

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

ENVIRONMENTAL MONITORING PLAN – HORIZONTAL EXPANSION

ARROWHEAD LANDFILL PERRY COUNTY ASSOCIATES, LLC PERRY COUNTY, ALABAMA SOLID WASTE PERMIT NUMBER 53-03

Prepared for:

ARROWHEAD ENVIRONMENTAL PARTNERS, LLC 622 Tayloe Road Uniontown, Alabama 36786

Prepared By:

BUNNELL-LAMMONS ENGINEERING, INC. 6004 Ponders Court Greenville, South Carolina 29615 BLE Project Number J11-4999-29



April 6, 2011 (Last Revised December 15, 2021)



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Arrowhead Environmental Partners, LLC 622 Tayloe Road Uniontown, Alabama 36786

Attention: Mr. William W. Gay, Chief Executive Officer

Subject: Environmental Monitoring Plan – Horizontal Expansion Arrowhead Landfill Perry County Associates, LLC Perry County, Alabama Solid Waste Permit Number 53-03 BLE Project Number J11-4999-29

Gentlemen:

Bunnell-Lammons Engineering, Inc. (BLE) has prepared an Environmental Monitoring Plan (EMP) for the Horizontal Expansion to the Arrowhead Landfill. The Environmental Monitoring Plan complies with the environmental monitoring requirements as outlined in Alabama Department of Environmental Management, Land Division – Solid Waste Program, Division 335-13, Chapter 4 titled Permit Requirement, related to groundwater and methane gas monitoring at a municipal solid waste (MSW) landfill. The attached Plan establishes locations for monitoring and describes methods for sampling groundwater and methane gas. The current revisions to the EMP include:

• Updated PQLs in the two lists of monitoring parameters of the *Groundwater Detection Monitoring Plan*.

We appreciate the opportunity to serve as your geological and geotechnical consultant on this project and look forward to continue working with you at the Arrowhead Landfill. If you have any questions, please contact us at (864) 288-1265.

Sincerely, BUNNELL-LAMMONS ENGINEERING, INC.

Mark S. Preddy, P.G. Consultant Geologist Registered, Alabama #801

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FIGURES

Figure 1 – Site Location Map

ATTACHMENTS Existing Groundwater Wells Existing Methane Gas Monitoring Probes



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INTRODUCTION

The Arrowhead Landfill is located in Perry County, Alabama southeast of the town of Uniontown (Figure 1). The facility is owned by Perry County Associates, LLC. To date, a portion of Tract 1 has been developed (began receiving waste in 2007), and the expanded Tract 1 area, Tract 2, and Tract 3 are scheduled to be developed in the future.

This Environmental Monitoring Plan (EMP) has been prepared to include procedures and locations for groundwater and methane gas monitoring as required by the Alabama Department of Environmental Control (ADEM) Rules 335-13-4.27 (groundwater) and 335-13-4.16 (methane gas). The EMP is designed to detect and quantify contamination, as well as to measure the effectiveness of engineered disposal systems. The groundwater and methane gas monitoring network for this site has been designed to provide an early warning of disposal system failure. The groundwater monitoring well locations and methane monitoring locations are indicated in the *Design and Operation Plan* (D&O Plan), *Arrowhead Landfill Horizontal Expansion for Perry County Associates, LLC*, prepared by Hodges, Harbin, Newberry, & Tribble, Inc. (HHNT), on the sheet titled *Environmental Monitoring Plan*. The facility will seek ADEM approval for future modifications or perform modifications as directed by ADEM, which has been previously reviewed and approved by ADEM.

GEOLOGIC CONDITIONS

Geologic conditions for this site summarized herein are described in the *Solid Waste Permit Application, Volume 1 of 2, Site Analysis, Perry County Associates Landfill*, dated September 2005, prepared by Jordan, Jones, and Goulding (JJ&G) which has been previously reviewed and approved by ADEM.

The site is underlain by Cretaceous-age Coastal Plain sediments comprised of the Selma Group (clay and chalk) overlying the Eutaw Formation (sand).

Regionally, the Selma Group is comprised of the Ripley Formation, Demopolis chalk, Arcola Limestone Member, and Mooreville chalk. Locally, the Selma Group generally consists of about 440 to 563 feet of low permeability, gray, clay and chalk at the landfill site. The upper 10 to 20 feet near the ground surface consists of brown clay, which represents the upper weathered portion of the formation. The existing shallow monitoring wells (GWM-15 through GWM-17) are set in the upper weathered portion of the Selma Group chalk to intersect potential perched groundwater, but they were dry when they were installed. It is anticipated that groundwater in these shallow wells will be a seasonal feature. The Selma Group serves as the confining layer for the underlying Eutaw Formation.

Underlying the Selma Group is the Eutaw Formation, which consists of gray glauconitic fine to medium sand and is a regional water supply aquifer. The existing deep monitoring wells (GWM-1 through GWM-5) were set to intersect the upper portion of the Eutaw Formation at depths ranging from 460.0 to 580.5 feet. Stabilized potentiometric water levels in the Eutaw Formation range from about 80 to 150 feet below ground surface, but the uppermost physical presence of groundwater is at the top of the Eutaw Formation and below the confining Selma Group clay and chalk.

Historical water table maps included in the semi-annual sampling reports have indicated very little potentiometric head difference in the water levels from the five existing monitoring wells set to interest the Eutaw Formation. Potentiometric head differences among the five wells during the twelve semi-



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annual sampling events since 2007 have ranged from 0.65 feet (N3; July 2, 2007) to 6.27 feet (N8; March 3, 2009). The most recent potentiometric surface elevation contours from March 8, 2011 are included on the *Environmental Monitoring Plan* in the D&O Plan prepared by HHNT.

The number, location, and placement of monitoring wells are recommended herein based on the geologic and hydrogeologic site characteristics described in the aforementioned JJ&G 2005 Permit Application and on recent potentiometric surface elevation contour maps included with the semi-annual sampling reports.

GROUNDWATER MONITORING SYSTEM



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GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system will define the relevant point of compliance, well locations, well construction, and phasing of well installation with cell construction. ADEM requirements for the groundwater monitoring system are included in Rule 335-13-4.27. The monitoring system was designed with regards to site geologic and hydrogeologic conditions as discussed in the *Solid Waste Permit Application, Volume 1 of 2, Site Analysis, Perry County Associates Landfill*, dated September 2005, prepared by JJ&G.

1.0 Relevant Point of Compliance

The relevant point of compliance has been established less than 150 meters (492 feet) from the boundary of the cells. The determination of the relevant point of compliance was based on the following factors:

- The hydrogeologic characteristics of the facility and the surrounding land;
- The anticipated physical/chemical characteristics of the leachate;
- The direction of groundwater flow;
- The proximity and direction of groundwater users;
- The availability of alternative drinking water supplies; and
- Public health, safety, and welfare effects.

2.0 Monitoring Well Locations

Forty (40) groundwater monitoring wells (25 shallow Selma Group monitoring wells and 15 deep Eutaw Formation monitoring wells) make up the groundwater monitoring system and their locations are indicated in the Design and Operation Plan Drawings. There are three tracts identified as facility waste disposal units (Tract 1, Tract 2, and Tract 3), and there are groundwater monitoring wells associated with each individual Tract. The monitoring wells will be installed in phases as new landfill tracts are constructed. The monitoring well locations have been selected based on the configuration of the water table, associated groundwater flow directions, and proposed cell sump locations.

MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-1 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> north of Tract 3. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-2 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.

The proposed monitoring well locations are discussed below:



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MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-3 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-4 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-5 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> north of Tract 2. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GMW-6 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> east of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.
GWM-7	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> south of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-8	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> southwest of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-9	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-10	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-11	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> northwest of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-12 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.
GWM-13 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.



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MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-14 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 1. The well was installed in conjunction with Tract 1 Expansion construction
GWM-15 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-16 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-17 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-18 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.
GWM-19	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-20	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-21	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-22	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-23	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-24	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-25	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.



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MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-26	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-27	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-28	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-29	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-30	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-31	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-32	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-33	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-34	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-35	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-36	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.



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MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-37	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> south of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-38	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-39	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-40	Proposed upgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-12)</u> construction.

3.0 Monitoring Well Depths and Screened Intervals

The 25 shallow groundwater monitoring wells (GWM-12 through GWM-36) are designed to monitor the shallow (perched) groundwater in the upper weathered portion of the Selma Group chalk and clay. It is anticipated that groundwater in these shallow wells will be a seasonal feature and dependent on weather conditions. The depth of these wells will likely be in the 10 to 30 feet range. The screened interval of these wells will initially be set to bracket the stabilized water table (if present). However, if shallow groundwater is not encountered at the time of drilling, the screened interval of the wells should be set to encounter the upper weathered portion of the Selma Group chalk and clay.

The 15 deep groundwater monitoring wells (GWM-1 through GWM-11, and GWM-37 through GWM-40) are designed to monitor the groundwater in the upper portion of the Eutaw Formation sand at the site. The depth of these wells will likely be in the 450 to 600 feet range; however, the depth to the stabilized water level will likely be in the 80 to 150 feet range.

4.0 Number of Monitoring Wells

The monitoring well locations were selected to intercept groundwater flow upgradient and downgradient from the landfill cells. Areas downgradient of cell sumps, leachate tanks, and convergent groundwater flow areas were targeted for monitoring. The number of monitoring wells (25 shallow and 15 deep) is sufficient to provide representative groundwater quality samples of the groundwater in the uppermost water-bearing aquifer flowing past the relevant point of compliance.

5.0 Monitoring Well Construction

A (certified or licensed) drilling contractor will perform the well installation, and a geologist registered in the state of Alabama will supervise the drilling activities. The monitoring wells will be constructed



in accordance with the "Design and Installation of Groundwater Monitoring Wells in Aquifers", ASTM Subcommittee D18.21 on Groundwater Monitoring. A typical well construction diagram is included in the *Miscellaneous Detail Sheet* of the D&O Plan prepared by HHNT.

The groundwater monitoring well will consist of 4-inch polyvinyl chloride (PVC) casing (Schedule 80 with flush-threaded joints) inserted into a 6-inch (or larger) diameter borehole. The bottom 10-foot section of each well will be a manufactured well screen with 0.010-inch wide slots. Centralizers will be installed every 50 feet on the PVC risers during well construction to stabilize the casing.

Filter sand will be placed in the borehole annulus around the outside of the well screen, to approximately three to five feet above the top of the screen interval. The filter sand will be used to stabilize the formation and to help yield a less turbid groundwater sample. The filter sand will consist of silica sand and will have a D_{70} grain size ranging between 0.5 and 1.0 millimeters and a coefficient of uniformity of 2.5 or less. A five foot (minimum thickness) thick bentonite seal will be installed on top of the sand backfill to seal the monitoring well at the desired level. The remaining borehole annulus will be tremie grouted to the surface with a cement/bentonite grout mixture.

Each well will be constructed with a vent hole in the top of the PVC casing and a weep hole near the base of the outer protective steel cover. A 6-ft by 6-ft square concrete pad will be constructed at the ground surface for each well. A lockable PVC cap and a protective stickup-mounted steel cover will be placed over each well. Permanent well labels will be affixed to the protective surface casing.

Once constructed, the monitoring wells should be surveyed for horizontal and vertical control by an Alabama licensed professional surveyor.

6.0 Monitoring Well Development

Each monitoring well will be developed in order to remove fine particles from the sand pack around the well screen. The well development will consist of the following:

- 1. place an electrical submersible pump, a manual hand pump, or bailer in the monitoring well;
- 2. purge groundwater from the well using the aforementioned pump or bailer; and
- 3. intermittently surge the well with a surge block.

Turbidity, pH, specific conductance, and temperature will be measured periodically during the well development. The wells will be developed until the turbidity has been reduced to 5 Nephelometric Turbidity Units (NTUs), or until further development no longer significantly reduces the turbidity.

7.0 Phasing of Well Installation

The groundwater monitoring system for the landfill is shown on the *Environmental Monitoring Plan*, of the D&O Plan. Once constructed, the comprehensive groundwater monitoring system will include 40 groundwater monitoring wells (25 shallow and 15 deep). The schedule for monitoring well installation is shown and is summarized on the following table.



Tract	Monitoring Well Installation		
Construction			
Tract No. 1	Deep Eutaw Formation Wells: GWM-1 through GWM-6		
(Existing)	Shallow Selma Group Wells: GWM-12 through GWM-18		
Tract No. 2	Deep Eutaw Formation Wells: GMW-7 through GWM-9		
(Cells No. 1-4)	Shallow Selma Group Wells: GWM-19 through GWM-22		
Tract No. 2	Deep Eutaw Formation Wells: GMW-10 through GWM-11		
(Cells No. 5-9)	Shallow Selma Group Wells: GWM-23 through GWM-26		
Tract No. 3	Deep Eutaw Formation Wells: GWM-40		
(Cells No. 1-12)			
Tract No. 3	Deep Eutaw Formation Wells: GMW-37 and GWM-38		
(Cells No. 1-5, 9-12)	Shallow Selma Group Wells: GWM-27, GWM-28, GWM-34 through		
	GWM-36		
Tract No. 3	Deep Eutaw Formation Wells: GWM-39		
(Cells No. 6-12)	Shallow Selma Group Wells: GWM-29 through GWM-33		

If it is determined that an existing well should be replaced for any reason, a *Monitoring Well Abandonment and Replacement Plan* (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.

8.0 Reporting

Groundwater monitoring well installation reports will be prepared upon completion of well installation and prior to new cell development. The monitoring well installation and reporting will follow the phasing of well installation mentioned in Section 7.0. The well installation reports will include documentation of boring logs, well diagrams, and field procedures. Within 60 days of well installation, development, and survey, the reports should be forwarded to ADEM.

GROUNDWATER DETECTION MONITORING PLAN



GROUNDWATER DETECTION MONITORING PLAN

The detection monitoring program will define the parameters for analysis and frequency of sample collection. ADEM requirements for the sampling and analysis are included in 335-13-4.27(3).

1.0 Monitoring Parameters and Frequency

Groundwater sampling will be performed semi-annually in March and September during the landfill's active life and post-closure care period.

A laboratory certified by the TNI (NELAC) or equivalent, which has demonstrated the ability to analyze the specific contaminants at an acceptable detectable limit established by EPA will perform the analyses and specify the laboratory methods used (EPA Manual SW-846, EPA 600/4-79-020, or an EPA approved method).

Laboratory analysis reports will identify the methods used (by number), the extraction date, and date of actual analysis. Data from samples that are not analyzed within recommended holding times will be considered suspect. Deviations from EPA approved methods will be adequately tested to ensure that the quality of the results meet the performance specifications (e.g. detection limit, sensitivity, precision, accuracy) of the reference method. A planned deviation from an approved analytical procedure will be justified and submitted for approval by ADEM prior to use.

Background sampling of the newly installed wells (shown on the plans) will be performed for establishment of a statistical database, which will include four sampling events during the first semiannual sampling period. The monitoring wells will be sampled on a semi-annual basis thereafter (per phasing schedule).

INDICATOR PARAMETERS	METHOD
pH	Field test or EPA 150.1
Specific Conductivity	Field test or EPA 120.1 or
	EPA 9050
Temperature	Field test
Turbidity	Field test

The water samples will be tested in the field for the following indicator parameters:

Groundwater samples will not be field-filtered. The water will be tested in the laboratory for the Drinking Water Standard total metals and volatile organic compounds (VOCs) (ADEM Appendix I list) in accordance with the designated methods. If excessive turbidity becomes an issue, the samples may also be tested for dissolved metal as a demonstration that metal detections are related to turbidity. The list of constituents, associated methods, and detection limits are on the following two tables. The detection limits for the individual constituents will not be greater than the Practical Quantification Limit (PQL) for the chosen laboratory method.



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METALS &	EPA METHOD	MAXIMUM DETECTION LIMIT		
INORGANICS				
		μg/l	Based on:	
Antimony	6010/6020/7040/7041	5	PQL	
Arsenic	6010/6020/7060/7061	5	PQL	
Barium	6010/6020/7080	10	PQL	
Beryllium	6010/6020/7090/7091	3	PQL	
Cadmium	6010/6020/7130/7031	4	PQL	
Chromium	6010/6020/7090/7091	5	PQL	
Cobalt	60106020//7200/7201	2	PQL	
Copper	6010/6020/7210/7211	5	PQL	
Lead	6010/6020/7420/7421	2	PQL	
Mercury	7470	0.2	PQL	
Nickel	6010/6020/7520	5	PQL	
Selenium	6010/6020/7740/7741	5	PQL	
Silver	6010/6020/7760/7761	5	PQL	
Thallium	6010/6020/7840/7841	1	PQL	
Vanadium	6010/6020/7910/7911	5	PQL	
Zinc	6010/6020/7950/7951	10	PQL	
Boron	6010/6020	40	PQL	
Calcium	6010/6020	100	PQL	
Chloride	9056A	1,000	PQL	
Fluoride	9056A	100	PQL	
Sulfate	9056A	5,000	PQL	
Total Dissolved Solids (TDS)	2540C	10,000	PQL	



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		MAXIMUM		
VOLATILES	METHOD	DETECTION LIMIT		
		μg/l	Based on:	
Acetone	8260	25	PQL	
Acrylonitrile	8260	10	PQL	
Benzene	8260	2	PQL	
Bromochloromethane	8260	5	PQL	
Bromodichloromethane	8260	5	PQL	
Bromoform;Tribromomethane	8260	5	PQL	
Carbon disulfide	8260	5	PQL	
Carbon Tetrachloride	8260	2	PQL	
Chlorobenzene	8260	2	PQL	
Chloroethane; Ethyl Chloride	8260	2	PQL	
Chloroform;	8260	2	PQL	
Trichloromethane				
Dibromochloromethane;	8260	5	PQL	
Chlorodibromomethane				
1,2-Dibromo-3-	8011	0.2	PQL	
chloropropane; DBCP				
1,2-Dibromoethane; Ethylene	8011	0.05	PQL	
dibromide; EDB				
o-Dichlorobenzene; 1,2-	8260	5	PQL	
Dichlorobenzene				
p-Dichlorobenzene; 1,4-	8260	5	PQL	
Dichlorobenzene				
Trans-1,4-Dichloro-2-butene	8260	5	PQL	
1,1-dichloroethane;	8260	2	PQL	
Ethylidene chloride				
1,2-dichloroethane; Ethylene	8260	2	PQL	
dichloride				
1,1-dichloroethylene; 1,1-	8260	2	PQL	
Dichloroethene; Vinylidene				
chloride				
C1s-1,2-D1chloroethylene; c1s-	8260	2	PQL	
1,2-Dichloroethene	0.0		Dot	
Trans-1,2-Dichloroethylene;	8260	2	PQL	
trans-1,2-Dichloroethene	0.0		Dot	
1,2-dichloropropane;	8260	2	PQL	
Propylene dichloride	00	2	DOI	
Cis-1,3-dichloropropene	8260	2	PQL	
Trans-1,3-Dichloropropene	8260	2	PQL	
Ethylbenzene	8260	2	PQL	
2-Hexanone; Methyl butyl	8260	10	PQL	
ketone			-	



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		MAXIMUM		
VOLATILES	METHOD	DETECTIO	ON LIMIT	
		μg/l	Based on:	
Methyl Bromide;	8260	5	PQL	
Bromomethane				
Methyl Chloride;	8260	5	PQL	
Chloromethane				
Methylene bromide;	8260	5	PQL	
Dibromomethane	02(0	~	DOI	
Methylene Chloride;	8260	5	PQL	
Mathyl athyl katona: MEK: 2	8260	25	DOI	
Butanone	8200	23	rQL	
Methyl iodide; Iodomethane	8260	10	PQL	
4-Methyl-2-pentanone;	8260	10	POL	
Methyl isobutyl ketone				
Styrene	8260	5	PQL	
1,1,1,2-Tetrachloroethane	8260	2	PQL	
1,1,2,2-Tetrachloroethane	8260	2	PQL	
Tetrachloroethylene;	8260	2	PQL	
Tetrachloroethene;				
Perchloroethylene	0.0.0		Dot	
Toluene	8260	2	PQL	
1,1,1-Trichloroethane;	8260	2	PQL	
Methylchloroform	0.0.0	-	Dot	
1,1,2-Trichloroethane	8260	2	PQL	
Trichloroethylene;	8260	2	PQL	
Trichloroethene	0000	2	DOL	
Trichloroflouromethane;	8260	2	PQL	
CFC-II	8260	2	DOI	
1,2,3-1 richloropropane	8200	2	PQL	
Vinyl acetate	8260	10	PQL	
Vinyl Chloride	8260	1	PQL	
Total Xylenes	8260	5	PQL	

Notes:

1. PQL = Practical Quantification Limit



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2.0 Reporting

The owner or operator must report sampling activities, analytical results, and statistical analysis results of the water quality data as outlined in ADEM Rule 335-13-4-.27(2)(n).

Background sampling of newly installed wells will include four sampling events during the first semiannual sampling period. The monitoring wells will be sampled on a semi-annual basis thereafter. The semi-annual reports should include laboratory analytical results of the water quality data, statistical results of the water quality data, a water table elevation contour map with groundwater flow directions, groundwater flow rates, and a determination of the technical sufficiency of the monitoring network.

Within 60 days of receiving valid and complete analytical results and field notes, the operator should determine whether there has been a Statistically Significant Increase (SSI) over background at each monitoring well. Reports will be submitted to ADEM within 14 days from this determination.

GROUNDWATER SAMPLING AND ANALYSIS PLAN



GROUNDWATER SAMPLING AND ANALYSIS PLAN

The sampling and analysis plan will define the sample collection methods and sample handling procedures.

1.0 Water Level Measurement and Purge Volume Calculations

Water level elevations will be measured during each sampling event to determine if horizontal and vertical flow gradients have changed since initial site characterization. A change in hydrologic conditions may necessitate modification to the design of the groundwater monitoring system. A water table elevation contour map will be prepared and submitted for each sampling event.

Field measurements will include depth to water and total depth of the well to the bottom of the intake screen structure (total depth may be taken from well installation logs). The measurements will be taken to 0.1 foot. All site groundwater elevations will be measured within 48-hours for each sampling event. Each well will have a reference point from which its water level measurement is taken. The reference point will be established in relation to a permanent benchmark and the survey will also note the well location.

The water standing in a well prior to sampling may not be representative of in-situ groundwater quality. Therefore, the standing water will be removed so that water which is representative of the formation can enter the well. For wells with rapid recovery, which cannot be evacuated to dryness, at least three well volumes will be removed or until field parameters have stabilized. This reflects the present technology in which the goal is to remove standing water without diluting any potential plume by drawing in pure water.

Any item coming in contact with the inside of the well casing or the well water will be kept in a clean container and handled only with gloved hands. If possible, sampling personnel should always start with the up-gradient wells or with wells having the potential of being less contaminated.

1.1 Work Area Preparation

To minimize the potential of contamination from the surrounding environment, place a plastic sheet (such as a painter's drop cloth) around the well as a work area, then unlock protective well casing. A steel measuring tape and an electric water level meter should be brought to the plastic sheet (the water level meter and tape have been precleaned). New nitrile gloves should be donned and the well cap removed, then placed top-down on a corner of the plastic sheet.

1.2 Calculate the Volume of Water to be Evacuated

Use the electric water level meter to measure the distance from the known elevation to the top of water. Use the steel tape to measure the distance from top of casing to the bottom of the well or use total depth data from a well installation record (this information may be available from as-built well diagrams). This information should be placed on a copy of the *Field Data Information Log for Groundwater Sampling* (Attached; other forms may be used as long as the form includes the information listed on the attached form) and the height (h) of the column of water in the well should be calculated. Multiply h times the appropriate conversion factor to obtain the volume of water in the



well in gallons:

- For a 2-inch inside diameter well, $h \ge 0.163 =$ Volume (gal); or
- For a 4-inch inside diameter well, $h \ge 0.653 =$ Volume (gal).

The steel measuring tape and electric sounder probe should be washed between each well with a laboratory-grade, phosphate free detergent and rinsed with deionized (DI) water after each use.

2.0 Well Purging Procedures

A dedicated positive gas displacement bladder pump will be placed in each well or a bailer will be utilized to purge each well.

Bladder pumps have the capability of purging wells at low flow rates, which reduces the potential loss of VOCs by volatilization as well as lowering the potential of having turbid samples, ultimately providing a more representative sample. The wells will be purged until the field indicator parameters have stabilized as described in Section 3.0 below. Bladder pumps are made of PVC or stainless steel with an internal Teflon® bladder. Discharge tubing will also be made of Teflon®. After the pump has been installed and secured in the well to the depth of the well screen, the pump can be operated. Pump operation consists of pulsing air into the bladder with an air compressor, which is controlled by a pump controller unit. The controller unit is used to vary the discharge rate to the desired flow rate.

Bailers are made of Teflon[®], which are pre-cleaned in the laboratory and wrapped in aluminum foil prior to bringing them to the landfill. Well purging using a bailer is as follows:

- 1. Bring 2 dish pans and a measuring container to the plastic sheet and line one dish pan with aluminum foil.
- 2. Bring the bailer to the plastic sheet. Unwrap it without touching the bailer.
- 3. Bring the roll of bailer cord to the sheet. This roll has also been covered with foil to keep it clean. Place it in the unlined dish pan and unwrap it without handling the rope.
- 4. At this point both bailer-handler and helper should put on a new pair of gloves.
- 5. The end of the bailer rope is tied to the top of the bailer. Use foil where needed to assure that the rope does not touch any item while in use.
- 6. The bailer is lifted and lowered carefully into the well until it is submerged.
- 7. The bailer is raised in a hand-over-hand manner and the rope is allowed to fall into the polyethylene dish pan lined with foil.
- 8. Pour groundwater from bailer into the measuring container. Repeat bailing procedure until a 3 x volume (gal) has been evacuated. If the bailer touches the container, line the lip with aluminum foil.
- 9. If the well goes dry before 3 volumes are obtained, then sample when the well has recovered sufficiently to provide a sample volume. Some wells require up to 8 hours for recovery and settling.



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- 10. The rope is untied from the bailer and the used portion is cut off and discarded.
- 11. The used gloves, the used rope, the bailer foil, dish pan foil and the plastic sheet are rolled up and discarded in a large trash bag provided.

During the purging activities, measurements of pumping rate, temperature, pH, specific conductance, and turbidity should be made at periodic intervals and documented on a copy of the *Field Data Information Log for Groundwater Sampling* (Attached; other forms may be used as long as the form includes the information listed on the attached form).

3.0 Sample Collection Procedures

Monitoring wells shall be bailed or pumped to remove at least three times the well volume of water or until field parameters have stabilized. Groundwater quality is considered stable when pH values remain constant within 0.2 Standard Units, specific conductance varies no greater than 10%, temperature is consistent over three readings, and turbidity has stabilized or is below 10 NTUs. New nitrile gloves should be donned prior to sample collection. VOC samples can be collected directly from the discharge line at a rate not greater than 100 milliliters per minute. The samples are poured into the bottles without bubbles, and are filled to the top without headspace. It is not good practice to leave samples in the sun. They should be placed in the ice chest as soon as possible. Do not allow field equipment to touch any sample bottles while pouring.

The organic samples are the most delicate and should be collected first. A sample for volatile analysis must be filled so that the vial has a meniscus. The cap is slid over it and closed so that no bubble can be seen when the sample vial is upended. The volatile samples are always collected in pairs. The other organics usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace. Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the sampler's gloves and thus pass to other caps and bottles.

The sample bottles should now be carried to the ice chest where they are labeled, placed in zip-lock bags, and iced down. The labels can be pre-filled out leaving less work and time delay at the site. The label must have:

Name of facility Date of sampling and time Sample description (monitoring well ID) Sampler's name

Additionally, mark each sample bottle with an identification number using glass-marking crayon, which is resistant to water. Bottle caps are good places to add an ID. This is a precaution in case labels get wet or come off during transport. Furthermore, it is good practice to take an extra set of sample bottles to the field in case of breakage or accidental contamination.

Upon completion of the sample collection activities, the well cap is replaced and the protective well casing should be locked. The used gloves and other sampling material should be discarded in a large trash bag.



4.0 Sample Handling and Preservation

Analysis for total metals will be performed on unfiltered representative groundwater. When there is a sediment problem, the metals sample only may be collected after waiting no longer than a maximum of 24 hours after purging.

Sample bottles will be filled to the top, capped, and placed on ice immediately after sampling. On arrival at the laboratory they will be transferred to a refrigerator. Samples for VOC analysis must be filled to the top without headspace. Special vials with septum caps will be used for this purpose. Table 1 is a list of preservatives and holding times.

Sample delivery to the laboratory will be in the shortest possible time after collection. If delay is incurred this will be entered in the field log book along with the time increment.

Trip blanks of DI water will be carried to the field through the entire sampling procedure. This will be done a minimum of one time for each sampling event. If positive detections are found, this will alert the collector to field sampling error (See Section 6.0, Quality Assurance).

5.0 Chain of Custody

Custody and protection of samples is an important legal consideration. As few people as possible should handle the samples. The sampler is personally responsible for collected samples, and will be able to attest to the integrity of samples until transfer. If the samples are placed in a vehicle, it will be kept locked. Ice chests will be locked or located in a place which is locked, and having access only by responsible officials.

A Chain-of-Custody form will be used to document the handling of samples from the moment of collection until testing. The ID number of each sampling point will be entered along with a word description of the sample. Note that several bottles collected for different parameters will have the same ID number if they come from one sampling point.

The Chain-of-Custody form will contain the facility name, date of sampling and name of the collector. Each transfer of custody is recorded with an appropriate signature, date, and time.

If the samples are to be shipped they must be sealed. The driver for the delivery service must sign the custody form or a bill of lading must be secured.

6.0 Field and Laboratory Quality Assurance/Quality Control

It is the responsibility of the Operator to insure the reliability of the analytical data gathered during the monitoring program.

A <u>trip blank</u> should be part of each sampling event. A trip blank is collected when VOCs are of concern and is used to determine if sample handling and shipping has compromised sample integrity. The samples are filled in the laboratory with DI water. The samples are placed in the cooler with the collected groundwater samples and returned to the laboratory for analysis. The trip blank test results are not used to correct the sample results, but are reported as-is.



A <u>field blank</u> should be collected with each sampling event. A field blank should be collected when weather or environmental conditions are unstable during groundwater sampling (high winds, rain, heavy equipment operation). The field blank samples consist of pouring DI water into sample containers immediately after groundwater sample collection. The analysis of the field blank sample will be used to determine if air particulates may have altered the collected groundwater samples.

In selecting a laboratory to conduct analyses of groundwater samples it will be the Operator's responsibility to ensure that the laboratory of choice is exercising a proper Quality Assurance / Quality Control (QA/QC) program. The laboratory must be Alabama certified. The approved EPA test methods contain within them the requirement to run a spiked sample to determine percent recovery. This will be a part of the lab report. Additional quality control such as method blanks and duplicates are also described in the test method and will be included in the laboratory work agreement. The laboratory QA/QC program will be a part of this Plan. Quality assurance procedures are time consuming and increase the cost of testing, but the facility will be regulated based on the results and it is the Operator's advantage to employ the best qualified laboratory.

Field instruments that the Operator will use will be calibrated prior to field use and recalibrated in the field each day. The calibration will be recorded in a field logbook along with appropriate documentation of other field activities.

7.0 Reporting

The owner or operator must report sampling activities, analytical results, and statistical analysis results of the water quality data as outlined in ADEM Rule 335-13-4-.27(2)(n).

The semi-annual reports should include laboratory analytical results of the water quality data, statistical results of the water quality data, a water table elevation contour map with groundwater flow directions, groundwater flow rates, and a determination of the technical sufficiency of the monitoring network.

Within 60 days of receiving valid and complete analytical results and field notes, the operator should determine whether there has been an SSI over background at each monitoring well. Reports will be submitted to ADEM within 14 days from this determination.

 TABLE 1

 Preservation Procedures and Holding Times

Parameter	EPA Method (Groundwater)	Recommended Container	Preservatives & Indicators of Groundwater Contamination	Holding Time	Volume Required For One Analysis
pН	150.1/9045C	T,P,G	Field Determined	Field/15 minutes	25 ml
Specific Conductance	120.1/9050A	T,P,G	Field Determined	Field/28 days	100 ml
TOC	415.1/9060	G, amber, Teflon-lined cap	Cool 4°C, HCL	28 days	1000 ml
ТОХ	9020B	T,P,G (amber), Teflon-lined cap	Cool 4°C, H ₂ SO ₄	7 days	1000 ml
Chloride	9250/9251/9253	T,P,G	Cool 4°C	28 days	200 ml
Antimony	6010/7040/7041	T,P	Total Metals	6 months	500 ml
Arsenic	6010/7060/7061	,	HNO ₃		
Barium	6010/7080		-		
Beryllium	6010/7090/7091		Dissolved Metals		
Cadmium	6010/7130/7031		1.Field filtration	6 months	500 ml
Chromium	6010/7090/7091		if possible.		
Cobalt	6010/7200/7201		2.Acidify HNO ₃		
Copper	6010/7210/7211				
Lead	6010/7420/7421				
Mercury	7470				
Nickel	6010/7520				
Selenium	6010/7740/7741				
Silver	6010/7/60/7/61				
Thallium	6010/7840/7841				
Vanadium	6010/7910/7911				
Zinc	6010/7950/7951	TD	G 1.40G	20.1	200 1
Fluoride	9214	I,P	Cool 4°C	28 days	300 ml
Nitrate/Nitrite	353.2	T,P,G	$\frac{\text{Cool } 4^{\circ}\text{C}/\text{H}_2\text{SO}_4}{\text{Cool } 4^{\circ}\text{C}/\text{H}_2\text{SO}_4}$	28 days	200 ml
Volatile	8260/8011	G, Teflon-lined	Cool 4°C, HCL	7-14 days	4-40 ml
Organics	0001 + /0002 /01 41 +		G 1.40G	7 1	2 1 000 1
Pesticides	8081A/8082/8141A	G, Teflon-lined	Cool 4°C	7 days	2-1,000 ml
Uarbiaidas	9151A	C. Toflon lined	Cool 4°C	7 dava	2 1 000 ml
Therbicides	0151A	can	000140	/ uays	2-1,000 IIII
PCB	8082	G Teflon-lined	Cool 4°C	7 days	$2_{-1} 000 \text{ ml}$
TCD	0002	can	0001 4 0	/ days	2-1,000 IIII
Semi-Volatile	8270	G. Teflon-lined	Cool 4°C	7 days	2-1.000 ml
Organics	0270	cap		, duys	2 1,000 III
Cvanide	335.2/9010B/9012A/	P.G	Cool 4°C NaOH	14 davs*	500 ml
-)	9014	-,-			
Oil &	1664	G	Cool 4°C, H ₂ SO ₄	28 days	2-1,000 ml
Grease					
Phenols	8270C/9065	G	Cool 4°C, H ₂ SO ₄	7 days/ 28 days	2-1,000 ml
*Unless sulfide is present, - then 24 hours (see lab method)					
P = polye	ethylene				
G = glass	- -				
T = Fluorocarbon resins (Teflon, PTFE, FEP, etc.)					

FIELD DATA INFORMATION LOG FOR GROUNDWATER SAMPLING

Page ____ of ____

Site Name/Client:	Casing Diameter:		
Project Number:	Casing Material:		
Field Personnel:	Dedicated Pump or Bailer:		
Well ID #:	Locking Cap:		
Date:	Protective Post/Abutment:		
Weather Conditions:	Well Integrity Satisfactory:		
Air Temperature:	Method of Well Evacuation:		
Total Well Depth in feet (TWD) =	Method of Sample Collection:		
Depth to Ground Water in feet (DGW) =	Well Yield (subjective):		
Length of Water Column (LWC) = TWD - DGW =	Sample Date and Time:		
2" Well: 1 Casing Volume in gallons (CV) = LWC x 0.163 =			
4" Well: 1 Casing Volume in gallons (CV) = LWC x 0.653 =			
Standard Evacuation Volume (3 casing volumes) =			
Total Volume of Water Removed (gallons):			
FIELD ANALYSIS			
Time (military)			
Volume Purged (gallons)			
Purge Rate (gpm)			
pH (S.U.)			
Sp. Cond. (µmhos/cm)			
Water Temp. (°C)			
Turbidity (NTU)			
COMMENTS/OBSERVATIONS:			

GROUNDWATER STATISTICAL ANALYSIS PLAN



GROUNDWATER STATISTICAL ANALYSIS PLAN

1.0 Statistical Calculations

In order to determine whether the groundwater is receiving contamination from the site, it is necessary to compare the groundwater laboratory results from each semi-annual event to the background laboratory results. Statistical analysis of the groundwater data will begin after a sufficient number of background sampling events (4 to 8 events, depending on the statistical test performed) have taken place for each well and after each subsequent semi-annual event. Statistical analysis will be performed in accordance with ADEM Rule 335-13-4-.27(2). Several inherent variabilities can affect the laboratory results and these inherent variabilities should be considered:

- The sampling technique will vary somewhat from event to event even under ideal conditions.
- The aquifer matrix will contain a certain quantity of natural elements.
- The laboratory test itself can vary slightly.
- Seasonal variations can result in slightly different chemical constituents in the water samples.
- Turbidity of the sample can affect the results.

The statistical method used will depend on the number of detected concentrations and the distribution of the data for a specific compound. Techniques for performing statistical analysis will follow the *"Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance"* (RCRA Unified Guidance) (March 2009 or latest version). The performance criteria specified in this RCRA Unified Guidance is consistent with ADEM Rule 335-13-4-.27(2)(m). Selection of the statistical test to be used is based on the following:

- Intrawell comparisons can be performed, as needed, using Shewhart-CUSUM control charts, prediction limits, confidence intervals, Kendell-Mann Trend tests, or by a rank-sum method for non-parametric data sets.
- Other statistical methods may be used as long as they meet the performance requirements of the RCRA Unified Guidance, with Department approval.

The background water quality database may be updated in accordance with Charter 5 of the RCRA Unified Guidance (Sections 5.3.1 and 5.3.2) every two years using outlier tests, trend tests, t-tests or Wilcoxon tests, where appropriate. This may be done with the Second Semi-Annual sampling event on even-numbered years (i.e., 2022, 2024, etc.).

2.0 Reporting

If additional verification sampling / resampling is warranted, this sampling will be performed no sooner than 30 days from the original sampling event, but no longer than 90 days from the original sampling event.

Within 30 days after receiving all the analytical report(s) including subsequent resampling reports, it will be determined whether there has been an SSI over background at each well. If it is determined that there is an SSI over background concentrations, ADEM will be notified within 14 days of the finding and a copy of the notification should be placed in the operating record. A demonstration may be made that a source other than the landfill caused the detects or that the SSI resulted from natural variation in



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groundwater quality or from an error in sampling, analysis or statistical evaluation. This demonstration will be certified by a qualified groundwater scientist and will be submitted to ADEM. If the demonstration has not been made within 90 days, an assessment monitoring program that conforms with ADEM Rule 335-13-4-.27(4)(a) through (j) should be initiated.

METHANE GAS MONITORING PLAN



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METHANE GAS MONITORING PLAN

The objective of the Methane Gas Monitoring Plan is to detect the lateral movement of potentially explosive gases in the subsoil and along man-made migration pathways toward on-site and off-site structures. The information gathered from gas monitoring stations will be used to evaluate the potential explosive hazard of methane gas accumulations within the explosive limits of 5 - 15 percent by volume.

1.0 Monitoring Network Design and Phasing of Installation

Landfill gas monitoring points have been established on site between the landfill units and the facility boundary. Since groundwater is a vertical barrier for potential methane gas migration, areas selected for monitoring are along the facility boundary where streams, wetlands, and sediment ponds are not present.

As a result of a change in the facility's permitted property boundary in 2016 along Cahaba Road, existing methane monitoring probes MM-105 and MM-106 and existing barhole punch locations MM-107 and MM-108 have to be abandoned and relocated. The abandoned locations will be replaced with two new methane monitoring probes (MM-105R and MM-106R) and two new bar-hole punch locations (MM-107R and MM-108R). The proposed new methane monitoring locations, the existing methane monitoring locations to be abandoned, and the new facility boundary are indicated on the revised *Environmental Monitoring Plan* of the D&O Plan prepared by HHNT.

Methane monitoring will be conducted at 81 proposed bar-hole punch locations (MM-1 through MM-58 and MM-107R through MM-129), 6 existing bar-hole punch locations (MM-63, MM-86 through MM-90), 40 existing monitoring probe locations (MM-59, through MM-62, MM-64 through MM-85 and MM-91 through MM-104), 2 proposed methane monitoring probe locations (MM-105R and MM-106R), one on-site structure (scalehouse), and culverts/drop inlets once they are constructed. The bar-hole punch locations and methane monitoring points are spaced approximately 300 feet apart in the western, northern, and eastern portions of the facility. In the southern portion of the site the bar-hole punch locations and methane monitoring points (MM-66 through MM-129) are spaced approximately 100 feet apart or 300 feet apart due to residences located as close as 600 feet west of the facility. The locations of the methane monitoring points are indicated on the *Environmental Monitoring Plan* of the D&O Plan. All bar-hole punch locations have been established by a licensed surveyor and marked with identification posts prior to the completion of the first waste cell constructed at the facility.

Bar-hole punch locations shown as existing are currently being sampled. All bar-hole punch locations shown as proposed will be sampled after cell construction progresses to that area of the landfill.

MONITORING LOCATION	LOCATIONS AND JUSTIFICATION
MM-1 to MM-20	Proposed bar-hole punch locations on a 300-foot spacing at the western property boundary.
MM-21 to MM-40	Proposed bar-hole punch locations on a 300-foot spacing at the northern property boundary.



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MONITORING LOCATION	LOCATIONS AND JUSTIFICATION
MM-41 to MM-58	Proposed bar-hole punch locations on a 300-foot spacing at the eastern property boundary.
MM-59 to MM-62	Existing methane monitoring probe locations on a 300-foot spacing at the eastern property boundary.
MM-63	Existing bar-hole punch location on a 300-foot spacing at the eastern property boundary.
MM-64 to MM-65	Existing methane monitoring probe locations on a 300-foot spacing at the eastern property boundary.
MM-66 to MM-70	Existing methane monitoring probe locations on a 100-foot spacing at the eastern property boundary.
MM-71 to MM-85	Existing methane monitoring probe locations on a 100-foot spacing at the southern property boundary.
MM-86 to MM-90	Existing bar-hole punch locations on a 100-foot spacing at the southwestern property boundary.
MM-91 to MM-102	Existing methane monitoring probe locations on a 100-foot spacing at the southwestern property boundary.
MM-103 to MM-104	Existing methane monitoring probe locations on a 300-foot spacing at the southwestern property boundary.
MM-105R to MM-106R	Proposed replacement methane monitoring probe locations on a 300-foot spacing at the southwestern property boundary.
MM-107R to MM-108R	Proposed replacement bar-hole punch locations on a 100-foot spacing at the southwestern property boundary.
MM-109 to MM-129	Proposed bar-hole punch locations on a 100-foot or 300-foot spacing at the southwestern property boundary.
On-site structures	scale house

2.0 Gas Monitoring Schedule

Gas monitoring stations will be established by land surveyors and marked with a permanent station marker. For the purpose of detecting migration of potentially explosive gas from the landfill, the following monitoring schedule will be implemented:

- 1. Upon commencement of active operations and quarterly prior-to-closure.
- 2. Quarterly for at least 30 years during the post-closure care period or until demonstration is made to ADEM that methane gas no longer presents a threat to the environment.



- 3. Each monitoring event is to include observations for stressed vegetation due to methane gas movement. If present, areas around and beyond stressed vegetation will be monitored with a bar punch to determine if gas is moving off site.
- 4. Monitoring in, beneath, and around site structures will be a part of each screening event.

3.0 Monitoring Procedures

3.1 Bar-hole Punch Locations and Structures

Screening at each monitoring station will consist of initially forming a small diameter hole (1" hole with a minimum depth of four feet into the soil). This will be achieved by utilizing a punch bar or small auger (manual or gas power). At most locations, this hole should remain open for sufficient time to allow for collection and measurement of gases within the soil. If the hole tends to collapse, a small temporary perforated pipe will be placed in the hole.

After punching the bar-hole, an air sample from the bar-hole will be withdrawn and analyzed with a combustible gas indicator. The combustible gas indicator shall provide direct readings of methane concentrations (0 - 100% methane by volume). Percent of methane by volume and percent of oxygen will be recorded on approved ADEM forms along with pertinent data such as ambient air temperatures and weather for a permanent record. Should initial reading yield an exceedance, the bar-hole will be sealed at the ground surface for 30 to 60 minutes and then retested. Both initial test and retest results should be reported.

Each gas monitoring event will include monitoring of all on-site structures. Readings of percent methane by volume, percent LEL and percent oxygen will be obtained inside, beneath, and around structures. Any other installations such as a scale pit will also be monitored. Readings obtained will be recorded in the field and reported to ADEM as described below in Section 6.0.

3.2 Methane Probe Locations

An air sample from the probe casing will be withdrawn and analyzed with a combustible gas indicator, immediately after approaching the probe and opening the casing. Should an initial reading yield an exceedance (5% methane by volume or greater), the probe will be covered for 30 to 60 minutes and retested. Both initial test and retest results should be reported to ADEM along with pertinent data such as ambient air temperatures and weather for a permanent record.

4.0 Quality Assurance and Quality Control Procedures

The following quality assurance and control procedures will be implemented.

Sampling will not be performed if conditions conductive to decreasing gas concentrations are present (e.g., subsurface gas pressure less than atmospheric pressure). In this case, sampling will be delayed until such conditions pass.

Sampling must be conducted when gas pressures are at a maximum. Subsurface gas pressures have a diurnal cycle and generally are at a maximum during the afternoon. Therefore, sampling should be



conducted after 12 noon.

Gas production will vary with changes in seasons and climatic conditions. Each sampling event must be conducted under the same conditions, as near as possible, as the preceding event. Therefore, the operator will review the log of the time and conditions which existed during the proceeding sampling event and attempt to emulate those conditions as closely as possible during subsequent events.

Landfill gas will be analyzed using a combustible gas indicator, such as an E.G. Gascope, Model 62S, manufactured by Mine Safety Appliances Co., Decatur, Ga., (or equal). The combustible gas indicator will be calibrated according to the manufacture's specifications prior to the landfill gas survey.

Air samples from the bar-hole punches will be withdrawn and analyzed with the combustible gas indicator. The combustible gas indicator will provide direct readings of methane concentrations (0-100% methane and 0-100% LEL). Percent of methane and percent of LEL will be recorded, along with pertinent data such as ambient air temperatures, barometric pressure, subsurface pressure, weather conditions, and soil moisture conditions for a permanent record.

Each gas survey will include screening at on-site structures. Monitoring in on-site structures will be conducted at times when the dilution of indoor air is minimized and the concentration of soil gas is expected to be at its highest concentration. Recommended sampling locations within structures include: basements, crawl spaces, ceiling areas, and around subsurface utility lines such as service or electrical connections. Reading of percent methane and percent LEL will be recorded on forms along with pertinent data such as ambient air temperatures, barometric pressure, and weather conditions.

5.0 Methane Gas Safety Guidelines

The following guidelines should be followed when at a landfill in the presence of potentially dangerous gases:

- 1. No person should enter a vault or a trench on a landfill without first checking for the presence of methane gas. The person should also wear a safety harness with a second person standing by to pull him or her to safety.
- 2. Anyone installing probes in a landfill should wear a safety rope to prevent falling in the borehole. Open holes should be covered when they are left unattended.
- 3. Smoking should be prohibited on the landfill where drilling, excavating, or installation of equipment is taking place or where gas is venting from the landfill.
- 4. Collected gas from a mechanically evacuated system should always be cleared to minimize air pollution and any potential explosion or fire hazard.
- 5. Methane gas in a concentration of 5 to 15 percent is an explosive mixture. Gas accumulations should be monitored inside enclosed structures to avoid explosive conditions and properly ventilate dangerous areas when needed.

Personnel working on a landfill must be provided training regarding the danger posed by landfill gases.


Arrowhead Landfill – Perry Co., Alabama Environmental Monitoring Plan – Horizontal Expansion

Personnel operating safety equipment around the landfill must be thoroughly trained in its use and have a clear understanding of the meaning of observations made with the monitoring equipment. Monitoring equipment must also be periodically calibrated to ensure continued accuracy in the results.

6.0 Reporting

Interpretation of quarterly sampling for methane gas will be as follows:

- 1. Methane gas concentrations shall not exceed 25 percent of the lower explosive limit (LEL). (1.25%) for gases in facility structures.
- 2. Methane gas concentrations shall not exceed the lower explosive limit for methane facility boundaries (5%).

Results of methane gas monitoring will be submitted to ADEM quarterly within 30 days of the methane monitoring event.

Upon findings of methane gas migration, a contingency plan including the following will be implemented:

- 1. Verification of explosive gas concentrations by immediate retesting.
- 2. Upon verifications of readings above the 25 percent of the LEL in facility structures or the LEL at facility boundaries, immediate notifications to ADEM and appropriate local public safety authorities such as the local health district, fire department, and police department will be given. Structures within 300 feet of the site boundary where the reading was at LEL will be tested for methane.
- 3. The monitoring frequently of the subject soil gas station(s) will be increased from quarterly monitoring to a frequency determined appropriate by ADEM until such time that the problem is corrected or determined not to pose a significant threat to the environment and public health and safety.
- 4. The need for methane gas control systems will be assessed upon validated finding of methane gas migration and appropriate recommendations implemented. A remediation plan as required by Rule 335-13-4-.16 will be prepared, submitted to ADEM, and implemented.

FIGURE



Phone: [864] 288-1265 Fax: (864) 288-4430

APPROVED:

JOB NO: J20-4999-49

1

ATTACHMENTS

EXISTING GROUNDWATER WELLS



			СТ: <u>Ре</u> : Н	GR erry C HNT	OUNDW	ATER MC			WE	LL NC: PRO. STAR). GWM-1 JECT NO. <u>: J07-4999-05</u> RT: 5-14-07 END: 5-16-07
BUNN	IELL-LAMMONS	LOCAT	ION: UI	nionto	wn, Alabama					ELEV	ATION: 200.1
ENG	INEEKING, INC.	DRILLE	R: A	len &	Willis Drilling	g Company, T	. Willis			LOG	GED BY: M. Preddy
GEOTECH		DRILLIN		HOD:	Failing 1250 I	lolemaster wa	ash drill				.
	JUNJULIAN I S	DEPTH	то - w/		• INITIAL: ∇		AFTER	7 HOURS	: T	82.5	
				ES							
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPL	STANDARD	PENETRATIO BLOWS/FOOT 10 20 30	N RESUL 40 50	.TS 70 90		мо	NITOR WELL INSTALLATION DETAILS
-	Gray and brown, fine sand	y, silty									FACE COMPLETION
100	Brown, fine sandy, silty CL	AY								pin a	nd a standup steel cover. A
190	,,,,,,,,,,,,,									well	casing. A weep hole was put
180	Gray LIMEROCK (Selma G	roup						· · · · · · · · · · · · · · · · · · ·	×.	grav	el was placed between the we
	Chalk)						•				ig and steel cover.
170											
Ē			\//////		E					\bigotimes	
160+										Gro	Ind elev. = 200.1 feet MSI
Ę			\/////		E						nig eiev 200. I 1991 MOL
150 🕂										\bowtie	
Ē					E						
140 –										Тор	of well casing elev. = 203.32
-										feet	MSL
130-											
-							•••••••••••••••••••••••••••••••••••••••				
120											
							•••••••••••••••••••••••••••••••••••••••				
110											
-											
100-									Ň	Cem	ent grout, 0 to 435.0 feet
90-							•••••				
					E						
80										Blac	k steel risers = 21.21 feet eac
_ _			\/////								
70+			\/////							\bigotimes	
60			\/////							\boxtimes	
60 <u>-</u>			\/////							\bowtie	
50			\/////							\bigotimes	
50										\bigotimes	
40 È					<u> </u>		•••••••••••••••••••••••••••••••••••••••			\bigotimes	
-			\/////				•••••••••••••••••••••••••••••••••••••••				
30			X//////							Cent	ralizers installed every 50 fee
			\/////							\bigotimes	
20			\/////								
			\/////		E					Ň	
10∔										\bigotimes	
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F			V//////	1							
						GRO	JUND	WAIFR	κMΟ	NIIORI	NG WELL NO. GWM-



4999-05.GPJ WELL GEOT

			((T) Dem	GRO		RING	WELL	NO. GWM-1		
		CLIENT	: HHN	NT			:	START: 5-14-07 END: 5-16-07		
BUNN	ELL-LAMMONS	LOCAT	ION: Unio	ontov	vn, Alabama			ELEVATION: 200.1		
GEOTECH		DRILLE	R: Alle	en & V	Villis Drilling Company, T. Willis			LOGGED BY: M. Preddy		
0101100	Consultants	DRILLIN	NG METHO	OD: F	ailing 1250 Holemaster wash drill					
		DEPTH	TO - WAT	ER>		HOURS:	<u> </u>	82.5 CAVING>		
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL SOIL TYPE		STANDARD PENETRATION RESULTS BLOWS/FOOT	s		MONITOR WELL INSTALLATION DETAILS		
	Grav LIMEROCK (Selma G	roup		-		/0 90				
-210	Chalk)	•						Cement grout, 0 to 435.0 feet		
-220								Black steel risers = 21.21 feet each		
-230								Centralizers installed every 50 feet		
-240	Gray and black, silty, fine S	SAND						Bentonite seal, 435.0 to 445.0 feet		
-250	Formation)	IC						Filter pack, sand 445.0 to 460.5 feet		
								4-inch diameter, 0.010-inch slotted		
-260	Boring terminated at 460.5 Groundwater encountered	feet. at 82.5	1913년 1					460.0 feet		
-270	feet on May 21, 2007. 8-inc wash-drilled borehole.	h						Total well depth, 460.5 feet		
-280								Sump = 0.5 foot stainless steel		
-290								8-inch diameter borehole		
-310								-		
-320								Durham Geo bladder pump installed with intake set at 453 feet_		
-330										
-340								-		
-350								-		
-360								-		
-370										
-380								_		
-390								-		
-										
					GROUNDW	VATER I	MONIT	ORING WELL NO. GWM-1 Sheet 3 of 3		

BUNN	IELL-LAMMONS		. <u>ст. гег</u> Г: <u>НН</u> 10N: Uni	NT	wn. Alabama					STAF	RT: <u>4-30-07</u> END: <u>5-2-0</u> /ATION: 271.2
ENG	NEERING, INC.	DRILLE	ER: Alle	en & \	Willis Drillina	Company.	T. Willis			LOG	GED BY: M. Preddy
GEOTECH		DRILLI	NG METH	OD: F	Failing 1250 Ho	olemaster	wash dril				
	CONSULTANTS	DEPTH	I TO - WAT	rer>	INITIAL: Σ		AFTER	9 HOURS	: ▼	148	
LEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE		STANDARD F	PENETRATI	ON RESUL	TS		MO	NITOR WELL INSTALLATION DETAILS
270-	Prown fine condu cilty C			6	2 5	10 20 3	80 40 50	70 90		SUR	FACE COMPLETION
	_ (fill)	LAT-				· · · · · · · · · · · · · · · · · · ·	· · · · · ·			6' X	6' concrete pad with a surve
260	Brown, fine sandy, silty C	LAY				· · · · · · · · · · · · · · · · · · ·	· · · · ·			vent vent	hole was put in the top of t casing. A weep hole was p
-										at th grav	e base of the steel cover. P el was placed between the
250 -	Gray LIMEROCK (Selma G Chalk)	Group				· · · · · · · · · · · · · · · · · · ·				casi	ng and steel cover.
E						· · · ·	· · · · · · · · · · · · · · · · · · ·				
240							· · · · · · · · · · · · · · · · · · ·			\bigotimes	
						· · · · · · · · · · · · · · · · · · ·					
230-							· · · · ·			Grou	und elev. = 271.2 feet MSL
220.										Ň	
220-											
210-						· · · ·	· · · · ·				of well casing elev = 274 43
F							· · · · · · · · · · · · · · · · · · ·			feet	MSL
200 –						· · · · · · · · · · · · · · · · · · ·				\bigotimes	
F						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			\bigotimes	
190-						· · · · · · · · · · · · · · · · · · ·					
E						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·)	
180-										\bigotimes	
Ę							· · · · · · · · · · · · · · · · · · ·				
170							· · · · · · · · · · · · · · · · · · ·			Cem	ent grout, 0 to 558.0 feet
F										\bigotimes	
160-						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
E							· · · · · · · · · · · · · · · · · · ·			\bowtie	
150-										\bigotimes	
						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			\bigotimes	
140						· · · ·	· · · · ·			Blac	k steel risers = 21.0 feet ea
130							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		Ň	
						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·			tralizore installed evenu EO f
120 -						· · · ·	· · · · ·				a anzers mstalleu every 30 h
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110-						· · · · · · · · · · · · · · · · · · ·				\bigotimes	
E						· · · ·	· · · · · · · · · · · · · · · · · · ·			\mathbb{X}	
100-											
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90-						· · · ·	· · · · ·			\mathbb{K}	
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80						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			\bigotimes	
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4999-05.GPJ WELL GEOT

		PROJECT: Perry	County Landfill	PROJECT NO.: J07-4999-05
BUNN	IELL-LAMMONS	CLIENT: HHN	r	START: <u>4-30-07</u> END: <u>5-2-07</u>
ENG	INEERING. INC.	LOCATION: Union	ntown, Alabama	ELEVATION: 271.2
GEOTECH	HNICAL AND ENVIRONMENTAL	DRILLER: Allen	& Willis Drilling Company, T. Willis	LOGGED BY: M. Preddy
	Consultants	DRILLING METHO	D: Failing 1250 Holemaster wash drill	
		DEPTH TO - WATE	R> INITIAL: 4 AFTER 9 HOU	RS: <u> </u>
ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	STANDARD PENETRATION RESULTS BLOWS/FOOT	MONITOR WELL INSTALLATION DETAILS
-130				
E	Chalk)	bup		
-140				Cement grout, 0 to 558.0 feet
F			- · · · · · · · · · · · · · · · · · · ·	
-150 -				
F			⊢ · · · · · · · · · · · · · · · · · · ·	
-160				
F				
-170				
F				
-180 -				
Ę				
-190 -				Durbam Geo bladder pump
-				installed with intake set at 574 feet
-200 -				
-				
-210 -				
-				
-220 -				
-				
-230				
-240 -				
-				
-250 -				Black steel risers = 21.0 feet each
F				
-260				
F				
-270				
F				Centralizers installed every 50 feet
-280 -				
F				
-290 -				
E	Gray and black, silty, fine SA	AND	E	Bentonite seal, 558.0 to 568.0 feet
-300 -	Formation)	u katala	F	Filter pack, sand 568.0 to 585.0 fee
F	Rock layer from 573 to 574 f	feet		4-inch diameter, 0.010-inch slotted
-310				stainless steel well screen, 570.5 to 580.5 feet
E	Boring terminated at 585 fee	et.		
-320 -	Groundwater encountered a	at 148		Total well depth, 581.0 feet
F	teet on May 9, 2007. 8-inch wash-drilled borehole.			Sump = 0.5 foot stainless steel
-		1 1 1	1	

BURNELL-LAIMMONS BENGNEERING, INC. Gentralized. Alaboration of the sandy altry CLAY. CLATTON: United the sandy altry CLAY. START: 32:297 END: 34:407 ELEVATION: 28:5. LOGGED BY: M. Prody DPILLING METHOD: Failing 12:99 Holemaster wesh drill DPITH TO: WATEP INITIAL: 2:5 19 79 39 49 59 79 59 MONTOR WELL NETALIATION BENTROM 2:5 19 79 39 49 59 79 59 BEOW, The sandy altry CLAY. Brown, fine sandy altry CLAY. Standado netrofron/rol RESULTS 2:5 19 79 39 49 59 79 59 MONTOR WELL NETALIATION 2:5 19 79 39 49 59 79 59 2:00 - 2:00 - 2:00 - 2:00 - 2:00 - 1:00 - 1:00 - 1:00 - 00 - 00 - 00 - 00 - 00 - 00 - 00 -			PROJEC	T: Pe	GR rry C	OUNDW	/ATE	R MC	DNITC	RINC	G WI	ELI	L NO. GWM-3 PROJECT NO. <u>: J07-4999-05</u>
ENGINEERING, INC. Gerotamaa, Abd Divisionanta, Constructors LOCATOR: Unitonitory, Automa Dilla, EX. Malling, 2009 Holimaster week dill. DEPTH To - WATER> INTRAL [®] ATTER 56 HOURS. I 143.57 LOCGED 97: M. Prady Disprimentation week dill. DEPTH To - WATER> INTRAL [®] ATTER 56 HOURS. I 143.57 CAVING> 2007 ELEWITION BETTIN OF MALERS Stankage Petermion Results MONTOP RELINFACTUATION DEFENSION RESULTS MONTOP RELINFACTUATION DEFENSION RESULTS MONTOP RELINFACTUATION DEFENSION RESULTS 260 DESCRIPTION Stonkage Petermion Results MONTOP RELINFACTUATION DEFENSION RESULTS MONTOP RELINFACTUATION DEFENSION RESULTS 260 DESCRIPTION Stonkage Petermion Results MONTOP RELINFACTUATION DEFENSION RESULTS MONTOP RELINFACTUATION DEFENSION RESULTS 260 DESCRIPTION Stonkage Petermion Results MONTOP RELINFACTUATION DEFENSION RESULTS MONTOP RELINFACTUATION DEFENSION RESULTS 260 Description results Description Results MONTOP RELINFACTUATION DEFENSION RESULTS 260 Description Results Description Results MONTOP RELINFACTUATION DEFENSION RESULTS Description Results 260 Description Results Description Results Description Results Description Results 260 Description Results Description Results Description Results Description	BUNN	IELL-LAMMONS	CLIENT:	H	INT						-		START: <u>3-12-07</u> END: <u>3-14-07</u>
Description DBLLLRE: Allen & Willis DRIVING Company, T. Willis LOGGED BY: M. Preddy DBLLING METHON: Filling Status AFER 56 HOURS: 113.57 CAMING>300 DBC/TH (PT) DBSCRPTION Status Status AFER 56 HOURS: 113.57 CAMING>300 260 Brown, fine sandy, sity CLAY: Status Status <td< th=""><th>ENG</th><th>NEERING, INC.</th><th>LOCATIO</th><th>ON: Ur</th><th>ionto</th><th>wn, Alabam</th><th>а</th><th></th><th></th><th></th><th>-</th><th></th><th>ELEVATION: 269.5</th></td<>	ENG	NEERING, INC.	LOCATIO	ON: Ur	ionto	wn, Alabam	а				-		ELEVATION: 269.5
Consultaria DRETHOD: Raling 1280 Holemater wash drill AFTER B HOURS: 143.57 CANING-SSS ELEVATION DESCRIPTION 150.57 Control test in the standard stale of the s	GEOTECH	INICAL AND ENVIRONMENTAL	DRILLEF	R: <u>Al</u>	en &	Willis Drillin	ng Com	ipany, T	. Willis		-		LOGGED BY: M. Preddy
Image: Depth to - WATER> INTLU: 2 AFTER 66 HOURS: 2 143.57 CANING-SC ELEVATION DEFINITION SOLE STANDADD PENTERTION RESULTS 2.5 10 20 30 40 80 70 90 MONTOR WELL INSTALLATION DEFINITION 2.5 10 20 30 40 80 70 90 MONTOR WELL INSTALLATION DEFINITION		Consultants	DRILLIN	G METH	IOD:	Failing 1250	Holem	aster wa	ash drill			,	
ELEVATION DESCRIPTION STANDARD PENETRATION RESULTS BLOWADO 10 4 50 70 50 MONTOR WILL INSTALLATION DETAILS 280 Brown, fine sandy, silly CLAY - Brown, fine sandy, silly CLAY - Brown, fine sandy, silly CLAY - Wark Pictor of the sandy of the sandy silly CLAY - Brown, fine sandy, silly CLAY - Wark Pictor of the sand Charles of the sand cover, fine grade sand sandy close of the sand cover, fine sandy, silly CLAY - Brown, fine sandy, silly CLAY - Wark Pictor of the sand Charles of the sand cover, fine grade sand cover, fine grade sand sand cover, fine grade sand sand cover, fine grade sand cover, fine gr		I	DEPTH	to - Wa	TER>	> INITIAL: →	<u> </u>	/	AFTER	56 HOU	RS: 🔻		143.57 CAVING>
Brown, fine sandy, silty CLAY Bit Strate Computer A 260 Brown, fine sandy, silty CLAY 260 Convert, fine sandy, silty	ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLES	STANDAR	D PENE BLOV	TRATION /S/FOOT 20 30	N RESUL	TS 70 90			MONITOR WELL INSTALLATION DETAILS
260 - Brown, fine sandy, silty CLAY Very light gray and brown - - 250 - - 260 - - 270 - - 280 - - 280 - - 280 - - 280 - - 280 - - 280 - - 280 - - 280 - - 280 - - 280 - - - 280 - - - 280 - - - 280 - - - 280 - - - 280 - - - - 280 - - - - - 290 - - - - - - 180 - - - - - - - - <td></td> <td>Brown, fine sandy, silty CL</td> <td>AY -</td> <td></td> <td>+</td> <td>E</td> <td></td> <td>20 00</td> <td>+0 00</td> <td></td> <td></td> <td></td> <td>SURFACE COMPLETION</td>		Brown, fine sandy, silty CL	AY -		+	E		20 00	+0 00				SURFACE COMPLETION
200 Drown, line samp, sny CAT 200 UMERCOX 200 Chaik, 200 Ground elev, = 288.5 feet MSL 201 Ground elev, = 288.5 feet MSL 202 Ground elev, = 288.5 feet MSL 203 Ground elev, = 288.5 feet MSL	a aa	_ (fill) Brown fine condu ciltu Cl											pin and a standup steel cover. A
20 LideROCK / Seima Group 20 Crash 20 Ground diev. = 288.5 feet MSL 20 Top of well easing elev. = 272.54 20 Crash	260	Vory light gray and brown											well casing. A weep hole was put
240 Gray LINERCCK (Solina Group Chalk) Easing and steel cover. 240 Ground elex. = 258.5 feet MSL 220 Ground elex. = 272.54 200 Free MSL 200 Ground elex. = 272.54 180 Ground elex. = 272.54 190 Ground elex. = 272.54 190 Ground elex. = 272.54 190 <td< td=""><td>250</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>at the base of the steel cover. Pea gravel was placed between the well</td></td<>	250												at the base of the steel cover. Pea gravel was placed between the well
240 - 220 -	250	Gray LIMEROCK (Selma G	roup					• • • • • • • • •					casing and steel cover.
200	-	Chaik)											
200- 200- 200- 190-	240							· · · · · · · · · · · · · · · · · · ·				\mathbb{K}	-
230						E		· · · · · · · · · · · · · · · · · · ·					
220 - 210 -	230 —											\otimes	Ground elev. = 269.5 feet MSL
220- Image: Constraint of the second sec	-												
210	220					F							-
210 - 1 200 - 1 190 - 1 180 - 1 170 - 1 160 - 1 150 - 1 160 - 1 16	-												
200 - <td>210-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>• • • • • • • • • • • •</td> <td></td> <td></td> <td></td> <td></td> <td>Top of well casing elev = 272 54</td>	210-							• • • • • • • • • • • •					Top of well casing elev = 272 54
200 - 180 - 180 - 170 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 160 - 170 - 180 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 100 - 100 <td< td=""><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>feet MSL</td></td<>	-												feet MSL
190-	200												-
190	-												
180- Cernent grout, 0 to 538.0 feet 160- Black steel risers = 21.0 feet each 130- Entralizers installed every 50 feet 100- Entralizers installed every 50 feet 90- Entralizers installed every 50 feet 80- Entralizers installed every 50 feet	190												_
180 Cement grout, 0 to 538.0 feet 160 Enderstand 170 Enderstand 180 Enderstand 190 Enderstand 100	-												
170 Cernent grout, 0 to 538.0 feet 160 Black steel risers = 21.0 feet each 130 Centralizers installed every 50 feet 110 Centralizers installed every 50 feet 100 GROUNDWATER MONITORING WELL NO. GVMA:3 Sheet 1 of 3	180												
170- Cement grout, 0 to 538.0 feet 160- Black steel risers = 21.0 feet each 130- Centralizers installed every 50 feet 100- C													-
170 Cement grout, 0 to 538.0 fest 160 Black steel risers = 21.0 feet each 130 Entralizers installed every 50 feet 110 Entralizers installed every 50 feet 100 Entralizers installed every 50 feet 80 Entralizers installed every 50 feet													
160 Image: State intervent of the state inter	1/0												Cement grout, 0 to 538.0 feet
160 Image: Contralizer sinstalled every 50 feet 130 Image: Contralizer sinstalled every 50 feet 120 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 90 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 90 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 100 Image: Contralizer sinstalled every 50 feet 90 Image: Contret 90 I	-											K	
150 Image: Contralizer sinstalled every 50 feet 130 Image: Contralizer sinstalled every 50 feet 100 Image: Contret 100 <td>160</td> <td></td> <td>-</td>	160												-
150	-							· · · · · · · · · · · · · · · · · · ·					
140 Image: Contralizer installed every 50 feet 130 Image: Contralizer installed every 50 feet 120 Image: Contralizer installed every 50 feet 100 Image: Contralizer installed every 50 feet 100 Image: Contralizer installed every 50 feet 90 Image: Contralizer installed every 50 feet 80 Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet Image: Contralizer installed every 50 feet	150 –											K	-
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130 Image: State insets = 21.0 red tech 120 Image: State insets = 21.0 red tech 120<	140-											\otimes	Black steel risers = 21.0 feet each
130 - 120 - 110 - 100 - 90 - 80 - 80 - B0	Ē					E							- 21.0 ICCL COUL
120 Image: Contralizers installed every 50 feet 110 Image: Contralizers installed every 50 feet 100 Image: Contralizers installed every 50 feet 90 Image: Contralizers installed every 50 feet	130 —							· · · · · · · · · · · · · · · · · · ·				\otimes	-
120- Centralizers installed every 50 feet 110- GROUNDWATER MONITORING WELL NO. GWM-3 Sheet 1 of 3	Ę Į					E						\mathbb{K}	
110 Centralizers installed every 50 feet 100	120												
110 - 100 -	-											\otimes	Centralizers installed every 50 feet
100 - 90 - 80 - 5	110-											K	
100						E						\bowtie	-
90 90 80 E BO BO BO BO BO BO BO BO BO BO	100							· · · · · · · · · · · · · · · · · · ·				\otimes	
90 - 80 - 90 - 90 - 90 - 90 - 90 - 90 -								· · · · · · · · · · · · · · · · · · ·				V	-
90 - 6 80 - 6 - 6 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7	Ē					E						Ň	
80	90							• • • • • • • • • • • • • • • • • • • •				K	-
80	F					-							
GROUNDWATER MONITORING WELL NO. GWM-3 Sheet 1 of 3	80											\otimes	-
GROUNDWATER MONITORING WELL NO. GWM-3 Sheet 1 of 3	F											X	
GROUNDWATER MONITORING WELL NO. GWM-3 Sheet 1 of 3													
Sheet 1 of 3								GRO	JUND	WATE	K MC	INC	UKING WELL NO. GWM-3
													Sheet I OF S



		PROJECT: <u>I</u>	GR Perry C	OUNDWATER N	IONITORING	WEL	L NO. GWM-3 PROJECT NO.: <u>J07-4999-05</u> START: 3-12-07 END: 3-14-07
BUNN	ELL-LAMMONS	LOCATION: 1	Jnionto	own, Alabama			ELEVATION: 269.5
ENGI	NEERING, INC.	DRILLER:	Allen &	Willis Drilling Company	v, T. Willis		LOGGED BY: M. Preddy
GEOTECH		DRILLING ME	THOD:	Failing 1250 Holemaster	wash drill		
	CONSULTANTS	DEPTH TO - W		> INITIAL: $\overline{\Sigma}$	AFTER 56 HOUR	s: 👤	143.57 CAVING>
ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	AMPLES	STANDARD PENETRAT BLOWS/FO	- TION RESULTS OT	_	MONITOR WELL INSTALLATION DETAILS
			S S	2 5 10 20	30 40 50 70 90		/
	Gray LIMEROCK (Selma Gro	oup					Š
-140 –	onaky						Comont grout 0 to 529 0 foot
-							Cement grout, o to 556.0 leet
150 —							× ·
-							
160 —							
							X
170							Durtherer Orie blackt
-							installed with intake set at 565 fee
180							× ·
-							
190							
200							
<u>F</u>					· · · · · · · · · · · · · · · · · · ·		
210							
-							×
220					· · · · · · · · · · · · · · · · · · ·		Black steel risers = 21.0 feet eacl
-							
230							
-							
240							
E					· · · · · · · · · · · · · · · · · · ·		
250 –							
							Controlling in stallad around 50 fo
260 –							Centralizers installed every 50 fe
				E			
270							
-							Bentonite seal, 538.0 to 555.0 fee
280	Gray LIMEROCK with glauce	onite					
	(Seima Group Chaik)						
290-1-1							Filter pack, sand 555.0 to 578.5 fe
	Gray and black, fine to medi	ium					4-inch diameter, 0.010-inch slotte
300 -	SAND with glauconite (Euta Formation)	W					stainless steel well screen, 560.0 570.0 feet
an							
ა10 <i>−</i> 	Boring terminated at 578.5 f	eet.					i otal well depth, 5/0.5 feet
E	143.57 feet on May 9, 2007.	8-inch					Sump = 0.5 foot stainless steel
320	wash-drilled borehole.						9 inch diamatar harshala
							o-incli ulameter porenole
				G			Sheet 3 of

		PROJE	CT: <u>P</u> e	GR(erry Co	OUNDWATE	R MONIT	ORING	S WI	ELL	_ NO. GWM-4 PROJECT NO. <u>: J07-4999-05</u>		
BUNN	IELL-LAMMONS	CLIENT	: <u>H</u>	HNT				-		START: <u>5-7-07</u> END: <u>5-9-07</u>		
ENG	NEERING, INC.	LOCATI	ION: Ur	nionto	wn, Alabama			-		ELEVATION: 269.0		
GEOTECH	INICAL AND ENVIRONMENTAL	DRILLE	R: <u>Al</u>	len &	Willis Drilling Com	pany, T. Willi	S	-		LOGGED BY: M. Preddy		
	Consultants	DRILLIN	NG METH	10 <u>D:</u> I	Failing 1250 Holema	aster wash dr	<u>ill</u>	·				
		DEPTH	TO - WA	TER>	INITIAL: 🖳	AFTEI	r 13 houi	RS: - <u>▼</u>		123.0 CAVING>		
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLES	STANDARD PENE BLOW	TRATION RES	JLTS			MONITOR WELL INSTALLATION DETAILS		
-	Brown, fine sandy, silty CL	AY -			2 5 10	20 30 40 50	70 90			SURFACE COMPLETION		
260	(fill) Brown fine condu ciltu Cl	AV/								pin and a standup steel cover. A		
200	Brown, fine sandy, slity CL	AI								vent hole was put in the top of the well casing. A weep hole was put		
250 -										at the base of the steel cover. Pea gravel was placed between the we		
230	Gray LIMEROCK (Selma G Chalk)	roup								casing and steel cover.		
240 -			\//////						\bowtie			
			\//////		E				\otimes			
230 -												
						· · · · · · · · · · · · · · · · · · ·			\bowtie	Ground elev. = 269.0 feet MSL		
220 -			\/////						\otimes			
210												
E										Top of well casing elev. = 272.55		
-												
190												
180 -												
-												
1 70 –										Cement grout, 0 to 552.5 feet		
-										-		
1 60 – []												
-												
150	-								X	Black steel risers = 21.21 feet eac		
	-		\//////						\bowtie			
140			\//////						\otimes			
F			\/////							Centralizers installed every 50 fee		
130			\//////						\bowtie	- sha annot be included over y ou lot		
E					F				\boxtimes			
20-			\/////			· · · · · · · · · · · · · · · · · · ·						
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110-			\/////						\mathbb{N}			
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1 00 -			\/////									
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90												
E									Ň			
80			\//////									
- -						· · · · · · · · · · · · · · · · · · ·						
70-					E				\bowtie			
						GROUN	DWATE	r MC	DNIT	FORING WELL NO. GWM-4 Sheet 1 of 1		



		PROJECT: I	GR Perry C			DRING	WEL	L NO. GWM-4 PROJECT NO.: J07-4999-05			
		CLIENT: I	HNT					START: 5-7-07 END: 5-9-07			
BUNN	IELL-LAMMONS	LOCATION:	Jnionto	own, Alabama				ELEVATION: 269.0			
ENGI	NEEKING, INC.	DRILLER:	Allen &	Willis Drilling Con	npanv. T. Willis			LOGGED BY: M. Preddy			
GEOTECH		DRILLING ME	THOD:	Failing 1250 Holem	aster wash drill						
	CONSULTANTS	DEPTH TO - W	/ATER:	> INITIAL: \overline{Y}	AFTER 1	13 HOURS	; V	123.0 CAVING>			
			S								
ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLE	STANDARD PENE BLOV 2 5 10	ETRATION RESUL VS/FOOT 20 30 40 50	TS 90		MONITOR WELL INSTALLATION DETAILS			
-140 -	Gray LIMEROCK (Selma G Chalk)	roup									
-								Cement grout, 0 to 552.5 feet			
-150											
-160											
-170											
-180 —								Durban Goo bladdar awaa			
-190 -								installed with intake set at 571 feet			
-											
-200								-			
-210								-			
-220											
-230 -								Black steel risers = 21.21 feet each			
-240 -											
-250 -											
								-			
-260-[Controlizors installed 70 fact			
-270								Centralizers installed every 50 feet.			
-280 -											
-290								Bentonite seal, 552.5 to 564.0 feet			
-300 -	Gray and black, silty, fine S with glauconite (Eutaw Sar	SAND						Filter pack, sand 564.0 to 585.0 fee			
210	Formation). Rock layer fro to 568 feet	m 567						4-inch diameter, 0.010-inch slotted stainless steel well screen, 569.0 to 579.0 feet			
-310											
-320	Boring terminated at 585 fe	et.					. • •	Total well depth, 579.5 feet			
-520	Groundwater was encount 123.0 feet on May 21, 2007	ered at 8-inch						Sump = 0.5 foot stainless steel			
-330-	wash-drilled borehole.							8-inch diameter borehole			
		,			GROUND	WATER	MONI	TORING WELL NO. GWM-4 Sheet 3 of 3			

BUNNELL LAMMAONS BENGINEERING, INC. Gentemen, AndeEvnonann. Contextual Contex			PRO.IF	CT· P	GR (ORIN	g we			M-5 ∴.107-4999-05	
BUTINELL-LAMINONS ENGINEERING, INC. GORDENNEOLADES/NROMENL COMBENNE COMBENN			CLIENT	с. <u>г</u> : н	HNT		•			_	ST	ART: 5-22-	07 END: 5-23-07	
EPCENTROL DRULE: Allen & Willis Drilling Company, T. Willis LOGGED BY: M. Praddy Contractional, Able Networksmin, Countrative Networks DRULE: Allen & Willis Drilling Company, T. Willis LOGGED BY: M. Praddy DEVINTOR DESCRIPTION DEFINITO AFTER & HOURS: S.S. CANING-TON 200 Brown, fine sandy, silly CLAY The Balan & Wills Drilling Company, T. Wills MONTOR WELL INSTALATION 200 Brown, fine sandy, silly CLAY Brown, fine sandy, silly CLAY S.S. 2.5 10 20 30 45 50 79 50 MONTOR WELL INSTALATION 200 Brown, fine sandy, silly CLAY Brown, fine sandy, silly CLAY S.S. C.S. S.S. C.S. 201 Brown, fine sandy, silly CLAY Brown, fine sandy, silly CLAY Concord the set part in the tool of the set part in the tool of the set part in the set of the set part	BUNN	ELL-LAMMONS	LOCAT	ION: U	nionto	wn. Alabama				_	EL	EVATION:	212.7	
General Constraints Constraint	ENG	NEEKING, INC.	DRILLE	R: A	llen &	Willis Drilling	g Company	, T. Willi	is	_	LO	GGED BY:	M. Preddv	
DEPTH TO - WATER: ATER & HOURS: I 9.5 CANNEX 300 LIEWTION DEPTH (P) DESCRIPTION STRE & STRNDARD PRETENTION (RESULTS) EXCORPTON MONTOR WELL NOTALIATION DEFORMED 2 5 10 20 30 40 50 70 90 MONTOR WELL NOTALIATION DEFORMED TO BE CONFIDENTION DEFORMED TO BE CONFIDENTION SUPPACE CONFIDENTION DEFORMED TO TO THE DESCRIPTION SUPPACE CONFIDENTION DEFORMED TO THE DESCRIPTION DEFORMED TO THE DEFORMED TO THE DEFORMED TO THE DEFORMED TO THE DEFORMED TO THE DEFORMED TO THE DEFORMED TO THE DEF	GEOTECH		DRILLI		HOD: I	Failing 1250 H	- Holemaster	wash di	rill	_				
ELEVATION DESCRIPTION STANDARD PENETRATION RESULTS BLOWSFOOT MONTOR WELL INSTALLATION DETAILS 210 Brown, fine sandy, silly CLAY Image: Classifier and the same participation of the same p		CONSULTANTS	DEPTH	то - w/	ATER>	INITIAL: ∇		AFTE	R 6 HOUP	rs: 工	: 👤 89.5 CAVING>😿			
ELEVATION DESCRIPTION STANDARD PERTEXTION RESULTS MONITOR WELL NETALLATION DEPENTION 210 Brown, fine sandy, silty CLAY 2 5 10 20 30 40 50 70 50 PRADARD PERTEXTION RESULTS PRADARD PERTEXTION RESULTS 200- Brown, fine sandy, silty CLAY Provide standy standy base rown of the standy fine same perturbation survey at the base of the stand part o					ES			_						
210 Brown, fine sandy, silly CLAY 200 Brown, fine sandy, silly CLAY 180 Crey LIMEROCK (Seima Group 180 Crew Limerock (Seima Group) 180 Crew Limerock (Seima Group) <t< th=""><th>ELEVATION/ DEPTH (FT)</th><th>DESCRIPTION</th><th></th><th>SOIL TYPE</th><th>SAMPLI</th><th>STANDARD</th><th>PENETRAT BLOWS/FO</th><th>TION RES OT 30 40 50</th><th>ULTS</th><th>. [</th><th></th><th>MONITOR WE Di</th><th>ELL INSTALLATION</th></t<>	ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLI	STANDARD	PENETRAT BLOWS/FO	TION RES OT 30 40 50	ULTS	. [MONITOR WE Di	ELL INSTALLATION	
Image: Standy, Silty CLAY Gray LIMEROCK (Seima Group 190 190 190 190 190 190 190 190 190 190 190 190 190 191 192 193 194 195 196 197 198 199 199 190	210-	Brown, fine sandy, silty CL	AY -			E						URFACE CO	MPLETION	
200 Gray LIMEROCK (Seima Group Table - 100 100 100 100 100 100 100 10		_ (fill) Brown_fine_sandy_silty_CL		ÌÌÌÌ							pi	n and a stan	dup steel cover. A	
190 - Chaik) 190 - Chaik) 19	200-	Drown, mic sandy, sitty of									w	ell casing. A	weep hole was put	
190- Untain() Casing and steel cover. 180- Ground elev. = 212.7 feet MSL 180- Feet MSL 18	-	Gray LIMEROCK (Selma G	roup								gr	the base of tavel was pla	ced between the we	
180 180 180 180 190 190 190 190 190 190 190 19	190-	Chaik)				E					Ca	ising and ste	el cover.	
180 Image: Second allow in the second al	-													
170- Image: Constraint of the second sec	180-			<i>\/////</i>							\bigotimes			
170- 160- 160- 160- 160- 160- 160- 160- 160- 100-	-										\bowtie			
160 100 Top of well casing elev. = 215.76 140 100 100 120 100 100 90 100	170-			¥//////							G	round elev. =	212.7 feet MSL	
160				V/////							\bowtie			
160 Top of well casing elev. = 215.76 140 Top of well casing elev. = 215.76 130 Cement grout, 0 to 456.0 feet 100 Black steel risers = 21.21 feet eac 80 Centralizers installed every 50 feet 60 Centralizers installed every 50 feet 30 Centralizers installed every 50 feet 30 Centralizers installed every 50 feet 30 Centralizers installed every 50 feet	160-			V/////							\bowtie			
150	-													
140	150-										To	op of well cas et MSL	sing elev. = 215.76	
140	-													
130 -	140-					E								
130	-													
120	130-					E								
120		L												
110	120-	-				E								
110- Cement grout, 0 to 456.0 feet 90- Black steel risers = 21.21 feet eac 80- Centralizers installed every 50 feet 60- Centralizers installed every 50 feet 50- Centralizers installed every 50 feet 30- Centralizers installed every 50 feet 20- Centralizers installed every 50 feet	-													
100- Image: Contralizer installed every 50 fer 90- Image: Contralizer installed every 50 fer 60- Image: Contralizer installed every 50 fer 50- Image: Contralizer installed every 50 fer 30- Image: Contralizer installed every 50 fer 20- Image: Contralizer installed every 50 fer State Image: Contred State	110-										C	ement grout,	0 to 456.0 feet	
100-	-										\mathbb{X}			
90 Image: Second se	100-													
90 Black steel risers = 21.21 feet ead 80 Centralizers installed every 50 feet 70 Centralizers installed every 50 feet 60 Centralizers installed every 50 feet 30 Centralizers installed every 50 feet 20 Centralizers installed every 50 feet 60 Centralizers installed every 50 feet 70 Centralizers installed every 50 feet <td>-</td> <td></td>	-													
80 -	90					E					В	ack steel ris	ers = 21.21 feet eac	
80	- -					-	· · · · · · · · · · · · · · · · · · ·				\bowtie			
TO	80-			\/////							\bigotimes			
70	-					-					C	entralizers in	stalled every 50 fee	
60	70-													
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50 - 40 - 40 - 40 - 40 - 40 - 40 - 40 -	60										\boxtimes			
50				<i>\//////</i>		 					\bowtie			
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30 - 20 - E C C C C C C C C C C C C C C C C C C	40			¥//////							\bowtie			
30	E					E					\bigotimes			
20 - E GROUNDWATER MONITORING WELL NO. GWM-	30-			<i>\//////</i>		E	· · · · · · · · · · · · · · · · · · ·				\bowtie			
20- GROUNDWATER MONITORING WELL NO. GWM-				V/////		E					\bowtie			
GROUNDWATER MONITORING WELL NO. GWM	20										\bigotimes			
GROUNDWATER MONITORING WELL NO. GWM	[E					\boxtimes			
Choot 1 of	LI			<u>V//////</u>	1		G	ROUN	DWATE	R MO	NITOF	RING WEI	L NO. GWM-	

		PROJEC	:T: <u>P</u> e	GR (erry Co	OUNDW	/ATE	R MONIT(DRING	WE	ELI	_ NO. GWM-5 PROJECT NO.: <u>J07-4999-05</u>
BUNN	IELL-LAMMONS	CLIENT:	<u>_HI</u>	HNT							START: <u>5-22-07</u> END: <u>5-23-07</u>
ENGI	NEERING, INC.		0N: <u>Ur</u>	nionto	wn, Alabam	a	T 14/101				ELEVATION: 212.7
GEOTECH	INICAL AND ENVIRONMENTAL		K: <u>AI</u> G METI		Willis Drillin		pany, I. Willis				LOGGED BY: M. Preday
	Consultants				$\sum_{i=1}^{i} \sum_{j=1}^{i} \sum_{j$	7			. 🔻	,	
		DEFIN	10 - WA	۰۱ER/				0 HOUKS). <u>+</u>		
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLE	STANDAR	D PENE BLOW	TRATION RESUL	_TS			MONITOR WELL INSTALLATION DETAILS
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0											
-											
-10					E						
-20							· · · · · · · · · · · · · · · · · · ·				
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-30-[F						
					-						
-40 -											
50											
-50 _											
-60-									×.		
-70 -											
-											
-80-											
-							· · · · · · · · · · · · · · · · · · ·				
-90 -	Gray LIMEROCK (Selma G	roup									Cement grout, 0 to 456.0 feet
-	Chalk)										
-100 -											
-											Black steel risers = 21.21 feet eac
-110-									$ \otimes $	Ň	
					E						
-120											Centralizers installed every 50 fee
										Ň	
-130-[Ē						
-140-[E				Ň	Ň	
460										\boxtimes	
-150											
-160-											
-100 _					È						
-170 -										K	
					E						
-180 -										Ň	
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	I	į		1	<u>L`</u>		GROUND	WATER			FORING WELL NO. GWM-
							_				Sheet 2 of

		PROJE	(CT: Per	GR(Ty Co	DUNDWATER MC	DNITORING	WEL	L NO. GWM-5 PROJECT NO.: J07-4999-05			
		CLIENT	: HH	NT				START: 5-22-07 END: 5-23-07			
BUNN	IELL-LAMMUNS	LOCATI	ON: Uni	ontov	wn, Alabama			ELEVATION: 212.7			
Grosser		DRILLE	R: Alle	en & V	Willis Drilling Company, T	. Willis		LOGGED BY: M. Preddy			
GEOTECH		DRILLIN	NG METHO	OD: F	ailing 1250 Holemaster wa	ash drill					
		DEPTH	TO - WAT	TER>	INITIAL: $ aggregation Temperature Temper$	AFTER 6 HOURS	: <u> </u>	89.5 CAVING>			
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL Id TYPE	DAMIFLED	STANDARD PENETRATIO BLOWS/FOOT	N RESULTS		MONITOR WELL INSTALLATION DETAILS			
-190	Gravil IMEROCK (Salma G	roup			2 5 10 20 30	40 50 70 90		3			
-200 -	Chalk)	roup						Cement grout, 0 to 456.0 feet			
-210											
-220								Black steel risers = 21.21 feet each			
-230								Centralizers installed every 50 feet			
-250 -	-							Bentonite seal, 456.0 to 466.0 feet			
-260 – [Gray and black, fine to me SAND with glauconite (Eut Formation)	dium taw						Filter pack, sand 466.0 to 485.0 feet 4-inch diameter, 0.010-inch slotted stainless steel well screen, 471.0 to 481.0 feet			
-270-	Device to main start at 405 f							401.0 leet			
-280	Groundwater encountered feet on May 29, 2007. 8-ind wash-drilled borehole.	eet. at 89.5 ch						Total well depth, 481.5 feet			
-290								Sump - 0.5 foot stainless steel			
-300								8-inch diameter borehole			
-310								Durham Geo bladder pump installed with intake set at 475 feet			
-320											
-330								-			
-350											
-360											
-370-											
-380								-			
					GR	OUNDWATER	MONI	TORING WELL NO. GWM-5			
								Sheet 3 of 3			

		PROJE		GRO		TE	R MONIT	ORING	i WE	ELI	L NO. GWM-6
		CLIENT	: <u>л</u>	HNT							START: 9-16-12 END: 9-24-12
BUNN	ELL-LAMMONS		. <u></u>	erry Co	ounty Alabam	a					ELEVATION: 259 1
ENGI	NEERING, INC.	DRILLE	R: A	llen & \	Willis Drilling	Com	panv. T. Willis				LOGGED BY: P. VanHeest
GEOTECH		DRILLIN		HOD: N	MJ Rotary Dril	l; 8.0	-inch wash dri	ling			
	CONSULTANTS	DEPTH TO - WATER> INITIAL: 💆 AFTER 24 HOURS: 💆 140.1 CAVING>									140.1 CAVING>
				ES							
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLI	STANDARD I E	PENE BLOW	TRATION RESU S/FOOT	LTS 70 ۹0			MONITOR WELL INSTALLATION DETAILS
E	Brown, fine sandy, silty CL	AY -					20 00 40 00				SURFACE COMPLETION
250	_ <u>(fill)</u>	/									pin and a standup steel cover. A
230											well casing. A weep hole was put
240											at the base of the steel cover. Pea gravel was placed between the well
240							· · · · · · · · · · · · · · · · · · ·				casing and steel cover.
220							· · · · · · · · · · · · · · · · · · ·				
230											Top of PVC casing elev. = 262.26
220 F					_						Teet
220										Ň	Ground surface elev. = 259.1 feet
Ē											
210			\/////								Survey pin elev. = 259.51 feet
Ē							· · · · · · · · · · · · · · · · · · ·				
200											Northing = 878,866.18'
-							· · · · · · · · · · · · · · · · · · ·				
190											Easting = 1.979.676.92'
180 —											
					E		· · · · · · · · · · · · · · · · · · ·				
170											Next coment 0 to 522 0 feat
					E						Neat cement, 0 to 522.0 leet
160							· · · · · · · · · · · · · · · · · · ·				4 inch diamatan Cabadula 90 DVC
Ē	Gray LIMEROCK (Selma G chalk)	roup									casing
150	••••••						· · · · · · · · · · · · · · · · · · ·				-
-											
140							· · · · · · · · · · · · · · · · · · ·				
E										\otimes	
130 – L			\//////								
											8.0-inch diameter borehole
120	Z									\otimes	
	-		\/////								-
110-			\/////								
Ē							· · · · · · · · · · · · · · · · · · ·			\otimes	
100-			\/////								
			\/////				· · · · · · · · · · · · · · · · · · ·				Centralizers installed every 50 feet
on			\//////							\otimes	
90 <u>-</u>			\/////								-
			\/////		E						
80 <i>−</i> -			\/////		-					\mathbb{N}	-
Ē											
70										\otimes	-
E I											
[]			<u>\///////</u>							<u>[]</u>	
							GROUNL				Sheet 1 of 3



BUNN		PROJE	GR CT: <u>Arrowh</u> : <u>HHNT</u>	OUNDWATEF		5 WEL	L NO. GWM-6 PROJECT NO.: <u>J12-4999-30</u> START: <u>9-16-12</u> END: <u>9-24-12</u>
ENG	NEERING, INC.	LOCATI	ON: Perry C	ounty, Alabama			ELEVATION: 259.1
GEOTECH	INICAL AND ENVIRONMENTAL	DRILLE	R: Allen &	Willis Drilling Comp	any, T. Willis		LOGGED BY: P. VanHeest
	Consultants	DRILLIN	NG METHOD:	MJ Rotary Drill; 8.0-i	nch wash drilling		
		DEPTH	TO - WATER	> INITIAL: ⊻	AFTER 24 HOUR	ks: <u>▼</u>	<u>140.1</u> CAVING>
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL SOIL TYPE	STANDARD PENET BLOWS	RATION RESULTS /FOOT		MONITOR WELL INSTALLATION DETAILS
-150	Gray LIMEROCK (Selma G chalk) Gray and black, silty, fine with glauconite (Eutaw Sa Formation) Boring terminated at 555.0 Groundwater was encoun 140.1 feet after 24 hours.	Sroup SAND Ind D feet. tered at					8.0-inch diameter borehole 8.0-inch diameter borehole Centralizers installed every 50 feet Neat cement, 0 to 522.0 feet Bentonite seal, 522.0 to 532.0 feet Filter pack, sand 532.0 to 555.0 feet 4-inch diameter, 0.010-inch slotter Schedule 80 PVC well screen, 544.5 to 554.5 feet 0.5-foot sump/pipe cap Total well depth, 555.0 feet

BUNN	IELL-LAMMONS	CLIENT:	<u></u>	INT		START: <u>10-3-12</u> END: <u>10-3-1</u>
ENGI	NEERING, INC.	LOCATIO	DN: <u>Pe</u>	rry Co	bunty, Alabama	ELEVATION: 272.9
GEOTECH	INICAL AND ENVIRONMENTAL	DRILLER	k: <u>La</u> i	ndpro	be, R. Banks	LOGGED BY: P. VanHeest
	Consultants	DRILLIN	G METH		UME /50 AIV; 6-Inch air hammer	
		DEPTH	10 - WA	(1 ER>	$\underline{\text{INITIAL:}} \stackrel{\simeq}{=} \underline{\text{ary}} AFTER 24 HOURS: -$	<u>+</u> CAVING> <u>></u>
LEVATION/ EPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT	MONITOR WELL INSTALLATION DETAILS
270 - 5 - 5 10 15 15	Brown, fine sandy, silty CI (fill) Gray, slightly moist, silty C (CL) Gray, moist, silty CLAY (C	LAY -				SURFACE COMPLETION 6' X 6' concrete pad with a survey pin and a standup steel cover. A vent hole was put in the top of the well casing. A weep hole was p at the base of the steel cover. P gravel was placed between the vecasing and steel cover. Top of PVC casing = 276.06 feet Ground surface elev. = 272.9 feet Northing = 878,746.96' Easting = 1,978,684.14' Grout, 0 to 11.8 feet Bentonite seal, 11.8 to 15.4 feet Filter pack, sand 15.4 to 30.0 feet
255 - - 20 - 250						4-inch diameter, 0.010-inch slot
- 25 - 245 						0.5-foot sump/pipe cap
240	Boring terminated at 30.0 groundwater encountered of drilling or after 24 hours	feet. No at time s.				Total well depth, 28.5 feet 6.0-inch diameter borehole
- 35 - 235 -						

				T: <u>Arrowh</u>		VVLLI	- NO. GVVIVI-13 PROJECT NO.: <u>J12-4999-30</u> START: 10-4-12 END: 10-4-12
BL	JNN	ELL-LAMMONS		ON: Perrv C	ountv. Alabama		ELEVATION: 259.1
E	NG	NEERING, INC.	DRILLER	R: Landpro	obe. R. Banks		LOGGED BY: P. VanHeest
Ge	OTECH		DRILLIN	G METHOD:	CME 750 ATV; 6-inch air hammer		
		CONSULTANTS	DEPTH 1	TO - WATER	NITIAL: V dry AFTER 24 HOUR	s: 工	dry CAVING>
				S			
EVA1	TON/ (FT)	DESCRIPTION			STANDARD PENETRATION RESULTS BLOWS/FOOT		MONITOR WELL INSTALLATION DETAILS
-	-	Brown, fine sandy, silty CL (fill)	_AY -				
55-	5	Grayish-brown, slightly mo	oist,				Grout, 0 to 8.1 feet
-	-	silty CLAY (CL)					
50 —	- 10 -	Gray, slightly moist, silty C (CL)	LAY				Bentonite seal, 8.1 to 12.3 feet
5	-						Filter pack, sand 12.3 to 27.0 fee
э –	- 15						6-inch diameter borehole
0-	- - 20						
	-						Schedule 80 PVC well screen, 1 to 25.0 feet
5-	- 25						0.5-foot sump/pipe cap
-	-						Total well depth, 25.5 feet
0-	- - - 30	Boring terminated at 27.0 f groundwater encountered of drilling or after 24 hours	feet. No at time S.				SURFACE COMPLETION 6' X 6' concrete pad with a surve pin and a standup steel cover. A vent hole was put in the top of th well casing. A weep hole was p at the base of the steel cover. P
-	-						gravel was placed between the casing and steel cover. Top of PVC casing elev. = 262.1 feet
25 -	-						Ground surface elev. = 259.1 fee
-	- 35						Survey pin elev. = 259.46 feet
	-						Northing = 879,504.50' Easting = 1,978,499.15'
20 –	-						

GEOT_WELL 4999-30.GPJ 8/19/20

		PROJEC	GRC		WELI	_ NO. GWM-14 PROJECT NO.: <u>J12-4999-30</u>
BUNN	ELL-LAMMONS	CLIENT:	HHNT			START: 10-4-12 END: 10-4-12
ENGI	NEERING, INC.	LOCATIO	ON: <u>Perry C</u>	ounty, Alabama		ELEVATION: 235.1
G EOTECH	NICAL AND ENVIRONMENTAL	DRILLE		obe, R. Banks		LOGGED BY: P. VanHeest
	Consultants	DRILLIN			o. 🛡	
		DEPTH	IU - WATER	NITIAL: \pm dry AFTER 24 HOUR	s: <u>+</u>	
LEVATION/ EPTH (FT)	DESCRIPTION		SOIL TYPE	STANDARD PENETRATION RESULTS BLOWS/FOOT		MONITOR WELL INSTALLATION DETAILS
230 - 5 -	Brown, fine sandy, silty CL (fill) Grayish-brown, slightly mo silty CLAY (CL)	LAY -				Grout, 0 to 8.3 feet
-						Filter pack, sand 12.4 to 27.0 feet
- 220 15 - - -	Gray, slightly moist, silty C (CL)	CLAY				6-inch diameter borehole
215 — 20 - - -						4-inch diameter, 0.010-inch slotte Schedule 80 PVC well screen, 15. to 25.0 feet
210 25 						0.5-foot sump/pipe cap
- - 205 30 -	Boring terminated at 27.0 f groundwater encountered of drilling or after 24 hours	feet. No at time s.			(<u>L.1412)</u>	J Total well depth, 25.5 feet <u>SURFACE COMPLETION</u> 6' X 6' concrete pad with a survey pin and a standup steel cover. A vent hole was put in the top of the well casing. A weep hole was put at the base of the steel cover. Pea gravel was placed between the we casing and steel cover.
- - -						Top of PVC casing elev. = 237.99 feet Ground surface elev. = 235.1 feet
200 35						Survey pin elev. = 235.37 feet
$\left - \right $						Northing = 880,438.28'
						Easting = 1,978,283.93'
					MONIT	

GEOT_WELL 4999-30.GPJ 8/19/20

			PROJEC	CT: Pe	GR erry	ROI Cou	JNDWAT	ſER	MON	VIT(ORI	NG	W	ELL	NO . PROJE	GWM-15 CT NO.: J07-4999-05
DI			CLIENT	: HI	HNT	•									START	: <u>5-9-07</u> END: <u>5-9-07</u>
E	NGI	NEERING, INC.	LOCATI	ON: UI	nion	tow	n, Alabama								ELEVA	TION: 271.2
GE	EOTECH		DRILLE	R: <u>B</u>	unne	ell-L	ammons Eng	gineer	ring, Inc	., J. (Gorm	an			LOGGE	D BY: M. Preddy
		Consultants	DRILLIN	IG METI	HOD	D: M	obile B-59 Tru	uck, h	nollow s	tem a	auger					
			DEPTH	TO - WA	ATE	R>	NITIAL: Ψ	Dr	<u>y</u> A	FTEF	R 24 H	IOUR	S: -	<u> </u>	Dry	
ELEVAT DEPTH	rion/ (FT)	DESCRIPTION		SOIL TYPE	SAMPLES		STANDARD P B		RATION S/FOOT	RESI	ULTS		ſ		MONI	TOR WELL INSTALLATION DETAILS
270-	- - -	Stiff, brownish-gray, dry, si sandy CLAY - (fill)	lty, fine			2 7 4		•	20 30 4	10 50	/ /0	90			Cemer	it grout, 0 to 7.45 feet
265 -	-	Hard, brown, dry, silty CLA	Y												Riser =	: 10' + 5.25' black steel
	- 10				X	2 13 32				•					Bentor Filter p	nite seal, 7.45 to 10 feet back, sand 10 to 26.5 feet
260 -	- - 	Hard, gray and brown, mois CLAY	st, silty		X	9 20 20				•					Centra riser, j	lizer at bottom of 10 foot ust above screen
255-	- - ·	Hard, gray, moist, silty CLA	Y.			8						· · · · · · · · · · · · · · · · · · ·			4-inch stainle 22.25 f	diameter, 0.010-inch slotted ss steel well screen, 12.25 f eet
250 -	20 				X	19 25				•					Durhai installe feet	n Geo bladder pump ed with the intake set at 20
	-					9 18									Sump	- 0.5 foot stainless steel
245-	- 25					23									8.25-in	ch diameter borehole
	-	Boring terminated at 26.5 fe groundwater encountered a of drilling.	eet. No at time													
240-	- 30 - - -														SURFA 6' X 6' pin and vent he well ca at the l gravel casing	ACE COMPLETION concrete pad with a survey d a standup steel cover. A ble was put in the top of the ising. A weep hole was put base of the steel cover. Per was placed between the we and steel cover.
235-	35 						 					· · · · · · · · · · · · · · · · · · ·			Groun	d elev. = 271.2 feet MSL
	-								000						Top of feet M	well casing elev. = 274.62 SL
									GROL	JND	WA	ER	MC	NIT	URING	WELL NO. GWM-1

BUNN		PROJE CLIENT LOCATI	CT: <u>P</u> : <u>H</u> ON: <u>U</u>	erry HNT nior	/ Cou T ntow	ty Landfill Alabama		PROJECT NO.: <u>J07-4999-05</u> START: <u>5-9-07</u> END: <u>5-9-07</u> ELEVATION: <u>269.5</u>
GEOTECHNICAL AND ENVIRONMENTAL		DRILLE	R: <u>B</u>	unn	nell-L	nmons Engineering, Inc.,	J. Gorman	LOGGED BY: M. Preddy
	Consultants	DRILLIN	IG MET	HOI	D: M	bile B-59 Truck, hollow ste	em auger	
		DEPTH	TO - W/		R>	ITIAL: $-$ Dry AF	TER 24 HOURS: 👤	DryCAVING>
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE	SAMPLES		TANDARD PENETRATION R BLOWS/FOOT 2 5 10 20 30 40	ESULTS	MONITOR WELL INSTALLATION DETAILS
 2655	Very stiff, brownish-gray, c slightly fine sandy, silty CL (fill)	lry, AY -			5 8 8	•		Cement grout, 0 to 6.6 feet Riser = 10' + 5.25' black steel
260 -	Very stiff, brown and gray, moist to moist, silty CLAY	slightly		X	5 8			Bentonite seal, 6.6 to 10 feet
-10					10			Filter pack, sand 10 to 26.5 feet
-					3			Centralizer at bottom of 10 foot riser, just above screen
255- - 15 - -					7 12	•		4-inch diameter, 0.010-inch slotte stainless steel well screen, 12.75 22.75 feet
250 - - - 20 -	Hard to very hard, gray, sli moist, silty CLAY	gntly		X	7 19 22			Durham Geo bladder pump installed with the intake set at 20 feet
-					8			Sump - 0.5 foot stainless steel
245 <i>-</i> - 25 -					23 28		•	Total well depth, 23.2 feet
-	Boring terminated at 26.5 f groundwater encountered of drilling.	eet. No at time						8.25-inch diameter borehole
240 - - 30 - - - -								SURFACE COMPLETION 6' X 6' concrete pad with a survey pin and a standup steel cover. A vent hole was put in the top of th well casing. A weep hole was put at the base of the steel cover. Pe gravel was placed between the w casing and steel cover.
235- 35 -								Ground elev. = 269.5 feet MSL
230 -								Top of well casing elev. = 272.51 feet MSL

BUNNELL-LAMMONS ENGINEERING, INC. Geotechnical And Environmental Consultants		LING MET	HNT Inior Sunn HOI	ntow nell-L D: M	n, Alabama ammons Engineerir obile B-59 Truck, ho	ig, Inc., J. Gorman llow stem auger	- - - -	START: <u>5-10-07</u> END: <u>5-10-07</u> ELEVATION: <u>269.4</u> LOGGED BY: <u>M. Preddy</u>
ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE		:K>	INITIAL: <u>→</u> <u>Dry</u> STANDARD PENETR BLOWS/F	AFTER 24 HOU		MONITOR WELL INSTALLATION DETAILS
-	Firm, brownish-gray, dry, silty, fine sandy CLAY - (fill)		S X X X X X X X X X X X X X X X X X X X	2		30 40 50 70 90		Cement grout, 0 to 6.8 feet
265				2 3	• 			Riser = 10' + 5.25' black steel
260- 	Very stiff, red, brown and gray, slightly moist, silty CLAY		X	3 6 10	•			Bentonite seal, 6.8 to 10.2 feet
	Stiff, brown and gray, slightly moist, silty CLAY			3				Centralizer at bottom of 10 foot riser, just above screen
255 - - 15 - -			X	6 9	• •			4-inch diameter, 0.010-inch slotte stainless steel well screen, 12.25 22.25 feet
250	Hard, gray, slightly moist, silty CLAY		X	8 16 21		•		Durham Geo bladder pump installed with the intake set at 20 feet
-				8 20				Sump - 0.5 foot stainless steel
-25				27		•		Total well depth, 22.70 feet
240	Boring terminated at 26.5 feet. No groundwater encountered at time of drilling.	0						8.25-inch diameter borehole
-								SURFACE COMPLETION 6' X 6' concrete pad with a survey pin and a standup steel cover. A vent hole was put in the top of th well casing. A weep hole was pu at the base of the steel cover. Pe
235								graver was placed between the w casing and steel cover. Ground elev. = 269.4 feet MSL
230-								Top of well casing elev. = 273.20 feet MSL

			CT: <u>Arrowh</u> : HHNT	ead Landfill		PROJECT NO.: <u>J12-4999-30</u> START: 10-3-12 FND: 10-3-12
BUNN	ELL-LAMMONS		ON: Perry C	ounty Alabama		ELEVATION: 282.6
ENGI	NEERING, INC.	DRILLE	R [.] Landor	obe R Banks		LOGGED BY: P VanHeest
GEOTECH	NICAL AND ENVIRONMENTAL	DRILLIN	NG METHOD:	CME 750 ATV: 6-inch air hammer		
	Consultants	DEPTH	TO - WATER		s V	dry CAVING>
		DEITI			<u>. </u>	
EVATION/ PTH (FT)	DESCRIPTION		SOIL HINDE	STANDARD PENETRATION RESULTS BLOWS/FOOT		MONITOR WELL INSTALLATION DETAILS
-	Brown, fine sandy, silty Cl (fill)	_AY -				
30-[
-						Grout, 0 to 8.4 feet
-5	Light brown, slightly mois CLAY (CL)	t, silty				
/5-						
-						Bentonite seal 8.4 to 11.3 feet
- 10						Filter pack, sand 11.3 to 27.0 fee
'0 -						· · · · · · · · · · · · · · · · · · ·
-	Gray, slightly moist, silty ((CL)	CLAY				
-						6-inch diameter borehole
5						
-						
20 -						4-inch diameter, 0.010-inch slott Schedule 80 PVC well screen, 1 to 25.0 feet
0-						
-						
- 25						0.5-foot sump/pipe cap
5	Boring terminated at 27.0	feet No				SURFACE COMPLETION
	groundwater encountered of drilling or after 24 hours	at time s.				6' X 6' concrete pad with a surve pin and a standup steel cover. vent hole was put in the top of t
- 30						at the base of the steel cover. F gravel was placed between the casing and steel cover.
0-[Top of PVC casing elev. = 285.6 feet
-35						Ground surface elev. = 282.6 fee
						Survey pin elev. = 282.92 feet
5-[Northing = 877,891.57' Easting = 1,979,006.68'

GEOT_WELL 4999-30.GPJ 8/19/20

EXISTING METHANE GAS MONITORING PROBES

			METHANE N	IONITORING	PROBE NO. MM-64	
		PROJECT:	Perry County Landfill		PROJECT NO.: J07-4999-0	6
		CLIENT:	HHNT		START: 6-21-07 END: 6-2	1-07
BUNN	IELL-LAMMONS	LOCATION:	Uniontown. Alabama		ELEVATION: 266.5	
ENGI	NEERING, INC.	DRILLER:	Landprobe, T. Gradwei		LOGGED BY: T. Gradwel	
GEOTECH	INICAL AND ENVIRONMENTAL	DRILLING MI	ETHOD: 4-1/4 inch hollow	stem auger		
	Consultants		waters initial $\cdot \nabla$	AFTER 24 H		
	· · · · · · · · · · · · · · · · · · ·	DEFINIO.				
ELEVATION/ DEPTH (FT)		DESCRIPTIO	ON	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS	
	- 6-inches of TOPSOIL				Neat cement, 0 to 1.0 feet	
265-	Brown silty SAND wit	th very hard	CLAY		Bentonite seal, 0 to 2.5 feet	-
5					Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 13.0 feet	- - -
260- - - - 10 255-					2-inch diameter, 0.020-inch slotte Schedule 40 PVC well screen, 3.0 13.0 feet	- ed -) to - - -
						_
			<u></u>			_
-15	Boring terminated at	14.0 feet. N	o groundwater		rotal well depth, 13.25 feet	
	encountered at time of	of drilling.	_		Borenole depth, 14.0 feet	
250-					SURFACE COMPLETION 4" round stand-up locking alumir protective cover with a 3' x 3' concrete pad at the base with sur pin	num _ rvey _
-20					1/4-inch weep hole installed in aluminum cover	-
					PVC stick-up = 3.59-feet	-
					Top of PVC casing elev. = 270.09	feet _
-25					Survey pin elev. = 266.91 feet	-
240-					Ground surface elev. = 266.5 feet	-
					Northing = 877 453 19'	-
					Fasting = 1 979 617 80'	-
-30					Lusting - 1,919,011,08	_
						-
235						-
						-
						-
-25						_
						-
230-						
						-
						-
						-
				METHA	NE MONITORING PROBE NO. M	M-64
					Sheet 1	of 1

			METHANE M	ONITORING P	PROBE NO. MM-65
	A MAINC.	PROJECT:	Perry County Landfill		PROJECT NO.: J07-4999-06
		CLIENT:	HHNT		START: 6-26-07 END: 6-26-07
BUNN	ELL-LAMMONS	LOCATION:	Uniontown, Alabama		
ENG	NEEKING, INC.	DRILLER:	Landprobe, T. Gradwell		LOGGED BY: T. Gradwell
GEOTECH		DRILLING MI	ETHOD: 6-inch air rotary		
	CONSULTANTS	DEPTH TO -	water> initial: ∇	AFTER 24 HO	URS: 💆 CAVING> 🚃
ELEVATION/ DEPTH (FT)		DESCRIPTI	N	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL				Neat cement, 0 to 1.0 feet
270-	i annish-brown, sand	IY SIL I			Bentonite seal, 1 to 2.5 feet Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 25.0 feet
-5	Very hard, gray, stiff	CLAY			
265- - -10 -					
260- -15					2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 23.0 feet
255- 20					
250-					Pipe cap Total well depth, 23.25 feet
-25	Boring terminated at encountered at time of	25.0 feet. No of drilling.	o groundwater		Borehole depth, 25.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey
245- -30					pin 1/4-inch weep hole installed in
-					PVC stick-up = 3.59-feet
240-					Top of PVC casing elev. = 276.99 feet
-35					Survey pin elev. = 273.78 feet
-					Ground surface elev. = 273.4 feet
235					Northing = 877,156.58'
					Easting = 1,979,607.01'
<u>l</u>	I			METHAN	IE MONITORING PROBE NO. MM-6 Sheet 1 of

			DNI I ORING P						
	····								
BUNN	ELL-LAMMONS								
ENG	NEERING, INC.	LOCATION: Uniontown, Alabama	ELEVATION: 280.5						
GEOTECH	INICALANDENVIRONMENTAL	DRILLER: Landprobe, T. Gradwell	DRILLER: Landprobe, T. Gradweli						
	CONSULTANTS	DRILLING METHOD: 6-inch air rotary							
		DEPTH TO - WATER> INITIAL: ⊻.	AFTER 24 HOU	URS: 🖳 CAVING> 😿					
VATION/ PTH (FT)		DESCRIPTION		MONITOR WELL INSTALLATION DETAILS					
in –	6-inches of TOPSOII	· · · · · · · · · · · · · · · · · · ·	C Within M	Neat cement, 0 to 1.0 feet					
Ĭ	Tannish-brown, silty	y, sandy CLAY		Bentonite seal, 1.0 to 2.5 feet					
ŀ				Eilter pack cand 2 E to 2.0 feet					
F				Pea gravel, 3.0 to 35.0 feet					
F									
55									
-									
F	Very hard, gray CI A	Y							
ŀ		-							
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5-[-15									
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F				2-inch diameter, 0.020-inch slotted					
F				- Soliedule 40 PVC well screen, 3.0					
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-25									
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Ļ									
20									
Γ									
Γ									
F				O Pipe cap					
-									
	Boring terminated a	t 35.0 feet. No groundwater		Total well depth, 33.25 feet					
F	encountered at time	of drilling.		Borehole depth, 35.0 feet					
				SURFACE COMPLETION 4" round stand-up locking aluming protective cover with a 3' x 3'					
ſ				concrete pad at the base with surv pin					
	· · · · · · · · · · · · · · · · · · ·		BATTILAN	TE MONITODINO DDODE NO MA					

		BLABINC.	DDO IEOT.		ONITORING P	ROBE NO. MM-66
BI	UNN NGI EOTECH	ELL-LAMMONS NEERING, INC. NICALANDENVIRONMENTAL Consultants	CLIENT: LOCATION: DRILLER: DRILLING MI	HHNT Uniontown, Alabama Landprobe, T. Gradwel ETHOD: 6-inch air rotary	START: <u>6-26-07</u> END: <u>6-26-07</u> ELEVATION: <u>280.5</u> LOGGED BY: <u>T. Gradwell</u>	
			DEPTH TO -	water> initial: ⊻		
DEPTH	DEPTH (FT)		DESCRIPTIO	ON	TYPE	MONTOR WELL INSTALLATION DETAILS
240-	45					1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.73-feet Top of PVC casing elev. = 284.23 feet Survey pin elev. = 280.88 feet
230-						Ground surface elev. = 280.5 feet Northing = 876,841.99' Easting = 1,979,598.88'
225-	- 55 -					-
220-	- 60 					- - - -
215–	- 65 					- - - -
210-	- 70 					- - - -
205-	-75					- - - - - -
		<u></u>			METHAN	E MONITORING PROBE NO. MM-66 Sheet 2 of 2
	BL Binc.	PROJECT		ONITORI	NG PRO	OBE NO. MM-67 PROJECT NO.: J07-4999-06
-------------------------	---------------------------	-------------	--------------------------	-----------------	---------	---
						START: 6.26.07 FND: 6.27.07
BUN	NELL-LAMMONS		Uniontown Alabama			ELEVATION: 283.2
EN	ENGINEERING, INC.		Landprobe T Gradwell			LOGGED BY: T Gradwell
Geote	CHNICAL AND ENVIRONMENTAL		ETHOD: 6-inch air rotany		,	
	CONSULTANTS		WATERS INITIAL ∇	AFTER		
		Dermito				OATING XXX
ELEVATION DEPTH (FT)	V)	DESCRIPTI	ON	SOII TYP		MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL	•	<u> </u>	(11) × 10 × 10		Neat cement, 0 to 1.0 feet
-	Tannish-brown, silty	, sandy CLA	Y			Bentonite seal, 1.0 to 2.5 feet
280-						Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 40.0 feet
-5						
	Very hard, grayish-w	hite CLAY				
275-						
[
-10						
F						
F						
270-						
ŀ						
-15	5					
ŀ						
F						
265						2-inch diameter 0 020-inch slotted
						Schedule 40 PVC well screen, 3.0 to
-20						38.0 feet
-						
260						
200-						
-25						
2.						
Ē						
255-						
ŀ						
-30						
F						
ŀ						
250-						
ŀ						
-35	5					
F						
Ļ						8
245						Discourse
245-						
						Total well depth, 38.25 feet
				ME	THANE N	NONITORING PROBE NO. MM-6 Sheet 1 of 2

		BLA BINC.		METHANE M	IONITOR	NG PRO	DBE NO. MM-67	
B	UNN	ELL-LAMMONS		Perry County Landfill HHNT	START: <u>6-26-07</u> END: <u>6-27-07</u>			
E	ENGINE ERING, INC.		DRILLER:	Landprobe, T. Gradwel			LOGGED BY: T. Gradwe	11
G	EOTECH		DRILLING ME	ETHOD: 6-inch air rotary				
		CONSULTANTS	DEPTH TO -	water> initial: $ abla$	AFTE	R 24 HOURS	: 💆 CAVING>😿	
ELEVA DEPTH	TION/ I (FT)		DESCRIPTIC	N	SC	PE	MONITOR WELL INSTALLATION DETAILS	
240- 235- 230- 225- 220- 215-	-45	Boring terminated at encountered at time	40.0 feet. No	o groundwater			Borehole depth, 40.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking alumi protective cover with a 3' x 3' concrete pad at the base with su pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.51-feet Top of PVC casing elev. = 286.7' Survey pin elev. = 283.58 feet Ground surface elev. = 283.2 feet Northing = 876,736.79' Easting = 1,979,586.55'	inum
210-								-
. 12121	-75							-
205-								-
	·····	L			M		MONITORING PROBE NO. M Sheet 2	/M-67 of 2

BUNN ENG	IBLE EINC. IELL-LAMMONS INEERING, INC. INIGALANDENVIRONMENTAL CONSULTANTS	METHANE MONITORING PROBE NO. MM-68 PROJECT: Perry County Landfill CLIENT: HHNT LOCATION: Uniontown, Alabama DRILLER: Landprobe, T. Gradwell DRILLING METHOD: 6-inch air rotary DEPTH TO - WATER> INITIAL: AFTER 24 HOURS:					
ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	SC TY		MONITOR WELL INSTALLATION DETAILS	
285	6-inches of TOPSOIL					Neat cement, 0 to 1.0 feet	
-5	Very hard, gray CLA	, sandy CLA	r 			Bentonite seal, 1.0 to 2.5 feet Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 40.0 feet	
		-					
-15 270						2-inch diameter, 0.020-inch slotted	
265						38.0 feet	
-25							
255							
-35 250						Ріре сар	
	L			M	ETHANE N	NONITORING PROBE NO. MM-	

	BLABINC.	METHANE MC PROJECT: Perry County Landfill	DNITORING P	ROBE NO. MM-68 PROJECT NO.: J07-4999-06				
RIMN		CLIENT: HHNT	CLIENT: HHNT					
ENG	NEERING. INC.	LOCATION: Uniontown, Alabama		ELEVATION: 285.9				
GEOTECH	INICAL AND ENVIRONMENTAL	DRILLER: Landprobe, T. Gradwell		LOGGED BY: T. Gradwell				
	Consultants	DRILLING METHOD: 6-inch air rotary						
	1	DEPTH TO - WATER> INITIAL: ¥	AFTER 24 HOU	JRS: 🖣 CAVING>🚃				
ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS				
245 - - -45	Boring terminated at encountered at time	40.0 feet. No groundwater of drilling.		Total well depth, 38.25 feet Borehole depth, 40.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey				
240				pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.61-feet				
				Top of PVC casing elev. = 289.51 feet				
235				Survey pin elev. = 286.54 feet Ground surface elev. = 285.9 feet Northing = 876,637.69'				
-				Easting = 1,979,589.19'				
-55								
-								
-60 225 -								
-65 220								
-70 215								
-75								
-								
	····		METHAN	E MONITORING PROBE NO. MM-6 Sheet 2 of 2				

			METHANE MO	ONITOF	RING PRC	DBE NO. MM-69
		PROJECT:	Perry County Landfill			PROJECT NO.: J07-4999-06
		CLIENT: HHNT START: 6-27-07 EN				
BUNN	NEEDING ING	LOCATION:	Uniontown, Alabama			ELEVATION: 287.9
ENUSI George		DRILLER:	Landprobe, T. Gradwell			LOGGED BY: T. Gradwell
Geotech		DRILLING M	ETHOD: 6-inch air rotary			
	GONSULIANIS	DEPTH TO -	water> initial:∑	AFT	ER 24 HOURS:	
ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	S T		MONITOR WELL INSTALLATION DETAILS
	- 6-inches of TOPSOIL			31		Neat cement, 0 to 1.0 feet
-	Tannish-brown, silty	, sandy CLA	Y			Bentonite seal, 1.0 to 2.5 feet
285						Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 45.0 feet
-						
280 - 10 -	Very hard, gray CLA	r				
275-						
- 15 -						
270-						
-20 - 265						2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet
- 25 -						
260 - -30						
255						
-35						
250						
1	l			 N	METHANE M	ONITORING PROBE NO. MM-6 Sheet 1 of 2

			METHANE	MONITO	RING	G PROBE NO. MM-69	
		PROJECT:	Perry County Landfil	PROJECT NO.: J07-4999-06			
		CLIENT:	HHNT			START: <u>6-27-07</u> END: <u>6-27-07</u>	
BUNN	IELL-LAMMUNS	LOCATION:	Uniontown, Alabama	l		ELEVATION: 287.9	
ENGI	NEEKING, INC.	DRILLER:	Landprobe, T. Gradv	vell		LOGGED BY: T. Gradwell	
Geotech	INICAL AND ENVIRONMENTAL	DRILLING MI	ETHOD: 6-inch air rotar	y			
	CONSULTANTS	DEPTH TO -	WATER> INITIAL: ∇	AF	TER 24	HOURS: V CAVING>	
		_I	······································				
ELEVATION/ DEPTH (FT)		DESCRIPTI	N		SOIL TYPE	MONITOR WELL INSTALLATION DETAILS	
245 -45 -45 -45 -45 -50 -55 -55 	Very hard, gray CLAY Boring terminated at encountered at time of	40.0 feet. Noof drilling.	o groundwater			2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet Pipe cap Total well depth, 43.25 feet Borehole depth, 45.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3" x 3" concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.71-feet Top of PVC casing elev. = 291.61 feet Survey pin elev. = 288.35 feet Ground surface elev. = 287.9 feet Northing = 876,545.34" Easting = 1,979,585.23'	
-75							
						-	
210-						-	
						HANE MONITOKING PROBE NO. MM-69 Sheet 2 of 2	

ENGINE ERING, INC. BEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS ATION/ H (FT) 6-inches of TOPSO Tannish-brown, silt	CLIENT: <u>HHNT</u> LOCATION: <u>Uniontown, Alabama</u> DRILLER: <u>Landprobe, T. Gradwe</u> DRILLING METHO <u>D: 6-inch air rotary</u> DEPTH TO - WATER> INITIAL: <u>↓</u> DESCRIPTION	START: <u>6-27-07</u> END: <u>6-28-0</u> ELEVATION: <u>287.2</u> LOGGED BY: <u>T. Gradwell</u> AFTER 24 HOURS: <u>CAVING></u> SOIL TYPE MONITOR WELL INSTALLATION DETAILS Neat cement, 0 to 1.0 feet Bentonite seal, 1.0 to 2.5 feet
-5 Very hard, dry, gray	CLAY	Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 45.0 feet

		INC.					4000.06
				Perry County Landfill	PROJECT NO.: JUT-	4999-00	
BL	JNN	ELL-LAMMONS	CLIENT:		START: <u>0-27-07</u> EN	D: 0-20-07	
E	ENGINEERING, INC.		LUCATION:	Uniontown, Alabama			radwali
Ge	EOTECH	INICALANDENVIRONMENTAL	DRILLER:	Landprobe, I. Gradwe			rauwen
		CONSULTANTS		= 1 HOU: 6-inch air rotary	AFTED 2		
			DEPTHIO				×
ELEVAT DEPTH	ELEVATION/ DEPTH (FT)		DESCRIPTIO	NC	SOIL TYPE	MONITOR WELL INSTALLAT DETAILS	ION
045	-	Very hard, dry, gray (CLAY			2-inch diameter, 0.020-inc Schedule 40 PVC well scr 43.0 feet	h slotted een, 3.0 to
245-	-					Pipe cap	-
	-45					Total well depth, 43.25 fee	t _
	-	Boring terminated at encountered at time	45.0 feet. No	o groundwater		Borehole depth, 45.0 feet	
240-	-		or animg.			SURFACE COMPLETION 4" round stand-up locking protective cover with a 3" concrete pad at the base v pin	aluminum x 3' vith survey
	-50					1/4-inch weep hole installe aluminum cover	ed in
235-	-					PVC stick-up = 3.40-feet	
	-					Top of PVC casing elev. =	290.60 feet
	-					Survey pin elev. = 287.49 f	eet
	-55					Ground surface elev. = 28	7.2 feet [–]
	-					Northing = 876,480.96'	
230-	-					Easting = 1,979,582.39'	
	-						-
	-						
	-60						-
	-						
225-	-						
	-						
	-						
	-65						-
	-						
220-	-						
	-						
	-						
	-70						-
	-						
215-	-						
	-						
2							
	-75						-
1							
210-							
ŕ	-						
	-	·					
					MET	HANE MONITORING PROBE N She	O. MM-70 eet 2 of 2

BUNNELL-LAMMONS ENGINEERING, INC. Outcomeduate Regionalization Consummers CLENT HNT STATT: 628-07 END: 62 ELEVATION Consummers Consummers Declent Lindroke, I consult Licogen BY Consummers Declent Consummers Licogen BY Licogen BY DepTri (P) Declent Declent AFTER 24 HOURS: X CAVING-320. DepTri (P) Description Status Nontrop Well Install. Nontrop Well Install. 285- -5 Status Status Nontrop Well Install. Nontrop Well Install. 286- -5 Very hard, dry, gray CLAY Status Principacity Install. Principacity Install. 287- -10 Very hard, dry, gray CLAY Status Status Principacity Install. 286- -20 -20 -20 -20 Status Status 286- -23 -23 Status Status Status 286- -23 -24 -25 Status Status 286- -25 -25 -25 Status Status 287- -3 -3 -3 Status Status 288- -3 -3 -3 Status Status 289-		BL/Binc.	PROJECT:	METHANE MO	ONITORIN	G PRO	DBE NO. MM-71 PROJECT NO.: <u>J07-4999-06</u>
ENCINEERING, INC. Construction LocATION: Uncention LocATION: 28.0 Construction Addition Construction Construction LocATION: LocATION: Construction Construction Addition Construction Construction Construction Construction LocATION: Construction LocATION: 28.0 LocATION: Construction LocATION: Construction LocATION: Construction Construct			CLIENT	HHNT	START: 6-28-07 END: 6-28-07		
Georgeneration DRLLER: Landprobe 1. Gradwei Consultants DRLLING METHOD: CANNE-SSS DEFTIN (FT) DESCRIPTION SOL Consultants DESCRIPTION SOL Consultants DESCRIPTION Nontron will, NETALLATION DEFTIN (FT) DESCRIPTION SOL Consultants DESCRIPTION SOL Consultants DESCRIPTION Nontron will, NETALLATION DESCRIPTION DESCRIPTION Nontron will, Netal Line 25 feet Consultants Tannish-brown, silty, sandy CLAY Nontron will, 10 0.25 feet Consultant Very hard, dry, gray CLAY Nontron will an object of the solution and the solution	FNG	NEERING, INC.	LOCATION:	Uniontown, Alabama			ELEVATION: 288.0
DRILLING METHOP: ATTER 24 HOURS: CAVING>300 DEPTH TO - WATER> INITIAL:			DRILLER:	Landprobe, T. Gradwell			LOGGED BY: <u>T. Gradwell</u>
IDEPTH TO - WATER> INITIAL: V ATTER 24 HOURS: V CAVING-355 ELEXATION DEFINION SOIL Transish-brown, silty, sandy CLAY SOIL Transish-brown, silty, sandy CLAY Moat cennent, to 10 for et Bentonite seal, 1.0 to 2.5 feat. 285- -5 -5 Very hard, dry, gray CLAY Mathematic Participantial Solution (Control of the seal, 1.0 to 2.5 feat. 287- -10 -10 Very hard, dry, gray CLAY Mathematic Participantial Solution (Control of the seal, 1.0 to 4.0 feat. 287- -10 -10 Very hard, dry, gray CLAY Mathematic Participantial Solution (Control of the seal, 1.0 to 4.0 feat. 287- -10 -10 Very hard, dry, gray CLAY Mathematic Participantial Solution (Control of the seal, 1.0 to 4.0 feat. 287- -20 -20 -30 Solution (Control of the seal, 1.0 to 4.0 feat. 287- -20 -30 -30 -30 287- -20 -30 -30 -30 287- -20 -30 -30 -30 287- -30 -30 -30 -30		Consultants	DRILLING M	ETHOD: 6-inch air rotary	· · · · · · · · · · · · · · · · · · ·		
ELEVATION DESCRIPTION SOL Type MONTOR WELL NET ALLATION DETAILS 285- -5 -6 -6-inches of TOPSOIL Tannish-brown, silty, sandy CLAY Meat ceneral, 0 to 1.0 feet Bentonite seei, 1.0 to 2.5 feet Bentonite seei, 1.0			DEPTH TO -	water> initial: $ arrow $	AFTER 2	4 HOURS:	: 🖣 CAVING> 😿
e-inches of TOPSOIL AL 23 Tannish-brown, silty, sandy CLAY -5 -6 -7	ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
283 -5 Bentonite seal, 1.0 to 2.5 feet 284 -5 280 -5 280 -10 275 -10 276 -10 276 -10 276 -10 276 -10 276 -10 276 -10 270 -20 280 -20 280 -20 280 -20 280 -20 280 -30 280 -30		- 6-inches of TOPSOIL	•	······································			Neat cement, 0 to 1.0 feet
285 -5 -5 Filter pack, sand 2.5 to 3.0 feet 280 -10 Very hard, dry, gray CLAY Filter pack, sand 2.5 to 3.0 feet 275 -10 -10 Filter pack, sand 2.5 to 3.0 feet 276 -10 -10 Filter pack, sand 2.5 to 3.0 feet 276 -10 -10 Filter pack, sand 2.5 to 3.0 feet 276 -10 -10 Filter pack, sand 2.5 to 3.0 feet 276 -10 -10 Filter pack, sand 2.5 to 3.0 feet 270 -10 -20 -20 286 -20 -20 -20 286 -25 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30 286 -30 -30 -30		Tannish-brown, silty	, sandy CLA	Y			Bentonite seal, 1.0 to 2.5 feet
28010 27515 27015 27020 28525 28035	285	Very hard, dry, gray (Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 45.0 feet
275 -15 270 -20 -20 -20 -25 -25 -25 -25 -25 -35 -25 -35 -25 -35 -25 -35	280 - 10 -	very nard, dry, gray					
270 - 20 265 - 25 260 - 30 255 - 35 250 - 35	275 - 15 - -						
	270 20 -						2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet
	265 25 						
	260						
	255— —35 -						
	250				MET		AONITORING PROBE NO. MM-

				METHANE N	NONITOF	RING	G PROBE NO. MM-71		
			PROJECT: Perry County Landfill PROJECT NO.: J07-49						
	-		CLIENT:	HHNT		START: 6-28-07 END: 6-28-07			
B			LOCATION:	Uniontown, Alabama			ELEVATION: _288.0		
E	ENGINEERING, INC.		DRILLER:	Landprobe, T. Gradwe	1		LOGGED BY: T. Gradwell		
GE	OTECH	NICALANDENVIRONMENTAL	DRILLING M	ETHOD: 6-inch air rotary					
	CONSULTANTS		DEPTH TO	WATERS INITIAL ∇	ΔΕΤ	FR 24			
			DEI III IO		1				
elevat Depth	10N/ (FT)		DESCRIPTI	ON	Ę	SOIL YPE	MONITOR WELL INSTALLATION DETAILS		
245-	- - 	Very hard, dry, gray (CLAY				2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet Pipe cap Total well depth, 43.25 feet		
240-	-	Boring terminated at encountered at time	45.0 feet. N of drilling.	o groundwater			Borehole depth, 45.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey		
	-50						PVC stick-up = 3.39-feet		
235-	-						Top of PVC casing elev. = 291.39 feet		
	~55						Survey pin elev. = 288.45 feet		
	~						Ground surface elev. = 288.0 feet		
	-						Northing = 876.475.67'		
230-	-						Easting = 1 979 515 29'		
	-						Lasting - 1,979,910.29		
	-60						-		
	-								
	-					:			
225-	-								
	-								
	-65						-		
	_								
220									
220-									
	-70						-		
	-								
	-								
215-	-								
	-75						-		
	-								
	-								
210-	-								
	-								
						METI	HANE MONITORING PROBE NO. MM-71 Sheet 2 of 2		

		PROJECT: CLIENT:	METHANE MO Perry County Landfill HHNT	ONITORING	B PRC	DBE NO. MM-72 PROJECT NO.: J07-4999-06 START: <u>6-28-07</u> END: <u>6-28-07</u>
ENG	INEERING. INC.	LOCATION:	Uniontown, Alabama			ELEVATION: 287.2
GEOTEC	HNICAL AND ENVIRONMENTAL	DRILLER:	Landprobe, T. Gradwell			LOGGED BY: <u>T. Gradwell</u>
010110	Consultants	DRILLING M	ETHOD: 6-inch air rotary			
		DEPTH TO -	water> initial: Ψ	AFTER 24	HOURS:	
ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL			NIL ST		Neat cement, 0 to 1.0 feet
-	Tannish-brown, silty	, sandy CLA	Y			Bentonite seal, 1.0 to 2.5 feet
285-					Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 45.0 feet	
280-	Very hard, dry, gray (CLAY				
-10 275-						
- 15 -						
270-						
-20 - 265- ⁻ -						2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet
- 25 -						
260 - 						
255						
-35						
250						
				METH	IANE M	IONITORING PROBE NO. MM- Sheet 1 of

· · ·	20		1	METHANF MC	ONITORING	G PROBE NO. MM-72
			PROJECT	Perry County Landfill		PROJECT NO.: .107-4999-06
				HHNT		START: 6-28-07 END: 6-28-07
BL	JNN	ELL-LAMMONS		Uniontown, Alabama		ELEVATION: 287.2
E	ENGINEERING, INC. GeotechnicalAndEnvironmental			Landprobe, T. Gradwell	LOGGED BY: T. Gradwell	
Ge			DRILLING M	THOD: 6-inch air rotary		
		CONSULTANTS	DEPTH TO -	water> initial: ∇	AFTER 24	
ELEVA1 DEPTH	rion/ (FT)		DESCRIPTIO	N	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245- 240-	- - - - - - -	Very hard, dry, gray of Boring terminated at encountered at time	CLAY 45.0 feet. No of drilling.	o groundwater		2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet Pipe cap Total well depth, 43.25 feet Borehole depth, 45.0 feet <u>SURFACE COMPLETION</u>
235-	- 50 -					4 Found stand-up locking autimutin protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.43-feet Top of PVC casing elev. = 290.63 fee
230-	- 55 -					Survey pin elev. = 287.77 feet Ground surface elev. = 287.2 feet Northing = 876,472.08' Easting = 1,979,435.36'
225-	- - 60 -					
220-	- 65 -					
	- 70					
215-	75					
210	-					
		L			METH	HANE MONITORING PROBE NO. MM- Sheet 2 of

		MONITORING PROBE NO. MM-73			
	PROJECT: Perry County Landfill PROJECT NO.: J				
BUNNELL-LAMMONS	CLIENT: HHNT	STAKT: <u>6-28-07</u> END: <u>6-28-07</u>			
ENGINEERING, INC.	LOCATION: Uniontown, Alabama	ELEVATION: 285.6			
Geotechnical And Environmental	DRILLER: Landprobe, T. Gradwe	LUGGED BY: _ I. Gradwell			
CONSULTANTS					
	DEPTH TO - WATER> INITIAL: -	AFTER 24 HOURS: -¥ CAVING>>>>>			
ELEVATION/ DEPTH (FT)	DESCRIPTION				
285 6-inches of TOPSOIL		Neat cement, 0 to 1.0 feet			
Tannish-brown, silty,	sandy CLAY	Bentonite seal, 1.0 to 2.5 feet			
$ \begin{array}{c} 2805 \\ -5 \\ 2805 \\ -5 \\ 27010 \\ -1$	EAY	Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 40.0 feet Pipe cap			
		METHANE MONITORING PROBE NO. MM-7 Sheet 1 of			

		BLABINC.		ONITORING	PROBE NO. MM-73
			PROJECT: Perry County Landfill		PROJECT NO.: J07-4999-06
B	UNN	ELL-LAMMONS			ELEVATION: 295.6
j	ENGINEERING, INC. Geotechnical And Environmental Consultants		DRILLER: Londershe T. Creduell		
6			DRILLER. Landprobe, T. Gradwein		
				AETER 24 1	
ELEV/ DEPT	ATION/ H (FT)		DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245		Doring torminated at	40.0 fact. No groundwater		Total well depth, 38.25 feet
		encountered at time	of drilling.		Borehole depth, 40.0 feet
240-	- - - 45 -		-		SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.64-feet
					Top of PVC casing elev. = 289.24 feet
					- Survey nin elev, = 286 07 feet
235	-50				Ground surface elev = 285.6 feet
					Northing = $87646510'$
					Easting = $1.979.334.39'$
	Ť				-
230-	-55				-
	-				-
	-60				-
225-	$\frac{1}{2}$				-
	-				
	-				-
	-				-
000	-65				-
220-	-				-
	-				-
	-				
	-				-
215-	-70				-
					-
					-
					-
2/10	_				-
²² 210-	- 75				-
					-
J-66					
1B 46					-
(ELLA					
GEOT_M				METH	ANE MONITORING PROBE NO. MM-73 Sheet 2 of 2

BUNNELL-LAMMONS ENGINEERING, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS ELEVATION/ DEPTH (FT) 6-inches of TOPSOIL Tannish-brown, silty		PROJECT: CLIENT: LOCATION: DRILLER: DRILLING MI DEPTH TO - DESCRIPTIO	Perry County Landfill HHNT Uniontown, Alabama Landprobe, T. Gradwel ETHO <u>D: 6-inch air rotary</u> WATER> INITIAL: ⊻ ON	AFTER 24	HOURS:	PROJECT NO.: <u>J07-4999-06</u> START: <u>6-29-07</u> END: <u>6-29-07</u> ELEVATION: <u>283.2</u> LOGGED BY: <u>T. Gradwell</u> <u>CAVING></u> MONITOR WELL INSTALLATION DETAILS Neat cement, 0 to 1.0 feet Bentonite seal, 1.0 to 2.5 feet Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 40.0 feet
275- - - - - - - - - - - - - - - - - - -	Very hard, dry, gray (CLAY				
265- - -20 - 260- - - -25						2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 38.0 feet
255						
245- -				METH		Pipe cap

			METHANE MC	NITORING I	PROBE NO. MM-74		
		PROJECT:	Perry County Landfill	<u>.</u>	PROJECT NO.: <u>J07-4999-06</u>		
BUN	INELL-LAMMONS	CLIENT:	HHNT	· · · · · ·	START: <u>6-29-07</u> END: <u>6-29-07</u>		
EN	GINEERING, INC.	LOCATION:	Uniontown, Alabama		ELEVATION: 283.2		
GEOT	Geotechnical And Environmental. Consultants		Landprobe, T. Gradwell		LOGGED BY: <u>T. Gradwell</u>		
			ETHOD: 6-inch air rotary		.		
		DEPTH TO -	Water> initial: ¥	AFTER 24 HC	DURS: ⊈ CAVING>		
ELEVATION DEPTH (F1	:LEVATION/ DEPTH (FT)		ON	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS		
	Boring terminated at	40.0 feet. N	o aroundwater		Total well depth, 38.25 feet		
240-	encountered at time	of drilling.			Borehole depth, 40.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover		
					PVC stick up = 3.56 feet		
235-					Top of PVC casing elev. = 286.76 feet		
					Survey pin elev. = 283.56 feet		
[°					Ground surface elev. = 283.2 feet		
					Northing = 876,458.55'		
220					Easting = 1,979,237.71'		
230-							
-5	5				-		
-	-						
225-							
-6	0				-		
220-							
-6	5				-		
215-							
7					-		
210-							
22/10	5				-		
<u>5</u>	-						
-666 - 00E							
MEIT							
GEOT				METHA	NE WONITORING PROBE NO. MM-74 Sheet 2 of 2		

			METHANE MON	ITORIN	G PRC	DBE NO. MM-75	
	- 112 1 21 INU.	PROJECT: Perry County Landfill PROJECT NO.: <u>J07-</u>					
DIRIAICI		CLIENT:	START: <u>6-29-07</u> END: <u>6-29-0</u>				
ENCINI	EERING INC	LOCATION:	Uniontown, Alabama			ELEVATION: 280.4	
		DRILLER:	Landprobe, T. Gradwell			LOGGED BY: <u>T. Gradwell</u>	
Georechnic		DRILLING MI	ETHOD: 6-inch air rotary				
Ŭ	UNBULIAN IS	DEPTH TO -	water> initial: $ abla$	AFTER 24	HOURS:		
		DESCRIPTIO	ON	SOIL		MONITOR WELL INSTALLATION	
280-6	-inches of TOPSOIL	•				Neat cement, 0 to 1.0 feet	
T T	annish-brown, silty	, sandy CLA	(Bentonite seal, 1.0 to 2.5 feet	
						Filter pack, sand 2.5 to 3.0 feet	
						Pea gravel, 3.0 to 35.0 feet	
275-5							
F					的一般		
		<u></u>					
- \	/ery hard, dry, gray (CLAY			阿爾		
F				\//////	日本		
-10					的目的		
					的目的		
					G		
				\//////	図目気		
F					図目気		
65					的一段		
-							
-							
-							
-							
-20						0 in the Newston 0 000 in the station	
60-20						Schedule 40 PVC well screen, 3.0	
						33.0 feet	
55 25							
				\//////			
				<i>\//////</i>			
50							
F							
F 1						Pipe cap	
-					1 COSC		
-35				{///////	1 BASSE	i otal well depth, 33.25 feet	
45 E	Boring terminated at	t 35.0 feet. N	o groundwater			Borehole depth, 35.0 feet	
e	encountered at time	of drilling.				4" round stand-up locking aluminu	
						protective cover with a 3' x 3'	
						pin	
			· · · · · · · · · · · · · · · · · · ·	MET	HANE N	NONITORING PROBE NO. MM	
						Sheet 1 c	

	BLEINC.	METHANE MONITORING PROBE NO. MM-75 PROJECT: Perry County Landfill PROJECT NO.: J07-4999-06						
BUNN ENGI Geotechi	ELL-LAMMONS NEERING, INC. NICALANDENVIRONMENTAL Consultants	CLIENT LOCATION: DRILLER: DRILLING ME	HHNT Uniontown, Alabama Landprobe, T. Gradwell ETHOD: 6-inch air rotary WATER> INITIAL: ⊻	START: <u>6-29-07</u> END: <u>6-29-07</u> ELEVATION: <u>280.4</u> LOGGED BY: <u>T. Gradwell</u> JRS: ¥ CAVING>				
ELEVATION/ DEPTH (FT)		DESCRIPTIO		SOIL TYPE	MONITOR WELL INSTALLATION DETAILS			
24045 23545 23050 22555 -55 -60 22060 -60 -70 -70 -70 -70 -70 -75					1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.68 feet Top of PVC casing elev. = 284.08 feet Ground surface elev. = 280.4 feet Northing = 876,443.46' Easting = 1,979,131.91'			
				METHAN	E MONITORING PROBE NO. MM-75 Sheet 2 of 2			

			METHANE MON	IITORING F	PROBE NO. MM-76
		PROJECT:	Perry County Landfill		PROJECT NO.: <u>J07-49</u> 99-06
		CLIENT:	HHNT		START: 6-29-07 END: 6-29
BUNN	ELL-LAMMONS	LOCATION:	Uniontown, Alabama		ELEVATION: 277.5
ENGI	NEEKING, INC.	DRILLER:	Landprobe, T. Gradwell		LOGGED BY: T. Gradwell
GEOTECH	NICALANDENVIRONMENTAL		THOD: 6-inch air rotany		
	CONSULTANTS		$AATED > INITIAL \nabla$		
		DEPTHIO-	WATER / INITIAL		
EVATION/ EPTH (FT)		DESCRIPTIC	DN	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL		· · · · · · · · · · · · · · · · · · ·		Neat cement, 0 to 1.0 feet
-	Tannish-brown, silty	, sandy CLAY			Bentonite seal, 1.0 to 2.5 feet
""					Filter pack, sand 2.5 to 3.0 feet
-5					
70-	Very hard, drv. grav	CLAY			
40					
F					
5-					
-					
-15					
-					
50-					
20					
20					2-inch diameter, 0.020-inch slotted
					33.0 feet
55-					
F					
-25					
-					
50-					
- 30					
50					
ı5-[
					Pipe cap
F					Total well depth. 33 25 feet
-35	h	·			Borehole donth 25.0 feat
	Boring terminated at	35.0 feet. No	o groundwater		SURFACE COMPLETION
.	encountered at time	of drilling.			4" round stand-up locking alumin
40-					protective cover with a 3' x 3' concrete pad at the base with sur
					pin

		BLABINC.		METHANE	IONITOR	RING	PROBE NO. MM-76
			PROJECT:	Perry County Landfill			PROJECT NO.: J07-4999-06
BL	JNN	ELL-LAMMONS	CLIENT:	HHNT			STARI: <u>6-29-07</u> END: <u>6-29-07</u>
E	NGI	NEERING, INC.	LOCATION:	Uniontown, Alabama			ELEVATION: <u>277.5</u>
G	OTECH	INICALANDENVIRONMENTAL	DRILLER:	Landprobe, T. Gradwe	<u> </u>		LOGGED BY: <u>T. Gradwell</u>
		CONSULTANTS	DRILLING ME	THOD: 6-inch air rotary			
			DEPTH TO - V	WATER> INITIAL: ¥	AFTI	ER 24	HOURS: CAVING>
ELEVA DEPTH	FION/ (FT)		DESCRIPTIC	DN	S	OIL YPE	MONITOR WELL INSTALLATION DETAILS
	-						1/4-inch weep hole installed in aluminum cover
235-							PVC stick-up = 3.91 feet
							Top of PVC casing elev. = 281.41 feet
	-						Survey pin elev. = 278.06 feet
	-45						Ground surface elev. = 277.5 feet
i	F						Northing = 876,424.18'
230-	-						Easting = 1,979,028.48'
200	-						-
	-						-
	-50						-
	-						-
225-	-						-
	_						-
	-						-
1	-55						-
1	-						-
220-	_						-
220	-						-
	-						-
	-60						-
	\vdash					1	-
045	-						-
215-	\mathbf{F}						-
	-						-
	-65						-
	-						-
	-						-
210-	-						-
	-						-
	-70						-
1	-						-
	ļ						-
205-	1						-
,	Ļ						-
	-75						
1	Ļ						-
	Ļ						-
200-							-
	Ļ						-
					1	METH	IANE MONITORING PROBE NO. MM-76
5L							Sheet 2 01 2

			METHANE MC	DNITORIN	G PRO	DBE NO. MM-77		
		PROJECT	PROJECT: Perry County Landfill PROJECT NO.: J07-4					
			HHNT					
BUNN	ELL-LAMMONS	LOCATION	Uniontown Alabama					
ENGI	NEERING, INC.	LOCATION:	Uniontown, Alabama					
GEOTECHI	NGALANDENVIRONMENTAL	DRILLER:	Landprobe, I. Gradwell			LOGGED BT: 1. Gradwen		
	Consultants	DRILLING M	HOD: 6-inch air rotary			V		
		DEPTH TO -	water> initial:⊻	AFTER 2	4 HOURS:	<u> </u>		
ELEVATION/ DEPTH (FT)		DESCRIPTIO	N	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS		
<u> </u>	6-inches of TOPSOIL			12. AL		Neat cement, 0 to 1.0 feet		
- F [Tannish-brown, sand	- dv. siltv CLA	/	\/////		Neat cement. 1.0 to 2.5 feet		
-	· · · · · · · · · · · · · · · · · · ·	,,,,				·····, ····,		
-						Filter pack, sand 2.5 to 3.0 feet		
-						Pea gravel, 5.0 to 26.0 leet		
270-5								
Γ								
F	Mana har tala and							
F	very nard, dry, gray	LAI						
	;							
265-10								
Γ						2-inch diameter, 0.020-inch slotted		
						28.0 feet		
-								
26015								
-					RER			
25520								
-								
250-25								
-								
						Ріре сар		
24530				{	6626	Total well depth, 28.25 feet		
-	Boring terminated at	t 30.0 feet. N	o groundwater			Borehole depth, 30.0 feet		
	encountered at time	of drilling.				SURFACE COMPLETION		
						4" round stand-up locking aluminut protective cover with a 3' x 3'		
						concrete pad at the base with surve		
24035						pin 1/4-inch weep hole installed in aluminum cover		
F						PVC stick-up = 3.58 feet		
F						Top of PVC casing elev. = 276.48 fe		
-						Ground surface elev. = 273.29 feet		
						Northing = 876,417 10'		
						⊨asung = 1,978,927.97'		
				MET	HANE N	NONITORING PROBE NO. MM		
						Sheet 1 of		

		ľ	METHANE MO	NITORING	6 PRC	DBE NO. MM-78
		PROJECT: Peri	y County Landfill			PROJECT NO.: J07-4999-06
		CLIENT: HH	IT			START: 6-30-07 END: 6-30-07
BONN	IELL-LAMMUNS	LOCATION: Unio	ontown, Alabama			ELEVATION: 273.0
ENG	NEEKING, INC.	DRILLER: Lan	dprobe, T. Gradwell			LOGGED BY: T. Gradwell
GeotechnicalAndEnvironmental		DRILLING METHO	D: 6-inch air rotary			
	Consultants	DEPTH TO - WATE	\mathbb{R} initial : ∇	AFTER 24	HOURS:	
EVATION/ EPTH (FT)		DESCRIPTION		SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
	- 6-inches of TOPSOIL			<u> </u>		Neat cement, 0 to 1.0 feet
÷	Dark tannish-brown,	silty CLAY	······································			Bentonite seal, 1.0 to 2.5 feet
Γ						Filter pools cound 2 5 to 2 0 foot
70+						Pea gravel, 3.0 to 28.0 feet
F						
-5					数目数	
ŀ					お目的	
╞	Very hard dry grav			¥///////		
65 +	very nara, ary, gray	v = 7 ()				
ŀ						
⊢ 10					的目的	
Ļ						
Ļ					図一段	o inchestioner a coo tradication t
<u></u>						Schedule 40 PVC well screen, 3.0 to
~						28.0 feet
Γ						
-15						
F						
F						
5+					設置は	
ł					路田路	
-20					路目路	
ŀ						
F						
50-						
-						
25						
_						
					ST S	
15-						Dine con
					B BBB	гіре сар
20		·····			6656	Total well depth, 28.25 feet
_ 30	Boring terminated a	t 30.0 feet. No arc	oundwater			Borehole depth, 30.0 feet
ſ	encountered at time	of drilling.				SURFACE COMPLETION
40-		-				4" round stand-up locking aluminun protective cover with a 3' x 3' concrete pad at the base with surve
ŀ						pin
-35						1/4-inch weep hole installed in aluminum cover
ŀ						PVC stick-up = 3.66 feet
ŀ						Survey pin elev. = 273.62 feet
35-						Ground surface elev. = 273.0 feet
ŀ						Easting = 1,978,836.20'
					J A KIC B	

			METHANE MO	NITORIN	G PRC	DBE NO. MM-79
		PROJECT:	Perry County Landfill			PROJECT NO.: J07-4999-06
		CLIENT:	HHNT			START: <u>6-30-07</u> END: <u>6-30-</u>
BUNN	IELL-LAMMUNS	LOCATION:	Uniontown, Alabama			ELEVATION: 271.7
ENG	NEEKING, INC.	DRILLER:	Landprobe, T. Gradwell			LOGGED BY: T. Gradwell
GEOTECH	INICAL AND ENVIRONMENTAL		ETHOD: 6-inch air rotary			
	Consultants	DEPTH TO -	waters initial $\cdot \nabla$	AFTER 2	4 HOURS:	
	· · · · · · · · · · · · · · · · · · ·					00
LEVATION/ DEPTH (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
1	6-inches of TOPSOIL			\$ 12: 31		Neat cement, 0 to 1.0 feet
-	Dark tannish-brown.	silty CLAY	····			Bentonite seal, 1.0 to 2.5 feet
270-		· · · · · · · · · · · · · · · · · · ·				
ŀ						Filter pack, sand 2.5 to 3.0 feet
						Pea gravel, 3.0 to 25.0 feet
5						
5						
265	Vonchard dry areas					
	very nard, dry, gray	ULAI				
-						
-						
-10						
Ļ						
60-						
· -						2-inch diameter, 0.020-inch slotted
F						23.0 feet
ŀ						
-15						
L						
255-						
Γ						
T T						
-						
-20						
Ļ						
250-						
Γ						Pipe cap
ŀ						
-25					4 www.	Total well depth, 23.25 feet
245-	Boring terminated at encountered at time	t 25.0 feet. N of drilling.	o groundwater			Borehole depth, 25.0 feet
						SURFACE COMPLETION
Γ						4" round stand-up locking alumin
F						concrete pad at the base with sur
-30						pin
240-						1/4-inch weep hole installed in
Ļ						
L						PVC stick-up = 3.56 feet
						Top of PVC casing elev. = 275.26
-35						Survey pin elev. = 272.14 feet
25						Ground surface elev. = 271.7 feet
					ļ	Northing = 876,401.69'
ŀ						Easting = 1,978,765.86'
ŀ						
l	L		· ····	MET		ONITORING PROBE NO. MI

			METHANE M	IONITOR	ING PRO	DBE NO. MM-80
		PROJECT	Perry County Landfill			PROJECT NO.: J07-4999-06
		CLIENT:	HHNT			START: 6-30-07 END: 6-30-
ENCI	NEEDING INC	LOCATION:	Uniontown, Alabama			ELEVATION: 271.8
ENG	REEKING, INC.	DRILLER:	Landprobe, T. Gradwel			LOGGED BY: T. Gradwell
GEOTEC	INICALANDENVIRONMENTAL	DRILLING M	ETHOD: 6-inch air rotary			
	CONSULTANTS	DEPTH TO -	water> initial: ∇	AFTE	R 24 HOURS:	
LEVATION/ DEPTH (FT)		DESCRIPTI	ON	SC TY		MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL			<u></u>		Neat cement, 0 to 1.0 feet
-	Dark brownish-tan, s	ilty CLAY		^		Bentonite seal, 1.0 to 2.5 feet
270-		•				
-						Filter pack, sand 2.5 to 3.0 feet
Ļ						Pea gravel, 3.0 to 25.0 feet
-5						
265						
	Very hard, dry, gray	CLAY				
F						
F						
-10						
-						
60-						
						2-inch diameter, 0.020-inch slotter
F						23.0 feet
F						
-15						
Ļ						
255-						
Ē						
-						
-20						
-						
250-						
Γ						Pipe cap
-25						Total well depth, 23.25 feet
:45-	Boring terminated at encountered at time	25.0 feet. No of drilling.	o groundwater			Borehole depth, 25.0 feet
						SURFACE COMPLETION
						4" round stand-up locking alumin protective cover with a 3' x 3'
200						concrete pad at the base with sur
-30						pın
.40-						1/4-inch weep hole installed in aluminum cover
F						PVC stick-up = 3.68 feet
F						Top of PVC casing elev. = 275.48
-35						Survey pin elev. = 272.17 feet
ŀ						Ground surface alay = 271 & fact
35						
						Northing = $8/6,440.88^{\circ}$
						Easting = 1,978,695.61'
ſ						
I	L	<u> </u>		M	ETHANE M	ONITORING PROBE NO. MN

		BLA BINC.		METHANE MC	DNITORING	PRC	DBE NO. MM-81
			PROJECT:	Perry County Landfill			PROJECT NO.: J07-4999-06
BU	NN	ELL-LAMMONS	CLIENT:	HHNT			START: <u>7-1-07</u> END: <u>7-1-0</u>
F	NGI	NEERING. INC.	LOCATION:	Uniontown, Alabama			ELEVATION: 271.2
		DRILLER:	Landprobe, T. Gradwell			LOGGED BY: T. Gradwell	
GE	OIECH		DRILLING MI	ETHOD: 6-inch air rotary			
			DEPTH TO -	water> initial: $ abla$	AFTER 24 H	OURS:	▲ CAVING> ★
:LEVATI DEPTH (10N/ (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
		6-inches of TOPSOIL			34 34 R	d-ka	Neat cement, 0 to 1.0 feet
270-	. [Tannish-brown, silty	CLAY				Bentonite seal 1.0 to 2.5 feet
╞	.	· · · · · · · · · · · · · · · · · · ·					
ŀ	.					x bix	Filter pack, sand 2.5 to 3.0 feet
F	.					建國	rea graver, 3.0 to 23.0 teet
Ļ	-5					和國	
	-						
265	.	Very hard dry gray (CLAY	· · · · · · · · · · · · · · · · · · ·			
Γ		tory nara, ary, gray (
ſ							
F	·					図目的	
ŀ	-10					XEX	
260-+	.					と言わ	
ŀ						X=X	2-inch diameter 0 020-inch slotter
╞	.					ð B	Schedule 40 PVC well screen, 3.0
L	.					ð≡Ø	23.0 feet
	-15					ð Egg	
	-15					8≡8	
255-						ð Eg	
F						ģ≣ģ	
ŀ						ġ=ġ	
F	.					\$ E \$	
ŀ	-20					\$ 二 \$	
250						\$ F }	
-	.					算算	
Ļ						<u> </u>	
L						826	Ріре сар
ſ	_2=					686	
Γ	-23	Boring terminated at	25 A foot N	o aroundwater			Total well depth, 23.25 feet
245-[encountered at time	of drilling.	o groundwater			Borehole depth, 25.0 feet
ſ							SURFACE COMPLETION
ſ							4" round stand-up locking aluminu
ľ							concrete pad at the base with surv
	-30						pin
240-1							1/4-inch weep hole installed in
ſ							aluminum cover
ľ							PVC stick-up = 3.49 feet
F	.						Top of PVC casing elev. = 274.69 f
F	-35						Survey pin elev. = 271.53 feet
235-+							Ground surface elev. = 271.2 feet
ŀ	.						Northing = 876.507.02'
-							Fasting = 1 978 610 70'
F	.						1,010,01010
		<u> </u>					
					METHA	ANE M	IONITORING PROBE NO. MN

				METHANE MC	ΝΙΤΟ	ORINO	G PRC	DBE NO. MM-82
			PROJECT:	Perry County Landfill				PROJECT NO.: <u>J07-4999-06</u>
	a i a i		CLIENT:	HHNT		START: <u>7-1-07</u> END: <u>7-1-07</u>		
		ELL-LAMMUNS	LOCATION:	Uniontown, Alabama				ELEVATION: 270.1
			DRILLER:	Landprobe, T. Gradwell				LOGGED BY: <u>T. Gradwell</u>
GEO	OTECH		DRILLING M	ETHOD: 6-inch air rotary		·····		
		ourgulian 13	DEPTH TO -	water> initial: $ abla$	A	FTER 24	HOURS:	
ELEVATI DEPTH (ION/ (FT)		DESCRIPTI	ON		SOIL TYPE	ابل آر	MONITOR WELL INSTALLATION DETAILS
		C inches of TODSON		· · · · · · · · · · · · · · · · · · ·		\$4:54		Neat cement 0 to 10 feet
1	ŀ	Tannish-brown silty	<u>CLAY</u>					Rentonite seal 1 0 to 25 feet
		ramisi-brown, sity						Dentonite seal, 1.0 to 2.3 leet
							in the	Filter pack, sand 2.5 to 3.0 feet
	1							Pea gravel, 3.0 to 20.0 feet
265-	-5							-
						<i>\//////</i>		
	ļ							
		Gray CLAY				\/////		
	10						設置設	2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to _
260-	-10						辞録	18.0 feet
-	·							
255-	-15							-
	.							
							<u> <u> </u></u>	D
[6856	Ріре сар
	-20						66266	Total well depth, 18.25 feet
250-	20	Boring terminated at	20.0 feet. N	o aroundwater				
		encountered at time	of drilling.	- 3				Borehole depth, 20.0 feet
-								SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
245	-25							
								1/4-inch weep hole installed in aluminum cover
								PVC stick-up = 3.72 feet
								Top of PVC casing elev. = 273.82 feet
240-	-30							Survey pin elev. = 270.51 feet
								Ground surface elev = 270.1 feet
								Northing = $876 574 44^{-1}$
	.							Northing - 010,014.41
	.							⊑asting = 1,978,547.53
	- 25							-
235-	55							
[
†								
		<u> </u>			. <u>.</u>	MET		IONITORING PROBE NO. MM-82 Sheet 1 of 1

	BLABINC.	PROJECT	METHANE MC Perry County Landfill	NITORING PR	OBE NO. MM-83 PROJECT NO.: <u>J07-4999-06</u>
DIM	inei I I annong	CLIENT:	HHNT		START: 7-1-07 END: 7-1-07
DUr En	GINFERING INC	LOCATION:	Uniontown, Alabama		ELEVATION: 268.5
GEOT		DRILLER:	Landprobe, T. Gradwell	.	LOGGED BY: T. Gradwell
CLU.	CONSULTANTS	DRILLING M	ETHOD: 6-inch air rotary		
		DEPTH TO -	water> initial:⊻	AFTER 24 HOUR	S: ¥ CAVING>
ELEVATIO DEPTH (F)N/ T)	DESCRIPTI	ON	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL				Neat cement, 0 to 1.0 feet
+	Tannish-brown, silty	CLAY			Bentonite seal, 1.0 to 2.5 feet
265- -	5				Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 20.0 feet
[Š.
260	Gray CLAY				2 2-inch diameter, 0.020-inch slotted 5 Schedule 40 PVC well screen, 3.0 to 18.0 feet
255 -	15				
250-	20	. <u>.</u>			Y Pipe cap Total well depth, 18.25 feet
245-	Boring terminated at encountered at time	20.0 feet. N of drilling.	o groundwater		Borehole depth, 20.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
-					1/4-inch weep hole installed in aluminum cover
240-	30				PVC stick-up = 3.56 feet Top of PVC casing elev. = 272.06 feet Survey pin elev. = 268.83 feet Ground surface elev. = 268.5 feet
235-	35				Northing = 876,638.20' Easting = 1,978,467.56'
230-					
'				METHANE	MONITORING PROBE NO. MM-8 Sheet 1 of

				METHANE MO		G PRC	DBE NO. MM-84	
		DAZ inc.	PROJECT: Perry County Landfill PROJECT NO.: J07-4999-06					
			CLIENT:	HHNT			START: 7-2-07 END: 7-2-07	
B	UNN	ELL-LAMMONS	LOCATION	Uniontown, Alabama			ELEVATION: 272.2	
E	NG	NEERING, INC.	DRILLER:	Landprobe, T. Gradwell		<u> </u>	LOGGED BY: T. Gradwell	
G	EOTECH	INICALANDENVIRONMENTAL		ETHOD: 6-inch air rotary				
		CONSULTANTS		wated initial ∇				
			DLP III TO -					
ELEVA DEPTH	TION/ I (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS	
		Tan and gray CLAY -	(fill)				Neat cement, 0 to 1.0 feet	
	F						Bentonite seal, 1.0 to 2.5 feet	
270-								
	-					20 20	Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 20.0 feet	
	-	Tannish-brown silty				日日日		
	-5	rannon brown, only	02.0				-	
265-	<u> </u>							
200	-							
	_	Very hard, dry, gray (JLAY					
							2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to _	
	10						18.0 feet	
	-							
260-	-							
	-							
	-							
	-15						-	
	-							
255-						成三段		
200	Ļ					Q Q	Dine con	
						66566	Pipe cap	
	20			<u></u>		6626	Total well depth, 18.25 feet	
	20	Boring terminated at	20.0 feet N	o aroundwater				
	「	encountered at time	of drilling.	o groundhaloi			Borehole depth, 20.0 feet	
250-			U				SURFACE COMPLETION	
	~						protective cover with a 3' x 3'	
	F						concrete pad at the base with survey	
	-25							
							1/4-inch weep hole installed in	
245	-					1	aluminum cover	
	-						PVC stick-up = 3 58 feet	
	-						Top of DVC casing alow = 275.79 foot	
	-30							
							Survey pin elev. = $2/2.47$ feet	
	L						Ground surface elev. = 272.2 feet	
240-							Northing = 876,694.73'	
	[]						Easting = 1,978,385.16'	
	-35				1		-	
	F							
235-	╞╴╽							
	-							
	-							
		L						
					MET	HANE M	ONITORING PROBE NO. MM-84	
							Sneet 1 of 1	

		BLA Binc.	PROJECT	METHANE MC	NITORI	ing Pro	OBE NO. MM-85 PROJECT NO: 107-4999-06
_			CLIENT	HHNT			START: 7-1-07 END: 7-1-07
BL	JNN	ELL-LAMMONS	LOCATION:	Uniontown. Alabama			ELEVATION: 262.5
Ξ	ENGINEERING, INC. Geotechnical And Environmental		DRILLER:	Landprobe, T. Gradwell		<u>. </u>	LOGGED BY: T. Gradwell
G			DRILLING M	ETHOD: 6-inch air rotary	· · · · · · · · · · · · · · · · · · ·		
		Consultants	DEPTH TO -	water> initial: Ψ	AFTEI	R 24 HOURS	: ¥ CAVING>
ELEVA DEPTH	tion/ I (FT)		DESCRIPTI	ON	SO TYI		MONITOR WELL INSTALLATION DETAILS
	[6-inches of TOPSOIL					Neat cement, 0 to 1.0 feet
	-	Tannish-brown, silty	CLAY				Bentonite seal, 1.0 to 2.5 feet
260-							Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 10.0 feet
	-5	Gray CLAY					2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 8.0 feet
255-	-						Pipe cap
	-10						Total well depth, 8.25 feet
	-	Boring terminated at	10.0 feet. N	o groundwater			Borehole depth, 10.0 feet
250-	-	encountered at time	of drilling.				SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey
							1/4-inch weep hole installed in aluminum cover
245-	-						PVC stick-up = 3.55 feet
	-						Top of PVC casing elev = 266.05 fee
	-20						Survey nin elev. = 262.89 feet
	-						Ground surface elev. = 262.5 feet
.	-						Northing = 876.767.03'
240-	-						Easting = 1,978,284.29'
	-25						
235-							
	ŀ						
	-30						
	-						
230-	-						
	-						
	- 35						
	-						
225-	- 						
	F						
	F						
		•			M	ETHANE M	MONITORING PROBE NO. MM-8 Sheet 1 of

	BLE.	METHANE MONITORING PROBE NO. MM-91 PROJECT: Perry Uniontown Landfill PROJECT NO.: 109-4995						
BUNN	ELL-LAMMONS	CLIENT:	Hodges, Harbin, Newberry & Tr	ribble, Inc.	START: <u>9-9-09</u> END: <u>9-9-09</u>			
ENGINEERING, INC. Geotechnical And Environmental		LOCATION:	Uniontown, Alabama	.	ELEVATION: 261.5			
		DRILLER:	Landprobe, R. Banks		LOGGED BY: <u>M. Preddy/C. I</u>			
	CONSULTANTS		ETHOD: CME 750 ATV; 8-1/4 inch (OD hollow stem a				
	· · · · · · · · · · · · · · · · · · ·	DEPTH TO -	WATER> INITIAL: ¥	AFTER 24 HOU	RS: 🛂 CAVING> 😿			
ELEVATION/ DEPTH (FT)		DESCRIPTION	N	SOIL TYPE	MONITOR WELL INSTALLATION			
	6-inches of TOPSOIL			1 String	Neat cement, 0 to 1.84 feet			
260-	Stiff, brown, slightly	moist, silty C	CLAY		Bentonite seal 1 84 to 2 84 feet			
					Filter pack, sand 2.84 to 3.44 feet			
255-					2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.22 8.22 feet			
F	Hard, brown and gra	y, slightly mo	bist, silty CLAY		Pipe cap			
-	Boring terminated at	t 8.47 feet.			Total well double 0.47 fact			
-10					i otal well depth, 8.47 feet			
250					SURFACE COMPLETION 4" round stand-up locking aluminu protective cover with a 3' x 3' concrete pad at the base with surve pin			
-15					1/4-inch weep hole installed in aluminum cover			
-					PVC stick-up = 2.96-feet			
					Top of PVC casing elev. = 264.48 fe			
240-					Survey pin elev. = 261.94 feet			
					Ground surface elev. = 261.5 feet			
-					Northing = 877,100.63'			
-25					Easting = 1,977,800.62'			
235-								
-								
-30								
230-								
-								
-35								
225-								
-								
				WEIHAN	E WONITOKING PROBE NO. MM Sheet 1 o			

	BLE BINC.		METHANE MONI	TORING PF	
			Hodges, Harbin, Newberry & 1	START: 9-9-09 FND: 9-9-09	
BU	BUNNELL-LAMMONS ENGINEERING, INC.		Uniontown. Alabama		ELEVATION: 263.0
EN			Landprobe, R. Banks		LOGGED BY: M. Preddy/C. Bro
GEO	TECHNICALANDENVIRONMENT	TAL DRILLING M	ETHOD: CME 750 ATV; 8-1/4 inch	OD hollow stem at	uger
	Consultants	DEPTH TO -	WATER> INITIAL: 🗸	AFTER 24 HOUR	ks: ¥ CAVING>
ELEVATIO DEPTH (F	DN/ T)	DESCRIPTI	ON		MONITOR WELL INSTALLATION DETAILS
			·····		
Ļ	- 6-inches of TOP	SOIL			Neat cement, 0 to 1.19 feet
260-	Light brown, on	ginty moloc, only			Filter pack, sand 2.19 to 2.79 feet Pea gravel, 2.79 to 8.19 feet
	5 Very stiff, gray,	slightly moist, sil	ty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.94 to 7.94 feet
255-					Pipe cap
- 	Boring terminat	ted at 8.19 feet.			Total well depth, 8.19 feet
250					SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
-	15				1/4-inch weep hole installed in aluminum cover
245-					PVC stick-up = 3.04-feet
-:	20				Top of PVC casing elev. = 266.00 feet
-					Survey pin elev. = 263.37 feet
240-					Ground surface elev. = 263.0 feet
-					Northing = 877,158.82'
-:	25				Easting = 1,977,726.85'
235					
ļ-;	30				
F					
230					
-: -	35				
225-					
-					
				METHANE	MONITORING PROBE NO. MM-92 Sheet 1 of '

				METHANE MON	IITORING	PROBE NO. MM-93		
			PROJECT:	Perry Uniontown Landfill		PROJECT NO.: <u>J09-4999-18</u>		
BI	BUNNELL-LAMMONS ENGINEERING, INC.		CLIENT	Hodges, Harbin, Newberry &	START: <u>9-9-09</u> END: <u>9-9-09</u>			
E			LOCATION:	Uniontown, Alabama		ELEVATION: _264.2		
G	EOTEC	HNICAL AND ENVIRONMENTAL	DRILLER:	Landprobe, R. Banks		LOGGED BY: <u>M. Preddy/C. Bro</u>		
		Consultants	DRILLING MI	ETHOD: CME 750 ATV; 8-1/4 inc	h OD hollow ste	em auger		
		r	DEPTH TO -	water> initial:⊻	_ AFTER 24 H			
ELEVA [®] DEPTH	fion/ (FT)		DESCRIPTIO	NC	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS		
		- 6-inches of TOPSOIL			34.34	Neat cement, 0 to 1.41 feet		
	-	Stiff, brown, slightly	moist, silty C	LAY				
	-					Eliter peek cond 2 41 to 2 4 feet		
	-					Dea gravel, 3.1 to 13.12 feet		
260-	-							
	-5							
	-	Very stiff, light brown	n, slightly mo	bist, clayey SILT				
	-					2-inch diameter, 0.010-inch slotted		
	-					Schedule 40 PVC well screen, 2.87 to		
255-	-							
	-10							
	_							
	_							
	-					Pipe cap		
250-	-	Boring terminated at	: 13.12 feet.			. Po oup		
200	-15					Total well depth, 13.12 feet		
	-					<u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum		
	_					protective cover with a 3' x 3'		
	_					pin		
	_							
245-	_20					1/4-inch weep hole installed in aluminum cover		
	20							
						PVC stick-up = 2.57-feet		
	-					Top of PVC casing elev. = 266.79 feet		
240-	-					Survey pin elev. = 264.41 feet		
	-25					Ground surface elev. = 264.2 feet		
	-					Northing = 877,198.39'		
	-					Easting = 1,977,656.35'		
235-	-							
	-30					-		
	-							
	-							
	_							
230-	-							
200	-35					-		
	-							
	_							
	_							
	_							
225-								
					METHA	ANE MONITORING PROBE NO. MM-93		
						Sheet 1 of 1		

	BLARINC.	METHANE MONITORING PROBE NO. MM-94 PROJECT: Perry Uniontown Landfill PROJECT: Perry Uniontown Landfill					
RUNNEI I J AMMONG		CLIENT:	Hodges, Harbin, Newberry &	Tribble, Inc.	START: 9-9-09 END: 9-9-0		
FIGINFERING INC.		LOCATION:	Uniontown, Alabama		ELEVATION: 264.5		
GEOTEC		DRILLER:	Landprobe, R. Banks		LOGGED BY: M. Preddy/C.		
	Consultants	DRILLING M	ETHOD: CME 750 ATV; 8-1/4 incl	h OD hollow st	tem auger		
	T	DEPTH TO -	water> initial:⊻	_ AFTER 24 H	HOURS: 🖣 CAVING> 😿		
ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS		
	6-inches of TOPSOIL	-		14 N/4	Neat cement, 0 to 1.09 feet		
-	Stiff, brown, slightly	moist, fine to	o medium sandy, silty		Bentonite seal, 1.09 to 2.09 feet		
2605	CLAY				Filter pack, sand 2.09 to 2.69 feet Pea gravel, 2.69 to 13.19 feet		
-					Contraction of the state of the		
255	Very stiff, grayish-br	own, clayey (SILI		Schedule 40 PVC well screen, 2.94 12.94 feet		
-					Pipe cap		
250	Boring terminated at	: 13.19 feet.			Total well depth, 13.19 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminu protective cover with a 3' x 3' concrete pad at the base with surve pin		
245- 20					1/4-inch weep hole installed in aluminum cover		
-					PVC stick-up = 2.97-feet		
-					Top of PVC casing elev. = 267.42 fe		
240					Survey pin elev. = 264.85 feet		
-					Ground surface elev. = 264.5 feet		
-					Northing = 877,288.82' Easting = 1,977,547.87'		
235							
230-							
-35							
225-							
				METH	IANE MONITORING PROBE NO. MM Sheet 1 o		



	BL Binc.	PROJECT	METHANE M Perry Uniontown Landfi	ONITORING	PRO	BE NO. MM-96 PROJECT NO.: <u>J09-4999-18</u>		
BUNN	IELL-LAMMONS	CLIENT:	Hodges, Harbin, Newbe Uniontown. Alabama	rry & Tribble, Inc.		START: <u>9-3-09</u> END: <u>9-3-09</u> ELEVATION: 264.2		
ENGINEERING, INC. Geotechnical And Environmental		DRILLER:	Landprobe, R. Banks			LOGGED BY: M. Preddy/C. Br		
		DRILLING M	ETHOD: CME 750 ATV; 8-1	4 inch OD hollow s	tem auge	r		
	CONSULTANTS	DEPTH TO -	water> initial: $ arrow$	AFTER 24	HOURS:			
ELEVATION/ DEPTH (FT)		DESCRIPTI	ON	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS		
	Stiff. brown. slightly	moist silty CLAY				Neat cement. 0 to 1.15 feet		
-		····· · ··· · ··· · ···· · ···· · ······				Bentonite seal, 1.15 to 2.15 feet		
F					ia ia	Filter pack, sand 2.15 to 2.75 feet		
F						Pea gravel, 2.75 to 13.25 feet		
260-								
_								
L					料目的			
Ļ					設置的			
255						Schedule 40 PVC well screen, 3.00 to		
∠ ²⁰⁰ −10						13.00 feet		
-	[]							
-	Hard, grayisn-brown	i, moist, siity	GLAF					
-						Pipe cap		
250-	Boring terminated at	t 13.25 feet.				Total well depth 13 25 feet		
15 - -						SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin		
245-						1/4-inch weep hole installed in aluminum cover		
ŀ						PVC stick-up = 2.90-feet		
						Top of PVC casing elev. = 267.07 feet		
-25						Survey pin elev. = 264.49 feet		
						Ground surface elev. = 264.2 feet		
Ļ						Northing = 877,375.13'		
235-						Easting = 1,977,374.74'		
-30								
ŀ								
ŀ								
ŀ								
230-								
-35								
ŀ								
F								
225								
				МЕТН		ONITOPING PROBE NO MM.O		

		BLE RINC.	PROJECT	METHANE MONITORING PROBE NO. MM-97 PROJECT: Perry Uniontown Landfill PROJECT: Perry Uniontown Landfill CLIENT: Hodges Harbin Newberry & Tribble Inc.					
BL	BUNNELL-LAMMONS			Hodges, Harbin, Newber		START: <u>9-3-09</u> END: <u>9-3-09</u>			
E	NGI	NEERING, INC.		Landprobe, R. Banks	LOGGED BY: M. Preddv/C. Bro				
Ge	OTECH		DRILLING M	ETHOD: CME 750 ATV; 8-1/	4 inch OD	hollow	stem auge	er	
		CONSULTANTS	DEPTH TO -	water> initial: $ arrow$	AF	TER 24	HOURS:		
ELEVAT DEPTH	rion/ (FT)		DESCRIPTION			SOIL TYPE		MONITOR WELL INSTALLATION DETAILS	
		Brown, slightly mois	t, silty CLAY					Neat cement, 0 to 1.25 feet	
	-		-					Bentonite seal, 1.25 to 2.25 feet	
260-	- - 5							Filter pack, sand 2.25 to 2.85 feet Pea gravel, 2.85 to 23.35 feet	
255-	- 10							2 inch diameter 0 010 inch slotted	
250 – 245 –	- 15 	Hard, grayish-brown	ı, moist, clayı	ey SILT				2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.10 to 23.10 feet	
240	-	Boring terminated a	t 23.35 feet.					Pipe cap	
240-	- 25							SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin	
235-	-30							1/4-inch weep hole installed in aluminum cover	
	-							PVC stick-up = 2.86-feet	
230-								Top of PVC casing elev. = 267.37 feet	
200	-35							Survey pin elev. = 264.84 teet Ground surface elev. = 264.5 feet	
	_							Northing = 877,438.48'	
39 5	-							Easting = 1,977,316.97'	
420	l	I				MET		ONITORING PROBE NO. MM-97 Sheet 1 of	
		PROJECT	METHANE MC Perry Uniontown Landfill		B PRC	DBE NO. MM-98 PROJECT NO.: <u>J09-4999-18</u>			
--	-------------------------	----------------	--	------------------	----------	--			
BUNN	ELL-LAMMONS	CLIENT:	NT: Hodges, Harbin, Newberry & Tribble, Inc.			START: 9-4-09 END: 9-4-09			
ENGINEERING, INC. Geotechnical And Environmental Consultants		LOCATION:	Uniontown, Alabama			ELEVATION: 261.9			
		DRILLER:	Landprobe, R. Banks			LOGGED BY: <u>M. Preddy/C.</u>			
		DRILLING M	ETHOD: CME 750 ATV; 8-1/4	inch OD hollow s	tem auge	ər			
····· ·	r	DEPTH TO -	water> initial: Ψ	AFTER 24	HOURS:				
ELEVATION/ DEPTH (FT)		DESCRIPTIO	О	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS			
	Stiff, gray and light b	orown, silty C	LAY			Neat cement, 0 to 1.18 feet			
-					* *	Bentonite seal, 1.18 to 2.18feet			
260-						Filter pack, sand 2.18 to 2.78 feet			
-						Pea gravel, 2.78 to 23.08 feet			
-5									
255	Hard, gray, silty CLA	Y							
_10									
250-									
_					88	2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.83			
						22.83 feet			
-15									
245-									
					X X				
-20									
240-									
-		· ·				Pipe cap			
	Boring terminated at	23.08 feet.				Total well depth. 23.08 feet			
-25						SURFACE COMPLETION			
						4" round stand-up locking aluminu			
235-						concrete pad at the base with surv			
-						pin			
-30						1/4-inch weep hole installed in aluminum cover			
						PVC stick-up = 3.17-feet			
:3U - -						Top of PVC casing elev. = 265.04 fe			
+						Survey pin elev. = 262.38 feet			
-35						Ground surface elev. = 261.9 feet			
225-						Northing = 877,504.82'			
-						Easting = 1,977,206.62'			
				METH	ANE M	IONITORING PROBE NO. MM Sheet 1 o			

BUNN ENG Geotect	IBLA BINC. IELL-LAMMONS INEERING, INC. INICALANDENVIRONMENTAL CONSULTANTS	PROJECT: CLIENT: LOCATION: DRILLER: DRILLING M DEPTH TO -	METHANE MC Perry Uniontown Landfill Hodges, Harbin, Newberr Uniontown, Alabama Landprobe, R. Banks ETHOD: CME 750 ATV; 8-1/4 WATER> INITIAL: ∑	S PRC	OBE NO. MM-99 PROJECT NO.: J09-4999-18 START: 9-9-09 ELEVATION: 261.3 LOGGED BY: M. Preddy/C. B Image: Start		
ELEVATION/ DEPTH (FT)		DESCRIPTI	SOIL		MONITOR WELL INSTALLATION DETAILS		
···	6 inches of TODSON		· · · · ·	Sty 54		Next coment 0 to 1 29 feat	
260	Stiff, brown, silty CL Hard, gray and light Hard, gray, slightly f	AY brown, silty (CLAY			Bentonite seal, 1.29 to 2.29 feet Filter pack, sand 2.29 to 2.99 feet Pea gravel, 2.99 to 18.29 feet 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.04 to 18.04 feet	
243- 20 240-	Boring terminated a	t 18.29 feet.				Pipe cap Total well depth, 18.29 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminun protective cover with a 3' x 3'	
-25 235 -						pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.30-feet	
230-						Top of PVC casing elev. = 264.57 fee Survey pin elev. = 261.86 feet Ground surface elev. = 261.3 feet Northing = 877.541.38'	
35 225 -						Easting = 1,977,131.23'	
				 METH			

BUNN ENGI Geotect	BLAR INC. ELL-LAMMONS NEERING, INC. INICALANDENVIRONMENTAL CONSULTANTS	PROJECT: CLIENT: LOCATION: DRILLER: DRILLING MI DEPTH TO -	METHANE MONITORING PRO PROJECT: Perry Uniontown Landfill CLIENT: Hodges, Harbin, Newberry & Tribble, Inc. LOCATION: Uniontown, Alabama DRILLER: Landprobe, R. Banks DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auge DEPTH TO - WATER> INITIAL:				BE NO. MIM-100 PROJECT NO.: <u>J09-4999-18</u> START: <u>9-10-09</u> END: <u>9-10-09</u> ELEVATION: <u>259.5</u> LOGGED BY: <u>M. Preddy/C. Bro</u> r ▼ CAVING>	
ELEVATION/ DEPTH (FT)		DESCRIPTION			SOIL TYPE		MONITOR WELL INSTALLATION DETAILS	
2555 25010 24515 24020 -20 -25 -25 -30 -30	6-inches of TOPSOIL Very stiff, brown, mo	ay, moist, cla	ayey SILT				Neat cement, 0 to 1.73 feet Bentonite seal, 1.73 to 2.73 feet Filter pack, sand 2.73 to 3.33 feet Pea gravel, 3.33 to 18.33 feet 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.08 to 18.33 feet Pipe cap Total well depth, 18.33 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.13-feet Top of PVC casing elev. = 262.66 feet Survey pin elev. = 260.07 feet Ground surface elev. = 259.5 feet Northing = 877,591.46' Easting = 1.977.039.45'	
220-					METH	ANE MC	DNITORING PROBE NO. MM-100 Sheet 1 of 1	

			PROJECT:	METHANE MC Perry Uniontown Landfill Hodges Harbin Newbor			S PRO	BE NO. MM-101 PROJECT NO.: <u>J09-4999-18</u> START: 9-10-09 END: 9-10-09
BUNNELL-LAMMONS ENGINEERING, INC. Geotechnical And Environmental		LOCATION:	Uniontown. Alabama	iy ci i i Di	JIG, 1116.	<u> </u>	ELEVATION: 258.8	
		DRILLER:	Landprobe, R. Banks				LOGGED BY: M. Preddy/C. Br	
		DRILLING M	ETHOD: CME 750 ATV; 8-1/4	inch OD	hollow	stem aug	er	
		CONSULTANTS	DEPTH TO -	WATER> INITIAL: 💆	A	FTER 24	HOURS:	
ELEVATION/ DEPTH (FT)		DESCRIPTION			SOIL TYPE		MONITOR WELL INSTALLATION DETAILS	
····· ſ		6-inches of TOPSOIL	•	· · · · · · · · · · · · · · · · · · ·		<u> 1, x1,</u>		Neat cement, 0 to 1.14 feet
F		Brown, slightly mois	t, fine sandy	, silty CLAY	/			Bentonite seal, 1.14 to 2.14 feet
255	5							Filter pack, sand 2.14 to 2.77 feet Pea gravel, 2.77 to 18.07 feet
250-	10	Hard, light brown, m	oist, clayey S	SILT				2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.82 to
245-	15	Hard, gray, moist, cla	ayey SILT					17.oz teet
240-	-	Boring terminated at	: 18.07 feet.					Pipe cap
	20							SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
235-	25							1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.20-feet
230-						5		Top of PVC casing elev. = 261.97 fee Survey pin elev. = 259.28 feet
-	30							Ground surface elev. = 258.8 feet Northing = 877,658.29'
225-	35							Easting = 1,976,948.04"
220								
I	I					METH	ANE MO	ONITORING PROBE NO. MM-10 Sheet 1 of

	BLA Binc.	PROJECT	Perry Uniontown Landf		PROJECT NO.: <u>J09-4999-18</u>
BUNI	NELL-LAMMONS	CLIENT:	Hodges, Harbin, Newbe	erry & Tribble, Inc.	START: <u>9-10-09</u> END: <u>9-10-0</u>
ENGINEERING, INC. Geotechnical And Environmental		LOCATION:	Uniontown, Alabama		ELEVATION: 258.3
		DRILLER:	Landprobe, R. Banks		LOGGED BY: <u>M. Preddy/C.</u>
	Consultants	DRILLING M	ETHOD: CME 750 ATV; 8-1	/4 inch OD hollow stem	auger
		DEPTH TO -	WATER> INITIAL:⊻	AFTER 24 HO	URS: 🖣 CAVING> 😿
:LEVATION/ DEPTH (FT)		DESCRIPTION		SOIL	MONITOR WELL INSTALLATION DETAILS
	6-inches of TOPSOIL		· · · · · · · · · · · · · · · · · · ·	14.14	Neat cement, 0 to 1.12 feet
F	Stiff, brown, slightly	moist, silty (CLAY		Bentonite seal, 1.12 to 2.12 feet
255					Filter pack, sand 2.12 to 2.78 feet Pea gravel, 2.78 to 18.01 feet
250-	Hard gray moist sil				- A A - A - A - A - A - A - A - A - A -
-10	י ומוט, טומא, וווטוגו, און וווטוגו, און	U OLAI			Schedule 40 PVC well screen, 2.76 17.76 feet
245- ⁻ - -15 -					
240-	Dening terminated at	40.04.51			Pipe cap
	Boring terminated at	18.01 feet.			Total well depth, 18.01 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminur protective cover with a 3' x 3' concrete pad at the base with surve pin
-25					1/4-inch weep hole installed in aluminum cover
-					r vo suorup - 3.13-1661
230-					i op of PVC casing elev. = 261.42 fe
-30					Survey pin elev. = 258.74 feet
-					Ground surface elev. = 258.3 feet Northing = 877,689.98'
225-					Easting = 1,976,892.29'
-35					
220-					

GEOTECHNICAL AND ENVIRONMENTAL Consultants	CLIENT: Hodg LOCATION: Unio DRILLER: Lanc DRILLING METHOD DEPTH TO - WATER	ges, Harbin, Newberry & T ntown, Alabama Iprobe, R. Banks : CME 750 ATV; 8-1/4 inch R> INITIAL: ∑	START: <u>9-3-09</u> END: <u>9-3-09</u> ELEVATION: <u>260.6</u> LOGGED BY: <u>M. Preddy/C. Bi</u>		
ELEVATION/ DEPTH (FT)	DESCRIPTION		SOIL TYPE		MONITOR WELL INSTALLATION DETAILS
260 Soft, light brown, model 255 -5 -5 Hard, gray, moist, classical 250 -10 250 -10 250 -10 250 -10 245 -10 245 -15 240 -20 235 -25	oist, fine to mediur ayey SILT htly moist, clayey S	n sandy, clayey SILT			Neat cement, 0 to 1.19 feet Bentonite seal, 1.19 to 2.19 feet Filter pack, sand 2.19 to 2.82 feet Pea gravel, 2.82 to 18.27 feet 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.02 to 18.02 feet Pipe cap Total well depth, 18.27 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.04-feet Top of PVC casing elev. = 263.68 fee



		PROJECT:	METHANE MC		g Pro	BE NO. MM-105 PROJECT NO.: J09-4999-18 START: 0.8.00 END: 0.8.00
BUNNELL-LAMMONS ENGINEERING, INC. Geotechnical And Environmental			Uniontown, Alabama	iy & Tribble, inc	•	START: 9-8-09 END: 9-8-09 ELEVATION: 265.1
		DRILLER:	Landprobe, R. Banks			LOGGED BY: M. Preddy/C. E
		DRILLING M	ETHOD: CME 750 ATV; 8-1/	4 inch OD hollow	stem aug	er
	CONSULTANTS	DEPTH TO -	WATER> INITIAL: 💆	AFTER 2	4 HOURS:	
ELEVATION/ DEPTH (FT)		DESCRIPTI	SOIL TYPE		MONITOR WELL INSTALLATION DETAILS	
<u> </u>	Stiff, brown, slightly	moist, silty (CLAY			Neat cement, 0 to 1.13 feet
-						Bentonite seal, 1.13 to 2.13 feet
2605						Filter pack, sand 2.13 to 2.76 feet Pea gravel, 2.76 to 18.28 feet
- - 25510 - -	Hard, gray, moist, fin	e sandy, silt	y CLAY			2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.03 18.03 feet
25015						Pine can
-	Boring terminated at	18.28 feet.				i ipe dap
24520						Total well depth, 18.28 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with surver pin
240-25						1/4-inch weep hole installed in aluminum cover
						PVC stick-up = 3.30-feet Top of PVC casing elev. = 268.39 fe
235 30						Survey pin elev. = 265.59 feet
200 00						Ground surface elev. = 265.1 feet
F						Northing = 878,223.18'
23035						Easting = 1,976,461.19'
				 Meth	ANE MO	ONITORING PROBE NO. MM-1 Sheet 1 of

