) The results of all analyses; and	
(6) The operating conditions that existed at the time of sampling or measurement.	
(b) Retention of records of all required monitoring data and support information of the source for a period of at least 5 years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation and copies of all reports required by the permit. Off-site records may be maintained if they are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.	
21. Reporting Requirements	
(a) Reports to the Department of any required monitoring shall be submitted at least every 6 months. All instances of deviations from permit requirements must be clearly identified in said	Rule 335-3-16-.05(c)3

Federally Enforceable Provisos	Regulations
reports. All required reports must be certified by a responsible official consistent with Rule 335-3-16-.04(9).	
(b) Deviations from permit requirements shall be reported within 48 hours or 2 working days of such deviations, including those attributable to upset conditions as defined in the permit. The report will include the probable cause of said deviations, and any corrective actions or preventive measures that were taken.	
22. <u>Emission Testing Requirements</u>	
Each point of emission which requires testing will be provided with sampling ports, ladders, platforms, and other safety equipment to facilitate testing performed in accordance with procedures established by Part 60 of Title 40 of the Code of Federal Regulations, as the same may be amended or revised. As allowed in MACT and other regulations, flexibility is provided to use alternative test methods, as approved by EPA, ADEM or permit condition.	Rule 335-3-1-.05(3) and Rule 335-3-1-.04(1)
The Air Division must be notified in writing at least 10 days in advance of all emission tests to be conducted and submitted as proof of compliance with the Department's air pollution control rules and regulations.	
To avoid problems concerning testing methods and procedures, the following shall be included with the notification letter:	
(1) The date the test crew is expected to arrive, the date and time anticipated of the start of the first run, how many and which sources are to be tested, and the names of the persons and/or testing company that will conduct the tests.	Rule 335-3-1-.04
(2) A complete description of each sampling train to be used, including type of media used in determining gas stream components, type of probe lining, type of filter media, and probe cleaning method and solvent to be used (if test procedures require probe cleaning).	
(3) A description of the process(es) to be tested including the feed rate, any operating parameters used to control or influence the operations, and the rated capacity.	
(4) A sketch or sketches showing sampling point locations and their relative positions to the nearest upstream and downstream gas flow disturbances.	

General Permit Provisos

Federally Enforceable Provisos	Regulations
A pretest meeting may be held at the request of the source owner or the Air Division. The necessity for such a meeting and the required attendees will be determined on a case-by-case basis. All test reports must be submitted to the Air Division within 30 days of the actual completion of the test unless an extension of time is specifically approved by the Air Division or an alternative time is specified by an applicable regulation.	Rule 335-3-1-.04
23. Payment of Emission Fees	
Annual emission fees shall be remitted each year according to the fee schedule in ADEM Admin. Code R. 335-1-7-.04.	Rule 335-1-7-.04
24. Other Reporting and Testing Requirements	
Submission of other reports regarding monitoring records, fuel analyses, operating rates, and equipment malfunctions may be required as authorized in the Department's air pollution control rules and regulations. The Department may require emission testing at any time.	Rule 335-3-1-.04(1)
25. Title VI Requirements (Refrigerants)	
Any facility having appliances or refrigeration equipment, including air conditioning equipment, which use Class I or Class II ozone-depleting substances as listed in 40 CFR Part 82, Subpart A, Appendices A and B, shall service, repair, and maintain such equipment according to the work practices, personnel certification requirements, and certified recycling and recovery equipment specified in 40 CFR Part 82, Subpart F. No person shall knowingly vent or otherwise release any Class I or Class II substance into the environment during the repair, servicing, maintenance, or disposal of any device except as provided in 40 CFR Part 82, Subpart F. The responsible official shall comply with all reporting and recordkeeping requirements of 40 CFR 82.166. Reports shall be submitted to the US EPA and the Department as required.	40 CFR Part 82
26. Chemical Accidental Prevention Provisions	
If a chemical listed in Table 1 of 40 CFR Part 68.130 is present in a process in quantities greater than the threshold quantity listed in Table 1, then:	40 CFR Part 68

General Permit Provisos

Federally Enforceable Provisos	Regulations
(a) The owner or operator shall comply with the provisions in 40 CFR Part 68.	
(b) The owner or operator shall submit one of the following:	
(1) A compliance schedule for meeting the requirements of 40 CFR Part 68 by the date provided in 40 CFR Part 68.10(a) or,	
(2) A certification statement that the source is in compliance with all requirements of 40 CFR Part 68, including the registration and submission of the Risk Management Plan.	
27. Display of Permit	
This permit shall be kept under file or on display at all times at the site where the facility for which the permit is issued is located and will be made readily available for inspection by any or all persons who may request to see it.	Rule 335-3-14-.01(1)(d)
28. Circumvention	
No person shall cause or permit the installation or use of any device or any means which, without resulting in reduction in the total amount of air contaminant emitted, conceals or dilutes any emission of air contaminant which would otherwise violate the Division 3 rules and regulations.	Rule 335-3-1-.10
29. Visible Emissions	
Unless otherwise specified in the Unit Specific provisos of this permit, any source of particulate emissions shall not discharge more than one 6-minute average opacity greater than 20% in any 60-minute period. At no time shall any source discharge a 6-minute average opacity of particulate emissions greater than 40%. Opacity will be determined by 40 CFR Part 60, Appendix A, Method 9, unless otherwise specified in the Unit Specific provisos of this permit.	Rule 335-3-4-.01(1)
30. Fuel-Burning Equipment	
(a) Unless otherwise specified in the Unit Specific provisos of this permit, no fuel-burning equipment may discharge particulate emissions in excess of the emissions specified in Part 335-3-4-.03.	Rule 335-3-4-.03

General Permit Provisos

Federally Enforceable Provisos	Regulations
(b) Unless otherwise specified in the Unit Specific provisos of this permit, no fuel-burning equipment may discharge sulfur dioxide emissions in excess of the emissions specified in Part 335-3-5-.01.	Rule 335-3-5-.01
31. Process Industries – General	
Unless otherwise specified in the Unit Specific provisos of this permit, no process may discharge particulate emissions in excess of the emissions specified in Part 335-3-4-.04.	Rule 335-3-4-.04
32. Averaging Time for Emission Limits	
Unless otherwise specified in the permit, the averaging time for the emission limits listed in this permit shall be the nominal time required by the specific test method.	Rule 335-3-1-.05
33. Permit Shield	
A permit shield exists under this operating permit in accordance with ADEM Administrative Code R. 335-3-16-.10 in that compliance with the conditions of this permit shall be deemed compliance with any applicable requirements as of the date of permit issuance. The permit shield is based on the accuracy of the information supplied in the application for this permit. Under this shield, it has been determined that requirements listed as non-applicable in such section are not applicable to this source.	Rule 335-3-16-.10

X001 Black Warrior Solid Waste Facilty

Informational Summary

Description: Municipal Solid Waste Landfill

Operating Schedule: 8760 hours/year.

This unit is subject to the following NSPSs, NESHAPs, or MACTs:

40 CFR Part 62, Subpart OOO

Pollutants Emitted

Pollutant	Emission Limit	Standard
NMOC	N/A	335-3-10-.02 (75)

Provisos for Landfill

Federally Enforceable Provisos	Regulations
Section 1--Applicability	
1. This source is subject to 40 CFR 62 Subpart OOO-Federal Plan Requirements for Municipal Solid Waste Landfills That Commenced Construction On or Before July 17, 2014 and Have Not Been Modified or Reconstructed Since July 17, 2014.	40 CFR 62 Subpart OOO
Section 2--Emission Standards	
1. The owner or operator must calculate a Tier 1 NMOC mass according to 40 CFR 62.16718(a)(1).	40 CFR 62 Subpart OOO
a. If the NMOC emission rate is less than 34 Mg/yr, the owner or operator must submit an NMOC emission rate report and must recalculate the NMOC mass emission rate annually as required by 40 CFR 62.16714(e).	
b. If the NMOC emission rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following:	
i. Submit a gas collection system design plan within 1 year as specified in 40 CFR 62.16724(d) and install and operate a gas collection and control system within 30 months according to 40 CFR 62.16714(b) and (c);	
ii. Determine a site-specific NMOC concentration and recalculate the NMOC emission rate using the Tier 2 procedures provided in 40 CFR 62.16718(a)(3);	
iii. Determine a site-specific methane generation rate constant and recalculate the NMOC emission rate using Tier 3 procedures provided in 40 CFR 62.16718(a)(4).	
2. If the owner or operator determines a site-specific NMOC concentration using Tier 2 procedures, the following applies:	40 CFR 62 Subpart OOO
a. If the NMOC emission rate is less than 34 Mg/yr, the owner or operator must submit a periodic emission report in accordance with 40 CFR 40 CFR 62.16724(c)(1) and retest the site specific NMOC concentration every five years using methods specified in 40 CFR 60 Appendix A.	
b. If the NMOC emission rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following:	
i. Submit a gas collection system design plan within 1 year as specified in 40 CFR 62.16724(d) and install and operate a gas collection and control system within 30 months according to 40 CFR 62.16714(b) and (c);	

Federally Enforceable Provisos	Regulations
ii. Determine a site-specific methane generation rate constant and recalculate the NMOC emission rate using the Tier 3 procedures provided in paragraph 40 CFR 62.16718(a)(4);	
iii. Conduct a surface emission monitoring demonstration using the Tier 4 procedures specified in paragraph 40 CFR 62.16718(a)(6).	
3. If the owner or operator determines a site-specific NMOC using Tier 3, the site-specific methane generation rate constant must be determined using the procedures in Method 2E of 40 CFR 60 Appendix A. The site-specific methane generation determined is used in all subsequent calculations.	40 CFR 62 Subpart OOO
a. If the NMOC emission rate is less than 34 Mg/yr,the owner or operator must submit a periodic emission report in accordance with 40 CFR 16724(c) and retest the site specific NMOC concentration every five years using methods specified in 40 CFR 60 Appendix A.	
b. If the NMOC mass emission rate as calculated using the Tier 2 site-specific NMOC concentration and Tier 3 site-specific methane generation rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following:	
i. Submit a gas collection system design plan within 1 year as specified in 40 CFR 62.16724(d) and install and operate a gas collection and control system within 30 months according to 40 CFR 62.16714(b) and (c);	
ii. Conduct a surface emission monitoring demonstration using the Tier 4 procedures specified in 40 CFR 62.16718(a)(6);	
4. The owner or operator may use other methods to determine the NMOC concentration or a site-specific methane generation rate constant as an alternative to the Tier 2 and Tier 3 methods if the method has been approved by the Administrator.	40 CFR 62 Subpart OOO
5. Under Tier 4 procedures, if Tier 2 NMOC emissions are greater than 34 Mg/yr but less than 50 Mg/yr, the owner or operator may demonstrate that surface methane emissions are below 500 parts per million and the owner or operator is not required to install and operate a gas collection and control system.	40 CFR 62 Subpart OOO
6. The collection and control system shall be installed within 30 months after:	40 CFR 62 Subpart OOO
a. The first annual report in which the emission rate equals or exceeds 34 Mg/yr, unless Tier 2 or Tier 3 sampling demonstrates the emission rate is less than 34 Mg/yr as specified in 40 CFR 62.16724(d)(4).	

Federally Enforceable Provisos	Regulations
b. The most recent NMOC emission rate report in which the NMOC emission rate equals or exceeds 34 Mg/yr based on Tier 2, if the Tier 4 surface emissions monitoring shows a surface methane concentration of 500 parts per million methane or greater as specified in 40 CFR 62.16724(d)(4)(iii). c. The first annual report in which the NMOC emission rate equals or exceeds 50 Mg/yr unless Tier 2 or Tier 3 sampling demonstrates the emission rate is less than 50 Mg/yr as specified in 40 CFR 63.1959(b).	
Section 3--Compliance and Performance Test Methods and Procedures	
1. The source with a required collection system shall demonstrate compliance use the procedures specified in 40 CFR 62.16720. Once the owner or operator begins to comply with 63.1960, the owner or operator must continue to operate the collection and control device according to those provisions and cannot return to 40 CFR 62.16720.	40 CFR 62 Subpart OOO
2. An initial performance test of the collection and control system shall be completed no later than 180 days after initial startup of the system in accordance with the test methods specified in 40 CFR 62.16718(d).	40 CFR 62 Subpart OOO
3. The owner or operator shall conduct an initial performance test of the collection system and flare in accordance with the requirements of 40 CFR 60.8.	40 CFR 62 Subpart OOO
4. The visible emissions shall be determined using reference Method 22 of 40 CFR 60 Appendix A.	40 CFR 62 Subpart OOO
Section 4--Emission Monitoring	
1. The owner or operator shall submit an emission report initially and annually thereafter in accordance with 40 CFR 62.16724(c)(1) and shall recalculate the NMOC rate using the formula and procedures provided in 62.16718(a) or (b) as applicable.	40 CFR 62 Subpart OOO
2. If the owner or operator submits a 5-year NMOC emission report in accordance with 40 CFR 62.16724(c)(1), the annual MSW acceptance rate shall be documented to determine if it exceeds the rate used in the 5-year NMOC calculations. If the acceptance rate exceeds the rate used in the report, a revised NMOC report shall be submitted based on the known acceptance rates.	40 CFR 62 Subpart OOO
3. Monitoring of a required collection and control system shall comply with the provisions of 40 CFR 62.16722.	40 CFR 62 Subpart OOO

Federally Enforceable Provisos	Regulations
Section 5--Recordkeeping and Reporting Requirements	
1. The owner or operator shall maintain on-site records of the design capacity report in which design capacity was first shown to meet or exceed 2.5 million m^3 by volume and 2.5 million Mg by mass, current waste in place and year by year acceptance rate.	40 CFR 62 Subpart OOO
2. The owner or operator shall submit an NMOC emission rate report as provided for below. The administrator may request additional information as may be necessary to verify the reported NMOC emission rate.	40 CFR 62 Subpart OOO
a. The NMOC emission rate report must contain an annual or 5-year estimate on the NMOC emission rate calculated using the formula and procedures provided in 40 CFR 62.16718 as applicable.	
i. The NMOC emission rate reports must be submitted annually except if the NMOC emission rate is less than 34 Mg/yr in each of the next 5 consecutive years, the owner or operator may elect to submit an estimate of the NMOC emission rate for the next 5-year period in lieu of the annual report. This estimate must include the current amount of solid waste-in-place and the estimated waste acceptance rate for each year of the 5 years for which an NMOC emission rate is estimated. All data and calculations upon which this estimate is based must be provided to the Administrator. This estimate must be revised at least once every 5 years. If the actual waste acceptance rate exceeds the estimated waste acceptance rate in any year reported in the 5-year estimate, a revised 5-year estimate must be submitted to the Administrator. The revised estimate must cover the 5-year period beginning with the year in which the actual waste acceptance rate exceeded the estimated waste acceptance rate.	
b. The NMOC emission rate report must include all the data, calculations, sample reports, and measurements used to estimate the annual or 5-year emissions.	
c. Each owner or operator subject to the requirements of 40 CFR 62.16710 Subpart OOO is exempted from the requirements to submit an NMOC emission rate report, after installing a collection and control system that complies with 40 CFR 62.16714(b) and (c), during such time as the collection and control system is in operation and in compliance 62.16716 and 62.16720.	
d. A copy of the NMOC emission rate report shall be kept on site.	

Federally Enforceable Provisos	Regulations
3. Each owner or operator required to install and operate a gas collection and control system must submit a collection and control system design plan to the Administrator for approval. The collection and control system design plan must be prepared and approved by a professional engineer and meet the requirements in 40 CFR 62.16724(d)(1)-(7).	40 CFR 62 Subpart OOO
4. An owner or operator intending to demonstrate site-specific surface methane emissions are below 500 parts per million(ppm) based on Tier 4 provisions must meet the following requirements: a. A notification of the date(s) upon which site-specific surface methane emissions are to be demonstrated to be below 500 ppm. The landfill must also include a description of the wind barrier to be used during the SEM in the notification. Notification must be postmarked no less than 30 days prior to such date. b. If there is a delay to the scheduled Tier 4 SEM date due to weather conditions, including not meeting the wind requirements in 40 CFR 62.16718(a)(6)(iii)(A), the owner or operator shall notify the Administrator by e-mail or telephone no later than 48 hours before any delay or cancellation in the original test date, and arrange an updated date with the Administrator by mutual agreement.	40 CFR 62 Subpart OOO

X002 Black Warrior Solid Waste Facilty

Informational Summary

Description: Municipal Solid Waste Landfill

Operating Schedule: 8760 hours/year.

This unit is subject to the following NSPSs, NESHAPs, or MACTs:

ADEM Admin Rule R. 335-3-19

Pollutants Emitted

Pollutant	Emission Limit	Standard
NMOC	N/A	ADEM Admin. Rule R. 335-3-19

Provisos for Landfill

Federally Enforceable Provisos	Regulations
Section 1--Applicability	
1. This source is subject to ADEM Admin. Rule R. 335-3-19 Control of Municipal Solid Waste Landfill Gas Emissions upon EPA's final approval of that Chapter.	ADEM Admin. Rule R. 335-3-19
Section 2--Emission Standards	
1. The owner or operator must calculate a Tier 1 NMOC mass according to 335-3-19-.03(3)(a). a. If the NMOC emission rate is less than 34 Mg/yr, the owner or operator must submit an NMOC emission rate report and must recalculate the NMOC mass emission rate annually as required by 335-3-19-.03(1)(d). b. If the NMOC emission rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following: i. Submit a gas collection system design plan within 1 year as specified in 335-3-19.03(6)(c) and install and operate a gas collection and control system within 30 months according to 335-3-19-.03(1)(a) and (b); ii. Determine a site-specific NMOC concentration and recalculate the NMOC emission rate using the Tier 2 procedures provided in 335-3-19-.03(3)(a)3.; iii. Determine a site-specific methane generation rate constant and recalculate the NMOC emission rate using Tier 3 procedures provided in 335-3-19-.03(3)(a)4.	ADEM Admin. Rule R. 335-3-19
2. If the owner or operator determines a site-specific NMOC concentration using Tier 2 procedures, the following applies: a. If the NMOC emission rate is less than 34 Mg/yr, the owner or operator must submit a periodic emission report in accordance with 40 CFR 335-3-19-.03(6)(c)1. and retest the site specific NMOC concentration every five years using methods specified in 40 CFR 60 Appendix A. b. If the NMOC emission rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following: i. Submit a gas collection system design plan within 1 year as specified in 40 CFR 62.16724(d) and install and operate a gas collection and control system within 30 months according to 335-3-19-.03(1)(a) and (b);	ADEM Admin. Rule R. 335-3-19

Federally Enforceable Provisos	Regulations
ii. Determine a site-specific methane generation rate constant and recalculate the NMOC emission rate using the Tier 3 procedures provided in paragraph 335-3-19-.03(3)(a)4.;	
iii. Conduct a surface emission monitoring demonstration using the Tier 4 procedures specified in paragraph 335-3-19-.03(3)(a)6.	
3. If the owner or operator determines a site-specific NMOC using Tier 3, the site-specific methane generation rate constant must be determined using the procedures in Method 2E of 40 CFR 60 Appendix A. The site-specific methane generation determined is used in all subsequent calculations.	ADEM Admin. Rule R. 335-3-19
a. If the NMOC emission rate is less than 34 Mg/yr,the owner or operator must submit a periodic emission report in accordance with 40 CFR 335-3-19-.03(6)(c)1. and retest the site specific NMOC concentration every five years using methods specified in 40 CFR 60 Appendix A.	
b. If the NMOC mass emission rate as calculated using the Tier 2 site-specific NMOC concentration and Tier 3 site-specific methane generation rate is equal to or greater than 34 Mg/yr, the owner or operator must do one of the following:	
i. Submit a gas collection system design plan within 1 year as specified in 40 CFR 62.16724(d) and install and operate a gas collection and control system within 30 months according to 335-3-19-.03(1)(a) and (b);	
ii. Conduct a surface emission monitoring demonstration using the Tier 4 procedures specified in 335-3-19-.03(3)(a)6.;	
4. The owner or operator may use other methods to determine the NMOC concentration or a site-specific methane generation rate constant as an alternative to the Tier 2 and Tier 3 methods if the method has been approved by the Administrator.	ADEM Admin. Rule R. 335-3-19
5. Under Tier 4 procedures, if Tier 2 NMOC emissions are greater than 34 Mg/yr but less than 50 Mg/yr, the owner or operator may demonstrate that surface methane emissions are below 500 parts per million and the owner or operator is not required to install and operate a gas collection and control system.	ADEM Admin. Rule R. 335-3-19
6. The collection and control system shall be installed within 30 months after:	ADEM Admin. Rule R. 335-3-19
a. The first annual report in which the emission rate equals or exceeds 34 Mg/yr, unless Tier 2 or Tier 3 sampling demonstrates the emission rate is less than 34 Mg/yr as specified in 335-3-19-.03(6)(c)4.	

Federally Enforceable Provisos	Regulations
b. The most recent NMOC emission rate report in which the NMOC emission rate equals or exceeds 34 Mg/yr based on Tier 2, if the Tier 4 surface emissions monitoring shows a surface methane concentration of 500 parts per million methane or greater as specified in 335-3-19-.03(6)(c)4(iii).	
c. The first annual report in which the NMOC emission rate equals or exceeds 50 Mg/yr unless Tier 2 or Tier 3 sampling demonstrates the emission rate is less than 50 Mg/yr as specified in 40 CFR 63.1959(b).	
Section 3--Compliance and Performance Test Methods and Procedures	
1. The source with a required collection system shall demonstrate compliance use the procedures specified in 335-3-19-.03(4). Once the owner or operator begins to comply with 63.1960, the owner or operator must continue to operate the collection and control device according to those provisions and cannot return to 335-3-19-.03(4).	ADEM Admin. Rule R. 335-3-19
2. An initial performance test of the collection and control system shall be completed no later than 180 days after initial startup of the system in accordance with the test methods specified in 335-3-19-.03(3)(d).	ADEM Admin. Rule R. 335-3-19
3. The owner or operator shall conduct an initial performance test of the collection system and flare in accordance with the requirements of 40 CFR 60.8.	ADEM Admin. Rule R. 335-3-19
4. The visible emissions shall be determined using reference Method 22 of 40 CFR 60 Appendix A.	ADEM Admin. Rule R. 335-3-19
Section 4--Emission Monitoring	
1. The owner or operator shall submit an emission report initially and annually thereafter in accordance with 335-3-19-.03(6)(c)1. and shall recalculate the NMOC rate using the formula and procedures provided in 335-3-19-.03(3)(a) or (b) as applicable.	ADEM Admin. Rule R. 335-3-19
2. If the owner or operator submits a 5-year NMOC emission report in accordance with 335-3-19-.03(6)(c)1., the annual MSW acceptance rate shall be documented to determine if it exceeds the rate used in the 5-year NMOC calculations. If the acceptance rate exceeds the rate used in the report, a revised NMOC report shall be submitted based on the known acceptance rates.	ADEM Admin. Rule R. 335-3-19
3. Monitoring of the collection and control system shall comply with the provisions of 335-3-19-.03(5).	ADEM Admin. Rule R. 335-3-19
Section 5--Recordkeeping and Reporting Requirements	

Federally Enforceable Provisos	Regulations
1. The owner or operator shall maintain on-site records of the design capacity report in which design capacity was first shown to meet or exceed 2.5 million m^3 by volume and 2.5 million Mg by mass, current waste in place and year-by-year acceptance rate.	ADEM Admin. Rule R. 335-3-19
2. The owner or operator shall submit an NMOC emission rate report as provided for below. The administrator may request additional information as may be necessary to verify the reported NMOC emission rate. a. The NMOC emission rate report must contain an annual or 5-year estimate on the NMOC emission rate calculated using the formula and procedures provided in 335-3-19-.03(3)(a) as applicable. i. The NMOC emission rate reports must be submitted annually except if the NMOC emission rate is less than 34 Mg/yr in each of the next 5 consecutive years, the owner or operator may elect to submit an estimate of the NMOC emission rate for the next 5-year period in lieu of the annual report. This estimate must include the current amount of solid waste-in-place and the estimated waste acceptance rate for each year of the 5 years for which an NMOC emission rate is estimated. All data and calculations upon which this estimate is based must be provided to the Administrator. This estimate must be revised at least once every 5 years. If the actual waste acceptance rate exceeds the estimated waste acceptance rate in any year reported in the 5-year estimate, a revised 5-year estimate must be submitted to the Administrator. The revised estimate must cover the 5-year period beginning with the year in which the actual waste acceptance rate exceeded the estimated waste acceptance rate. b. The NMOC emission rate report must include all the data, calculations, sample reports, and measurements used to estimate the annual or 5-year emissions. c. Each owner or operator subject to the requirements of ADEM Admin. Rule R. 335-3-19 is exempted from the requirements to submit an NMOC emission rate report, after installing a collection and control system that complies with 335-3-19-.03(1)(a), during such time as the collection and control system is in operation and in compliance with 335-3-19-.03(2) and 335-3-19-.03(4). d. A copy of the NMOC emission rate report shall be kept on site.	ADEM Admin. Rule R. 335-3-19
3. Each owner or operator required to install and operate a gas collection and control system must submit a collection and control system design plan to the Administrator for approval. The collection and control system design plan must be prepared and	ADEM Admin. Rule R. 335-3-19

Federally Enforceable Provisos	Regulations
approved by a professional engineer and meet the requirements in 335-3-19-.03(6)(d)1.-7.	
4. An owner or operator intending to demonstrate site-specific surface methane emissions are below 500 parts per million(ppm) based on Tier 4 provisions must meet the following requirements: a. A notification of the date(s) upon which site-specific surface methane emissions are to be demonstrated to be below 500 ppm. The landfill must also include a description of the wind barrier to be used during the SEM in the notification. Notification must be postmarked no less than 30 days prior to such date. b. If there is a delay to the scheduled Tier 4 SEM date due to weather conditions, including not meeting the wind requirements in 335-3-19-.03(3)(a)6.(iii)(I), the owner or operator shall notify the Administrator by e-mail or telephone no later than 48 hours before any delay or cancellation in the original test date, and arrange an updated date with the Administrator by mutual agreement.	ADEM Admin. Rule R. 335-3-19

X003 Black Warrior Solid Waste Facilty

Informational Summary

Description: Municipal Solid Waste Landfill

Operating Schedule: 8760 hours/year.

This unit is subject to the following NSPSs, NESHAPs, or MACTs:

40 CFR 61 Subpart M

Pollutants Emitted

Pollutant	Emission Limit	Standard
Asbestos	N/A	ADEM Admin. Rule R. 335-3-11-.02(12)

Provisos for Landfill

Federally Enforceable Provisos	Regulations
Section 1--Applicability	
1. This source is subject to National Emission Standards for Hazardous Air Pollutants 40 CFR 61-Subpart M National Emission Standard for Asbestos.	ADEM Admin. Rule R. 335-3-11-.02(12)
Section 2--Emission Standards	
1. Either there shall be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited, or at the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall:	ADEM Admin. Rule R. 335-3-11-.02(12)
a. Be covered with at least 6 inches of compacted nonasbestos-containing material.	
b. Be covered with a resinous or petroleum-based dust suppression agent that effectively binds dust and controls wind erosion. Other equally effective dust suppression agents may be used upon prior approval by the Director.	
c. Use an alternative emissions control method that has received prior written approval by the Director according to the procedures described in 40 CFR 61.149(c)(2).	
Section 3--Recordkeeping and Reporting Requirements	
1. For all asbestos-containing waste material received, the owner or operator of the active waste disposal shall:	ADEM Admin. Rule R. 335-3-11-.02(12)
a. Maintain waste shipment records which include the following information:	
i. Name, address, and telephone number of the waste generator.	
ii. Name, address, and telephone number of the transporter(s).	
iii. The quantity of the asbestos-containing waste material in cubic yards.	
iv. Presence of improperly enclosed or uncovered waste, or any asbestos-containing waste material sealed in leak-tight containers.	
v. The date of the receipt.	

Federally Enforceable Provisos	Regulations
b. Within 30 days after receipt of the waste, send a copy of the signed waste shipment record to the waste generator.	
c. Upon discovering a discrepancy between the quantity of waste designated on the waste shipment records and the quantity actually received, attempt to reconcile the discrepancy with the waste generator within 15 days. If the discrepancy is unresolved after 15 days, a written report shall be submitted to the local state or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator and for the disposal site.	
d. Retain a copy of all records and reports required by this proviso for at least 2 years.	
e. Maintain until closure, records of the location, depth and area, and quantity in cubic yards of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area.	
f. Upon closure of the facility, submit to the Director a copy of records of asbestos waste disposal locations and quantities.	
g. Upon request, furnish and make available during normal business hours for inspection by the Director, all records required under 40 CFR 61.154.	
h. Notify the Director in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Director at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice: i. Scheduled starting and completion dates. ii. Reason for disturbing waste. iii. Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Director may require changes in the emissions control procedures to be used. iv. Location of any temporary storage site and the final disposal site.	

Summary Page for Facility-Wide Fugitive Dust Plan

Permitted Operating Schedule: 8760 Hrs/yr

Emission limitations:

Emission Point #	Description	Pollutant	Emission limit	Regulation
Fugitive	Fugitive Dust	PM	N/A	ADEM Admin. Code r. 335-3-4-.02

Provisos for Facility-Wide Fugitive Dust Control

Federally Enforceable Provisos	Regulations
Section 1--Applicability	
1. This landfill is subject to the provisions of ADEM Admin. Code r. 335-3-16, "Major Source Operating Permits."	Rule 335-3-16
Section 2--Emission Standards	
1. The permittee shall take reasonable precautions as directed in Section 3--Compliance and Performance Test Methods and Procedures below to prevent fugitive dust at the facility that travel beyond the facility property line and cause a nuisance.	Rule 335-3-4-.02
Section 3—Compliance and Performance Test Methods and Procedures	
1. The permittee shall take reasonable precautions to prevent dust from any operation, process, handling, storage, or transportation activity, including from dust from paved and unpaved roads and landfill areas and grounds in the source permitted herein from becoming airborne. The permittee shall not cause or allow the discharge of visible emissions which travel beyond the property line or the landfill. Airborne fugitive dust emissions shall be prevented and addressed as needed and as appropriate to weather conditions using any or all of the following pre-approved control measures for the following sources of fugitive dust: a. Plant roads: the application of water and/or paving; b. Active landfill areas: the application of water and compaction c. Closed landfill areas: maintenance of vegetation; and d. Daily cover activities: minimization of drop heights and compaction.	
2. Specific dust control measures approved to be used as necessary for this landfill include, but are not limited to: a. Use vegetative cover to minimize fugitive dust from closed landfill cells. b. Landfill roads may be paved to minimize fugitive dust. c. Use wet suppression to minimize fugitive dust from roads, active landfill areas and any area or activity observed or expected to cause fugitive dust. Wet suppression shall not be required during natural wet conditions. Wet suppression means using water trucks or any other means of spraying or applying water. Mixing of water with material during handling also constitutes wet suppression.	

Federally Enforceable Provisos	Regulations
i. The indicator that water application is required is the visual observation of fugitive dust from vehicle traffic and/or act of wind.	
ii. Wet suppression is effective when the application of water prevents visible fugitive dust from crossing property lines.	
iii. Inspect the water truck on each day of use prior to operation and initiate corrective action with 24 hours of the inspection if any condition observed prevents the water truck from being used to apply sufficient water to prevent fugitive dust.	
iv. On a daily log (which may be in the form of a checklist), record the results of the water truck inspection, the amount of water applied, and the areas to which the water was applied, or if the water truck was not used on a given day, the reason it was not used.	
v. For the semi-annual report, maintain a record of the days when the water truck was not able to be used effectively for wet suppression, including the reason it was not used. It is not necessary to list wet days in the report.	
d. Use compaction of daily cover materials and minimize material drop heights for active landfilling operations.	
i. Train employees who participate or supervise daily cover activities in work practices to minimize material drop heights and to attain and maintain adequate compaction to prevent fugitive dust.	
ii. Maintain records of training in fugitive dust management techniques.	
iii. For the semi-annual report, maintain a record of the date and a brief description of each time when a work practice was not properly performed and the corrective action(s) taken.	
Section 4--Emission Monitoring	
1. The permittee shall conduct weekly visual observations, considering factors such as naturally wet conditions, for fugitive dust in areas listed with the potential to generate fugitive dust, and if visible emissions traveling beyond the facility property line are observed, any necessary corrective actions shall be initiated within four (4) hours of observation.	Rule 335-3-16-.05
Section 5--Recordkeeping and Reporting Requirements	
1. The permittee shall maintain a record of all inspections, to include visible observations performed to satisfy the requirements of	Rule 335-3-16-.05

Federally Enforceable Provisos	Regulations
Proviso 1 of Section 4--Emission Monitoring above. This shall include problems observed and corrective actions taken. The records shall be retained for at least five (5) years from the date of generation and shall be available upon request.	
2. The permittee shall submit a report at least every 6 months, which shall include the monitoring of fugitive dust control measures, including any days when a water truck was unable to be used effectively for wet suppression and the reason, or a statement that no such events occurred during the reporting period. The report shall be submitted within 30 days following the end of the six month period.	Rule 335-3-16-.05

APPENDIX D

FINANCIAL ASSURANCE

TABLE E.
TOTAL COST OF CLOSURE AND ANNUAL POST CLOSURE CARE
CONSTRUCTED AREA

Date: January 20, 2023

I. GENERAL INFORMATION:

Facility Name: Black Warrior Solid Waste Facility

Permit/Application No.: 63-01 Expiration Date: 3/30/2023

Facility Address: 3301 Landfill Drive, Coker, AL 35452

Permitee: Black Warrior Solid Waste Disposal Authority

Mailing Address: 3301 Landfill Drive, Coker, AL 35452

Solid Waste Disposal Units Included in Estimate:

Cell	Acres	Total Acres Requiring Closure	Constructed
1	11.00	11.00	X
2A	4.56	15.56	X
2B	6.95	22.51	X
3A	9.88	32.39	X
3B	5.70	38.09	X
4	10.70	48.79	X
5	5.30	54.09	X
6	8.20	62.29	X
7A	2.40	64.69	X
7B	7.7	72.39	X
8A	3.9	76.29	X
8B	2.90	79.19	X
9A	4.60	83.79	X
9B	3.22	87.01	X
10	6.16	93.17	X

Total Landfill Acreage included in this estimate. 102.48 Closure

93.17 Long-Term Care

II. TYPE OF FINANCIAL ASSURANCE DOCUMENT (Check Type)

	Letter of Credit*		Insurance Certificate
	Surety Bond*		Escrow Account
X	Trust Fund Agreement		Financial Test

III. ESTIMATED CLOSURE COST

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
1. Old Waste Relocation				
	CY	-	$ -	$ -
2. Proposed Monitoring Wells				
	EA	-	$ -	$ -
3. Slope and Fill (bedding layer between waste and barrier layer):				
Grading of Waste	LS	1	$ 14,700.00	$ 14,700.00
On-Site Foundation Material	CY	92,235	$ 3.08	$ 284,083.14
			Subtotal Slope and Fill:	$ 298,783.14
4. Cover Material (Barrier Layer):				
12" Sand Migration Layer	CY	165,339	$ 9.19	$ 1,519,469.04
18" Clay Infiltration Layer	CY	248,009	$ 6.91	$ 1,713,742.83
LLDPE Geomembrane Cap, 30-mil	SF	4,464,164	$ 0.69	$ 3,080,272.93
Topsoil (6" thick) - off-site	CY	82,670	$ 9.19	$ 759,734.52
			Subtotal Cover Material:	$ 7,073,219.31
5. Vegetative Layer				
Seeding / Grassing	AC	102	$ 1,590.00	$ 162,948.12
Fertilizer	AC	102	$ 1,590.00	$ 162,948.12
Mulch	AC	51	$ 750.00	$ 38,431.16
			Subtotal Vegetative Layer:	$ 364,327.41
6. Stormwater Control System:				
Grouted Rip-Rap Flumes	TON	2,357	$ 52.87	$ 124,620.47
			Subtotal Stormwater Controls:	$ 124,620.47
7. LFG Gas Control				
Wells	EA	31	$14,700.00	$455,700.00
Collection System	LF	6,500	$52.00	$338,000.00
Condensate Control System	LS	-	$44,000.00	$0.00
Blower/Flare Station	EA	1	$7,500.00	$7,500.00
			Subtotal Active Gas Extraction:	$801,200.00

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
8. Security System:				
Fencing	LF	-	$ -	$ -
Gate(s)	EA	-	$ -	$ -
Sign (s)	EA	2	$ 2,000.00	$ 4,000.00
			Subtotal Security System:	$ 4,000.00
9. Engineering:				
Closure Plan	LS	1	$ 118,900.00	$ 118,900.00
QA/QC Construction Management	LS	1	$ 300,800.00	$ 300,800.00
Final Survey	LS	1	$ 76,500.00	$ 76,500.00
Certification of Closure	LS	1	$ 75,600.00	$ 75,600.00
			Subtotal Engineering:	$ 571,800.00
			Subtotal of 1-9 Above:	$9,237,950.33
			Contingency	$923,795.03
			Total Closure Cost	$10,161,745.36

IV. ANNUAL COST FOR LONG-TERM CARE

Description	Sampling Frequency (events/yr.)	Number of Wells	$/Event	$/Year
1. Groundwater Monitoring				
Semi-Annual	2	9	$ 13,100.00	$ 26,200.00
2. Surface Water Monitoring				
Quarterly	4	1	$ 1,500.00	$ 6,000.00
3. Gas Monitoring				
Quarterly	4	70	$ 2,500.00	$ 10,000.00

4. Leachate Collection/Treatment Systems Maintenance				
		Gallons	$/Gallon	
Average Gallons	Annual	540,000.00	$ 0.05	$ 27,000.00
		Subtotal Leachate Collection/Treatment System Maintenance		$ 27,000.00
5. Maintenance of Groundwater Monitoring Wells				
Replacement	EA	1	$ 1,610.00	$ 1,610.00
Abandonment	EA	1	$ 810.00	$ 810.00
*1 well replacement per 5 years		Subtotal Groundwater Monitoring Well Maintenance:		$ 2,420.00

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
6. Erosion Repair & Cover Maintenance				
Erosion Control (slope regrading and repair)	AC	9	$ 310.00	$ 2,888.16
Site Mowing	AC	93	$ 185.00	$ 17,235.79
Fertilizer Application	AC	93	$ 155.00	$ 14,440.80
Topsoil Replacement	CYIP	4,658	$ 5.00	$ 23,291.61
Reseeding and Mulching	AC	9	$ 2,900.00	$ 27,018.27
		Subtotal Erosion Repair & Cover Maintenance :		$ 84,874.64
7. Stormwater Management System Maintenance				
Conveyance Maintenance	LS	1	$ 7,500.00	$ 7,500.00
		Subtotal Stormwater System Maintenance:		$ 7,500.00

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
8. Additional Expenses				
Engineering and Surveying Services	LS	1	$ 36,600.00	$ 36,600.00
Post Closure Care Manager	LS	1	$ 36,600.00	$ 36,600.00
			Subtotal Additional Expenses:	$ 73,200.00
	ANNUAL LONG-TERM CARE COST ($/Year):			$ 237,194.64
	NUMBER OF YEARS OF LONG-TERM CARE			30
	TOTAL LONG-TERM CARE COST ($)			**$ 7,115,839.10**

ACTIVE LANDFILL GAS COLLECTION SYSTEM ALTERNATIVE

Description	Frequency (events/yr.)	$/Event	$/Year
1. Gas Monitoring			
Monthly	12	$ 2,950.00	$ 35,400.00
2. Electrical Costs of Active LFG System			
Monthly	12	$ 2,200.00	$ 26,400.00
	ANNUAL LONG-TERM CARE COST ($/Year):		$ 61,800.00
	NUMBER OF YEARS OF LONG-TERM CARE		30
	TOTAL LONG-TERM CARE COST ($)		$ 1,854,000.00

* The Black Warrior Solid Waste Facility operates a voluntary LFG collection and destruction system. The operation of this system would not be required if the facility closed. Therefore, the costs of operating the system have not been included in the estimate for long-term care of the facility. Costs for operation of the system have been indicated above for estimate purposes only, should the Authority continue to operate the system voluntarily after closure.

SUMMARY

TOTAL CLOSURE COST	**$**	**10,161,745.36**
TOTAL POST-CLOSURE COST	**$**	**8,969,839.10**
GRAND TOTAL	**$**	**19,131,584.46**

APPENDIX E

PETITIONS FOR VARIANCE

PETITIONS FOR VARIANCE

PETITION FOR VARIANCE No. 1 – ALTERNATE DAILY COVER

The Black Warrior Solid Waste Disposal Authority is requesting a variance from the following ADEM Solid Waste Regulation **ADEM Admin. Code r. 335-13-4-.22(1)(a)1.** which states *"A minimum of six inches of compacted earth or alternative cover material that includes but is not limited to foams, geosynthetic or waste products, and is approved by the Department shall be added at the conclusion of each day's operation or as otherwise approved by the Department to control disease vectors, fires, odors, blown litter, and scavenging."*

The BWSWA is requesting that the Black Warrior Solid Waste Facility be approved to utilize ***VERDac landfill cover pellets*** as an alternative daily cover material. The VERDac cover pellet system meets the requirements of ADEM regulations for daily cover and achieves the operational benefits noted in EPA's study of the use of alternative daily cover at municipal solid waste landfills requirements. Manufacturer's information on the application and use of the VERDac cover pellet system is included for reference.

ENVIRONMENTAL PRODUCTS, LLC™

2183 Pennsylvania Avenue
Apalachin, NY 13732
Ph: 800-800-7671
Fx: 607-625-2689
www.lscenv.com

VERDac
LANDFILL COVER PELLETS

USAGE GUIDE

August 2020

Table of Contents

1.0 Definition of VERDac Landfill Cover Pellets 3
1.1 Background and Concept 3
1.2 Environmental and Economic Benefits 3
1.3 Equipment 3
1.4 Personnel 4
1.5 Materials 4
2.0 Safety 5
3.0 Operator Attire 5
4.0 Towing Units 5
5.0 Loading and Mixing Procedure 5
5.1 Liquid Addition 5
5.2 VERDac Pellets Addition 6
5.3 Optional Xtreme Rain Shield 6
6.0 Transporting 7
6.1 Cold Weather Transport 7
6.2 Towing on Slopes 7
7.0 Application of VERDac Pellets Landfill Cover 7
7.1 Odor Control 8
7.2 Vector Control 8
7.3 Scavenging 9
7.4 Litter Control 9
7.5 Fire Control 9
7.6 Additional Applications 9
VERDac Pellets Application Minimum Requirements Guideline 10
VERDac Pellets Products Guide 11
7.7 Discharge Nozzle Selection 12
7.8 Handling the Discharge Spray Boom 12
7.9 Coverage of Large Area 12
7.10 Heavy Applications 12
8.0 Cleaning 13
9.0 Winter Care 13
9.1 VERDac Pellets Winterizing Procedure 13
10.0 Material Storage 13
10.1 VERDac Pellets Material Storage 13
10.2 Xtreme Rain Shield Material Storage 13
11.0 Troubleshooting (may not apply to all hydroseeders) 14
11.1 Removing Foreign Object from Discharge Nozzle 14
11.2 Removing Foreign Object from Mixing Tank 14
11.3 Clearing Clogged Mixing Tank 14
11.4 Lockout/Tagout & Confined Space Entry 14
12.0 Contingency Soil Supply 14
GHD Safety Data Sheet Document 15

This guide gives you specific, easy to follow instructions for the safe and efficient usage of LSC Environmental Products VERDac Landfill Cover Pellets product. For best results and to ensure safety, please follow the instructions carefully.

1.0 Definition of VERDac Landfill Cover Pellets

VERDac Landfill Cover Pellets is a spray-applied mulch and mineral mortar slurry comprised of water and a proprietary combination of cellulose fiber, powdered clay, adhesives, and water conditioners, used for waste cover and hydroseeding. It is a low-cost alternative to the conventional six inches (150 mm) of soil used as daily cover at most landfills. VERDac Pellets is a non-flammable blend of mulch and mineral binder providing a thin, non-toxic coating that performs all functions of landfill daily cover. Applied with a standard hydroseeding unit, this product provides increased landfill capacity while providing a more environmentally effective cover system for the landfill.

1.1 Background and Concept

Landfilled solid waste must be covered each day to control vectors, fires, odors, blowing litter, and scavenging. Cover material is generally defined as a six inch (150 mm) soil layer or other suitable material. VERDac Pellets is designed for use by a landfill operator at the close of each operating day for compliance with cover regulations.

For most situations VERDac Pellets provides cover ranging from 10 ft^2 to 15 ft^2 per gallon (0.93 to 1.4 m^2/liter) of slurry but depending on conditions and desired quality coverage up to 30t^2 per gallon (2.8 m^2/L.) can be achieved. The coverage area is dependent upon the desired thickness and the texture of the covered surface. Application of VERDac Pellets is a one-man operation.

1.2 Environmental and Economic Benefits

Use of VERDac Pellets conserves energy, natural resources and improves air quality by eliminating the use of heavy earthmoving equipment for the transporting, laying, and reworking of some soil covers on the landfill.

The major benefit of the use of VERDac Pellets is the conservation of extremely valuable landfill capacity, commonly known as “air space”. Landfill air space is a valuable asset and the need to conserve capacity is paramount to achieve environmental and economic objectives for both landfill operators and regulatory agencies. Efficient use of air space today can directly translate into longer landfill life, decreased operating costs, and increased revenue generation. An increase in air space efficiency up to 20% delays the need for the siting and construction of new facilities that ultimately may have severe environmental and economic impacts.

1.3 Equipment

The equipment used for VERDac Pellets consists of a standard hydroseeding unit, a towing unit, and a water source. The towing unit is used for moving the hydroseeding unit around the landfill site. If a nearby hydrant or other water source is not available, then a water trailer or truck is required.

1.4 Personnel

One operator is required for VERDac Pellets. This operator must be capable of operating heavy equipment and be familiar with the mechanics of all equipment used. The operator may be trained by LSC Environmental Products in the use of VERDac Pellets. If preferred, a two man operation may be used to expedite coverage time.

1.5 Materials

1.5.1 Water

Potable water, non-potable water and landfill leachate can be used as the liquid portion of VERDac Pellets. Use of leachate requires site-specific regulatory approval, operations, and safety plan to assure proper health and safety practices are implemented. In most VERDac Pellet mixtures approximately 1000 gallons (3785 liters) of water is used for each load of VERDac Pellets.

Each 50 lb (22.7 kg) bag of VERDac Pellets typically mixes with approximately 80 gallons (303 liters) of water. The water can either be supplied by a hydrant, pumped from a nearby pond, or brought to and stored adjacent to the hydroseeding unit by water truck or trailer. The sizing of the specific water supply method should be adequate to ensure that the filling of the hydroseeding unit occurs within a few minutes time.

As stated, leachate can be used as a water source if specific regulatory approval is obtained. It is not recommended that a high-strength leachate be used due to odor concerns and the added safety precautions required to assure worker safety. However, use of relatively dilute leachate is an effective method for reducing a portion of a landfill's total leachate production. The inherent odor-neutralizing properties of VERDac Pellets can mitigate the potential odor problems of leachate when it is used as a water source.

1.5.2 VERDac Landfill Cover Pellets

A proprietary blend of finely ground mulch, mineral binders and coloring mixed with water creates the VERDac Pellets Landfill Cover. See the back of this manual for a GHS Safety Data Sheet for this material.

1.5.3 Xtreme Rain Shield

During light rains, VERDac Pellets coatings will not typically wash off. However, if heavy rains are expected prior to the product fully drying (12-24 hours) the addition of Xtreme Rain Shield may help to prevent washing.

2.0 Safety

VERDac Pellets is nonhazardous and is composed of nonhazardous materials. Certain safety measures are recommended during different aspects of VERDac Pellets use. **Follow safety procedures specific to your hydroseeding unit, towing unit, or other equipment used.**

3.0 Operator Attire

The operator should wear appropriate protective clothing as specific by site management. Recommended protective clothing may include the following:

- Safety glasses
- Work gloves
- Approved work clothing
- Reinforced-Toe work shoes or boots
- P95 Dust mast while emptying bags into mixing unit

If leachate is being used as the liquid portion of the VERDac Pellets mixture, protective clothing in accordance with site regulations should be worn.

4.0 Towing Units

See table on Page 11 for VERDac Pellets material weights. To determine the total load weight, add the liquid weight, VERDac Pellets material weight and the weight of your hydroseeding unit. Ensure that the towing unit and hitch arrangement are capable of handling the total of these weights. *Note: 100 gallons/378.5 liters of water weighs approximately 836 lbs./379 kg.*

5.0 Loading and Mixing Procedure

It is important to add the VERDac Landfill Cover Pellets materials in the order specified.

5.1 Liquid Addition (Step 1)

Before placing any dry material in the mixing tank, the tank must be filled with the appropriate amount of liquid (water or leachate). Each 50 lb (22.7 kg) bag of VERDac Pellets typically mixes with 80 gallons (303 liters) of water. See chart on Page 11. If your hydroseeding unit has a reserve water tank, fill at this time with clean water. It is not recommended to use leachate as the clean out water.

All bags of material (VERDac Pellets Landfill Cover and Xtreme Rain Shield) can be loaded through the side rails of the hydroseeding unit onto the mixing deck from the ground. Ensure that they do not obstruct the ladder area. Never attempt to carry materials up or down ladders. To avoid back injuries, always use proper lifting practices when handling bags. Frozen materials should not be used.

5.2 VERDac Landfill Cover Pellets Addition (Step 2)

VERDac Pellets or Xtreme Rain Shield produces very little dust but a dust mask is recommended to prevent inhalation, and coveralls and gloves to prevent skin contact. Safety glasses should be worn to keep dust from entering the eyes. Should eyes or skin come in physical contact with any VERDac ingredients thoroughly rinse with water.

With mixer paddles running at medium speed add VERDac Pellets material by cutting open bag and dumping contents into the mixing tank (discard bag). See chart on Page 11 for quantities. Allow VERDac Pellets to mix at high speed for about 5 minutes until peaks and craters are visible on the surface of the product. Properly thickened VERDac Pellets will have a somewhat homogenous consistency. (see left photo below).

5.3 Optional Xtreme Rain Shield

During light rains, VERDac Pellets coatings will not typically wash off. However, if heavier rains are expected prior to the product fully drying (12-24 hours), the addition of up to 20% Xtreme Rain Shield may be necessary. Operator experience and discretion will determine which Xtreme Rain Shield formulation is best suited for the situation. With mixer paddles running at medium speed, add material to the already thickened VERDac Pellets by cutting open the bag and gradually adding the contents into the mixing tank (discard bag). For better dispersion of this product into the VERDac Pellets, recirculation through the pump and back to tank may be necessary. Properly thickened VERDac Pellets with Xtreme Rain Shield added will be more homogenous and a lighter green color than basic VERDac Pellets (see right photo below).

Properly Thickened VERDac Pellets

6.0 Transporting

Close inlet hopper lid prior to transportation and leave mixer paddles turning at low speed.

6.1 Cold Weather VERDac Pellets Transport

To prevent freezing during extremely cold weather (below 20°F -6°C), recirculate product through system back to mixing tank.

6.2 Towing on Slopes

To avoid the possibility of equipment tipping over, always tow up or back down slopes. DO NOT traverse (tow sideways) across slopes.

Proper orientation of equipment on slope

7.0 Application of VERDac Pellets

For overnight cover, conventional end-of-day waste compaction and surface preparation are normally adequate prior to VERDac Pellets application. A smoother surface will require less material due to reduced surface area.

Methods of application and the recommended finished appearance of VERDac Pellets are shown in the photographs on the next page. In general, the operator should position the application unit upwind, and should select the spray nozzle appropriate to the distance from the waste pile. When changing nozzles, be sure to disengage pump before disconnecting nozzle. In some cases, it will be necessary to spray a given area from two directions to compensate for "spray shadow" effects or wind dispersion. The most effective method of coverage will vary with each site, but generally, if opposite spray angles cannot be achieved due to operational constraints, the product is best applied from the location at which it will be observed most often.

When high winds are encountered, it may be necessary to position the hydroseeding unit in an upwind position. Since pumps emit a high pressure stream of slurry it is not generally effected by light winds; however, wind direction should always be considered with respect to airborne dispersion of overspray.

The application process is not typically affected by cold weather.

Daily Cover

Application of VERDac Pellets for hydroseeding

Application of VERDac Pellets via
Deck -Mounted Discharge Wand

7.1 Odor Control

VERDac Pellets formulation has an inherent capability to suppress odors. By applying the VERDac Pellets as a daily cover, typical landfill odors will be reduced.

Where excess or extreme odors warrant additional action, contact LSC for information about our Odor-Shell® product.

7.2 Vector Control

VERDac Pellets Landfill Cover has proven affective at inhibiting the attraction of vectors to waste piles.

7.3 Scavenging

General animal scavenging is reduced since the VERDac Pellets seals in odors and hides the visible food source beneath the covering shell. Scavenging by humans is inhibited by the complete visual coverage of the waste pile and by the coating of slurry applied upon all surface objects.

7.4 Litter Control

VERDac Pellets is highly effective for litter control. Due to the sticky consistency and weight of the material, a shell is formed over the garbage which prevents litter from being blown away by high winds. A thin layer of VERDac Pellets is recommended for preventing blowing litter.

In extremely windy situations, VERDac Pellets can be applied to waste as it is being unloaded from garbage trucks. This technique has been proven highly effective.

7.5 Fire Control

VERDac Pellets is an extremely effective fire control material. Independent laboratory testing of VERDac Pellets by ASTM D-4982 method has certified that VERDac Pellets is non-fuel contributing, non-smoke producing, and non-combustible. When an acetylene torch is applied directly to the VERDac Pellets cover, ignition of the VERDac Pellets cover or underlying waste does not occur.

7.6 Additional Applications

VERDac Pellets may also be used as a hydroseeding medium. Addition of EarthGuard® may be required for some landfill surfaces. Contact us for more details.

VERDac Landfill Cover Pellets
Application Minimum Requirements Guideline

	SHORT TERM COVER (**Depending on conditions cover can last overnight to several days)**
SLURRY MIXTURE*	VERDac Landfill Cover Pellets (See next page for mixtures)
APPLICATION RATE	Approx. 10-15 ft^2/gal.** (0.93 - 1.4 m^2/L.)
COVERAGE METHOD	Apply from two directions to compensate for spray shadow.
COVERAGE THICKNESS	Finished cover should be Approx. 1/8" (3.5 mm)
COVERAGE APPEARANCE	Depending on surface conditions, some trash may be visible. Product still 100% functional.
COVERAGE MAINTENANCE	None. Waste is placed over cover next working day.

* These are manufacturer's recommendations. Use and practice will determine the best mixture for each situation.
** Depending on conditions and desired quality, up to 30 ft^2/gal. (2.8 m^2/L.) can be achieved.

VERDac Landfill Cover Pellets Formulations Guide

Materials	Base	
Water or Leachate (Gallons)	1000	(~80 gallons per bag of VERDac Pellets
VERDac: 50 lb Bag	13	
Xtreme Rain Shield (50 lb Bag)	1-2	(May be necessary for heavy rain)
Finished Product (Gallons)	1000	

Materials	Base	
Water or Leachate (Liters)	3,785	(~303 liters per bag of VERDac Pellets
VERDac 23 kg Bag	13	
Xtreme Rain Shield (23 kg Bag)	1-2	(May be necessary for heavy rain)
Finished Product (Liters)	3,785	

Some leachate, hard water, and salty water may require more VERDac Pellets to achieve proper thickness.
These are manufacturer's recommendations. Use and practice will determine the best mixture for each situation.

7.7 Discharge Nozzle Selection

While other nozzles may be used, LSC Environmental Products offers numerous types of discharge nozzles for the effective spraying of VERDac Pellets at a variety of ranges. Experience and operator discretion will determine which nozzle to use in each situation.

Long Range (Solid Stream) for Distances of 100—150 feet (30—46 meters)

Medium/Long Range (15° Flat Spray) for Distances of 75—100 feet (23—30 meters)

Medium Range (25° Flat Spray) for Distances of 25—75 feet

Short Range (50° Flat Spray) for Distances of 5—25 feet

High Efficiency (25° Low Flow Spray) for Distances of 5—25 feet

7.8 Handling the Discharge Spray Boom

Care must be taken to use the proper discharge nozzle in order to attain the desired spray range, as being too close to the surface will cause the VERDac Pellets stream to overturn waste on contact. At long range distances the VERDac Pellets stream will break up, causing the desired spray effect. At ranges under 75 ft. (23 meters) the medium or short nozzle should be used and are designed to spray in a wide fan pattern.

Blockages may occur in nozzles due to foreign objects in the raw materials. Refer to Section 11.1 for procedure on removing foreign object from discharge nozzle.

With the desired nozzle securely in place, firmly grasp discharge spray handle in one hand and point discharge nozzle in desired direction of spray. With the other hand engage product pump and begin covering area. For desired spray effect operator may adjust pump or throttle speed.

Never disconnect nozzles when pump is running. Never engage pump with discharge spray boom unattended. Never put hands in front of discharge nozzles.

Do not spray at or near other persons. Spray exits nozzle at a high velocity and could cause injury.

Do not spray toward power lines, transformers or other high voltage conductors. Avoid spraying into wind. When unavoidable, be sure to keep direction of spray near to ground. Safety glasses should be worn during spraying operation.

7.9 Coverage of Large Area

Coverage of a large area will require moving the application unit to several spray locations. Inspect the area from several perspectives to ensure that the spray has covered all areas.

8.0 Cleaning

It is recommended that the hydroseeding unit be cleaned after use. VERDac Pellets may be used over several days and will not set up in the mixing tank. After the product is all used, the unit should be cleaned.

1. When tank is empty of product, shut off pumps, paddles, and engine.
2. Open all inlet lids.
3. With clean water, rinse product from inlets, lids, deck, walls, etc.
4. Fill tank to mixing shaft.
5. Close inlet lids.
6. Agitate mixing paddles at high speed for several minutes, splashing water inside of tank.
7. Drain in approved location.
8. Repeat steps 4—7 as necessary.

A properly cleaned hydroseeding unit will remain free of any built-up product internally and externally.

9.0 Winter Care

In extreme cold it is imperative that engines and hydraulic systems are thoroughly warmed before introducing a load. Refer to the operations manual for your hydroseeding unit for proper winter usage and care. During cold weather periods, the hydroseeding unit tank and pump must be drained at the end of the day to avoid freezing. It is desirable, but not necessary, to bring the machinery into a heated building for overnight storage.

9.1 Applicator Winterizing Procedure

1. After cleanout, drain the mixing tank thoroughly. DO NOT REPLACE DRAIN CAP.
2. If your hydroseeding unit is equipped with a reserve water tank and/or pump, drain thoroughly. DO NOT REPLACE DRAIN CAPS.
3. Pour approximately one half gallon (1.9 L) of anti-freeze into pump or tank and slowly run through pump and lines to prevent freezing.

10.0 Materials Storage

All materials are inert and can be stored on or off the boundaries of lined landfill cells.

10.1 VERDac Pellets Material Storage

VERDac Pellets should be kept dry. Stretch wrapped pallets can be easily covered with a tarp or plastic as a secondary measure of protection.

10.2 Xtreme Rain Shield

Xtreme Rain Shield should be kept dry. Stretch wrapped pallets can be easily covered with a tarp or plastic as a secondary measure of protection. .

11.0 Troubleshooting

11.1 Removing Foreign Object from Discharge Nozzle

1. Immediately turn off pump.
2. If unit is equipped with pump reverse feature, reversing for a few seconds releases any potential pressure in lines. With nozzle pointing away, remove nozzle and clear obstruction.
3. Reconnect nozzle and continue spraying.

11.2 Removing Foreign Object from Mixing Tank

1. Shut off mixer, pump, and engine.
2. If object can be safely retrieved with extended gaff tool, remove and continue with operation. If object cannot be found, drain load in approved area, locate object, and safely remove with extended gaff tool.

11.3 Clearing Clogged Mixing Tank

1. In the unlikely event that the VERDac Pellets slurry has thickened in the mixing tank to the point that the mixer paddles will not turn, disengage mixer. Do not force mixer.
2. A strong stream of water applied to the surface of the material should begin to thin the slurry. Gently rocking the mixer should free up material and allow to mix back to normal consistency.

11.4 Lockout/Tagout & Confined Space Entry

1. The authorized employee must adhere to their own company's procedure for "Lockout/Tagout". He or she must understand the hazards and know how to control them.
2. If the equipment is operating, shut it down by normal stopping procedure (turn key switch off, depress emergency stop button, close valves, etc.) and remove the positive battery cable so that the machine or equipment is isolated from the battery.
3. Install tags on the battery cable lug and at the ignition control box with Date, Time, & Authorized Repair Employee's Name.
4. If repairing such items as springs, flywheels, hydraulic systems, air, gas or water pressure, etc…, stored or residual energy may be present and must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
5. Ensure that no other personnel are in the engine compartment or areas of isolation. Then verify the isolation of the equipment by operating the normal controls, testing to make certain the equipment will not operate.
6. Return all controls to "Neutral" or "OFF" after verifying the isolation of the equipment.
7. If entry into confined space is necessary, the authorized employee must adhere to their own company's procedure for "Confined Space Entry"

12.0 Contingency Soil Supply

In the event that you are unable to apply VERDac Pellets, the landfill operator should have a three-day supply of soil for daily cover material available on-site.