PRELIMINARY DETERMINATION

PERMIT RENEWAL, MINOR MODIFICATION, AND VARIANCE

Solid Waste Disposal Authority of the City of Mobile
17045 Highway 43
Mount Vernon, AL 36560

Chastang Sanitary Landfill
Permit No. 49-05

December 8, 2025

The Solid Waste Disposal Authority of the City of Mobile has applied for a permit to continue to operate a municipal solid waste landfill known as the Chastang Sanitary Landfill (Permit No. 49-05). The modifications to the permit include the installation of groundwater monitoring wells PZ-7R3, MW-9D, MW-11R, MW-12R, PZ-14R, MW-15D, MW-15S, and MW-16, and the abandonment of groundwater monitoring wells MW-2A, MW-11, and MW-12. The facility has requested to use refractory brick from SSAB as an alternate daily cover. The facility has requested a variance from ADEM Admin. Code 335-13-4-.22(1)(c) allowing the vertical lift within a completed daily cell to exceed eight (8) feet but not exceed fifteen (15) feet. The facility has requested a variance from ADEM Admin. Code 335-13-4-.22(1)(b) allowing two working faces temporarily during the initial lift placement on each newly constructed cell. The facility requested to discontinue a special condition which allowed the recirculation of leachate via phyto-irrigation. Leachate recirculation will be done exclusively through spray application. The facility has also requested to update their Operations Plan, Closure and Post-Closure Plan, Construction Quality Assurance Plan, Groundwater Monitoring Plan, and Gas Monitoring plan in accordance with present industry standards and ADEM Admin. Code Division 335-13. The approved waste stream for Chastang Sanitary Landfill will remain non-hazardous solid wastes, non-infectious putrescible and non-putrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, sludge, paper and other similar type materials. Special waste and industrial waste approved by the Department may also be accepted. The service area for Chastang Sanitary Landfill will remain Mobile County, Alabama. The maximum average daily volume of waste disposed at Chastang Sanitary Landfill will remain 1725 tons per day. All previous variances and special conditions have been requested. All other permit conditions will remain unchanged.

The Chastang Sanitary Landfill is described as being located in Sections 13, Township 1 North, Range 1 West in Mobile County, Alabama. The permitted facility consists of approximately 367 acres with 152.9 acres for disposal operations.

The Land Division has determined that the permit renewal, minor modification, and variance application complies with the requirements of ADEM Admin. Code Division 335-13 regulations.

Technical Contact:

Dr. Dontavious Sippial
Solid Waste Engineering Section
Land Division
(334) 270-5651

SOLID WASTE DISPOSAL FACILITY PERMIT

PERMITTEE:	**Solid Waste Disposal Authority of the City of Mobile**
FACILITY NAME:	**Chastang Sanitary Landfill**
FACILITY LOCATION:	**Sections 13, Township 1 North, Range 1 West, and located on Highway 43 in Mobile County, Alabama and consists of approximately 367 acres with 152.9 acres approved for disposal.**
PERMIT NUMBER:	**49-05**
PERMIT TYPE:	**Municipal Solid Waste Landfill**
WASTE APPROVED FOR DISPOSAL:	**Nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, sludge, paper and other similar type materials. Special waste and industrial waste approved by the Department may also be accepted**
APPROVED WASTE VOLUME:	**Maximum Average Daily Volume of 1725 tons per day**
APPROVED SERVICE AREA:	**Mobile County, Alabama**

In accordance with and subject to the provisions of the Solid Wastes & Recyclable Materials Management Act, as amended, Code of Alabama 1975,§ 22-27-1 to 22-27-27 ("SWRMMA"), the Alabama Environmental Management Act, as amended, Code of Alabama 1975, § 22-22A-1 to 22-22A-15, and rules and regulations adopted thereunder, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to dispose of the above-described solid wastes at the above-described facility location.

ISSUANCE DATE:	**XXXXXXX, 2026**
EFFECTIVE DATE:	**XXXXXXX, 2026**
EXPIRATION DATE:	**XXXXXXX, 2036**

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Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SOLID WASTE PERMIT

Permittee:	Solid Waste Disposal Authority of the City of Mobile 17045 Highway 43 Mount Vernon, AL 36560
Landfill Name:	Chastang Sanitary Landfill
Landfill Location:	Section 13, Township 1 North, Range 1 West, and located on Highway 43 in the City of Chastang, Mobile County, Alabama
Permit Number:	49-05
Landfill Type:	Municipal Solid Waste Landfill

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

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

This permit is based on the information submitted to ADEM on January 29, 2025, for permit renewal and modification, and as amended, and is known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Any inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform ADEM of any deviation from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

This permit is effective as of **????????????,** and shall remain in effect until **???????????**, unless suspended or revoked.

____ ____________________
Alabama Department of Environmental Management Date Signed

SECTION I. STANDARD CONDITIONS

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

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

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

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

1. "EPA" for purposes of this permit means the United States Environmental Protection Agency.

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

E. Duties and Requirements.

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

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

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

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

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

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

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

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

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

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

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

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

9. Monitoring, Corrective Actions, and Records.

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

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

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

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

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

      iii. The date(s) analyses were performed.

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

v. The analytical techniques or methods used.

vi. The results of such analyses.

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

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

11. Transfer of Permit. This permit may be transferred to a new owner or operator. All requests for transfer of permits shall be in writing and shall be submitted on forms provided by the Department. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of this permit.

12. Certification of Construction. Before the Permittee may commence disposal of waste in any new cell or phase:

a. The Permittee must submit a letter to the Department signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with the permit.

b. The Department must inspect the constructed cells or phases unless the permittee is notified that the Department will waive the inspection.

c. The Permittee may not commence disposal activities in any cells or phases until approval of the new cells or phases is granted by the Department.

13. Noncompliance. The Permittee shall report all instances of noncompliance with the permit at the time noncompliance is discovered.

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

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

G. Inspection Requirements.

1. The Permittee shall comply with all requirements of ADEM Admin. Code 335-13-4-.21(1)(b).

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

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

H. Recordkeeping and Reporting.

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

   a. Documentation of inspection and maintenance activities.

   b. Daily Volume reports.

   c. Personnel training documents and records.

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

   e. Groundwater monitoring records.

   f. Explosive gas monitoring records.

   g. Surface water and leachate monitoring records.

   h. Copies of this Permit and the Application.

   i. Copies of all variances granted by ADEM, including copies of all approvals of special operating conditions.

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

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

4. Availability, Retention, and Disposition of Records.

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

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

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

I. Documents to be Maintained by the Permittee. The Permittee shall maintain, at the Chastang Sanitary Landfill office, the following documents and amendments, revisions and modifications to these documents until an engineer certifies closure.

1. Operating record.

2. Closure Plan.

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

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

2. Physical Address.
Chief, Solid Waste Branch
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, Alabama 36110-2400

K. Signatory Requirement. All applications, reports or information required by this permit, or otherwise submitted to ADEM, shall be signed and certified by the owner as follows:

1. If an individual, by the applicant.

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

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

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

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

SECTION II. GENERAL OPERATING CONDITIONS.

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

B. Open Burning. The Permittee shall not allow open burning without prior written approval from ADEM and other appropriate agencies. A burn request should be submitted in writing to ADEM outlining why that burn request should be granted. This request should include, but not be limited to, specifically what areas will be utilized, types of waste to be burned, the projected starting and completion dates for the project, and the projected days and hours of operation. The approval, if granted, shall be included in the operating record.

C. Prevention of Unauthorized Disposal. The Permittee shall follow the approved procedures, as provided in the Application, for detecting and preventing the disposal of free liquids, regulated hazardous waste, regulated PCB waste, regulated medical waste, and other unauthorized waste streams at the facility.

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

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

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

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

SECTION III. SPECIFIC REQUIREMENTS FOR MSW LANDFILLS

A. Waste Identification and Management

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

2. The permitted facility boundary for the Chastang Sanitary Landfill is approximately 367 acres with approximately 152.9 acres designated for disposal area described on the permit application.

3. The maximum average daily volume of waste disposed at the facility, as contained in the permit application, shall not exceed 1725 tons/day for the municipal solid waste disposal area and the construction and demolition waste disposal area combined. Should the average daily volume exceed this value by 20% or 100 tons/day, whichever is less, for two (2) consecutive quarters the permittee shall be required to modify the permit in accordance with ADEM Admin. Code 335-13-5-.06(2)(b)2. The average daily volume shall be computed as specified by ADEM Admin. Code 335-13-4-.22(2)(g).

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

C. Service Area. The service area for the Chastang Sanitary Landfill is Mobile County, Alabama.

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

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

2. Foundry Sand. The Permittee shall dispose of foundry waste in accordance with ADEM Admin. Code 335-13-4-.26(3).

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

4. Municipal Solid Waste Ash. The Permittee shall dispose of municipal solid waste ash in accordance with ADEM Admin. Code 335-13-4-.26(5).

E. Liner Requirements. For municipal solid waste disposal areas, the Permittee shall install composite liner systems as required by ADEM Admin. Code 335-13-4-.18. As a minimum, the liner systems shall be constructed and tested in accordance with the specifications as required by ADEM Admin. Code 335-13-4-.18.

The Permittee has proposed two options for the liner system with minor differences. The Permittee shall install one of the liner system options below, meeting the requirements of the ADEM Admin. Code 335-13-4-.18(3).

Option 1: 12 inches of compacted soil layer exhibiting a hydraulic conductivity no greater than $1x10^{-5}$ cm/s, overlain with an internally reinforced geosynthetic clay liner, overlain with a 60 mil HDPE liner.

Option 2: 24 inches of compacted soil layer exhibiting a hydraulic conductivity of no greater than $lxl0^{-7}$ cm/s, overlain with a 60 mil HDPE liner.

The Permittee has proposed three options for the leachate collection system, which will overlay the constructed liner system. The Permittee shall install one of the leachate collection systems below, meeting the minimum requirements of the ADEM Admin. Code 335-13-4-.18(3).

Option 1: A geocomposite drainage layer consisting of a geonet core with a needle-punched, non-woven geotextile, heatbonded to each side, overlain with 18 inches of protective soil/drainage layer exhibiting a minimum hydraulic conductivity 1x10-3 cm/s.

Option 2: A non-woven geotextile cushion, overlain with 18 inches of protective soil/drainage layer exhibiting a minimum hydraulic conductivity 2.9x10-2 cm/s.

Option 3: On slopes 5:1 or greater, a non-woven geotextile cushion, overlain with 18 inches of protective soil/drainage layer with no minimum hydraulic conductivity requirements. A structured drain liner will underlay Option 3.

The base of the composite liner system shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-4-.11(2)(a). The Permittee may not commence disposal of waste in a new lined cell until the Permittee has submitted to the Department, by certified mail or hand delivery, a letter signed by both the Permittee and a professional engineer stating that the liner has been constructed in compliance with the standards or criteria prescribed or required by the manufacturers of the components and the Department's regulations, and that the panels or components would be expected to perform satisfactorily, without failure, to the required standards over a normally expected lifetime or performance period for typical panels or components. The Department must inspect the constructed cells before the owner or operator can commence waste disposal unless the Permittee is notified that the Department will waive the inspection.

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

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

H. Cover Requirements. The Permittee shall cover all wastes as required by ADEM Admin. Code 335-13. The municipal solid waste disposal area shall be covered at the conclusion of each day's activities.

The Permittee is granted a variance allowing the use of non-coal ash from Kimberly Clark operations, lagoon sludge from Armstrong World Industries operations, and meltshop refractory material from Outokumpu

Stainless USA operations as alternate cover materials. Furthermore, the Permittee is granted a variance allowing the use of automobile shredder fluff, contaminated soil, tarps, and non-coal ash, slaker grits, dregs, refractory bricks from SSAB, and lime generated from paper mill operations as alternate daily cover. The Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section X.)

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

The Permittee is granted a variance allowing the vertical lift within the daily cell to exceed eight feet but not exceeding fifteen feet. (See Section X.11.)

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

The Permittee is granted a variance allowing two working faces temporarily during the initial lift placement on each newly constructed cell. (See Section X.12.)

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

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

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

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

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

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

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

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

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

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

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

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

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

X. Litter Control. The Permittee shall control litter.

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

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS

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

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

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

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

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

    b. Well development method(s).

    c. A complete analysis of well construction materials.

    d. A schedule of implementation for construction; and

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

B. Groundwater Monitoring Requirements.

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

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

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample, and analyze for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27, in all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code 335-13-4-.27(2)(j) and ADEM Admin. Code 335-13-4-.27(2)(a)(1).

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

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

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

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

2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures. The Permittee has been approved to utilize Intra-well statistics to analyze groundwater. (See Chastang Sanitary Landfill Groundwater Monitoring Plan dated August 29, 2025)

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

D. Recordkeeping and Reporting Requirements.

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

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

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

TABLE 1

GROUNDWATER MONITORING WELLS

MONITORING WELL	NEW OR EXISTING	UPGRADIENT DOWNGRADIENT	PART MONITORED
MW-4A	EXISTING	DOWN	OLD SANITARY/SUBTITLE D AREA
MW-5R	EXISTING	DOWN	OLD SANITARY
MW-7	EXISTING	DOWN	SUBTITLE D AREA
PZ-7R3	EXISTING	DOWN	SUBTITLE D AREA
MW-8R	EXISTING	DOWN	SUBTITLE D AREA
MW-9D	NEW	DOWN	SUBTITLE D AREA
MW-9R	EXISTING	DOWN	SUBTITLE D AREA

MW-10R	EXISTING	DOWN	SUBTITLE D AREA
MW-11R	EXISTING	UP	SUBTITLE D AREA
MW-12R	EXISTING	DOWN	SUBTITLE D AREA
MW-13A	EXISTING	DOWN	SUBTITLE D AREA
MW-14	EXISTING	DOWN	OLD SANITARY
PZ-14R	EXISTING	DOWN	OLD SANITARY
MW-15D	NEW	DOWN	OLD SANITARY
MW-15S	NEW	DOWN	OLD SANITARY
MW-16	NEW	DOWN	OLD SANITARY

SECTION V. GAS MONITORING REQUIREMENTS.

The permittee must install and maintain an explosive gas monitoring system in accordance with ADEM Admin. Code 335-13.

SECTION VI. MUNICIPAL SOLID WASTE LANDFILL AIR EMISSIONS.

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

SECTION VII. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS.

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

Chastang Sanitary Landfill is granted permission for recirculation of landfill leachate through a spray nozzle onto the active working face or inactive lined areas. Leachate recirculation shall be conducted according to the approved Leachate Recirculation Plan submitted on July 29, 2013. Leachate shall not be recirculated during or immediately after rainfall events. (See Section X.4.)

SECTION VIII. CLOSURE AND POST-CLOSURE REQUIREMENTS

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

A. Final Cover. The Permittee shall grade final soil cover such that surface water does not pond over the permitted area as specified in the Application. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.20(2)(c)(2) to allow a final cover slope of 3 to 1, incorporating diversion berms at every 20 vertical feet, with an overall slope of 3.25 to 1 between successive benches. (See Section X.1).

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

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

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

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

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

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

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

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

J. Recording Instrument. The Permittee must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code 335-5 and shall execute the following:

1. Record a notation onto the land deed within 90 days from the certification of closure. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility, and beginning and closure dates of the disposal activity.

2. File the covenant at the courthouse where the land deed is held within thirty (30) days of receipt of the covenant signed by ADEM's Land Division Chief.

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

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

SECTION IX. FINANCIAL ASSURANCE

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

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

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code 335-13-4-28. into the landfill operating record before the initial receipt of waste in the case of closure, post-closure care, or no later than 120 days after corrective action remedy has been selected. A copy of this information shall be submitted to ADEM in accordance with ADEM Admin. Code 335-13-4-.28(5).

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

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

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

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

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

SECTION X. VARIANCES AND SPECIAL CONDITIONS

The following variances are granted for Chastang Landfill:

1. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.20(2)(c)(2) to allow a final cover slope of 3.25(H):1(V) with diversion berms at every 20 vertical feet interval. (See Section VIII. A.)

2. The Permittee has been approved to use non-coal ash from Kimberly Clark operations as an alternate cover material. The alternate cover material should be mixed with sand or other on site soils mixed in the ratio 50% soil: 50% non-coal ash. The Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

3. The Permittee has been approved to use lagoon sludge from Armstrong World Industries operations as an alternate cover material. The Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

4. The Permittee has been approved to perform leachate recirculation through a spray nozzle. Leachate recirculation shall be conducted according to the approved Leachate Recirculation Plan submitted on July 29, 2013. Leachate shall not be recirculated during or immediately after rainfall events. (See Section VII.)

5. The Permittee has been approved to use meltshop refractory material from Outokumpu Stainless USA operations as an alternate cover material. The Permittee shall be required to cover all exposed waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

6. The Permittee has been approved to use automobile shredder fluff as an alternative cover material. The alternate cover material should be mixed with sand or other soils in the ratio of 50% soil: 50% autofluff. Additionally, the Permittee is required to cover with six inches of earthen material at conclusion of each week's operation. (See Section III.H.)

7. The Permittee has been approved to use contaminated soil as an alternative cover material. The alternate cover material should be mixed with sand or other soils in the ratio of 50% soil: 50% contaminated soil. Additionally, the Permittee is required to cover with six inches of earthen material at conclusion of each week's operation. (See Section III.H.)

8. The Permittee has been approved to use tarps as an alternative daily cover. Permittee shall be required to cover all waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

9. The Permittee has been approved to use non-coal ash, slaker grit, dregs, and lime generated from paper mill operations as an alternate daily cover material. Permittee shall be required to cover all exposed alternate cover material with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

10. The Permittee has been approved to use refractory bricks from SSAB as an alternative cover material. The Permittee shall be required to cover all exposed refractory brick waste with a minimum of six inches of compacted earth at the conclusion of each week's operation. (See Section III.H.)

11. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.22(1)(c) allowing the vertical lift within the daily cell to exceed eight feet but not exceed fifteen feet. (See Section III.I.)

12. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.22(1)(b) allowing two working faces temporarily during the initial lift placement on each newly constructed cell. (See Section III.J.)

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

PERMIT APPLICATION

PERMIT RENEWAL APPLICATION AND MINOR MODIFICATION REQUEST

Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

July 2023
Revised January 2025, Revised November 2024, Revised October 2025
Promus Project No. 230102

Prepared for:
WM Mobile Bay Environmental Center, Inc.

Prepared by:

1200 Mountain Creek Road, Ste. 102 | Chattanooga, Tennessee 37405
www.promusengineering.com

PROMUS ENGINEERING
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October 20, 2025 (Rev. 3)

Mr. Jared D. Kelly
Alabama Department of Environmental Management (ADEM)
Land Division – Solid Waste Branch
Montgomery, Alabama 36130-1463

Re: Chastang Sanitary Landfill – Permit Renewal and Minor Modification
ADEM Permit No. 49-05

Dear Mr. Kelly,

Please find herewith a revised permit renewal package, minor modification request and variance request for the Chastang Sanitary Landfill in Mt. Vernon, Mobile County, Alabama (the Facility). The Chastang Sanitary Landfill is owned by the Solid Waste Disposal Authority (SWDA) of the City of Mobile and currently operated by WM Mobile Bay Environmental Center, Inc. (WMMBECI). This permit renewal includes minor modification and variance requests. The facility design remains unchanged for the requested permit renewal. Updated Operations Plan, Closure/Post-Closure Plan, CQA Plan, Groundwater Monitoring Plan (Work Plan), and Landfill Gas Monitoring Plan are being submitted to update these plans to current industry standards and site conditions. An updated permit drawing set will be transmitted under separate cover.

PERMIT RENEWAL APPLICATION

The facility's current permit was set to expire January 16, 2024. In accordance with Section I.E.2 of the permit, a renewal application was submitted at least 180 days prior to permit expiration (July 20, 2023). A review comment letter was received from ADEM on October 1, 2024. This revised Permit Application Report (PAR) addresses the comments provided by ADEM. The PAR includes the ADEM application form 439-02 as Attachment A and supplementary information requested from ADEM, provided within Attachment A and in additional appendices. We have included our response letter addressing the comments provided by ADEM as Attachment G to this PAR.

REQUESTED MINOR MODIFICATIONS

The requested minor modifications include the updates to the referenced facility plans. The facility Operations Plan, Closure and Post-Closure Plan, CQA Plan (CQAP), Groundwater Monitoring Plan (GWMP) and Landfill Gas Monitoring Plan (LGMP) were updated to incorporate current industry standards and facility site conditions and operations. The revised Operations Plan and Closure and Post-Closure Plan are provided in Attachments B and C, respectively. The revised CQAP is provided as Attachment D. The GWMP and LGMP are provided as Attachments E and F, respectively.

The GWMP includes an ADEM approved Work Plan that is proposed to address future GWMP revisions. The Work Plan is presented with the GWMP included as Attachment E of this application and revised in the Permit Drawings 2 and 7. WMBECCI and ADEM have corresponded about potential monitoring program changes. The GWMP was revised in January 2025 and is included as Attachment E of this application. The SWDA has submitted comments on the GWMP through their consultant, Dr. James Connors. Dr. Connors's comments are submitted as Attachment E of this application for ADEM's consideration.

PERMIT DRAWING UPDATES

The Permit Drawings were updated to show current site conditions (topography) and permit information (updated monitoring well network). The following updates were made to the Permit Drawing sheets. All other sheets not mentioned remain unchanged.

Sheet 1 – Cover Page – updated to reflect changes

Sheet 2 – General Layout – updated site topography to most recent survey (March 2022), revised landfill property line, updated monitoring well network.

Sheet 3 – Potentiometric Surface Map - updated site topography to most recent survey (March 2022), revised landfill property line, updated monitoring well network.

Sheet 4 – Base Grading Plan - updated site topography to most recent survey, revised landfill property line, updated monitoring well network.

Sheet 5 – Final Cover Grading Plan - updated site topography to most recent survey, revised landfill property line, updated monitoring well network.

Sheet 6 – Surface Water Management Plan - updated site topography to most recent survey, revised landfill property line, updated monitoring well network.

Sheet 7 – Monitoring Plan – updated with most recent topography, revised landfill property line, amended well network in accordance with GWMP.

The compiled Permit Drawings are transmitted separately.

ADDITIONAL INFORMATION

An updated site location highway map and adjacent landowners map and owner information (including boundary survey and parcel legal descriptions) are included with this application as figures in Attachment A. We have also provided, under separate cover, an updated permit drawing set. Payments for the permitting fee and variance fee were previously submitted.

Except as noted above, permitting information including siting information and engineering design reports have been submitted in the following previously submitted applications and remain unchanged:

- Permit Renewal and Minor Modification Request, Promus Engineering, LLC, August 25, 2017, and subsequent related submittals, permit issued January 17, 2019.
- Request for Variance and Minor Modification, Terracon Consultants, Inc., September 9, 2010 and subsequent related submittals, permit issued May 3, 2011.
- Request for Minor Modification to the Leachate Collection System, Chastang Landfill, Aquaterra Engineering, LLC, May 27, 2008.
- Application for Permit Modification, CDG Engineers & Associates, October 20, 2006, and subsequent related submittals, permit issued February 27, 2008.
- Application for Permit Renewal and Major Permit Modification-Lateral Expansion, Geosyntec Consultants, Inc., September 1999, and subsequent related submittals, permit issued September 1, 2000.
- Permit applications and information provided for 1993 and 1995 Subtitle D expansions.

In addition to the above, the following is a list of reports and/or data that were used as sources of information in this Permit Renewal Application and Minor Modification Request (Application):

Semiannual Groundwater Reports

Geotechnical Engineering Testing, Inc. 1994. *Subtitle D Expansion Permit Application, Chastang Landfill*.

Southern Earth Sciences, Inc. 1992. Report *of the Hydrogeologic Investigation, Proposed Subtitle D Landfill, Chastang Landfill, Mobile County, Alabama.*

Geotechnical Engineering Testing, Inc. 1999. Hydrogeologic *Report, Chastang Landfill*.

Aquaterra Engineering LLC. 2008. *Alternate Source Demonstration – (Mercury in MW-9R) Chastang Landfill*.

Aquaterra Engineering LLC. 2010. Alternate *Source Demonstration, Barium in Monitoring Well MW-9R, Chastang Landfill*.

Aquaterra Engineering LLC. 2010. Alternate *Source Demonstration, Mercury in Monitoring Well MW-10R, Chastang Landfill*.

Carlson Environmental Consultants, PC. 2020. *Phase II Nature and Extent Evaluation in Vicinity of MW-7, Chastang Sanitary Landfill, Permit No. 49-05.*

Carlson Environmental Consultants, PC. 2020. *Groundwater Well PZ-7R3 Installation Report, Chastang Landfill, Permit No. 49-05*.

Carlson Environmental Consultants, PC. 2021. *Investigative Groundwater Piezometer/Well PZ-12R Installation Report, Chastang Landfill, Permit No. 49-05*. .

SCS Engineers. 2004. *Monitoring Well MW-7 Alternate Source Demonstration Report, Chastang Landfill, Mobile, AL.* (Low Level VOC and Cobalt Detections).

Terracon Consultants, Inc. 2010. *Alternate Source Demonstration Supplemental, Barium in MW-9R and Mercury in MW-10R, Chastang Sanitary Landfill, Mobile County, Alabama.*

Terracon Consultants, Inc. 2011. *Alternate Source Demonstration Cobalt in MW-7 and Barium in MW-5R, Chastang Sanitary Landfill, Mobile County, Alabama.*

Terracon Consultants, Inc. 2013. *Nature and Extent of Apparent Releases in Vicinity of Monitoring Wells MW-7 and MW-14. Chastang Sanitary Landfill, Mt. Vernon, Mobile County, Alabama, Permit No. MSWL 49-05*.

Waste Management. 1999. *Alternate Source Demonstration for Chastang Landfill* (Low Level VOC Detections).

Waste Management. 2001. *Background Well MW-5 Alternate Source Demonstration Report for Chastang Landfill* (Low Level VOC Detections).

Post, Buckley, Schuh & Jernigan, Inc. (PBSJ). 1992. *Delineation and Assessment of Wetlands on the Chastang Landfill Site, Chastang, Alabama.*

Environmental Resource Analyst. 1994. *Preliminary Wetlands Investigation Study at the Proposal Lateral Expansion of the Chastang Sanitary Landfill*. .

Volkert Environmental Group, Inc. 2002. *Wetland Determination Letter to the United States Army Corps of Engineers in Mobile Alabama*.

BioResources, LLC. 2016. *Wetland & Stream Evaluation, Chastang Landfill, Mount Vernon, Mobile County, Alabama, Section 13, Township 1 North, Range 1 West*

VARIANCES

We request these currently approved variances in this permit renewal including:

1. A variance from ADEM Admin. Code 335-13-4-.20(2)(c)(2) to allow a final cover slope of 3.25(H):1(V) with diversion berms at every 20 vertical feet interval,.
2. A variance allowing the use of non-coal ash from Kimberly Clark operations as an alternative cover material. The alternate cover material will be mixed with soil in the ratio 50% soil to 50% non-coal ash. All exposed waste will be covered with a minimum of six inches of compacted earth at the conclusion of each week's operation. [1]
3. A variance allowing the use of lagoon sludge from Armstrong World Industries operations as an alternate cover material. A minimum of six inches of compacted earth will be placed at the conclusion of each week's operation to cover all exposed waste. [1]

[1] These variances have been previously approved. WM intends to update Section 12 of its Operations Plan to be consistent with these variances and requests that they be retained in this permit renewal.

4. A variance allowing the use of meltshop refractory material from Outokumpu Stainless USA operations as an alternative cover method. All exposed meltshop refractory material waste shall be covered with a minimum of six inches of compacted earth at the conclusion of each week's operation. [1]
5. A variance allowing the use of automobile shredder fluff as an alternative cover material. The alternate cover material should be mixed with soil in the ratio 50% soil to 50% autofluff. All exposed shredder fluff waste shall be covered with a minimum of six inches of compacted earth at the conclusion of each week's operation. [1]
6. A variance allowing the use of contaminated soil and sediment as an alternative cover material. All exposed contaminated soil waste shall be covered with a minimum of six inches of compacted earth at the conclusion of each week's operation. [1]
7. A variance allowing the use of tarps as an alternate daily cover.
8. A variance allowing the use of non-coal ash, slaker grit, dregs, and lime generated from paper mill operations as an alternate daily cover material. [1]

We request the approval of the following variances:

1. A variance allowing the use of SSAB refractory brick as alternative daily cover material. The supporting documentation for this variance is included as Attachment H of this application.
2. A variance allowing a completed daily cell to exceed a vertical thickness of eight (8) feet, but shall not exceed fifteen (15) feet in vertical thickness.
3. A variance allowing the operator the use of two (2) working faces temporarily during the initial lift placement in each newly constructed cell.

PERMIT DURATION

The remaining life of the facility is greater than 10 years. Therefore, in accordance with 335-13-5-.02(3), we request a permit duration of 10 years from the date of renewal permit issuance.

We appreciate your time and effort in reviewing this permit renewal application. Should you have any questions or comments, please contact Michele Lersch at mlersch@wm.com or me at jbreedlove@promusengineering.com.

Sincerely,
PROMUS ENGINEERING, LLC

Ann Peyton Douglas	Jeffrey J. Breedlove, P.E.
Project Manager	Principal Engineer

Distribution: *Jared Kelly, ADEM (1 HC, 1 Elec)*
Michele Lersch, WM (1 Elec)

WM Mobile Bay Environmental Center, Inc.
Chastang Landfill
17045 Highway 43
Mount Vernon, AL 36560

October 31, 2025

via email: stacy.hinson@adem.alabama.gov

Ms. Stacy Hinson
Alabama Department of Environmental Management
Land Division - Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

Re: Chastang Sanitary Landfill
Request for Leachate Recirculation Variance Continuance
ADEM Permit No. 49-05

Dear Ms. Hinson:

Pursuant to our October 31, 2025, phone conversation, WMMBECI/Chastang Landfill is submitting this request to retain approval for leachate recirculation and evaporation via spray application onto the active working face and/or over inactive lined areas in the pending solid waste renewal permit. This special condition has been included in previous permits since 2013. The special condition previously included phyto-irrigation as a recirculation method, but we are requesting that references to phyto-irrigation be removed from the text under Section VII and the Special Condition description of Item 4 in Section X.

Should you have any questions or require additional information, you may contact me at 813-786-6807.

Respectfully,

Michele H. Lersch

Michele Lersch
Environmental Protection Manager
Waste Management – Gulf Coast Area

Encl.

Cc: File (City of Mobile-SWDA)
Jeff Breedlove, Promus Engineering

SOLID WASTE APPLICATION

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

1. Facility type:
   - X Municipal Solid Waste Landfill (MSWLF)
   - ____ Industrial Landfill (ILF)
   - ____ Construction and Demolition Landfill (C/DLF)
   - ____ CCR Landfill (CCRLF)
   - ____ CCR Surface Impoundment (CCRSI)
   - ____ Other (explain)____________

2. Facility Name Chastang Sanitary Landfill

3. Applicant/Permittee:

   Name: Solid Waste Disposal Authority of the City of Mobile

   Address: 17045 Highway 43, Mount Vernon, AL 36560

   Telephone: 251-509-0488

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

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

   Township 1N Range 1W
   Section 13 County Mobile

5. Land Owner:

   Name: Solid Waste Disposal Authority of the City of Mobile

   Address: 17045 Highway 43, Mount Vernon, AL 36560

   Telephone: 251-509-0488

   (Attach copy of agreement from landowner if applicable.)

ADEM Admin. Code r. 335-13-5-.02(1)(d)
Professional Engineer and Representative of Operator Statement

This Permit Renewal Application and Minor Modification Request (Application) for the Chastang Sanitary Landfill located in Mount Vernon, Alabama, and the documents and plans attached here within were completed for WM Mobile Bay Environmental Center, Inc. and/or its agents and/or clients.

This report was developed and depends upon data, reports, and plans developed by others and developed over the life of the site, as previously submitted to ADEM. We have assumed that information provided to us and/or developed by others is correct and true, unless otherwise noted. The information contained within this report is, to the best of our knowledge and belief, true, accurate, and complete. If additional information or changes in previous information become available in the future, we request the opportunity to review and change our recommendations and conclusions, as necessary.

We have reviewed the information provided by others that is compiled in this report and it is our professional judgment that the plans provided in this application are in substantial accordance with the State of Alabama ADEM Admin Code Division 335-13 regulations and industry accepted standards.

Engineer:

Jeffrey J. Breedlove, PE
Principal Engineer
Promus Engineering, LLC

Facility Operator Representative:

Walter Polk, II
District Manager
WM Mobile Bay Environmental Center, Inc.

6. **Contact Person:**

Name Michele Lersch (mlersch@wm.com) and Jim McNaughton (jimmcnaughton@comcast.net)

Position or Affiliation WM Area Environmental Manager; Contract Administrator SWDA

Address: 17045 Highway 43, Mount Vernon, AL 36560

Telephone: 813-786-6807 (Lersch); 615-594-2299 (McNaughton)

7. **Size of Facility:** 367 +/- **Acres**

Size of Disposal Area(s): 152.9 +/- **Acres**

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

Mobile County

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

1725 **Tons/Day** ________ **Cubic Yards/Day**

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

Non-hazardous, non-infectious, putresceble and non-putresceble waste including household garbage, industrial waste, construction and demolition debris, tires, appliances, trees, limbs, stumps, dried sludge, paper, and similar type materials. Special wastes approved by ADEM.

SIGNATURE (Responsible official of permit applicant):

TITLE: Chairman, Solid Waste Disposal Authority, City of Mobile

Pete Riehm
(please print or type name)

DATE: 15 JAN 25

ADDITIONAL REQUIRED INFORMATION

Applicants seeking to obtain a permit to construct and/or continue to operate a municipal solid waste (MSW) landfill, industrial landfill, construction and demolition (C/D) landfill, coal combustion residuals (CCR) landfill, or CCR surface impoundment are required to submit additional information as part of the Solid Waste Disposal Facility Permit Application. These additional information requirements vary depending on the facility type.

For new and existing landfill units, refer to ADEM Admin Code 335-13-5-.02 for a list of additional information to be submitted in the permit application. Some requirements apply only to MSW landfills and CCR landfills, while other requirements apply to industrial landfills and C/D landfills. You need only to address the requirements that pertain to your type landfill. For new and existing CCR surface impoundments, refer to ADEM Admin Code 335-13-15-.09 for additional information to be submitted in the permit application.

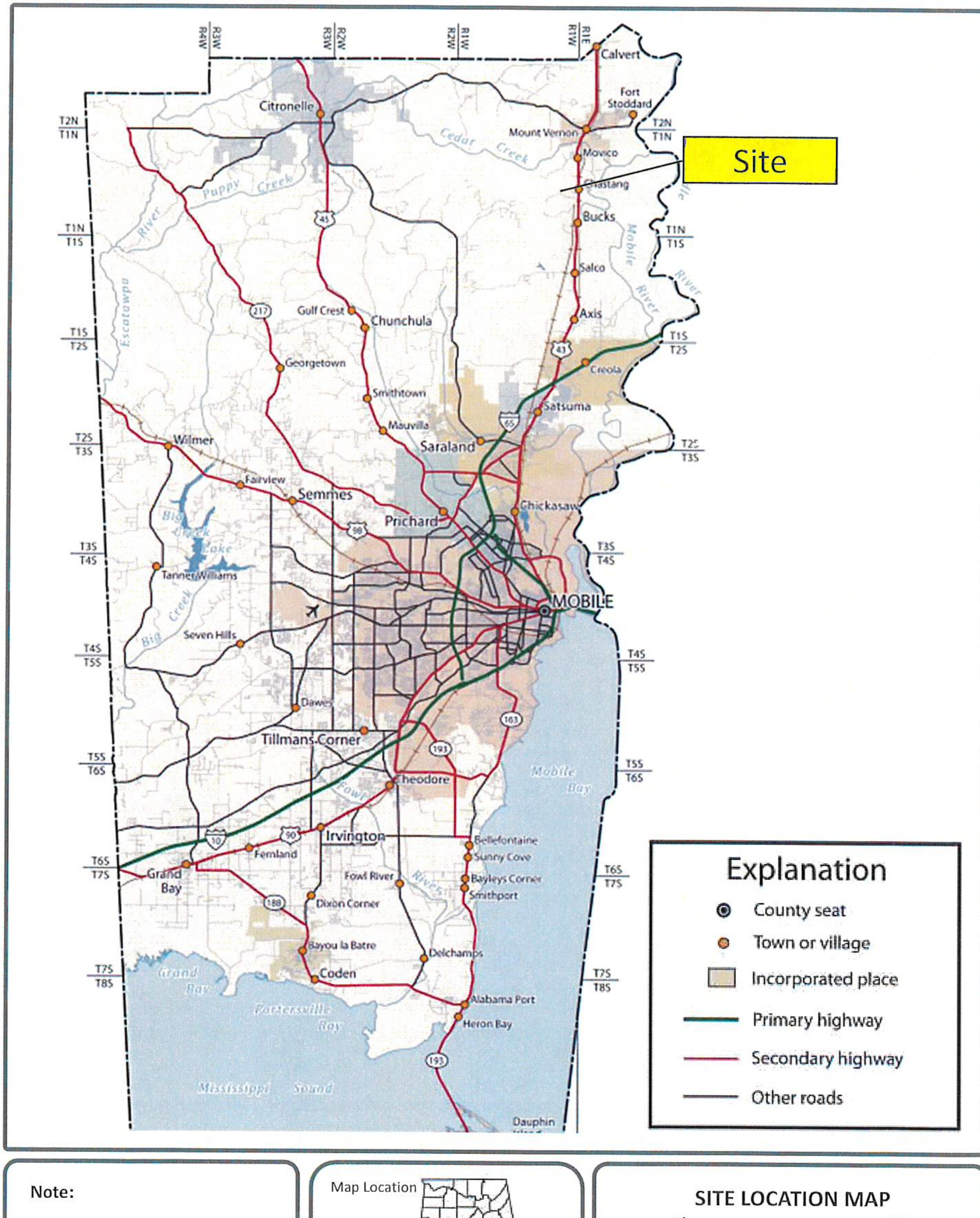
Each rule that is applicable to your type landfill or surface impoundment must be addressed in detail in the operational narrative and/or engineering drawings before the review process can be completed. All operational narratives, engineering drawings, survey maps and legal descriptions are to be prepared by licensed engineers or surveyors registered in the State of Alabama and with their stamp or seal on each drawing/map and cover of the narrative.

Act No. 89-824 Section 9(a) states "The department may not consider an application for a new or modified permit for a facility unless such application has received approval by the affected unit of local government having an approved plan." This document must be received by the Department prior to processing the application.

The referenced rules are covered in greater detail in ADEM's Administrative Code, Division 13. Clarification can be obtained by reviewing the regulations. Copies of the ADEM Administrative Code, Division 13 regulations, can be obtained for a fee by contacting ADEM's Permits and Services Division. If the Department can answer any questions, please contact the Solid Waste Branch at (334) 274-4201.

ATTACHMENT A

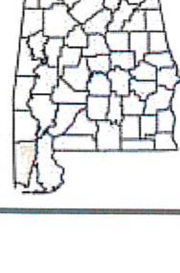
Engineer and Operator Signed Statement
Renewal Application Form (ADEM Form 439-02)
Figure 1 – Site Location Map
Figure 2 – Adjacent Property Parcels
Table 1 - Adjacent Property Owners
Boundary Survey – 1993
Legal Descriptions – 1993



Note:

PROMUS ENGINEERING

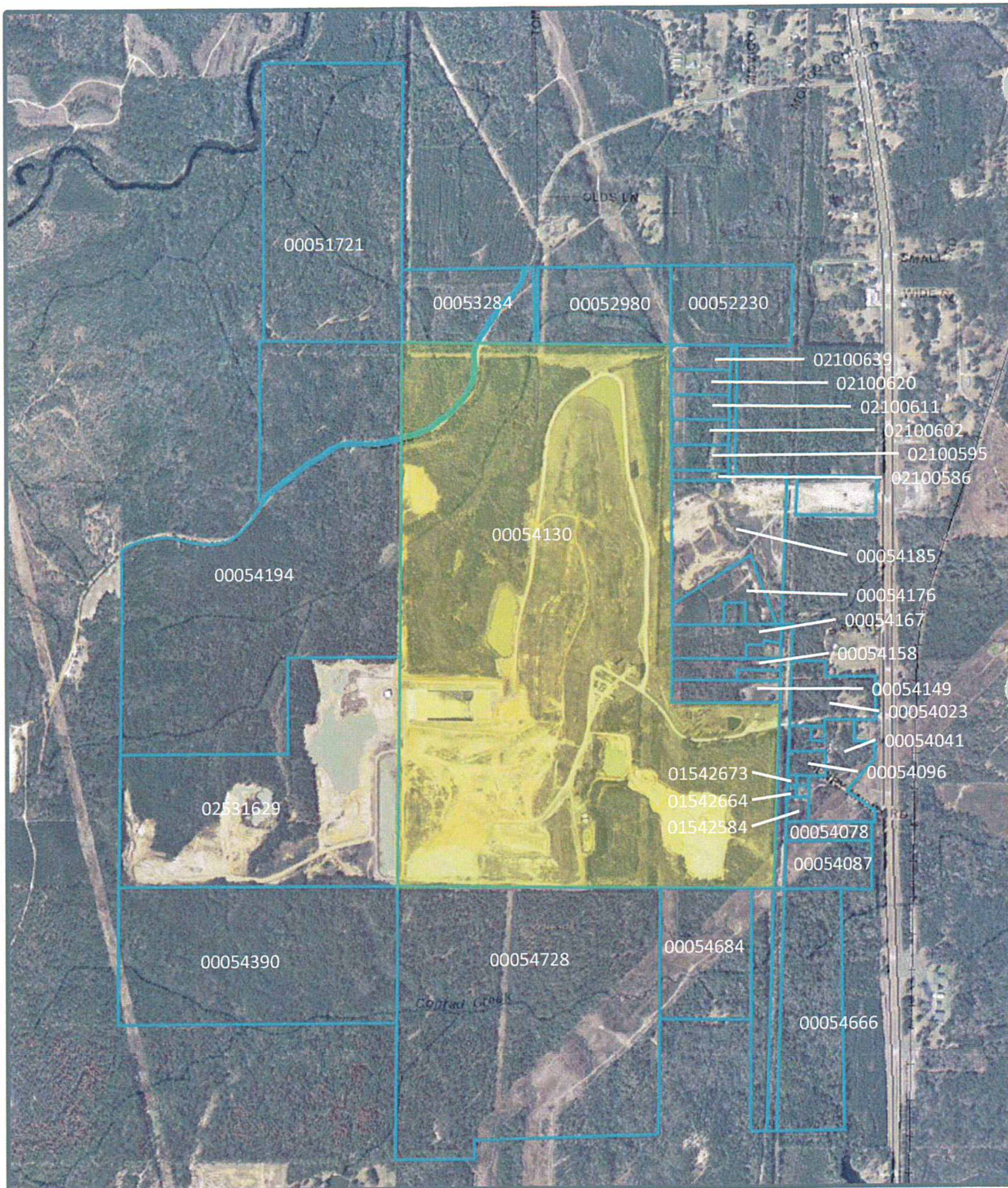
Map Location



SITE LOCATION MAP
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Drawn: APD
Engineer: JJB
Proj. No.: 230102

FIGURE 1



Note:
Imagery and parcel locations
by City of Mobile GIS

Map Location

PROMUS
ENGINEERING

ADJACENT PROPERTY PARCELS
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Drawn: APD
Engineer: JJB
Proj. No.: 230102

FIGURE 2

TABLE 1

ADJACENT PROPERTY OWNERS

Chastang Sanitary Landfill

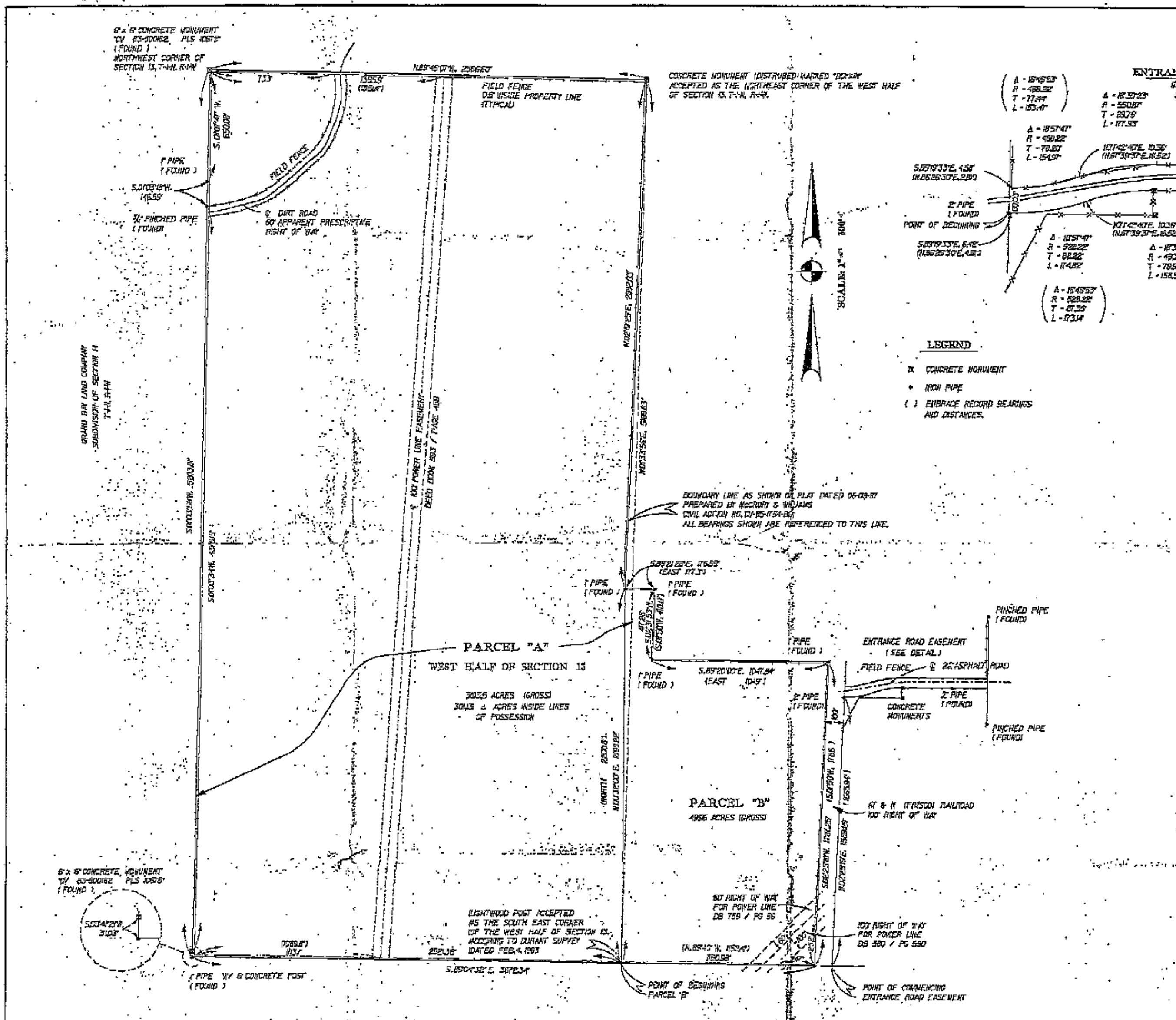
KEYX	PARCEL	NAME	ADDRESS	CITY	STATE	ZIP
02100611	R020906130000001.022	GOULD ALARIC L	705 EAST SALVIA ST	MOBILE	AL	36606
1542664	R020906130000017.01	IRBY ISAAC & GLADYS	16911 F HIGHWAY 43	MT VERNON	AL	36560
00052230	R020901120000036.02	TAMARACK TIMBERCO AL LLC	5605 WOODBINE RD	PACE	FL	32571
00054130	R020906130000022.	MOBILE CITY OF THE SOLID WASTE DISPOSAL AUTHORITY	17045 HIGHWAY 43	MT VERNON	AL	36560
00051721	R020901110000008.000	WELDON JEANETTE GOODYEAR & SUSANNE SMITH MCAVOY	754 EVERGREEN ST	FAIRHOPE	AL	36582
00054390	R020906230000001.000	WOODYARD GEORGE	178 WOODYARD ST	MCINTOSH	AL	36553
00054185	R020906130000027.000	WHITFIELD TRUCKING INC	PO BOX 13097	MOBILE	AL	36663
01542673	R020906130000018.	IRBY ISAAC & GLADYS	16911 F HIGHWAY 43	MT VERNON	AL	36560
00052980	R020901120000102.000	ELEY GLADYS RANDALL	290 DONA DRIVE	MANDEVILLE	LA	70448
02531629	R020906140000001.017	MOBILE CITY OF THE SOLID WASTE DISPOSAL AUTHORITY	17045 HIGHWAY 43	MT VERNON	AL	36560
00054087	R020906130000014.000	AGNEW ANDREA COLETTE	863 GRANT PARK DR	MOBILE	AL	36606
00054023	R020906130000010.000	CHIPPEWA LAKES LLC	P O BOX 2672	MOBILE	AL	36602
00054684	R020906240000009.000	STIELL AMELIA	159 LAKEVIEW LOOP	DAPHNE	AL	36526
02100639	R020906130000001.024.	CHASTANG IDA BELL C/O VANESSA MARIA CHASTANG	1909 ROSEDALE RD	MOBILE	AL	36605
00053284	R020901120000125.	ELEY GLADYS R PATRICIA R BREHM & JOHN MCENERY ROBERTSON JR	290 DONA DRIVE	MANDEVILLE	LA	70448
00054167	R020906130000025.000	HOWELL EDDIE L	PO BOX 96	SAINT STEPHENS	AL	36569
01542584	R020906130000016.000	IRBY ISSAC & GLADYS	16911 F HIGHWAY 43	MT VERNON	AL	36560
00054666	R020906240000008.09	CHASTANG PATRONIA	P O BOX 2672	MOBILE	AL	36652
00054176	R020906130000026.000	ANDRY RANDOLPH SR, RENETTA TRENICE	11726 OLD HIGHWAY 43	AXIS	AL	36505
02100586	R020906130000001.019	SPRAGGINGS CARL	3823 NEWTON ST	MOBILE	AL	36612
00054078	R020906130000013.000	CHIPPEWA LAKES LLC	P O BOX 2672	MOBILE	AL	36652
00054194	R020906140000001.000	CHIPPEWA LAKES LLC	P O BOX 2672	MOBILE	AL	36652

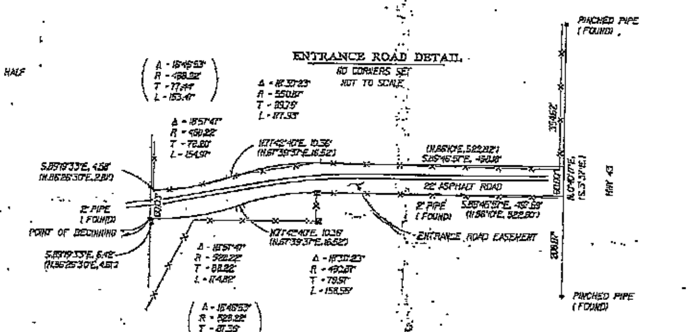
TABLE 1

ADJACENT PROPERTY OWNERS

Chastang Sanitary Landfill

KEYX	PARCEL	NAME	ADDRESS	CITY	STATE	ZIP
00054158	R020906130000024.000	BETTIS TERECA	PO BOX 705	CREOLA	AL	36525
02100595	R020906130000001.020	PHILLIPS BETTY	9305 OLD HWY 43	CREOLA	AL	36525
02100620	R020906130000001.023	ATCHLEY CHARLES EDWARD	425 ALBERT DR	GARDENDALE	AL	35071
00054149	R020906130000023.000	WILLIAMS LARRY NOBLE & LENA H	PO BOX 35	BUCKS	AL	36512
00054728	R020906240000012.01	ANDRY MARTHA (LIFE ESTATE)	16324 HIGHWAY 43	MOUNT VERNON	AL	36560
00054096	R020906130000019.000	ANDRY NOEL ALEXANDER SR MARGARET ANDRY SPENCER	P O BOX 441	MT VERNON	AL	36560
00054041	R020906130000011.000	MEAHER AUGUSTINE IV AS	PO BOX 2672	MOBILE	AL	36652
02100602	R020906130000001.021	CHASTANG PIERCE A	2773 S THOMPSON DR	MOBILE	AL	36606





CHASTANG LANDFILL PROPERTY DESCRIPTION
(FROM DEEDS)

PARCEL A

The West half of Section 13, Township 1 North, Range 1 West, Mobile County, Alabama. Containing 317.66 acres, more or less.

PARCEL B

Beginning at the Southeast corner of the Southeast Quarter of Section 13, Township 1 North, Range 1 West, Mobile County, Alabama; run thence North along half section line 2200.8 feet to a point; thence East 873 feet to a point; thence South 01 degrees, 50 minutes West along West line of Pollard and Benjamin Lots, 418 feet to a point; thence East along the South line of Benjamin Lot, 1049 feet to the West right-of-way of A.T. & N. (Frisco) Railroad right-of-way; thence South 01 degrees, 50 minutes West along said right-of-way 1786 feet to a point; thence North 89 degrees, 40 minutes West along established boundary line 1524 feet to the point of beginning, excepting Alabama Power Company right-of-way easement across Southeast corner of the above described property, containing 50.05 acres, more or less. All of said measurements being according to Plat of survey by Durant Engineering Company dated February 4, 1963.

ENTRANCE ROAD EASEMENT

An easement 60 feet in width for a public road described as follows: Commence at the intersection of the East right-of-way line of the A.T. & N. RR and the South line of Section 13, T1N, R1W; thence run N 01°-50'E along said East right-of-way line a distance of 1663.94 ft. to the Point of beginning; thence continue along said East right-of-way line a distance of 60.03 ft. to a point; thence run N 85°25'30"E a distance of 2.81 ft. to the P.C. of a curve to the left having a radius of 493.22 ft.; thence run easterly along said curve a distance of 153.47 ft. to the P.T. of said curve; thence run N 67°39'37"E a distance of 16.52 ft. to the P.C. of a curve to the right having a radius of 550.87 ft.; thence run easterly along said curve a distance of 177.53 ft. to the P.T. of said curve; thence run N 86°10'E a distance of 522.52 ft. to the West right-of-way line of U.S. Highway 43; thence run S 3°37'E along said West right-of-way line a distance of 60 ft. to a point; thence run S 86°10'W a distance of 522.60 ft. to the P.C. of a curve to the left having a radius of 490.87; thence run westerly along said curve a distance of 158.55 ft. to the P.T. of the said curve; thence run S 67°39'37"W a distance of 16.52 ft. to the P.C. of a curve to the right having a radius of 526.22 ft.; thence run westerly along said curve a distance of 173.14 ft. to the P.T. of said curve; thence run S 85°25'30"W a distance of 4.81 ft. to the Point of beginning, and containing 1.28 acres more or less.

SURVEYOR'S NOTE:

The entrance road easement shown on this plat is based on the actual location of property lines and fences. The deed description appears to be in error in its tie to the south line of Section 13, and the bearing along the railroad. A correction deed is recommended.

STATE OF ALABAMA:
COUNTY OF MOBILE:

I, Merlin J. Miller, a registered land surveyor in the State of Alabama, hereby certify to the best of my knowledge and belief, and in my professional opinion, that the foregoing survey and plat were conducted according to the minimum technical standards for surveying in the State of Alabama.

According to my survey this the 2nd day of March, 1993.

Ala. Reg. No. 14565

PROJ. NO. 9374050 — SHEET NO. 10

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
SURVEYED BY	R.C.W.	2-17-93	DRAWN BY	A.L.B.	2-19-93
CHECKED BY	M.J.M.	3-2-93	CHECKED BY	M.J.M.	1-19-93
SUPERVISED BY	MERLIN J. MILLER				

APPROVED BY — DATE

DAVID VOLKERT & ASSOCIATES, INC.

PLAT OF BOUNDARY SURVEY FOR CITY OF MOBILE

REVIEW

CHASTANG LANDFILL PROPERTY DESCR 'IN
(FROM DEEDS)

PARCEL A

The West half of Section 13,Township I North,Range I West,Mobile County,Alabama. Containing 317.66 acres,more or less.

PARCEL B

Beginning at the Southwest corner of the Southeast Quarter of Section 13,Township I North,Range I West,Mobile County,Alabama run thence North along half section line 2200.8 feet to a point; thence East 1177.3 feet to a point; thence South 01 degrees,50 minutes West along West line of Pollard and Benjamin Lots,418 feet to a point; thence East along the South line of Benjamin Lot,1049 feet to the West right-of-way of A.T.& N.(Frisco) Railroad right-of-way,thence South 01 degrees,50 minutes West along said right-of-way 1786 feet to a point; thence North 89 degrees,40 minutes West along established boundary line 1152.4 feet to the point of beginning,excepting, Alabama Power Company right-of-way easement across Southeast corner of the above described property; containing 50.08 acres,more or less. All of said, measurements being according to Plat of survey by Durant Engineering Company dated February 4,1963.

ENTRANCE ROAD EASEMENT

An easement 60 feet in width for a public road, described as follows: Commence at the intersection of the East right-of-way line of the A.T.& N.RR and the South line of Section 13,T1N,R1W; thence run N 01°-50'W along said East right-of-way line a distance of 1665.94 ft.to the Point of beginning; thence continue along said East right-of-way line a distance of 60.03 ft.to a point; thence run N 86°26'30" E a distance of 2.81 ft.to the P.C. of a curve to the left having a radius of 468.22 ft.; thence run easterly along said curve a distance of 153.47 ft.to the P.T.of said curve; thence run N 67°39'37" E a distance of 16.52 ft.to the P.C.of a curve to the right having a radius of 550.87 ft.; thence run easterly along said curve a distance of 177.93 ft.to the P.T.of said curve; thence run N 86°10' E a distance of 522.82 ft.to the West right-of-way line of U.S.Highway 43; thence run S 3°37' E along said West right-of-way line a distance of 60 ft.to a point; thence run S 86°10' W a distance of 522.60 ft.to the P.C.of a curve to the left having a radius of 490.87; thence run westerly along said curve a distance of 158.55 ft.to the P.T.of the said curve; thence run S 67°39'37" W a distance of 16.52 ft.to the P.C.of a curve to the right having a radius of 528.22 ft.; thence run westerly along said curve a distance of 173.14 ft.to the P.T.of said curve; thence run S 86°26'30" W a distance of 4.61 ft.to the Point of beginning,and containing 1.28 acres more or less.

SURVEYOR'S NOTE:

The entrance road easement shown on this plat is based on the actual location of property lines and fences. The deed description appears to be in error in its tie to the south line of Section 13, and its bearing along the railroad. A correction deed is recommended.

STATE OF ALABAMA:
COUNTY OF MOBILE:

I,Merlin J.Miller,a registered land surveyor in the State of Alabama,hereby certify to the best of my knowledge and belief,and in my professional opinion,that the foregoing survey and plat were conducted according to the minimum technical standards for surveying in the State of Alabama.

According to my survey this the 2nd day of March,1993.

Merlin J. Miller

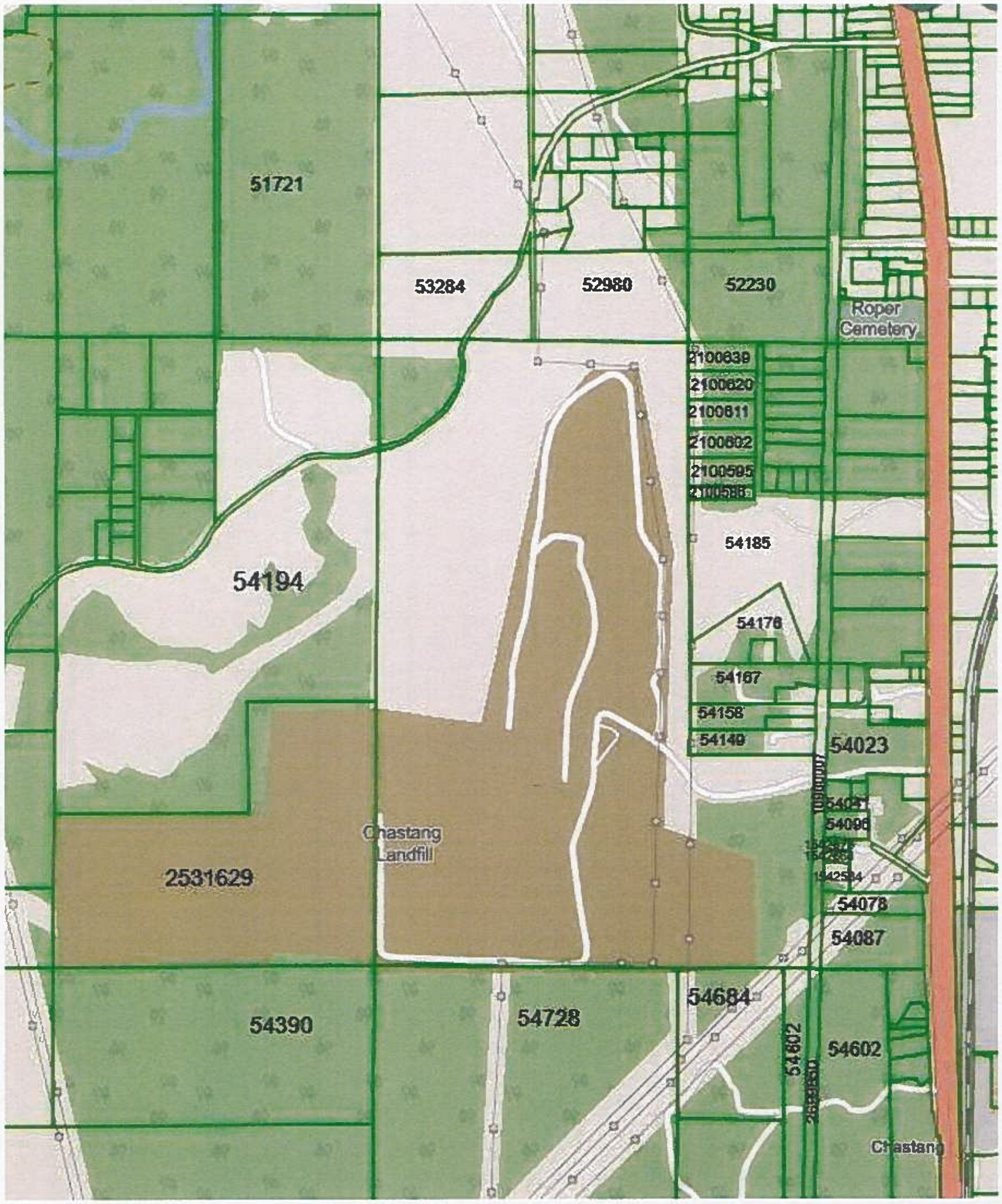
Ala.Reg.No.14566

ALABAMA REGISTERED NO. 14566 PROFESSIONAL LAND SURVEYOR MERLIN J. MILLER

Adjacent Property Owners - Chastang Landfill 11/26/2025		
Key number	**Owner name**	**Owner address**
54390	WM MOBILE BAY ENVIROMENTAL CENTER INC ATTN: CORPORATE REAL ESTATE DEPT	720 E BUTTERFIELD RD FL 4 Lombard, Il 60148-5620
2531629	MOBILE CITY OF THE SOLID WASTE DISPOSAL AUTHORITY A PUBLIC CORPORATION	4357 Midmost Drive Mobile, AL 36609-5505
54194	MASH PROPERTY HOLDINGS LLC ATTN: LARSON & MCGOWIN LLC	PO Box 2143 Mobile, AL 36652-2143
51721	WELDON JEANETTE GOODYEAR, SUSANNE SMITH MCAVOY, ATTN MARIA GWYNN	754 Evergreen St. Fairhope, AL 36532-3007
53284	ELEY GLADYS R, PATRICIA R BREHM & ATTN EDWIN ELEY	290 Dona Drive Mandeville, LA 70448-4718
52980	ELEY GLADYS R, PATRICIA R BREHM & ATTN EDWIN ELEY	290 Dona Drive Mandeville, LA 70448-4718
52230	TAMARACK TIMBERCO AL LLC C/O ORBIS INC	8809 Lenox Pointe Dr., Unit B Charlotte, NC 28273-3377
2100639	CHASTANG IDA BELL C/O VANESSA MARIA CHASTANG	19069 Rosedale Road Mobile, AL 36605-3126
2100620	WRIGHT DETERRANCE	5407 Henry Rd. Eight Mile, AL 36613-2137
2100611	GOULD ALARIC L	705 E. Salvia St. Mobile, AL 36606-2007
2100602	CHASTANG PIERCE A	2773 S. Thompson Dr. Mobile, Al 36606-2125
2100595	PHILLIPS BETTY	9305 OLD HIGHWAY 43 Creola, AL 36525-4554
2100586	SPRAGGINGS CARL	3823 NEWTON ST. Mobile, AL 36612-1340
54185	WHITFIELD TRUCKING INC	PO BOX 13097 Mobile, AL 36633-0097
54176	ANDRY RANDOLPH SR, RENETTA TRENICE	11726 Old Hwy 43 Axis, AL 36505-4366
54167	HOWELL EDDIE L	PO Box 96 Saint Stephens, AL 36569-0096
54158	BETTIS TERECA	PO Box 705 Creola, AL 36526-0705
54149	WILLIAMS LENA H	613 S AND R RD MOUNT VERNON, AL 36560-6435
54023	MASH PROPERTY HOLDINGS LLC ATTN: LARSON & MCGOWIN LLC	PO Box 2143 Mobile, AL 36652-2143
		page 1 of 2

Adjacent Property Owners - Chastang Landfill 11/26/2025		
54041	MEAHER AUGUSTINE IV AS TRUSTEE FOR AUGUSTINE	PO Box 2672 Mobile, AL 36652-2672
54096	ANDRY NOEL ALEXANDER SR MARGARET ANDRY SPENCER	PO Box 441 Mount Vernon, AL 36560-0441
154673	IRBY ISAAC & GLADYS	16911F HIGHWAY 43 MOUNT VERNON, AL 36560-7401
1542664	IRBY ISAAC & GLADYS	16911F HIGHWAY 43 MOUNT VERNON, AL 36560-7401
1542584	IRBY ISAAC & GLADYS	16911F HIGHWAY 43 MOUNT VERNON, AL 36560-7401
54078	MASH PROPERTY HOLDINGS LLC ATTN: LARSON & MCGOWIN LLC	PO Box 2143 Mobile, AL 36652-2143
54087	AGNEW ANDREA COLETTE	863 GRANT PARK DR Mobile, AL 36606-4731
10900007	MASH PROPERTY HOLDINGS LLC ATTN: LARSON & MCGOWIN LLC	PO Box 2143 Mobile, AL 36652-2143
2699850	MASH PROPERTY HOLDINGS LLC ATTN: LARSON & MCGOWIN LLC	PO Box 2143 Mobile, AL 36652-2143
54602 / 54666	CARTER KIMBERLY CHESTANG	203 MICHIGAN AVE Mobile, AL 36604-1917
54684	STIELL AMELIA C/O ANTHONY S STIELL	159 LAKEVIEW LOOP Daphne, AL 36526-7635
54728	ANDRY MARTHA (LIFE ESTATE)	15845 HIGHWAY 43 MOUNT VERNON, AL 36560-7419

2025-11-26 Chastang Landfill Adjacent Landowners by Key Number



ATTACHMENT B

Operations Plan

OPERATIONS PLAN

Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Revised June 20, 2017/May 1~~6~~7, 2023/January 2025
Promus Project No. 170061, 230102

Prepared for:
WM Mobile Bay Environmental Center, Inc.

WASTE MANAGEMENT

Prepared by:

PROMUS ENGINEERING

1200 Mountain Creek Rd, Ste 102 | Chattanooga, Tennessee 37405
www.promusengineering.com

OPERATIONS PLAN

CHASTANG SANITARY LANDFILL

TABLE OF CONTENTS

Revision note: This plan was originally prepared by Geosyntec Consultants, Inc. as part of the permitting effort in 2000. The plan was subsequently updated and modified in June 2017~~, and~~ May 2023 and January 2025 (this version) by Waste Management and Promus Engineering, LLC.

OPERATIONS PLAN

CHASTANG SANITARY LANDFILL

1. INTRODUCTION

Chastang Sanitary Landfill (Chastang, Site, or Facility) is operated by WM Mobile Bay Environmental Center, Inc, [formerly, TransAmerican Waste Industries, Inc.] (WM or Operator) under a management contract with the Solid Waste Disposal Authority of the City of Mobile (Owner or SWDA). The landfill is located in Mt. Vernon, Mobile County, Alabama.

The site is approximately 370 acres of which 153 acres are permitted for waste disposal by the Alabama Department of Environmental Management (ADEM) and consists of a Closed Pre-Subtitle D Landfill ~~n unlined landfill~~ and ~~a~~ lined Subtitle D lateral expansion areas comprised of Cells 1 through 12. Solid waste is currently disposed in the Subtitle D composite lined (compacted clay overlain with flexible geomembrane) cells that are equipped with leachate collection and removal systems in accordance with current ADEM regulations.

The ~~unlined~~ Pre-Subtitle D portion of the landfill was certified closed by Environmental Consulting & Engineering, Inc., in a report dated March 18, 1999. The closure was approved by ADEM in a letter dated March 30, 1999.

The Subtitle D lateral expansion design was prepared in September 1999, by Geosyntec Consultants and approved by ADEM in a permit issued August 31, 2000. In December 2005 CDG Engineers and Associates prepared plans for several modifications to the liner system and leachate collection system components, as well as to the base grade and final cover configurations. In the most recent permit renewals in 2013 and 2017, several modifications were consolidated into the facility plans and design drawings by Terracon Consultants, Inc. and Promus Engineering, LLC. This plan revision is part of the 2023 permit renewal by Promus Engineering, LLC which included ~~several major and~~ several minor modifications.

2. TYPES OF WASTE ACCEPTED

The Chastang Sanitary Landfill will only accept non-hazardous, non-infectious, putrescible and non-putresceble waste including household garbage, industrial waste, construction and demolition debris, tires, appliances, trees, limbs, stumps, dried sludge, paper, and similar type materials. Special wastes approved by ADEM may be accepted for disposal. The scale house operator determines acceptability of all vehicle loads as they are received at the scale facility. This initial determination of acceptability consists of verbal identification from the driver of the origin and type of waste. Any vehicle having unacceptable waste will be turned away.

3. PROHIBITED WASTES

This MSW landfill is intended to be used for the disposal of non-hazardous types of wastes. The following types of wastes will not be accepted: hazardous wastes, untreated medical wastes, radioactive materials, or infectious wastes.

Hazardous waste is defined by Chapter 335-14 of the ADEM Administrative Code. Radioactive materials include special nuclear, or by-product materials, as defined by the Atomic Energy Act of 1954, and as amended (68 statute 923).

4. ACCESS CONTROL AND SITE SECURITY

All vehicles will access the landfill via a single paved entrance road from Highway 43. The entrance allows for the safe and orderly traffic flow into and out of the facility. The gates at this entrance will be secured or locked when there is no scale house attendant on-site and during non-operational hours.

Identification and statement of purpose for access is mandatory and will be monitored by scale house operators. All vehicles entering the landfill must stop and report to the office at the scale house.

Any person(s) visiting the site that is not delivering waste material shall be required to check in at the office. Upon receiving clearance of site personnel or management they will be directed to the appropriate area.

A scale system is installed at the facility's main entrance. The scale will be calibrated in accordance with manufacturer's recommendations. Trucks will be weighed when entering the disposal site and the waste tonnage will be determined based upon the tare weight of the vehicle. Vehicles without tare weights will also be weighed on the way out to determine the waste tonnage. Tare weights for waste haulers that regularly visit the site are recorded so that they do not need to be weighed each time they leave the site unless specifically required by contract or to meet facility needs. All vehicles will receive transaction receipts from the scale house. Signs will be erected on-site directing the vehicles to their assigned areas. All vehicles will be required to obey all speed and stop signs. Signs at the entrance and at the scale house/office area will identify the site, the site permit, the owner, gate hours for receiving waste, and other related information. Signs will also state that the site does not accept hazardous waste. These signs will be maintained in a clean and upright condition.

Telephone communication will be available during all operating hours. Key personnel are reachable 24 hours/day via company cell phones in the event of emergencies and unusual circumstances. A list of emergency contacts is included as Appendix 1.

Typical hours for waste acceptance are:

Monday through Friday, 7:00 am to 4:00 pm.

The posted hours for receipt of wastes may differ from the actual operating hours (to allow for startup and shut down activities, processing of received wastes, or acceptance of special waste streams, for example). These hours may be extended in the event of emergencies and unforeseen circumstances.

No scavenging will be allowed at the landfill. Firearms will not be allowed on-site.

5. WASTE SCREENING PROCEDURES

WM personnel will implement a program for detecting and preventing the disposal of the following types of wastes: hazardous waste as defined by ADEM regulations, PCB waste, liquid wastes (as regulated by ADEM), and regulated medical waste.

Vehicles carrying acceptable waste loads will be directed by the scale house operator and site personnel to the unloading and disposal area. A load-checking program to detect and discourage attempts to dispose of unauthorized wastes at the facility is implemented. The load-checking program consists of the following:

- The scale house operator determines acceptability of all vehicle loads as they are received at the scale facility. This initial determination of acceptability consists of verbal identification from the driver of the origin and type of waste in the load.

- Landfill personnel examine at least one random load of waste delivered to the landfill each month. At the working face the spotter or other site personnel will direct the truck operator to the unloading area. The waste will then be spread, graded and compacted by site operation equipment. During this process, the waste will be visually inspected by the equipment operators who have been trained to identify unauthorized and hazardous materials.

A written record of the random load inspections will be maintained on-site and will be made available for review during ADEM inspections. The recorded information includes, at a minimum, the following information:

(i) date and time of the inspection;

(ii) names of the hauling firm and the driver of the vehicle;

(iii) vehicle ID number;

(iv) source of waste (generator), as stated by the driver; and

(v) observations made by the inspector during the detailed inspection. The written record is signed by the inspector.

If unacceptable materials (e.g., Freon-containing appliances) are identified, the spotter or heavy equipment operator will move the unauthorized material away from the active area for later removal and proper management.

If hazardous waste is identified during a random load inspection or discovered deposited on-site, operation in the area of the suspected waste will cease immediately, except for those operations necessary to confine or prohibit the movement of the suspected waste. That part of the site will be isolated from all other operations and secured from public access. The site manager is to immediately notify both senior management and ADEM. The waste vehicle is to be detained on-site pending a resolution of the situation. The hazardous material would then be removed in accordance with required regulations and procedures and taken off site for disposal. If the generator or hauler cannot be identified, the landfill will assume the responsibility for the cleanup, transportation, and disposal of the waste by an appropriately permitted hazardous waste management facility. Thorough and complete records will be kept for all suspected hazardous materials.

The Site Manager will ensure that all facility personnel are properly trained to recognize regulated hazardous waste and PCB waste.

6. BRIEF NARRATIVE OF TYPICAL OPERATION

Vehicles will enter the facility by the only public entrance into the landfill, from U.S Highway 43. This entrance includes a secure gate. Signage at the landfill entrance identifies the name of the facility, operating hours, types of waste received, and other required information.

All vehicles must first stop at the weigh scale office. Non-collection vehicles will be identified and directed to the appropriate area. Collection vehicles will be weighed, ticketed, and directed to the working face.

All primary access roads will be capable of service in all weather conditions. All vehicle traffic will be controlled by various signage and site personnel. Unless otherwise approved by ADEM, there will be only one active disposal area at any one time, with all unloading operations being directed in such a manner as to provide for quick, efficient, and safe ingress and egress to and from the working face area.

Collection vehicles will be directed to back up to the working face at the proper time, speed, and placement for unloading of the waste. At this time, the load will be visually inspected for prohibited waste. Once all waste has been unloaded and the driver has carried out any necessary clean-out procedures, the vehicle will be directed away from the working face to the landfill exit.

At the active disposal area, refuse will be placed, spread, compacted and covered according to subsequent sections of this plan.

7. PERSONNEL

The Chastang Sanitary Landfill is staffed to ensure the facility is effectively and efficiently controlled, operated, developed, and maintained to comply with all conditions of its permit.

The site will be adequately staffed (Table 1) for daily operation and maintenance as required by ADEM Administrative Code 335-13-4.22.

The Site Manager has overall responsibility for the site, including but not limited to:

- supervision of all site personnel;
- liaison with all regulatory officials involved with the landfill's development and
- operation;
- liaison with the public and local officials, ensuring compliance with ADEM-approved plans;
- development of continuing education and training programs for all employees;
- ensuring each employee adheres to all safety rules and policies and all company rules and policies;
- ensuring that all site development and daily disposal operations are performed properly and in conformance with regulatory requirements;
- ensuring that the permit is maintained in accordance with the detailed plans and construction documents;
- on-site machinery operations;
- equipment operation and maintenance;
- ensuring that the working face is being developed and operated in accordance with this operation plan and all ADEM regulations and guidelines;
- proper drainage and leachate management operations;
- proper daily and intermediate cover procedures;
- entrance road and haul road maintenance; and,
- building cleanliness, maintenance, and safety.

The Lead Operator has the responsibility for the following:

- daily operation at the actual on-site work force;
- road watering;
- dirt hauling for daily cover use; and,
- management of laborers/temps.

8. EQUIPMENT

On-site equipment has been selected and maintained to handle the expected incoming waste volumes. The site will maintain adequate equipment as required by ADEM Administrative Code 335-13-4.22.

Arrangements have been made with local contractors and nearby equipment rental dealers to provide replacement or additional equipment on short notice in the case of equipment breakdown. WM also has the option of bringing in equipment from other sites.

A landfill equipment preventative maintenance program will be established to ensure the daily performance of each piece of equipment and to preplan for the replacement of parts for each piece of equipment and for major repair requirements. The equipment operators, mechanics, and other personnel responsible for maintenance and repair will be provided adequate instructions and training to carry out their responsibilities.

Each piece of equipment will have a permanent file record that will indicate maintenance activities that have been performed. This will also assist in determining when a logical replacement schedule should be established.

9. SITE SAFETY

WM is committed to safety in every respect. Company policy necessitates that every employee perform his or her duties in the safest possible way to minimize their own, the company's and the general public's exposure to possibly injury and/or damages as a result of their actions.

Safety checks to ensure that the site is receiving only nonhazardous solid waste will include the following measures:

- Checking validity of waste characteristics and waste origin at the scale house;
- Ensuring that facility personnel are properly trained to recognize unauthorized waste materials;
- Visual inspection of the waste as it is unloaded at the working faces;
- Visual inspection of the waste as it is being spread in layers and compacted; and,
- Random Load Inspections at the working face.

All WM employees, prior to beginning work on the landfill site, shall receive training required by ADEM. The site manager is responsible for all matters pertaining to disposal of waste transported to the landfill. Safety is one of his primary responsibilities.

Safety training will be conducted on a regular basis and each employee will be trained in the safe performance of his job responsibilities. Weekly safety training is required for all landfill personnel.

Necessary safety equipment for personnel will be provided to minimize the potential for personnel injury. Equipment may include hard hats, special boots with steel plated soles and toes, gloves and safety glasses. Fire extinguishers on all machines will be checked daily for serviceability and replaced if needed.

Operations and safety policy regulations will be prepared for the employees and a rules list prepared for site users. All unsafe acts, injuries, or accidents will be reported immediately to the site manager or his designee.

The safe operation of heavy equipment, performed in many cases in tight, confined, areas is critical. The equipment used on-site at the landfill will be well maintained to help ensure it is running properly, and that it can be operated safely. All equipment operators will be trained, with reading of the operator's manual required. No person who is untrained on a machine is to be allowed to operate that machine.

10. FIRE PREVENTION AND CONTROL PROCEDURES

Several steps and procedures will be taken at the site to prevent fires. Site maintenance personnel will ensure that working berms remain clear of debris and/or brush, providing a firebreak around the immediate working area. The inside working face of the disposal area will also be similarly maintained to serve as a daily operation fire break,

The adequate placement and compaction of the daily cover will significantly reduce the chance of landfill fires. Also, all on-site fire extinguishers, including those mounted to heavy equipment, will be checked regularly (daily if on heavy equipment being used that day; monthly for all others) and after every fire event to ensure proper charge and working order. They will be recharged (or replaced if necessary) immediately if they are found to be deficient in any way.

If any large on-site fires do occur, ADEM will be notified immediately. The fire will be extinguished by smothering. Sufficient amounts of cover material will be immediately placed upwind of and adjacent to the burning area. The soil will then be bladed to cover the burning material. The on-site water truck may also be employed to provide a water spray.

In the unlikely event that a "hot load" is not identified before entrance into the facility, the following procedures are implemented:

- The truck carrying the "hot load" is directed to dump the load in the disposal area but away from the working face;
- The load is placed on top of initial cover which provides sufficient protection between the "hot load" and the underlying waste;
- A firebreak may be constructed around the burning load if necessary;
- Water and/or soil may be used to extinguish/smother the "hot load"; and
- The "hot load" is monitored until there is no evidence of smoldering or high temperatures.

At the end of the day, or at a time when the waste has been well extinguished and cooled, the load is worked into the waste placement working face. The designated area for extinguishing the "hot loads" varies depending on the location of the working face, but is always away from the working face.

If any vehicle or piece of equipment catches on fire, the driver or operator will leave the vehicle immediately, notify the site manager, and attempt to extinguish the fire with the available fire extinguisher. As above, site personnel and equipment will immediately be deployed to assist in controlling the fire.

A range of equipment will be used by site personnel in the event of a fire. Equipment is listed below, along with its general fire-fighting application:

- Track or wheeled dozers and loaders, used in smothering operations to push or deposit soil directly over and onto the fire and to construct fire breaks.
- Landfill compactor, used in smothering operations to spread soil onto the fire and construct fire breaks.
- Equipment-mounted fire extinguishers, used to douse fire with fire suppressant.
- If the fire becomes unmanageable, the local fire department will be contacted, notified of the nature of the fire, and asked to respond.

11. WASTE PLACEMENT – WORKING FACE, LIFT THICKNESS

The active disposal area will be kept as small as possible while still allowing safe and efficient access by the collection vehicles. Dumped refuse at the working face will be spread in loose lifts approximately 1 to 2 feet thick in a confined area and compacted. The waste will be compacted by several passes with the landfill trash compactor to achieve adequate waste compaction. In variance from Rule 335-13-4.22(1)(c) requiring that a completed daily cell shall not exceed eight (8) feet in vertical thickness, a completed daily cell will not exceed fifteen (15) feet in vertical thickness.

In variance from Rule 335-13-4-.22(1)(b) requiring all waste to be confined to as small an area as possible, the Operator shall be allowed to operate two (2) working faces temporarily during the initial lift placement in each newly constructed cell. The second working face, located away from the newly constructed cell, would be temporary and would only be used until each new cell is covered by a sufficiently thick initial lift of solid waste.

12. DAILY, INTERMEDIATE, AND FINAL COVER

At the end of each working day, a minimum of 6 inches of earthen material will be placed over the exposed waste to help control disease vectors, fires, odors, and blowing litter. All or part of the daily cover may be removed before placing additional waste lifts. Alternatively, an alternative daily cover (ADC), such as tarps or approved ADC materials as approved by ADEM ~~will~~ may be used for daily cover. The ADC, excluding tarps, should be mixed with ~~sand or other on-site~~ soil~~s~~ in 50/50 ratio or alternate ratio as approved by ADEM and the SWDA Contract Administrator. The Operator ~~may~~ will be required to cover with six inches of earthen material at the conclusion of each week's activities, ~~if~~ as required by ADEM.

Prior to the deployment or use of any ADC tarp or material listed below, the Operator shall submit a request in writing to the SWDA's Contract Administrator to approve the specific tarp or other material(s) to be used as ADC. Such request should include information to demonstrate that the ADC can achieve a level of performance equal to or greater than earthen cover material. The Operator shall not deploy or use any tarp or other material as ADC that is not approved by ADEM and the SWDA Contract Administrator. The Operator shall, upon request of the SWDA Contract Administrator, permit the Contract Administrator to enter, at all reasonable times, to inspect the cover and ADC operations of the landfill. ADCs and the approval status associated with each ADC are included in Table 2.

~~Current approved ADCs include:~~

- ~~Tarps,~~
- ~~Automobile shredder fluff,~~
- ~~Kimberly-Clark non-coal ash,~~
- ~~Non-hazardous contaminated soil,~~
- ~~Armstrong World Industries lagoon sludge,~~
- ~~OTK meltshop refractory,~~
- ~~SSAB refractory brick, and~~
- ~~Non-coal ash, slaker grit, dregs, and lime generated from paper mill operations.~~

Any areas of the landfill that will not receive waste for 6 months or more will be covered with 12 inches of soil (intermediate cover). This will be accomplished within 30 days of the last day that area received waste. The intermediate cover will be smoothed and graded to prevent pending. The area will then be seeded, fertilized, and mulched to establish a vegetative cover. The vegetative cover will help prevent erosion on the slopes.

Final cover will be placed over any areas of the landfill that will no longer receive solid waste. This final cover will minimize infiltration and erosion, and will consist of an erosion soil layer (12 inches of earthen material capable of sustaining native plant growth) underlain by a geocomposite drainage layer and a geomembrane barrier layer.

13. LITTER CONTROL

Several steps will be taken to control litter, or windblown material, on the site:

- All open-bed trucks, trailers, and container roll-off boxes shall be tarped, screened, or otherwise covered; covers shall not be removed until the trucks reach their designated discharge area.
- Placement of daily cover material as soon as possible;
- Upwind deployment of cover stockpiles;
- Downwind deployment of portable wind screens;
- Litter collection by hand in and around the site will be performed by site personnel as often as necessary to maintain an orderly appearance.

14. DISEASE VECTOR CONTROL

The most important factor in the control of disease vectors (insects, rodents, etc.) will be the placement of an adequate amount of cover material or ADC at the end of each working day. This will discourage rodent burrowing and also discourage or prevent the emergence of flies. Mosquito hatching will be discouraged by proper grading (to prevent the ponding of stagnant water) and the immediate disposal of processed waste tires.

In the event that flies, rodents, birds, mosquitoes, rats, or other vectors become a problem, an extermination program will be developed with the assistance of a licensed exterminator. This program will be reviewed and approved by ADEM prior to its implementation.

15. DUST CONTROL

Dust control at the site will be accomplished by various means on those surfaces producing excess dust. Any time that dust may be hampering visibility, breathing, or is being carried off-site, those areas producing the dust will be mitigated.

Slopes with intermediate or final cover will be vegetated as soon as possible to control possible dust problems. Also, all vehicles will adhere to the maximum on-site posted speed. Entrance roads are paved to a point beyond the scale house to minimize dust and sediment from being tracked onto the highway.

Specific dust control measures that may be used as necessary for this landfill include, but are not limited to:

1. Use vegetative cover to minimize fugitive dust from closed landfill cells.
2. Landfill roads may be paved to minimize fugitive dust.

3. Use wet suppression to minimize fugitive dust from roads, active landfill areas and any area or activity observed or expected to cause fugitive dust. Wet suppression shall not be required during natural wet conditions. Wet suppression means using water trucks or any other means of spraying or applying water. Mixing of water with material during handling also constitutes wet suppression.
   a. The indicator that water application is required is the visual observation of fugitive dust from vehicle traffic and/or act of wind.
   b. Wet suppression is effective when the application of water prevents visible fugitive dust from crossing property lines.
4. Use compaction of daily cover materials and minimize material drop heights for active landfilling operations.

16. EROSION CONTROL PROCEDURES

The sediment ponds shown on the Permit Drawings will receive the majority of stormwater from the disturbed or active portions of the site. The sediment ponds have been designed to have the capacity to receive, at a minimum, the volume of water resulting from a 24-hour, 25-year storm. The drainage features shown on the Permit Drawings will serve to collect and direct the drainage into the sediment ponds. The initial design report and calculations for sediment ponds and drainage features was performed by Geosyntec Consultants in September 1999 and included in the Application for Permit Renewal, September 1999 as Section A1. CDG Engineers & Associates submitted a Permit Modification in October 2006 that included sediment pond modifications as Section A.1 and A.2 of the 2006 Permit Modification Application.

17. ENVIRONMENTAL MONITORING

Environmental monitoring will be conducted in accordance with ADEM Admin. Code r. 335-13 and the facility's approved plans. Groundwater monitoring will be conducted in accordance with 335-13-4-.27 and the facility's Groundwater Monitoring Plan. Explosive gases monitoring will be conducted in accordance with 335-13-4-.16 and the facility's Landfill Gas Monitoring Plan.

18. FINANCIAL ASSURANCE

Proof of financial responsibility is prepared in accordance with ADEM requirements. The closure and post-closure cost estimates will be updated annually by the Engineer and/or the Environmental Protection Manager and submitted to ADEM.

Upon receipt of approval of the updated estimate, a revised mechanism in the form of a bond, insurance certificate, or other acceptable financial assurance mechanism to demonstrate financial responsibility will be provided by WM Corporate Financial.

19. OPERATING RECORD

An operating record shall be maintained at the site and will include all records, reports, analytical results and notifications required by ADEM. The operating records may consist of hard copy files and/or electronic files. This record is available for inspection at reasonable times by ADEM, other regulatory agencies, or the SWDA.

As part of the operating record, waste receipt records are maintained of each type of solid waste received each day. Waste reports are provided to ADEM and the SWDA quarterly.

TABLE 1
Minimum Landfill Personnel

Personnel Classification	Total Number of Personnel Employed
Scale Attendant	1
Trained Landfill Operator	4
Heavy Equipment Operator*	4
Spotter**	4
Mechanic	As needed
Site Operations Manager	1
Construction Manager/Engineer	As needed

Notes:
Personnel employees may be supplemented by subcontract labor in support roles (examples: temporary manual laborers for litter control, earthwork contractors for cover material transport and placement, etc.).
* A trained Landfill Operator may simultaneously serve as a heavy equipment operator.
** A trained Landfill Operator may simultaneously serve as a Trained Spotter

Table 2
Alternative Daily Covers

Alternative Daily Cover	ADEM Approved	SWDA Approved
Tarps	X	X
Automobile shredder fluff	X	
Kimberly-Clark non-coal ash	X	
Non-hazardous contaminated soil	X	
Armstrong World Industries lagoon sludge	X	
OTK meltshop refractory	X	
Non-coal ash, slaker grit, dregs, lime generated from paper mill operations	X	
SSAB refractory brick		

APPPENDIX 1
Emergency Contacts

Facility Name: Chastang Sanitary Landfill
Facility Address: 17045 Highway 43, Mt. Vernon, Alabama 36560
Facility Phone: (251) 829-4006

Name	Title	Office	Cell
PRIMARY			
Wally Polk	Landfill Operations Manager	251-829-4006	225-772-0658
ENVIRONMENTAL CONTACT			
Michele Lersch	Market Area Env. Manager		831-726-6807
SPILL RESPONSE CONTRACTORS			
Aaron Oil Company, Inc.		334-479-1616	
Oil Recovery Company, Inc.		800-350-0443	
Clean Rite, Inc.		334-649-1746	
AGENCY CONTACTS			
National Response Center		800-424-8802	
State of Alabama Emergency Management Agency		205-2802-2200	
EPA Region 4		800-241-1754	
Alabama Department of Environmental Management		334-271-7700	
Mobile County Emergency Management Agency		251-460-8000	
Fire Department		911	
Northside Clinic		251-675-4733	
Mobile County Health Department		251-690-8124	

ATTACHMENT C

Closure and Post Closure Plan

CLOSURE AND POST-CLOSURE PLAN

Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Sept. 1999/ Revised July 2023, October 2024

Promus Project No. 170061, 230102

Prepared for:
WM Mobile Bay Environmental Center, Inc.

Prepared by:

PROMUS ENGINEERING

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CLOSURE AND POST-CLOSURE PLAN

CHASTANG SANITARY LANDFILL

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Revision note: This plan was originally prepared by Geosyntec Consultants, Inc. as part of the permitting effort in 2000. The plan was subsequently updated and modified October 2024 (this version) by Waste Management and Promus Engineering, LLC. 2024 revisions are tracked except for changes to title page, headers, and footers.

CLOSURE AND POST-CLOSURE PLAN

CHASTANG SANITARY LANDFILL

1. INTRODUCTION AND PURPOSE

The Chastang Sanitary Landfill is located in northeast Mobile County, Alabama, immediately west of U.S. Highway 43 (see Figure 1), in Section 13 of Township 1 North, Range 1 West, as shown on the United States Geologic Survey (USGS) Mt. Vernon 7.5-minute quadrangle map (Figure 2). The site operated as a 75-acre county landfill since 1976. The vertical expansion option was exercised by TransAmerican Waste Industries, Inc. on September 15, 1993. A vertical expansion was granted in 1995 and Subtitle D lateral expansions (Expansion Area 1 and Expansion Area 2) were also granted in 1995. The site was laterally expanded to a total of 199 acres in 2000 (152.9 acres of Subtitle-D landfill and 75 acres of pre-Subtitle-D disposal area, with the Subtitle-D landfill overlaying a portion of the old landfill). The original ~~unlined~~ pre-Subtitle D landfill, the Subtitle D landfill areas, and the 2000 expansion area are presented on the "Site Plan" (Figure 3). The facility operates under Solid Waste Disposal Facility Permit number 49-05 as permitted by the Alabama Department of Environmental Management (ADEM).

The purpose of this Closure and Post-Closure Plan (CPCP) is to describe the procedures that will be implemented for closure and long-term maintenance and monitoring of the Chastang Sanitary Landfill. This CPCP was developed to comply with the ADEM Administrative Code, Chapter 335-13-4.20 Solid Waste Program Regulations.

2. SITE INFORMATION

Chastang Sanitary Landfill is owned by Solid Waste Disposal Authority of the City of Mobile and operated by WM Mobile Bay Environmental Center, Inc. (formerly, TransAmerican Waste Industries, Inc.). The site is designed as an approximate 152.9-acre disposal area which will contain an estimated 35,782,457 bcy of solid waste. The site includes a pre-Subtitle D disposal area (unlined) and a Subtitle D (composite liner system) lateral expansion that was permitted in 1999/2000. The pre-Subtitle D area was certified closed by Environmental Consulting & Engineering, Inc. in a report dated March 18, 1999 and approved by ADEM in a letter dated March 20, 1999.

Site topography showing existing contours has been obtained from aerial photography and will be updated regularly. This topography and the designed and permitted final grades, or the existing grades at the time of closure, will be used as a basis to develop engineering drawings for final closure. These contours along with the proposed final grades of the landfill are depicted on the Permit Drawings. The final closure procedures for Chastang Sanitary Landfill are based on ADEM Administrative Code, Chapter 335-13-4-.20, Solid Waste Program Regulations.

The largest possible area for which final closure will be implemented at any given time during the active life of the landfill is approximately 152.9 acres (currently 73.2 acres). Only cells currently constructed are included in this CPCP estimate. Financial assurance for future/unbuilt cells is deferred until completion of construction on those cells, at which time, the cell acreage will be incorporated into revised CPCP estimates.

3. CLOSURE PLAN

Within 30 days after the date of which the landfill receives the known final receipt of wastes, the owner or operator must begin closure activities. Prior to beginning closure, the owner or operator must submit to ADEM and place in the Operating Record a notice of intent to close the landfill. The closure activities must complete the closure withing 180 days following the last known receipt of waste. Additional time extensions may be requested and approved by ADEM but extensions granted shall not exceed a total of 180 days.

Final closure contours were developed in general accordance with ADEM closure requirements, or as alternately approved by ADEM:

- Surface water does not pond over the landfill unit;
- the maximum final grade of the final cover system does not exceed 33 percent (3H:1V);
- slopes longer than 25 ft have a mix of benches and berms for stormwater management; and
- the minimum final grade of the final cover system is not less than 5 percent.

Pursuant to 335-13-4.20(2)(i), within 90 days after permit expiration, revocation or when final closure requirements in 335-13-4-.20 are achieved as determined by ADEM, the permittee or owner must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code Division 33505 and shall record a notation onto the land deed containing the property used for disposal, and/or some other legal instrument that is normally examined during a title search, that will in perpetuity, notify any potential purchaser of the property that:

1. The land has been used as a solid waste disposal facility landfill unit;
2. Its use is restricted by items contained in 335-13-4-.20(3)(c) and 335-13-4-.20(3)(d);
3. The locations and dimensions of the landfill unit with respect to permanently surveyed benchmarks and section corners shall be on a plat prepared and sealed by a land surveyor;
4. Contain a note, prominently displayed, which states the name of the permittee or operating agency, the type of landfill unit and the beginning and closure dates of the disposal activity;
5. Certification by an engineer or land surveyor that all closure requirements have been completed as determined necessary by ADEM.

The permittee or owner shall submit a certified copy of the recording instrument to ADEM and place a copy in the Operating Record within 120 days after permit expiration, revocation or as otherwise directed by ADEM.

all deeds for real property which have been used for landfilling will include notice of the landfill operations, the dates operations commenced and terminated, an accurate legal description of the actual location of the landfill, and a description of the types of waste accepted. This information will be included on the property deed upon submission of notice of final closure to ADEM.

Signs will be posted at the entrance to the site to notify users of the closure and to provide the location of nearby landfills. This notice will be posted at least 30 days prior to the closing date and will be maintained during the post-closure period.

3.1 Final Cover

The permit drawings illustrate the general design for closure of the landfill, including final grades, slope details, final cover details, and stormwater management features. Prior to closure, a registered Professional Engineer shall prepare Closure Construction Drawings and Technical Specifications for the closure project in accordance with the requirements of 335-14-4-.20(2)(b) or as alternately approved by ADEM. The Closure Construction Drawings shall include design of the final cover components and stormwater management features to route all stormwater through a sediment pond. Upon closure, all waste received at the site will be spread, compacted and covered with the final cover system. A final cover system as detailed in the permit drawings will be constructed over the un-closed portions of the site. Should the site be closed prior to attaining final grades, all uncovered and intermittently covered areas will be capped with the system specified. The final cap will commence being placed within 30 days of final receipt of solid waste. Side slopes will not exceed 3H:1V (33%) and shall have a net effective slope (top of slope to bottom of slope) of 3.25:1 (30.7%) and all grades will be greater than 5% on the cap. Material to be used for final cover will be obtained from unused portions of the property or an approved off-site borrow area. The final cover system will be tested in accordance with the approved CQA Plan for this facility. An independent registered Professional Engineer shall prepare and sign a Final Closure Documentation Report to summarize the construction and CQA activities and results for submittal to ADEM for approval of the closure.

3.2 Erosion and Sediment Control

Upon closure, all ditches, diversion berms, culverts, rip-rap, silt fence, and other drainage structures serving disturbed areas but not already built, will be constructed and placed according to the Final Grading Plan.

3.3 Permanent Vegetative Plan

3.3.1 Seedbed Preparation

Before fertilizing and seeding, the soil surfaces must be cleared, grubbed, and graded to remove significant grade variation, bumps, ridges, depressions, and all detrimental materials. The soil surface to be seeded must be cultivated thoroughly to a depth not less than 3 inches with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth. If prepared surface becomes eroded or crusted before the seed is sown, the surface must again be brought to a condition suitable for seeding. Ground preparation operations should be performed only when the ground is in a tillable and workable condition.

3.3.2 Fertilization and Liming

Following seedbed preparation, fertilizer should be applied to all areas to be seeded as recommended by the design engineer, or in accordance with the results of a soil nutrient test report. Fertilizer should be spread evenly over the seedbed and should be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of at least 3 inches on slopes flatter than 3H:1V. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed cannot remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used. Agricultural limestone should be mixed thoroughly into the soil at a rate of 2 tons per acre. The rate of application of limestone may be reduced if pH tests indicate this to be desirable. During the second year after seeding, 8-12-12 fertilizer should be applied at a rate of 1,000 pounds per acre. Maintenance fertilizer (8-12-12) should be applied in early spring following the initial establishment of cover as needed. The above application notes are considered minimum rates.

3.3.3 Seeding

Seeding must be performed as soon as preparation of the seedbed has been completed. No seed must be sown during high winds nor until the surface is suitable for working and is in a proper condition. Seed mixtures can be sown together provided they are kept in a thoroughly mixed condition during the operation. Seeds must be uniformly sown by an approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast-type seeder, windmill hand seeder, or power-drawn seed drills. Hydroseeding and hydromulching can be used on steep embankments provided full coverage is obtained. Care must be taken to adjust the seeder to ensure proper rate before seeding begins and to maintain the adjustments during seeding. Seed in hoppers must be agitated to prevent segregation of the various seeds in a seeding mixture. Immediately after sowing, the seeds must be covered and compacted to a depth of 1/8 to 3/8 in. by a cultipaker or suitable roller. Leguminous seeds must be inoculated prior to seeding with an approved, compatible nitrogen-fixing inoculate according to the manufacturer's mixing instructions. Seeded areas can be mulched if warranted by existing site conditions.

4. POST-CLOSURE PROGRAM

The Owner/Operator will conduct a post-closure program for the Chastang Sanitary Landfill after the facility has been successfully closed. The post-closure program will involve maintenance activities as well as property control and environmental monitoring measures. The post-closure care period shall last for a minimum of 30 years after the constructed closure plan is approved by ADEM, or another time period as allowed by 335-13-4-.20(3)(b).~~the time period as stated by ADEM~~.

4.1 Post Closure Maintenance Program

The following activities will be integral to the post-closure maintenance program:

1. Regular scheduled inspections to determine if the closure plan procedures were effective in closing out the site will be made. These inspections will be scheduled quarterly for the first year, semiannually for the next five years, and annually thereafter. Based on these inspections, the following measures will be enacted when necessary:
    a. If areas of the closed landfill have eroded, or if low spots occur or surface cracks occur, the Owner/Operator will promptly fill the areas with suitable cover material, regrade, compact, and reestablish a vegetative cover in accordance with closure plan procedures.
    b. The Owner/Operator will maintain ~~a minimum of 1 foot of cover material over the closed landfill at all times~~the approved final cap system designed in accordance with ADEM Admin. Code r. 335-13-4-.20(2)(b).
2. Access control structures (gates, fences, etc.) and signs will be maintained during the post-closure time period to prevent access to the site by unauthorized personnel.
3. The Owner/Operator will maintain erosion control devices constructed during final closure activities. Erosion controls will be maintained, repaired and replaced as necessary to ensure

that erosion control is maintained on the site. All stormwater drainage piping, ditching, and sedimentation ponds will also be maintained, repaired, and replaced as necessary.

4. The Owner/Operator will maintain groundwater monitoring wells, monitor the groundwater, and report the results in conformance with ADEM requirements as set forth in the Groundwater Monitoring Plan. Monitoring will be conducted semi-annually until and unless changed by ADEM. The parameters required to be monitored are stated in the Groundwater Monitoring Plan. It is noted that the monitoring parameters include those listed in ADEM Administrative Code Rule 335-13-4-Appendix I.

5. The Owner/Operator will maintain its landfill gas monitoring program in accordance with the Landfill Gas Monitoring Plan and ADEM requirements.

6. The Owner/Operator will inspect the site during the post-closure period for evidence of leachate outbreaks. If leachate outbreaks appear, the Owner/Operator will develop procedures to control and/or limit the potential for future outbreaks. These procedures are as follows:

   a. Inspect the final cover in the problem area of the landfill. Repair any areas that may be contributing to the leachate problem.

   b. If problems with leachate persist, install leachate collection lines with holding tank(s) near troublesome areas of the site. Size of the holding tank will depend on the amount of leachate being generated at the site (or sites), and period of time between leachate removal for treatment.

7. Vector control measures will be provided during the post-closure period as needed.

8. If the Owner/Operator or anyone else wishes to remove waste, waste residues, or any contaminated soils, Owner/Operator will request approval from ADEM prior to any such removal.

4.2 Post-Closure Property Control Measures

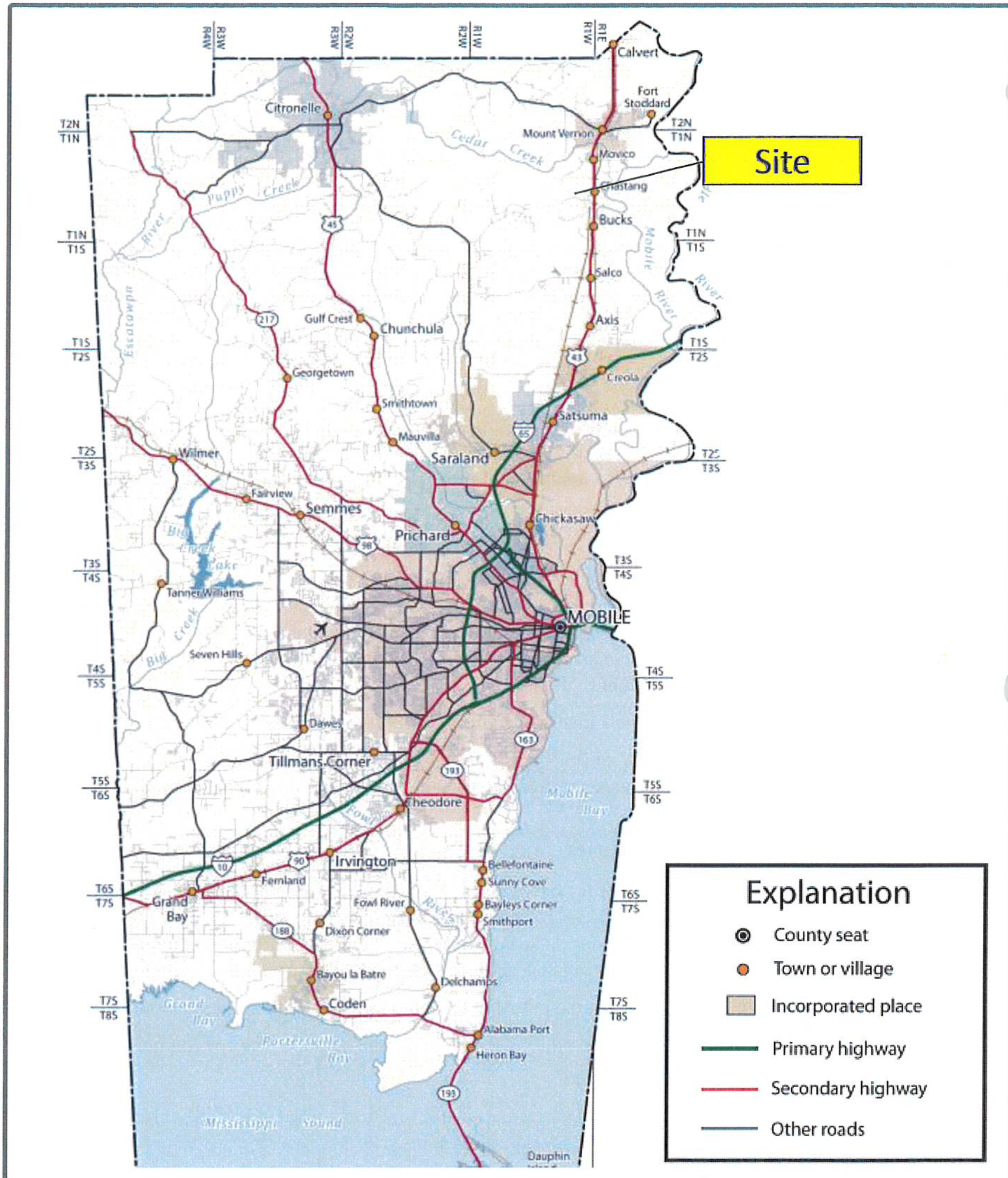
Any post-closure use of the landfill site shall not result in the disturbance of the integrity of the final cover on the site, interfere with any erosion control devices or prevent access to monitoring control systems. ADEM may approve any other disturbance if the owner or operator demonstrates that the disturbance, including the removal of waste, complies with the following:

1. The activities will not increase the potential threat to human health or the environment; or

2. The activities are necessary to reduce a threat to human health or the environment.

4.3 Post-Closure Notifications

Following completion of the post-closure care period, the owner or operator must submit to ADEM a certification, signed by an independent registered professional engineer verifying that post-closure care has been completed in accordance with the post-closure plan, and a copy placed in the Operating Record.



Note:

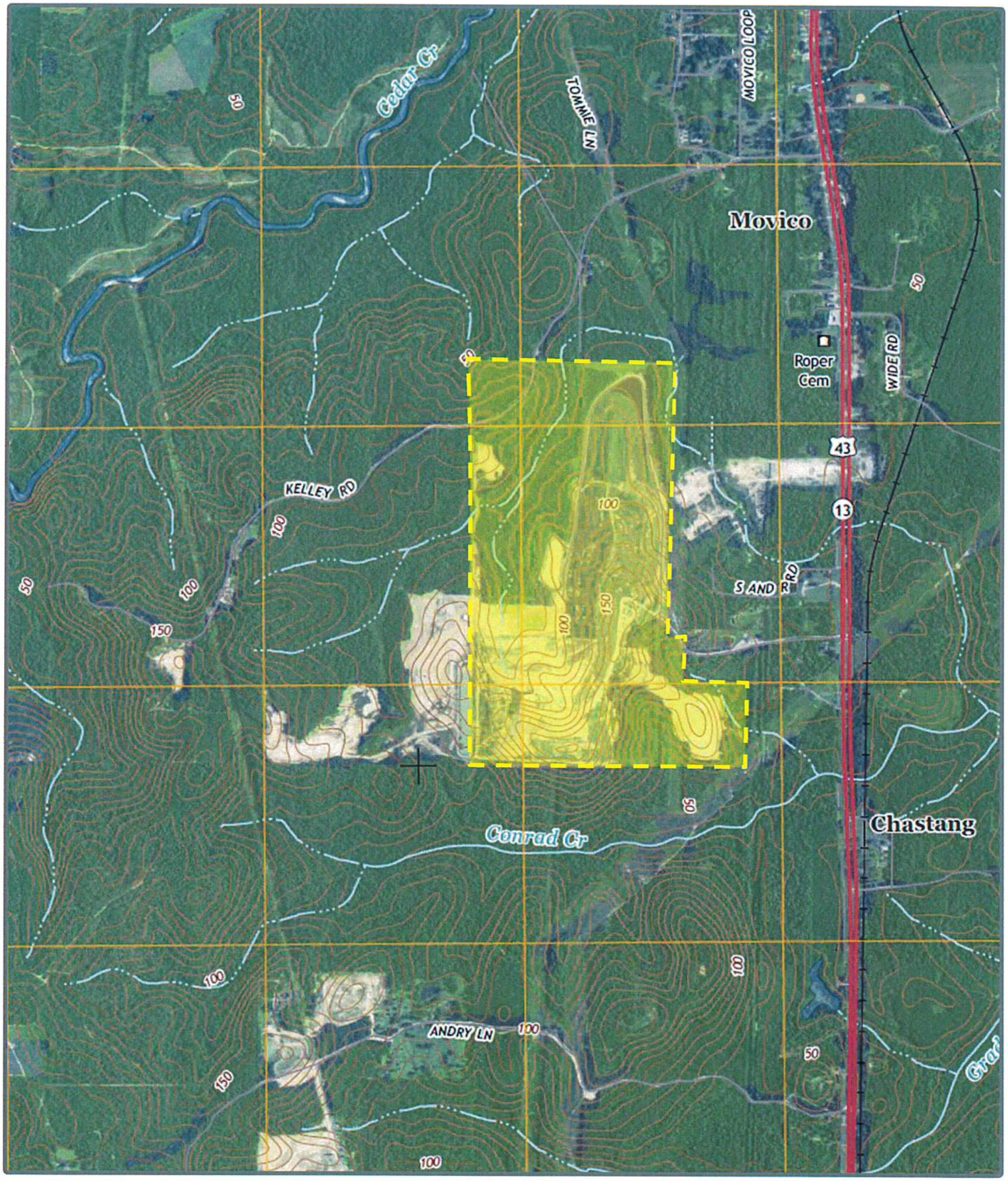
Map Location

SITE LOCATION MAP
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

PROMUS ENGINEERING

Drawn: JJB
Engineer: JJB
Proj. No.: 170061

FIGURE 1



Note:
Source USGS 7.5' Quadrangle
Mt. Vernon, Alabama
Property Boundary Approximate

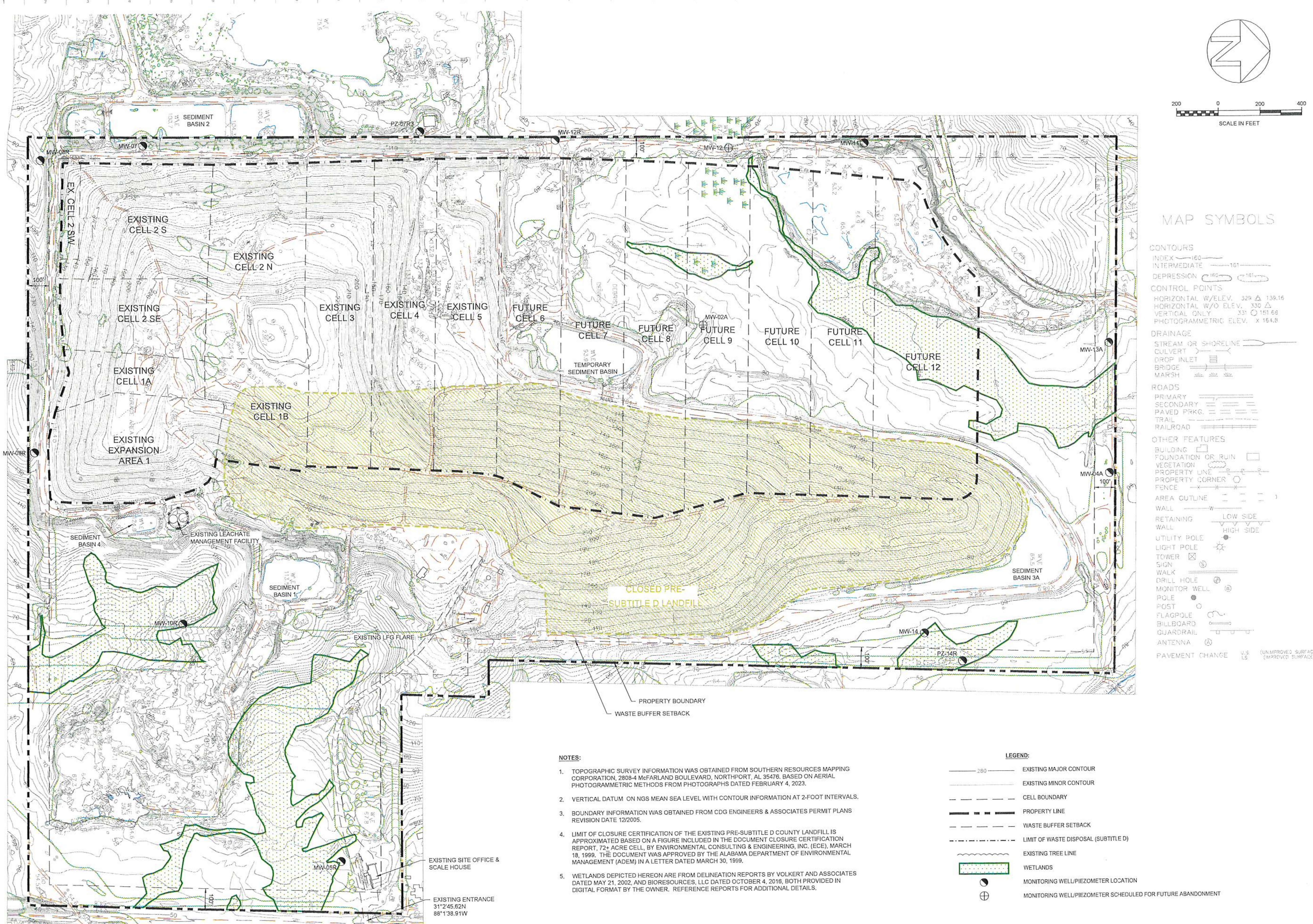
PROMUS ENGINEERING

Map Location

SITE VICINITY MAP
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Drawn: JJB
Engineer: JJB
Proj. No.: 170061

FIGURE 2



NOTES:

1. TOPOGRAPHIC SURVEY INFORMATION WAS OBTAINED FROM SOUTHERN RESOURCES MAPPING CORPORATION, 2808-4 McFARLAND BOULEVARD, NORTHPORT, AL 35476. BASED ON AERIAL PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHS DATED FEBRUARY 4, 2023.
2. VERTICAL DATUM ON NGS MEAN SEA LEVEL WITH CONTOUR INFORMATION AT 2-FOOT INTERVALS.
3. BOUNDARY INFORMATION WAS OBTAINED FROM CDG ENGINEERS & ASSOCIATES PERMIT PLANS REVISION DATE 12/2005.
4. LIMIT OF CLOSURE CERTIFICATION OF THE EXISTING PRE-SUBTITLE D COUNTY LANDFILL IS APPROXIMATED BASED ON A FIGURE INCLUDED IN THE DOCUMENT CLOSURE CERTIFICATION REPORT, 72± ACRE CELL, BY ENVIRONMENTAL CONSULTING & ENGINEERING, INC. (ECE), MARCH 18, 1999. THE DOCUMENT WAS APPROVED BY THE ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (ADEM) IN A LETTER DATED MARCH 30, 1999.
5. WETLANDS DEPICTED HEREON ARE FROM DELINEATION REPORTS BY VOLKERT AND ASSOCIATES DATED MAY 21, 2002, AND BIORESOURCES, LLC DATED OCTOBER 4, 2016, BOTH PROVIDED IN DIGITAL FORMAT BY THE OWNER. REFERENCE REPORTS FOR ADDITIONAL DETAILS.

LEGEND:

280 EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
CELL BOUNDARY
PROPERTY LINE
WASTE BUFFER SETBACK
LIMIT OF WASTE DISPOSAL (SUBTITLE D)
EXISTING TREE LINE
WETLANDS
MONITORING WELL/PIEZOMETER LOCATION
MONITORING WELL/PIEZOMETER SCHEDULED FOR FUTURE ABANDONMENT

REV	DATE	DES. BY	DRA. BY	APPR. BY	DESCRIPTION
0	7/10/2023	JJB	EJW	JJB	PERMIT RENEWAL MODIFICATION

PREPARED FOR:
WM MOBILE BAY ENVIRONMENTAL CENTER, INC.
WASTE MANAGEMENT

PREPARED BY:
PROMUS ENGINEERING
1200 MTN CREEK RD SUITE 102 CHATTANOOGA, TENNESSEE 37405

SITE PLAN

PERMIT RENEWAL MODIFICATION
CHASTANG SANITARY LANDFILL
MOUNT VERNON, ALABAMA

PROJECT NO.: 230102
SHEET NUMBER
3

WM Mobile Bay Environmental Center, Inc.
CHASTANG LANDFILL
17045 Highway 43
Mt. Vernon, AL 36560

October 21, 2024

UPS tracking # 1ZWR27021395886413

Scott Story, Chief
Land Division, Solid Waste Branch
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, AL 36110

Re: 2024-2025 Financial Assurance Instrument
Waste Management Mobile Bay Environmental Center, Inc.
(a.k.a. Chastang Sanitary Landfill)
Solid Waste Permit Number 49-05

Dear Mr. Story:

Enclosed please find the original National Guaranty Insurance Company of Vermont Certificate of Insurance for policy CPCS05-0003 that demonstrates financial assurance for the above referenced facility. The enclosed supporting estimated Closure and Post-closure costs have been inflation-factor adjusted to determine the amounts of this current renewal policy that covers the period 11/01/2024 to 11/01/2025.

If you have any questions or require additional information, please feel free to contact me at (813) 786-6807 or via email at mlersch@wm.com.

Sincerely,
WMMBECI-Chastang Landfill

Michele H. Lersch

Michele H. Lersch
Environmental Protection Manager

Enclosures: as noted above

cc: site file
Blake Holden, ADEM, cbholden@adem.alabama.gov
Jim McNaughton, SWDA Contract Administrator, jimmcnaughton@comcast.net

NATIONAL GUARANTY INSURANCE COMPANY OF VERMONT

100 BANK STREET, SUITE 630 • BURLINGTON, VT 05401

CERTIFICATE OF INSURANCE

CLOSURE AND POST-CLOSURE

Name and Address of Insurer (hereinafter called the "Insurer"):

NATIONAL GUARANTY INSURANCE COMPANY OF VERMONT

100 Bank Street, Suite 630, Burlington, Vermont 05401

Name and Address of Insured (hereinafter called the "Insured"):

WM Mobile Bay Environmental Center, Inc.

17045 Hwy. 43, Mt. Vernon, AL 36560 (Mailing address: same)

Facilities Covered:

EPA ID Number: 49-05

Name: Chastang Sanitary Landfill

Address: 17045 Hwy. 43
Mt. Vernon, AL 36560

Policy Face Amount: $27,119,697.31

Closure: A. $14,767,502.00

Post-Closure B. $12,352,194.84

Policy Number: CPCS050003

Effective Date: November 1, 2005 (Coverage Period 11/01/24 to 11/01/25)

The Insurer hereby certifies that it has issued to the Insured the policy of insurance identified above to provide financial assurance for closure and post-closure care for the facilities identified above. The Insurer further warrants that such policy confirms in all respects with the requirements of 40 CFR 258.74(d), as applicable and as such regulations were constituted on the date shown immediately below. It is agreed that any provision of the policy inconsistent with such regulations is hereby amended to eliminate such inconsistency.

Whenever requested by the EPA Regional Administrator(s) of the U.S. Environmental Protection Agency, the Insurer agrees to furnish to the EPA Regional Administrator(s) a duplicate original of the policy listed above including all endorsements thereon.

Authorized Signature for Insurer

October 15, 2024
Date

Jeffrey Koch
Name of person signing

Attorney-In-Fact
Title of person signing

Witness

POWER OF ATTORNEY

KNOWN ALL MEN BY THESE PRESENTS that the National Guaranty Insurance Company of Vermont, 100 Bank Street, Suite 630, Burlington, Vermont Corporation (the "Corporation"), has constituted and appointed and does hereby constitute and appoint Peter Snell, Brandi Guthrie, Michael Batsimm, Jeffrey Koch, and Nancy Madden of Burlington, Vermont, each its true and lawful Attorney-in-fact to execute under such designation in its name and to affix its corporate seal to deliver for and on its behalf as surety thereon or otherwise, bonds of any of the following classes, to wit:

1. Surety bonds to the United States of America or any agency thereof, including lease and miscellaneous surety bonds required or permitted under the laws, ordinances or regulations of any State, City, Town, Village, Board or any other body or organization, public or private.

2. Bonds on behalf of contractors in connection with bids, proposals or contracts.

3. Insurance policies and Certificates of Insurance related to financial assurance for closure, post-closure and/or corrective action obligations.

The foregoing powers granted by the Corporation shall be subject to and conditional upon the written direction of any officer (or any designee of any such officer) to execute and deliver any such bonds.

The signatures and attestations of such Attorneys-in-fact and the seal of the Corporation may be affixed to any such bond, policy or to any certificate relating thereto by facsimile and any such bond, policy or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Corporation when so affixed.

IN WITNESS WHEREOF, the Corporation has caused these presents to be signed by the President and its corporate seal to be hereto affixed. This power of attorney is in effect as of OCTOBER 15, 2024.

Witness:

Diana Seng

Diana Seng
Secretary

NATIONAL GUARANTY INSURANCE COMPANY OF VERMONT

Leslie K. Nagy

Leslie Nagy
President

Revised 10/11/23

ATTACHMENT D

Construction Quality Assurance Plan

CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL PLAN

Chastang Sanitary Landfill
Mount Vernon, Alabama

August 24, 2017, May 4, 2023
Promus Project No. 140088/170061/230102

Prepared for:
WM Mobile Bay Environmental Center, Inc.

Prepared by:

PROMUS ENGINEERING

Jeffrey J. Breedlove, P.E.
Principal Engineer

ALABAMA LICENSED NO. 28147 PROFESSIONAL 7/14/2023 ENGINEER JEFFREY J. BREEDLOVE

1200 Mountain Creek Rd, Suite 102 | Chattanooga, Tennessee 37405
www.promusengineering.com

TABLE OF CONTENTS

TABLES

CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL PLAN

Chastang Sanitary Landfill
Mount Vernon, Alabama

1. INTRODUCTION

1.1. Purpose

Pursuant to Code r. 335-13-4.12(2)(k) of the Solid Waste Regulations ("Solid Wastes and Recyclable Materials Management Act", Act No. 151, Regular Session 2008, Code of Alabama 1975, Section 22-27-1 et. seq.), the plans and operational reports for solid waste facilities in the State of Alabama shall include a "Quality Assurance/Quality Control (QA/QC) plan for all components of the liner, leachate collection, and cap systems." This Construction Quality Assurance and Quality Control Plan (CQA/QC Plan) presents the quality program for the construction of the Chastang Sanitary Landfill (the "Site" or "Facility") located near the town of Mount Vernon, Alabama.

The intent of this document is to outline the methods and minimum test frequencies by which Construction Quality Control (CQC) and Construction Quality Assurance (CQA) shall be performed and documented to verify construction conformance with the permit documents. This plan is not intended to provide all the comprehensive details necessary for effective CQC and CQA. The CQA Engineer and other professionals responsible for CQC and CQA are expected to supplement the measures in this document with their professional experience and judgment and use discretion in performing quality evaluations. Using alternate test methods, acceptance criteria and protocols may be allowed at the discretion of the CQA Engineer, when test methods are updated and industry standards are taken into consideration. Any exceptions to the requirements of this plan, however, shall only be allowed at the discretion of the CQA Engineer. Quality management involves both CQC and CQA activities performed to verify that construction activities meet the permitted design plans and specifications.

Subsequent to the construction of each phase or cell and closed area final cover of the waste containment facility, a Construction Quality Assurance Documentation Report (CQA Report) documenting construction will be submitted to Alabama Department of Environmental Management (ADEM).

This plan supersedes the existing *Construction Quality Assurance Plan, Chastang Sanitary Landfill,* (Promus Engineering, LLC) dated August 2017.

1.2. General Site Information

Site Location and Mailing Address:

Chastang Sanitary Landfill
17045 Highway 43
Mount Vernon, Alabama 36560
Tel. (251) 829-4006

Chastang Sanitary Landfill is a municipal solid waste landfill operated by WM Mobile Bay Environmental Center, Inc. [formerly, TransAmerican Waste Industries, Inc.] (WM or Operator) under a management contract with the City of Mobile Solid Waste Disposal Authority (Owner or SWMA) and in accordance with ADEM solid waste permit No. 49-05.

1.3. Scope of the CQA/QC Plan

The CQA/QC Plan addresses the responsibility and authority of various parties involved in waste containment construction at the Facility, quality objectives, construction materials testing and documentation during construction. The minimum elements of construction within the construction quality assurance scope, and therefore, addressed in this CQA/QC Plan, include:

- Structural Fill;
- Geosynthetic Reinforcing Layer;
- Soil Liner(s);
- Geosynthetic Clay Liner;
- Flexible Membrane Liner(s);
- Leachate Collection System; and
- Protective Soil Cover.

This CQA/QC Plan has been developed to work in conjunction with permitted plans and specifications for the facility. For each construction project, a set of construction drawings and specifications may be developed for the project. In the case of conflict between this CQA/QC Plan and construction plans and specifications, the CQA/QC Plan shall take precedence over both construction specifications and the construction drawings. Construction specifications should be no less stringent than this document.

1.4. Definition of Terms

In the context of this the CQA/QC Plan, the following terms are defined as follows:

As-built: As-Built drawings typically refer to plan and topographical surveys which illustrate the appearance or condition of the constructed element or feature, usually at the completion of construction.

Compaction: The act of increasing the soil density or unit weight by rolling, tamping, vibrating, or other mechanical means.

Construction Drawings: The submitted and approved drawings or reproductions of drawings pertaining to the project work or to ancillary structures.

Construction Quality Assurance (CQA): CQA refers to systematic quality measures taken by the Owner (or the Owner's representative) to determine if the work is in compliance with the requirements of the project documents.

Construction Quality Control (CQC): CQC refers to systematic quality measures taken by the Contractor (or the Contractor's representative) to determine if the work is in compliance with the requirements for material and workmanship as stated in the project documents.

Contract: Collectively, the Contract executed by the Owner and the Contractor, Notice to Bidders, Instructions to Bidders, Proposal Form, Form of Bond, Conditions of Contract, General Conditions, Specifications, Construction Drawings, Addenda, Performance Bonds, and supplemental agreements executed.

Density: Mass density of soil as its weight per unit volume, usually reported as dry density in pounds per cubic foot.

Hydraulic Conductivity: Ability of pore fluid to travel through a soil mass via interconnected voids. "High" permeability describes relatively rapid flow, and low permeability describes relatively slow flow. Hydraulic conductivity is generally reported in centimeters per second (cm/sec). Hydraulic conductivity may also be referred to as permeability.

In Situ: "In place" or "in position". This typically describes the manner or location in which a measurement or test is taken. In situ testing is assumed to be representative of the material as it exists in place.

Maximum Dry Density (MDD): Calculated dry density of material corresponding to optimum moisture as determined in Standard Effort Compaction Test, ASTM D698 or Modified Effort Compaction Test, ASTM D1557.

Moisture Content: Gravimetric percentage of weight of water in the soil to the weight of the dry soil. It is also referred to as water content.

Optimum Moisture Content (OMC): Moisture content corresponding to maximum dry density as determined in Standard Effort Compaction Test, ASTM D698 or Modified Effort Compaction Test, ASTM D1557 (Material Specific).

Overlay: A waste containment cell or portion of a waste containment cell that is constructed upon previously placed wastes. The overlay composite liner design may differ from the typical liner detail and may include additional components or construction requirements to improve stability.

Plasticity: The property of soil that allows it to deform without cracking or appreciably changing volume. Generally, it is defined by the range of moisture content between the liquid and plastic limit of the soil.

Remolded: A sample which has been remolded was sampled as loose soil material and typically recompacted to a specified moisture content and density in the laboratory before performing a test.

Undisturbed: Although not literally undisturbed, an undisturbed sample typically describes one where the condition of the soil in the sample is close enough to the conditions of the soil in-situ to allow testing of the soil sample to be used to approximate the properties of the soil in-situ. Undisturbed samples are usually sampled using thin-walled sampling cylinders and the soil is extruded from the cylinder in an intact condition in the laboratory.

Work: The work tasks and product proposed to be accomplished by the completion of the project, and ancillary activities necessary to accomplish the construction as designed. This includes all plant, labor, materials, supplies, and other facilities and acts necessary, proper or incidental to the carrying out and completion of the terms of the construction Contract.

1.5. Abbreviations and Acronyms

ASTM - American Society for Testing and Materials
CCL – Compacted Clay Liner
CQA – Construction Quality Assurance
CQC – Construction Quality Control
CSL – Compacted Soil Liner
DOT – Department of Transportation
EPA – United States Environmental Protection Agency
LCS – Leachate Collection System
MDEQ – Mississippi Department of Environmental Quality
GRI – Geosynthetics Research Institute
NSF – National Sanitation Foundation
PC – Protective Cover

1.6. References to Standard

This CQA Plan may include references to test procedures of the American Society for Testing and Materials (ATSM), the Federal Test Method Standards (FTMS), the "Standard for Flexible Membrane Liners" of the National Sanitation Foundation (NSF) and the Geosynthetic Research Institute (GRI). Typically, the most current edition of the stated standard shall be applied, at the discretion of the CQA Engineer.

2. RESPONSIBILITY AND AUTHORITY

The principal parties involved in the CQA of the solid waste containment system construction project include: the Permitting Agency, the Facility Operator, the Design Engineer, the CQA Consultant, the Soils CQA Laboratory, the Geosynthetics CQA Laboratory, the Earthwork Contractor, the Geosynthetics Manufacturer, and the Geosynthetics Installer. The general responsibilities and authorities of each of these parties or authority of a given party may be modified or expanded as dictated by specific project needs during Pre-Construction Meetings.

2.1. Permitting Agency

The Permitting Agency is authorized to issue the permit for construction of the waste containment facility based on review and acceptance of the permit application. The Alabama Department of Environmental Management (ADEM) is the agency responsible for permitting the Chastang Sanitary Landfill. ADEM maintains the responsibility to review the construction specifications and the CQA/QC Plan for compliance with the agency's regulations. ADEM may also perform site inspections during construction to monitor construction conformance to permitted documents.

2.2. Facility Operator

The facility Owner, Operator, or their representatives, are responsible for coordinating the design and construction of the landfill containment systems and operational systems. They also provide project management and are responsible for meeting the permit and ADEM requirements.

2.3. Design Engineer

The Design Engineer is a professionally licensed firm or person, retained by the Owner or Operator, to prepare permit and/or construction documents for acceptance by the Permitting Agency and necessary to construct the facility. The permit documents include forms, narratives, the CQA/QC Plan, and the design of the landfill. The permit documents establish the limits, type, and details for liner systems, leachate management systems and other components for the waste containment facility. The permit documents provide minimum specifications for construction and are the governing document when a specification contradiction is discovered.

The Design Engineer may also develop construction documents (plans and specifications) that further define the nature of the construction effort for bidding and construction purposes. During construction, the Design Engineer may be called upon to provide additional information or resolve discrepancies in the construction documents or CQA Plan, as necessary.

2.4. CQA Consultant

The CQA Consultant shall be selected by, and shall represent the Owner or Operator. The CQA Consultant shall be responsible for documenting the construction as being in conformance with the CQA/QC Plan. The CQA/QC Plan outlines the minimum inspection requirements to be used by the CQA Consultant to ensure that the requirements of the site permit are satisfied.

In general, the responsibilities and authorities of the CQA Consultant include:

- A working understanding of the project documents;
- Scheduling, coordinating, and performing CQA activities, as appropriate;
- Performing independent on-site observation of the work in progress to assess compliance with the CQA/QC Plan;
- Verifying that the CQC test equipment meets testing and calibration requirements, and that tests are conducted according to standardized procedures defined in the CQA/QC Plan;
- Recording and maintaining test data;
- Identifying CQC-tested work that should be accepted, rejected, or further evaluated;
- Providing recommendations for corrective measures, when needed, and verifying that corrective measures are implemented, as necessary;
- Reviewing and approving quality control documentation and activities;
- Collecting data needed for record documentation;
- Maintaining open lines of communications with other parties involved in the construction; and
- Documenting that major project elements are constructed in accordance with the project documents.

CQA Consultant shall designate a CQA Field Representative (or representatives, as necessary) to perform on-site observation of construction, verify or perform CQC field sampling and testing, develop and maintain daily logs, and report to the CQA Project Manager or CQA Engineer. CQA Field Representatives shall be specifically experienced and trained as field quality control and quality assurance personnel in the area of construction being inspected. The CQA Field Representatives' duties shall include the following:

- Performing independent on-site observation of the work in progress to assess compliance with the project requirements;
- Preparation of a Daily Field Report (DFR) for each day the representative is on site;
- Performing field and laboratory tests on samples retrieved in the field to determine that the materials placed meet the requirements of this CQA/QC Plan;
- Verify that soils testing meets the requirements and that the tests are conducted according to this CQA/QC Plan;
- Reporting to project management the results of the observation activities and field tests, including work that is not of acceptable quality or that fails to meet the specific design;
- Verifying that failed areas of work are reworked or replaced and completed in compliance with the CQA/QC Plan.

CQA Consultant shall designate a CQA Engineer who shall be responsible for overall administration of quality assurance procedures and for the control of quality assurance documents. The CQA Engineer shall be responsible for oversight and coordination of quality assurance technicians and testing laboratories and shall document construction to be in substantial conformance with the CQA/QC Plan. The CQA Engineer may be assisted in fulfilling project responsibilities by a CQA Project Manager or other CQA staff. The CQA documentation report shall bear the seal of a Professional Engineer registered in the state of the Permitting Agency.

2.5. Soils Laboratory

CQA/CQC testing of soils and aggregate may be performed by one or more commercial geotechnical laboratories. The Soils Laboratory is responsible for performing the laboratory testing required by the CQA/QC Plan to determine specific characteristics of the soils and aggregates. The Soils Laboratory shall be responsible for providing adequate documentation of analytical results, test methods followed, and testing equipment used. Work of the Soils CQA Laboratory shall be administered by, and reported to, the CQA Consultant.

2.6. Geosynthetics CQA Laboratory

CQA/CQC testing of geosynthetic materials may be performed by one or more commercial geosynthetic testing laboratories. The Geosynthetics Laboratory shall be responsible for performing the laboratory conformance testing required by the CQA/QC Plan to verify the specific characteristics of the geosynthetic materials. The Geosynthetics Laboratory shall also responsible for providing adequate documentation of analytical results, test methods followed, and testing equipment used. Work of the Geosynthetics Laboratory shall be administered by the CQA Consultant. Results shall be reported to the CQA Consultant.

2.7. General Contractor

The General Contractor may have overall responsibility for construction of the waste containment facility, or portions thereof. The Owner or Operator may select a General Contractor for various phases of construction, typically, for each individual landfill cell or closure construction. The General Contractor, as required in the Contract, arranges for purchase of materials that meet specifications, contracts with subcontractors for specialized needs, and has overall control and responsibility for the construction operations, including scheduling. The General Contractor has the primary responsibility for ensuring that the facility is constructed in accord with the permit, plans and specifications that have been developed by the Design Engineer. The General Contractor is also responsible for informing The Owner or Operator, CQC personnel and the CQA Consultant of the scheduling and occurrence of construction activities. The Owner or Operator may serve in the capacity of General Contractor and arrange for the necessary material, fabrication, and installation contracts. In such cases, the Owner or Operator's Construction Representative will serve the same function as the General Contractor.

2.8. Geosynthetics Manufacturer

The Geosynthetics Manufacturer(s) is responsible for the production of geosynthetic materials that meet the requirements of the contract documents. The Geosynthetics Manufacturer is also responsible for providing adequate documentation regarding the characteristics of the resin, the characteristics of the finished product, the testing performed to determine the characteristics and the quality control measures taken during manufacturing. They are responsible for performing and submitting conformance quality control testing and data to meet the requirements of the project for each material.

The Geosynthetics Manufacturer(s) is responsible for the safe transportation of the geosynthetic materials between the manufacturing plant and the site. The Geosynthetics Manufacturer is responsible for carefully loading and transporting materials and accepts full responsibility for damage to materials that may occur during these operations.

2.9. Geosynthetics Installer

The Geosynthetics Installer(s) is responsible for unloading, field handling, storing, placing, seeming, temporarily anchoring against wind, and other aspects of geosynthetic materials installation in accordance with the contract documents. The Geosynthetics Installer may also be responsible for offloading or staging materials.

Prior to installation, the Geosynthetics Installer is responsible for evaluating the surface upon which geosynthetics are to be installed and, once determined to be acceptable, providing signed acceptance of the subgrade on the CQA Consultant's provided form. Prior to installation, the Geosynthetics Installer is also responsible for the preparation and submittal of the planned panel layout drawing identifying construction of field seams and details. Upon request, the Geomembrane Installer shall also provide to the CQA Consultant a copy of their firm's installation quality control plan. The plan must be at least as stringent as the quality control installation requirements of the project or the Geomembrane Installer must adhere to the project requirements. The Geomembrane Installer is responsible for providing quality control documentation, as required. Upon completion of the installation, the Geosynthetics Installer shall provide a complete CQC installation package including the required completed CQC logs and other submittals. The Geomembrane Installer shall provide a geomembrane installation certification, the Manufacturer's warranty and the installation warranty, as required.

3. PROJECT COORDINATION

3.1. Pre-Construction Meeting

A pre-construction meeting shall be held prior to commencement of construction at the project site, or virtual meeting, as conditions dictate. Additional construction meetings may be held prior to commencement of a new phase of work, such as soil liner construction, geomembrane installation, or as necessary. Essential project personnel shall attend the construction meeting(s), as appropriate. The meetings shall include a discussion of the construction management organization, respective duties during the construction, construction plan for personnel and equipment, and periodic reporting requirements for test results and construction activities. A discussion of the schedule for coordinating activities shall also be included.

3.2. Progress Meetings

Routine progress meetings may be held from time to time, depending on the ongoing and anticipated construction activities, to discuss project progress. These meetings will include the Owner or Operator's Construction Manager, the CQA Consultant, the General Contractor and subcontractors, as appropriate. These meetings may be held daily, weekly, monthly or on a periodic basis.

3.3. Issue or Work Deficiency Meetings

Special meetings may be held when a problem or deficiency is identified or likely to occur. The meetings should be attended by the General Contractor, and involved Subcontractors, the Owner or Operator's Construction Manager, the CQA Consultant, and other construction or facility personnel as needed. If the problem requires a design modification, the Design Engineer should also be present. The purpose of the meeting is to define the problem or work deficiency, review alternative solutions, and most importantly implement an action plan to resolve the issue. This meeting shall be documented and the documentation maintained in the project files.

4. CONSTRUCTION QUALITY CONTROL

All contractors and material installers shall be responsible for implementing a quality control program. The General Contractor shall comply with the requirements for soil erosion and sedimentation control, and other requirements of governmental authorities having jurisdiction, including the State of Alabama.

The General Contractor shall be responsible for their quality control program and the quality control programs of subcontractors. The procedures and results of the quality control program(s) shall be available to the CQA Consultant for review, approval and documentation.

5. CONSTRUCTION QUALITY ASSURANCE

The purpose of Construction Quality Assurance (CQA) is to document the construction and quality activities that demonstrate that the waste containment facility is constructed in accordance with the requirements of the CQA/QC Plan. Additionally, it is the responsibility of the CQA Consultant to review CQA/QC actions, perform analyses of the data collected, as necessary, and to prepare the CQA Documentation Report.

Daily field reports prepared by the CQA organization shall typically include the following:

- Date, project name, location and other identification;
- Data on weather conditions;
- Reports of any meetings held and meeting participants;
- Descriptions of construction activities performed during the time frame of the report;
- Equipment working on site;
- Description of areas of work being tested;
- Description of off-site materials received, including quality verification documentation; and
- Decisions made regarding approval of units of material or of work, and/or corrective actions to be taken in instances of substandard quality.

Upon completion of a waste containment cell, phase of a cell, portion of the final cover or other milestone occasion as directed by the Owner or Operator, the CQA Consultant shall prepare a final CQA Documentation Report addressing the work accomplished. This report shall be signed and sealed by the CQA Engineer. The report shall include the following:

- CQC/CQA scope of work;
- Laboratory and field test results;
- Field Representative daily field reports;
- Reference to, summary of, or narrative of testing activities;
- Evaluation of the test results with respect to project specifications;
- As-built drawings and surveys;
- Statement regarding conformance of construction with the requirements of the CQA/QC Plan.

This report should be signed and stamped by a professional engineer registered in the State of Alabama.

6. SURVEY CONTROL AND DOCUMENTATION

Field surveys are required for verifying soil liner, geomembrane, leachate collection layer and final closure grades. The following sections summarize surveying requirements during construction.

6.1. Field Control

A Professional Land Surveyor registered in the State of Alabama shall establish reference points and benchmarks that shall constitute the field control. Horizontal control lines shall be determined in advance of construction operations and shall be coordinated with the General Contractor.

6.2. Construction Layout

From the field control set by the Surveyor or other reliable sources, the General Contractor shall establish and maintain all necessary controls for the proper layout and performance of the work. The contractor shall use competent personnel and suitable equipment for the layout work required.

6.3. As-Built Verification

The Owner or Operator shall have surveys performed to verify that phases of the work have been completed in accordance with the permitted design. Surveys shall be performed on the composite liner subgrade, soil liner, and leachate collection system surfaces to verify elevation and component thickness. Thickness verification of the compacted soil cover, by survey or other means, shall also be required. The surveys shall be performed utilizing a control grid with control points spaced no greater than 100 feet on center (100 ft x 100 ft). For final cover elements, the spacing shall be no greater than 200 feet on center (200 ft x 200 ft). On slopes, each grid section shall include at least the crest and toe, and an intermediate point, as necessary. These survey points shall coincide with those of the previous cross-section lines. As-Built surveys of geomembrane liner installation may be performed for reference and included in the CQA Documentation Report.

6.3.1. Composite Liner Subgrade

Upon completion of excavation or placement of fill to establish the elevations of the composite liner subgrade, an as-built verification survey shall be performed to document the subgrade elevation. This survey shall serve as the base elevations for the soil liner thickness determination. The survey may also be performed after the installation of a reinforcing geosynthetic over the constructed subgrade. Acceptable vertical tolerances from design grades for the subgrade shall be from 0.0 to -0.5 ft. Acceptable horizontal tolerances shall be 0.3 ft..

6.3.2. Soil Liner

Subsequent to completion of the soil liner, a verification survey shall be performed to document the surface of the soil liner from which to calculate the thickness of the layer. The surveyor must account for the slope angle in determining thickness measurements on slopes and must provide for the required component thickness as measured perpendicular to the slope. Acceptable vertical tolerances for soil liner shall be between elevations that indicate the minimum thickness of the layer is achieved provided minimum slope in the design direction is achieved. Acceptable horizontal tolerances shall be 0.3 ft. in any direction. Along cell phase interfaces, grades changes may need to be allowed by the Design Engineer to meet the design intent. The Design Engineer or CQA Engineer may allow horizontal offsets of certification points in certain circumstances. The Design Engineer or CQA Engineer may also grant variances from the surveyed tolerances provided that:

- The minimum soil liner thickness is achieved; and
- The minimum slope in the design direction is maintained between surveyed points.

6.3.3. Geomembrane Liner

Subsequent to completion of the installation of a component of geomembrane on a new cell construction or partial closure, a verification survey may be performed to document the locations of the installed liner limits, panel seams and destructive seam tests. Alternatively, a georeferenced aerial photograph or sketch of the liner installation may be generated and included in the CQA Documentation Report for reference.

6.3.4. Leachate Collection System

Subsequent to completion of the leachate collection system/protective cover layer, a verification survey shall be performed to document the surface of the layer. The surveyor shall take into account the slope angle in determining thickness measurements on slopes and must provide for the required component thickness as measured perpendicular to the slope. Acceptable vertical tolerances for this layer shall be between elevations that indicate the minimum thickness of the layer is achieved, provided minimum slope in the design direction is achieved. Acceptable horizontal tolerances shall be 0.1 ft. in any direction. The Design Engineer or the CQA Engineer may grant variances from the survey tolerances provided that the minimum thickness of the LCS layer is achieved.

6.3.5. Final Cover

Because of waste compaction and consolidation, standard surveying methods may not be an accurate means of verifying the thickness of final compacted soil cover components. The thickness of the final compacted soil cover component and protective cover may be determined by surveying, hand borings, settlement plates, or other method as approved by the CQA Consultant on a grid with a spacing of 200 feet or less. Any resulting holes in the compacted soil cover shall be backfilled with compacted soil cover material and/or bentonite and tamped in thin lifts.

6.4. Documentation

Surveys shall be provided to the CQA Engineer, as requested, to facilitate determination of compliance with specification requirements. Survey data shall be illustrated in a topographic format and table form demonstrating calculated component thicknesses at each point. The as-built survey information, certified by the surveyor, will be submitted in or with the CQA Documentation Report.

7. COMPONENTS OF CONSTRUCTION

Because of the unique aspects of each element of construction, the quality process is addressed separately in the following sections. Tables 1 through 9 provided within this plan present testing methods, frequencies and requirements for each of the construction components. The following sections detail these testing requirements.

7.1. Composite Liner Subgrade

The composite liner subgrade is defined as the soils that form the floor and side slopes of a cell after excavation or placement of structural fill but prior to placement of the soil liner or geosynthetics.

7.1.1. Excavation

Materials from cell excavation may be utilized for various purposes. Acceptable soils derived from excavations may be utilized for constructing structural fill, soil liner, or protective soil cover, provided that they meet the material property requirements listed in Table 1, as applicable.

In excavated or cut areas, the bearing surface for the soil liner shall be proof-rolled with a fully loaded, rubber-tired vehicle of sufficient weight to reveal areas requiring stabilization. Areas that exhibit significant instability, as determined by the CQA Engineer or Design Engineer, shall be stabilized. The stabilization may involve undercut and backfill or other procedures, as specified for stabilization of subgrades in structural fill areas.

7.1.2. Structural Fill

The CQA Engineer shall verify that the structural fill soils used for achieving design subgrade elevations are sampled and tested according to the ASTM methods and frequencies in Table 1 or 2. The CQA Engineer may adjust the test requirements and frequencies provided in Table 1, as necessary, to ensure adequate construction materials. If materials are found to be highly consistent, then the requirements of Table 1 may be relaxed by the CQA Engineer, appropriately.

Prior to placing fill, the surface shall be proof-rolled with a fully loaded, rubber-tired vehicle of sufficient weight to reveal areas requiring stabilization. The proof-rolling vehicle and methods shall be approved by the CQA Engineer. Stabilization shall consist of undercutting, construction of a bridge lift, installation of reinforcing geosynthetics or stabilizing with Portland Cement, lime, or other methods approved. Stabilization materials and methods shall be approved by the CQA Engineer prior to initiating work. Following placement of fill over the undercut materials, the bearing surface shall be proof-rolled to demonstrate that the surface has sufficient stability to support the soil liner, as determined by the CQA Engineer.

Fill materials shall conform to the requirements of this CQA/QC Plan and approved by the CQA Consultant prior to placement. The fill materials should be placed in loose lifts graded to provide a generally uniform thickness. Loose lifts of structural fill shall not exceed 8 inches in nominal thickness (except for approved bridge lifts). Each lift shall be compacted using approved pad-foot or cleated compaction equipment and tested by the CQA Field Representative in accordance with the requirements of Table 1. Each test shall be evaluated and determined to be passing or failing. Failing test areas shall be tracked until the failed areas is reworked or replaced and retested with satisfactory results. Occasionally, tests that do not satisfy the compaction requirements may be accepted by the CQA Engineer as outliers. Accepted outliers should not exceed five percent of the total number of test performed on the component. Laboratory testing for conformance testing shall be performed in accordance with the requirements of Table 1.

7.2. Reinforcing Geosynthetic Layer

On the overlay portions of the lateral expansion area, a reinforcing geogrid, woven geotextile, or alternate reinforcing layer satisfying the requirements of Table 2 and approved by the Design Engineer or CQA Engineer, shall be placed in direct and uniform contact with the prepared surface of the existing intermediate cover soil (and below the first lift of soil liner) to enhance the stability of the composite soil liner subgrade in the overlay area. The following paragraphs detail CQA requirements related to the installation of the reinforcing geosynthetic layer.

7.2.1. Shipping and Storage

The reinforcing geosynthetic layer supplier shall provide the CQA Consultant with materials specifications and manufacturer quality control (MQC) information and warranty data for the materials prior to delivery on site. Product data sheets or material test data from the manufacturer shall demonstrate that the material meets the material strength requirements in Table 2. The CQA Field Representative shall inventory the reinforcing geosynthetic layer materials that are received on site. The inventory will verify that the intended product(s) has been received and the MQC information provided previously to the CQA Consultant is applicable.

The reinforcing geosynthetic layer material shall be shipped and stored in general accordance with current manufacturer recommendations so that damage to the material is minimized. During shipping and storage, the material shall be protected from excessive exposure to ultraviolet light, mud, angular rock, or other materials that may cause significant material damage. Deleterious materials that become affixed to the reinforcing geosynthetic layer material shall be removed prior to installation.

7.2.2. Installation

The Geosynthetic Material Installer shall handle the reinforcing geosynthetic layer rolls in a manner to ensure that they are not significantly damaged. Installation shall comply with the following, unless otherwise recommended or allowed by the material manufacturer:

- Placement of the reinforcing geosynthetic layer shall adhere to the Construction Drawings and Specifications, as well as to the most current available manufacturer recommendations;
- Geogrid/geotextile shall be unrolled from the top of slopes downward in a manner that properly tensions the material before covering proceeds. Rolls shall not be deployed horizontally across slopes (grades steeper than 10%);
- Adjacent panels of deployed reinforcing geosynthetic layer shall be overlapped in accordance with the current available manufacturer recommendations or as approved by the CQA Engineer;
- Adjacent geogrid panel overlaps shall be secured with cable ties at least every 5 feet. Adjacent geotextile panel overlaps shall be overlapped in accordance with manufacturer's recommendations;
- End-to-end panels shall be overlapped or "shingled" in the direction of fill placement.
- End-to-end geogrid panel overlaps shall be secured with cable ties at least every 2 feet.
- End–to-end geotextile panel overlaps shall be overlapped and connected in accordance with manufacturer's recommendations;
- End–to-end panel seams shall be staggered on slopes;
- Plastic cable ties, if used, shall be white or brightly colored for easy inspection. Metallic ties shall not be used.
- Reinforcing geosynthetic layer shall be cut and overlapped to accommodate curves and irregularly shaped areas;
- If necessary, the reinforcing geosynthetic layer panels shall be straightened by hand after being unrolled to minimize wrinkles;
- At tie-in locations with previously constructed phases, the material should be properly overlapped and connected with the existing reinforcing geosynthetic material as recommended by the material manufacturer and approved by the CQA Engineer.
- Precautions will be taken to prevent damage to the reinforcing geosynthetic layer by restricting heavy equipment traffic.

The CQA Field Representative should visually observe the installation process. Installation of this effort should be documented in the DFRs and in the Photographic Record.

7.3. Compacted Soil Liner

The compacted soil liner is the low permeability soil component of the composite liner system. The soil liner may be constructed from approved soils that have been stockpiled from excavations, from onsite sources, or from offsite sources. The following paragraphs outline quality control parameters for the compacted soil liner component material acceptance and verification.

7.3.1. Material Evaluation

The selection of the proper soil types and verification of material consistency during construction is a requirement for low permeability soil liners. Therefore, material acceptance includes an initial laboratory material evaluation program, demonstration of compliance through construction of a test section, and continued material verification testing during construction. Each soil type proposed for use in the soil liner construction shall be evaluated. Pre-construction laboratory qualification testing for soil liner and cover materials shall be accomplished through source testing of the proposed soils in accordance with the frequencies specified in Table 1. Based on the results of the testing, the CQA Consultant shall determine if the material is acceptable and identify the preliminary placement acceptance criteria (moisture content and percent compaction) required to provide reasonable assurance that the permeability requirement will be achieved (development of Acceptable Permeability Zone, APZ). The CQA Consultant should take into the consideration the minimum requirements outlined in Table 1 when establishing placement criteria. This testing shall be performed on new soil types prior to acceptance for construction as the compacted soil liner.

After a material has been tested, approved for use, and the preliminary placement criteria are established, the contractor's equipment and construction methods shall be evaluated to determine if they are suitable to achieve the required compaction and permeability. A test section shall be constructed using the same equipment and methods proposed for the construction of the soil liner or cover. The proposed soil shall be placed at the specified moisture and percent compaction established from the preconstruction testing program. The test section construction shall be monitored by the CQA Consultant. The CQA Field Representative shall perform moisture and density compaction testing to assure the placement criteria are achieved. Samples should be collected from the constructed test section in accordance with Table 1. Undisturbed samples should be collected in the near vicinity of a moisture and density compaction test. The results of the samples collected from the test section shall be used by the CQA Consultant to confirm or modify the preliminary placement criteria, as necessary, to establish the material placement acceptance criteria (or APZ) to be used in construction of the soil layer. If the test section is constructed as part of the compacted soil liner in the cell, the testing performed on the test section may also be used to fulfill the construction testing requirements for the compacted soil liner.

7.3.2. Construction Control

During construction of the compacted soil liner, visual control must be exercised to observe material consistency and appropriate construction methods. The CQA Field Representative shall perform continuous visual observation of the materials being placed as soil liner. If significant variation in materials is apparent, in the opinion of the CQA Consultant, the material should be sampled for further evaluation. The CQA Engineer should recommend procedures to further evaluate the variation or to stop placement of the material until the source characteristics are determined in accordance with Table 1. The CQA Field Representative shall visually observe the construction process, and this effort shall be documented in the DFRs and in the Photographic Record. The following paragraphs outline the requirements for visual control of construction quality of the compacted soil liner.

7.3.2.1. Construction Observations

The CQA Field Representative shall maintain continuous visual inspection of soil liner material placement, processing, and compaction. The technician shall specifically observe the materials to detect any substantial change in materials. In addition, the technician should visually inspect the soil for clod size, roots, sticks, stones, or other deleterious matter.

Soils to be used for the construction of a compacted soil liner shall be reasonably free of roots, sticks, frozen material or any other foreign materials to the extent practical. Clods of significant size should be processed by disking or other means prior to compaction. The maximum allowable particle size for the soil layers is indicated in Table 1. Sharp particles protruding from the surface of the final lift of the layer to be covered with geosynthetics shall be removed.

The CQA Field Representative shall notify the earthwork contractor of observed non-conformities. In the event such non-conformities are not resolved, the compaction effort should be suspended, and the CQA Engineer shall be notified.

7.3.2.2. Lift Thickness

The compacted soil liner shall be placed in lifts with maximum loose thickness of 9-inches and compacted into 6-inch lifts. The CQA Field Representative shall visually verify the compacted lift thickness during construction. An increase in the thickness of the first lift may be approved by the CQA Engineer, if deemed appropriate, to prevent damage to the underlying reinforcing geosynthetic layer in an overlay area. If the initial lift is thickened, the subsequent lift(s) should be slightly thinned so that the average lift thickness is approximately 6 inches and the minimum layer thickness is achieved.

7.3.2.3. Placement Over Reinforcing Geosynthetic Layer

The General Contractor shall comply with the following in situations involving placing the first lift of the compacted soil liner over the reinforcing geosynthetic layer:

- Soil liner material shall be spread by a lightweight, low ground pressure bulldozer, such as a CAT D6 LGP or equivalent as approved by the CQA Consultant. The dozer blade should be raised gradually as each lift is spread out over the geosynthetic material to avoid catching the blade and in order to cause the soil to "cascade" or "tumble" onto the geosynthetic material rather than being pushed;
- Soil liner material shall be spread from the bottom of slopes upward, unless otherwise recommended by the geosynthetic material manufacturer;
- Soil placement shall be performed to minimize "wave" formation. Wave minimization techniques include pushing "fingers" of soil out over the geosynthetic and then filling between the fingers;
- If the spreading of soil liner material over the geosynthetic material causes a "wave" to form in the geosynthetic material ahead of the advancing fill placement, the material shall be pulled taught to remove "waving", as practical and
- Precautions shall be taken to prevent damage to the geosynthetic material by restricting heavy equipment traffic. The CQA Consultant may approve the use of lightweight, rubber-

tired equipment such as a four-wheel drive, all-terrain vehicle (ATV) with tire pressure less than 5 psi. This vehicle can be driven directly on the geogrid, provided the ATV makes no sudden stops, starts, or turns. Tracked equipment shall not be driven directly on the geosynthetic material.

7.3.2.4. Compaction Techniques

The soil compaction effort shall be accomplished by using a compactor with the ability to penetrate, or nearly penetrate, the lift thickness with "teeth" or "pads" on the compacting device. The CQA Consultant will determine the adequacy of compaction equipment. The number of passes over the loose lift should be adequate to achieve the required density requirements. The CQA Field Representative shall maintain visual observations of the compaction effort, and document the compaction techniques in the daily field report and in the photographic record.

7.3.2.5. Lift Bonding

After each lift is placed and compacted, the lift surface shall be moist and sufficiently scarified prior to placement of a subsequent lift. Scarification can be accomplished with a disc, compactor or similar equipment. If very hot or dry conditions exist, the lift may require repeated wetting prior to placement of the subsequent lift.

7.3.3. Field Compaction Testing

Compaction testing of compacted soil liner shall be performed by the methods and frequencies established in Table 1. The test shall be compared to the acceptance criteria established during the material evaluation program. Testing holes or penetrations made in the soil liner shall be backfilled with the soil material used in construction, bentonite or a soil/bentonite mix and tamped. Areas where failing tests are recorded shall be reworked and retested until satisfactory results are obtained. The boundaries of the area to be reworked will be determined by the CQA Consultant. The non-conforming area shall be scarified, recompacted, reworked, and dried or wetted as required to achieve satisfactory test results as determined by the project requirements. Alternatively, the material may be removed and replaced by acceptable soil liner material.

Separate samples may be necessary for laboratory moisture content analysis to verify the nuclear testing methods of the CQA Field Representative, as determined by the CQA Engineer. The number of separate samples should be sufficient to determine the need for moisture correction at the discretion of the CQA Engineer. Appropriate moisture corrections should be applied to the nuclear testing methods if the moisture content evaluation indicates the need.

7.3.4. Undisturbed Permeability Testing

Thin-walled tube samples of each lift of soil liner shall be obtained and tested at the frequency indicated in Table 1. The sampling locations will be determined by the CQA Field Representative and distributed across the construction area.

Loose surface material may need to be removed prior to sampling. The undisturbed samples shall be taken by carefully advancing a sampler tube into the compacted lift being evaluated. The permeability sampler tube shall be advanced perpendicular to the face of the compacted soil layer for parallel lift construction. The resulting hole(s) in the soil liner shall be backfilled by filling with soil liner material, bentonite or a soil/bentonite mix and tamped. The sample shall be trimmed, as necessary, so that no material protrudes from the sample cylinder. It shall then be capped or sealed to prevent loss of moisture. The sample shall be marked with the sample identification and returned to the laboratory for testing, as specified.

Samples shall be tested according to Table 1 utilizing the latest ASTM testing methods. The CQA Engineer or Design Engineer will specify the effective confining stress to be used during testing. The Soils Laboratory shall keep the Project Manager informed of the status of all permeability testing. If a sample fails to achieve the project requirements, the Laboratory Manager shall immediately inform the CQA Engineer to evaluate the results. The area to be reworked shall be determined by the CQA Engineer. Reworked areas shall be retested for moisture and density in accordance with previous sections prior to resampling and retesting.

7.3.5. Surface Preparation

Upon satisfactory completion of the compacted soil liner, the surface of the soil shall be prepared for deployment of the geosynthetic materials, as applicable. This process shall be observed and documented by the CQA Consultant. The surface must be reasonably smooth and prepared in such a manner as to allow the overlying geosynthetic material to lie in intimate contact with the underlying soil liner. The surface must maintain adequate slope that allows for proper drainage. The Geosynthetic Material Installer shall accept the surface for geosynthetic material installation in writing.

7.4. Geosynthetic Clay Liner

A geosynthetic clay liner (GCL) may be included as part of the alternate composite soil liner design. The GCL shall be a "reinforced" GCL. The primary constituent of the GCL will be bentonite, natural sodium montmorillonite clay, placed between two host geotextiles. The following paragraphs detail CQA requirements related to the acceptance of the GCL.

7.4.1. Material Acceptance

The GCL supplier shall provide the CQA Consultant with manufacturer quality control (MQC) information and warranty data for the materials prior to delivery on site. The MQC data shall meet the requirements for GCL as provided in Table 3. CQA conformance testing of the GCL shall be performed by the Geosynthetics Material Laboratory at the frequencies indicated in Table 3. The CQA conformance testing shall be reviewed and approved by the CQA Consultant prior to proceeding with field installation.

7.4.2. Installation

The Installer shall handle the GCL rolls in a manner to ensure that they are not damaged in any way and shall comply with the manufacturer's installation recommendations unless otherwise approved by the CQA Consultant. Placement of the GCL shall adhere to the Construction Drawings and Specifications. Additional GCL installation protocols requested by the CQA Consultant shall be followed by the Geosynthetics Installer.

Rolls shall be lifted, as necessary, by inserting a bar capable of supporting the full weight of the roll through the center core. Panels shall be placed generally free of excessive tension or stress while minimizing wrinkles or folds. It is not permissible to stretch the GCL in order to fit a designated area. Panels should not be dragged across the subgrade into position except where necessary to obtain the correct overlap for adjacent panels.

Material shall typically be deployed from the high elevation to the low elevation to protect against the adverse effect of precipitation during deployment. Exceptions may be approved by the CQA Consultant. Panels shall be shingled in a down-slope direction. Seams should be generally parallel with the direction of maximum slope (for slopes greater than 10H:1V). Horizontal seams should be minimized on side slopes (for slopes greater than 4H:1V) as approved by the CQA Consultant. GCL field seams shall be formed by constructing a bentonite-enhanced edge of panel overlap to promote a continuous seal between panels unless the material is manufactured with a bentonite-enhanced seam. A 6-inch to 8-inch panel overlap should exist at side seam locations. End-of-roll overlapped seams should be constructed to a minimum of 24 inches. The lap line and match lines printed on the panels, when applicable, may be used to assist in obtaining this overlap. The edges of the GCL panels should be adjusted to smooth out any wrinkles, creases, or "fishmouths," in order to maximize contact with the underlying panel. End-of-roll seams shall also be located at least 3 feet away from the toe and crest of slopes steeper than 4H:1V.

In general, the GCL installation shall halt during any form of precipitation and installed GCL shall be covered in a timely manner. Only as much of the GCL shall be deployed in a given day as can be covered during that day by a geomembrane or confining soil layer.

Damage in the form of cuts or tears to the GCL shall be identified and repaired by the Installer by cutting a patch from unused GCL and securing it over the affected area. The damaged area should be cleared of excessive dirt and debris. A patch of GCL shall be cut to fit over or under the damaged area and to extend at least one foot in all directions around the damaged area. Supplemental bentonite shall then be placed around the perimeter of the affected area at a minimum rate of approximately ½ pound per linear foot, and the patch shall be secured over the damage. If necessary, an epoxy-based adhesive, or alternative, shall be used to keep the patch in position while covering the material.

While covering the GCL material, precautions shall be taken to prevent damage to the GCL by restricting heavy equipment traffic. Unrolling an overlying geosynthetic may be accomplished through the use of lightweight, rubber-tired equipment such as a four- wheel drive, all-terrain vehicle (ATV) with tire pressure less than 5 psi, as approved by the CQA Engineer. This vehicle may be driven directly on the GCL, provided the ATV makes no sudden stops, starts, or turns.

If a textured geomembrane is placed over the GCL, a slip sheet (such as 20-mil smooth HDPE) may be necessary over the GCL to allow the geomembrane to slide into its proper position. If sliding is not necessary, the slip sheet is not required.

The Installer and Contractor shall keep the GCL material dry, to the extent practicable, from the time that it is received on site until it is installed and covered. If the GCL material is observed to be excessively hydrated during installation or becomes excessively hydrated after installation, the hydrated material must be removed and replaced (or supplemented) with non-hydrated and approved material. The determination of hydration and extent of the material that is compromised requiring replacement will be at the discretion of the CQA Engineer.

7.4.3. Shipping and Storage

The CQA Representative shall inventory GCL materials that are received on site. The CQA Representative shall verify that the MQC information is provided for the received materials. Selected rolls of GCL material shall be sampled onsite or at the place of manufacture for confirmation of material properties as provided in Table 3.

The GCL material shall be shipped and stored by appropriate means so that minimal damage is caused to the material. Material will be stored in a secure area to protect against standing water, precipitation, and contamination. The GCL shall be wrapped in plastic to protect it from ultraviolet light and to ensure the product stays dry during shipment and storage.

Once the intermediate cover soils have been stripped of vegetation, the CQA Consultant shall walk the exposed subgrade to identify any visible seeps, gas vents, wet or soft areas. The CQA Consultant shall identify the location and extent of these areas on the construction documents and present them to the Owners Representative, CQA Engineer, and Design Engineer for further evaluation and mitigation.

The Owner's representatives or the Design Engineer shall evaluate the identified areas and make recommendations for mitigation or further action, if necessary.

7.5. Geomembrane Liner (Bottom Liner and Final Cover)

As specified, geomembrane liner shall be installed over the soil/geosynthetic component, as part of the composite liner system or the final closure. Depending on the application, the geomembrane may be composed of a high density polyethylene (HDPE) or a linear low density polyethylene (LLDPE). The final cover also has options for LLDPE "Drain Liner" that has drainage studs incorporated into the geomembrane. The following paragraphs detail CQA requirements related to the installation of geomembrane liners for these applications.

7.5.1. Material Acceptance

The geomembrane supplier shall provide the CQA Consultant with manufacturer quality control (MQC) information for the geomembrane materials prior to delivery on site. The CQA Consultant shall compare the material MQC data to the requirements as provided on Tables 4,5, or 6. CQA conformance testing of the geomembrane liner shall be performed by the Geosynthetics Material Laboratory at the frequencies indicated in Tables 4, 5, or 6. The CQA conformance testing shall be reviewed and approved by the CQA Consultant prior to proceeding with field installation.

7.5.2. Shipping and Storage

The CQA Field Representative shall inventory geomembrane materials that are received at the site. The receipt inspection will be used to confirm that the MQC documentation is applicable. The CQA Field Representative shall also observe material handling and storage. Handling of the geomembrane shall be conducted with procedures that will not cause damage to the materials. Significant damage or defects of the delivered material shall be documented on the material inventory sheets, and the damaged rolls shall be segregated.

The geomembrane material shall be shipped and stored by appropriate means so that minimal damage is caused to the material. Material will be stored in a secure area to protect damage and contamination. Any material deemed to be compromised or damaged by the CQA Consultant shall be clearly marked and excluded from field installation.

7.5.3. Construction Control

The construction control of geomembrane deployment and seaming includes visual observations and record keeping, as well as seam non-destructive testing and destructive testing. The following sections outline procedures for each construction quality control activity. An important variation in the CQA procedures associated with the geomembrane is the utility of the Geomembrane Installer's technicians to perform CQC testing of welds (trial welds and continuous seam non-destructive testing). The CQA Consultant shall provide the necessary CQA field staff to observe and document deployment, seaming and the Geomembrane Installer's CQC activities. Geomembrane field testing requirements are summarized on Table 7 for the different geomembrane materials.

7.5.3.1. Proposed Panel Layout

Prior to deployment of the geomembrane, the Installer shall provide the CQA Consultant with a proposed panel layout figure. This plan shall illustrate the orientation and direction of the panels of geomembrane during deployment process. The plan shall be reviewed by the CQA Consultant and approved or revised by the Installer. The Installer shall not deviate from the approved proposed panel layout without written approval from the CQA Consultant.

A panel and seam numbering system shall be developed based upon the proposed panel layout. This systemized approach will provide a unique number to identify each panel and seam, and it shall also be sufficient to be utilized in the field by the CQC and CQA field staff. The identification of each panel shall be the responsibility of the Installer.

7.5.3.2. Visual Inspection

The CQA Field Representative shall maintain constant visual observation of liner deployment and seaming and document the installation process in the daily field reports and photographs. Specifically, the following observations shall be made:

- Subgrade suitability;
- Deployment techniques for the geomembrane liner;
- Evaluations of scratches or crimps in the geomembrane liner;
- Damage to the underlying soil or synthetic component;
- Efforts to keep the geomembrane liner clean and free of debris during installation;
- Compliance with, and variations from, the proposed panel layout plan;
- Minimum panel overlaps prior to seaming;
- Significant wrinkles developed within the geomembrane liner, including wrinkle height, length, etc. and provisions to minimize wrinkle formation, as necessary;
- Repair procedures for damaged areas of geomembrane liner;
- Test weld and seaming operations;
- Weather conditions that may compromise installation integrity;
- Installer CQC nondestructive seam testing and methods;
- Personnel and/or vehicular traffic on the deployed geomembrane liner; and
- Deployment methods.

The CQA Field Representative should prepare field as-built sketches that includes at least the locations of primary welded seams, destructive test locations, and panel numbers.

7.5.4. Seam Testing

Extrusion welding and fusion welding are approved methods for field seaming of geomembrane liner. Seam testing shall include trial welds, continuous (non-destructive) testing and destructive testing of completed seams in accordance with Table 7. The trial welds and continuous testing shall be performed and documented by the Geomembrane Installer. The destructive samples shall be secured by the Installer and provided to the CQA Representative for shipment to an independent third-party laboratory for testing.

7.5.4.1. Field Test Welds

Field test welds (trial welds) are a performance test for the welder and his welding equipment. Prior to performing any seams, each seaming technician shall perform a field test weld with the device they operate in the field. Field test welds shall be made at the beginning of each seaming period and if there are significant changes in ambient conditions (temperature, moisture, etc.). Each seaming technician shall make at least one trial seam each day. After performing a trial seam, two adjoining one-inch specimens will be cut from the trial seam and tested in shear and peel.

The seaming technician and his equipment shall not be used for production until satisfactory trial seams have been performed. Each test weld shall be documented on a test weld form or log. Each welder shall produce a passing trial weld for each 4-hour working period. The CQA Field Representative shall observe the test welding process.

If a test weld fails to meet the seaming requirement, the welder shall prepare another test weld for evaluation. If the second test weld fails, the welder will be required to pass two successive test welds before being allowed to weld production material.

7.5.4.2. Non-Destructive Testing

Non-destructive seam testing shall be continuously performed and documented on welded seams, patches and repairs. Air pressure testing shall be performed for fusion welds where an air channel exists between double welds. Testing shall be performed in accordance with Table 7, as applicable. Vacuum testing shall be performed on extrusion welds by vacuum chamber (or box) testing techniques. During the vacuum test, no soap bubbles appearing during approximately 10 seconds under a vacuum box pressure of 3 psig is acceptable. The CQA Consultant may approve alternative testing procedures if the Geomembrane Installer can demonstrate equal or better capability to detect seam failures. The Geomembrane Installer shall provide the procedures to be used in a documented CQC Plan. The specific testing program shall be reviewed by the CQA Consultant and approved or modified, as necessary.

7.5.4.3. Destructive Testing

Destructive samples shall be obtained from the welded production seams at the appropriate frequency indicated in Table 7. The sample should be of sufficient size to yield three full samples with the seam approximately centered in each sample. One sample shall be provided to the Installer for testing and one sample shall be provided to the CQA Field Representative for testing by an approved geosynthetics material laboratory. The remaining portion may be retained as an archive, if specified by the Owner or Operator. Each sample shall be properly labeled with project name and sample ID at a minimum.

Five subsamples shall be tested in shear and five in peel in accordance with ASTM D6392. A passing test is one that achieves the minimum acceptable requirements of Table 7. The results of the testing shall be compared to the project requirements by the CQA Consultant. The CQA Consultant shall notify the Installer of the results.

7.5.5. Documentation

Upon completion of the geomembrane installation, the CQA Field Representative shall complete a final panel layout sketch. Alternately, the final panel layout may be determined by plan survey of panel intersections, seams, destructive test locations, and other pertinent locations. This plan shall include the final arrangement of panels, including panel and seam numbering and identification of the destructive seam tests.

CQC logs of the geomembrane installation should include panel layout log, seam log, repair log and trial weld log at a minimum. The non-destructive seam testing should be documented on the seam log or recorded on a separate log.

7.6. Drainage Geocomposite (LCS and Final Cover)

A geotextile-geonet-geotextile drainage geocomposite may be included in the design directly over the geomembrane to facilitate leachate drainage and management, and in the final cover to facilitate drainage of infiltration water over the final cover geomembrane. This section addresses the CQA requirements related to the installation of the geocomposite.

7.6.1. Material Acceptance

The geocomposite supplier shall provide the CQA Consultant with manufacturer quality control (MQC) information prior to delivery. The MQC data shall be compared to the requirements for geocomposite as provided in Table 8 (and Table 9, as applicable). CQA conformance testing of the drainage geocomposite shall be performed by the Geosynthetics Material Laboratory at the frequencies indicated in Table 8. The CQA conformance testing shall be reviewed and approved by the CQA Consultant prior to proceeding with field installation.

7.6.2. Shipping and Storage

The CQA Representative shall inventory the geocomposite materials that are received on site. The receipt inspection shall be used to confirm that the MQC documentation is applicable. Selected rolls of geocomposite material shall be sampled onsite or at the place of manufacture for confirmation of material properties as provided in Tables 8 and 9.

During shipment and storage, the geocomposite materials shall be protected from excessive ultraviolet light exposure, moisture, dirt, or dust that may cause damage to the material. The General Contractor and the Installer shall be responsible for storage and protection of the geocomposite rolls. Handling of the geocomposite rolls should be with devices that do not cut, puncture or otherwise damage the materials. Any noticeable defects of the delivered material shall be documented on the material inventory and the damaged material shall be segregated. Care shall be taken to prevent entrapment of excessive dust or dirt before or during installation. If the geocomposite is not substantially free of soil and debris before installation, it shall be adequately cleaned by the General Contractor or the Installer prior to or during installation. The CQA Field Representative shall observe and document material handling and storage.

7.6.3. Installation

The Installer shall handle the geocomposite in a manner to ensure that it is not damaged during installation. Installation shall comply with the following, unless otherwise approved by the manufacturer:

- Placement of the geocomposite shall adhere to the Construction Drawings. Modifications to installation requirements may be acceptable, if recommended by the material manufacturer and CQA Engineer.
- The geocomposite shall be placed with the long dimension of the rolls running vertical with the slope, rather than across (horizontal to) the slope (on slopes of 4H:1V or steeper).
- The geocomposite shall be unrolled down the slope in a manner that continually keeps the material in tension. If necessary, the geocomposite shall be straightened by hand after being unrolled to minimize wrinkles.
- Adjacent panels shall be sufficiently overlapped so that the geonet is overlapped a minimum of 6 inches and the geonet shall be secured with plastic ties approximately every 5 feet along the roll length.
- End-to-end overlaps of geonet shall be connected with ties at about every 2 feet, and the rolls shall be oriented such that these end-of-roll seams are staggered.
- Adjacent and end-to-end overlaps of the geocomposite at tie-ins with existing landfill phases/cells shall be constructed in the same manner as the overlaps described above. Variations in seaming must be approved by the CQA Engineer.
- Plastic ties shall be white or brightly-colored for easy inspection. Metallic ties will not be allowed.
- The geotextile shall be overlapped and sewn. Heat tacked seams or other methods may be allowed by the CQA Engineer in lieu of sewing if the manufacturer's written recommendations allow alternative geotextile seaming methods.
- Soil materials placed on top of the geocomposite shall be deployed in such a manner as to ensure that the geocomposite and underlying materials are not damaged, wrinkles are minimized and minimal slippage of the geocomposite on underlying layers occurs.

7.7. Leachate Collection System

The material for leachate collection system includes leachate collection and conveyance pipe, sand, soil, gravel and/or geotextile, used to collect and remove leachate from the waste containment cell. The following paragraphs detail CQA requirements related to the construction of the leachate collection system (LCS).

7.7.1. Material Acceptance

The CQA Consultant shall review the manufacturers' submittals for leachate collection pipe and geotextile, as applicable, to confirm that these materials meet the project requirements. The sand, soil and/or gravel components of the LCS will be sampled and tested according to Table 1.

7.7.2. Visual Inspection

The CQA Field Representative shall maintain visual inspection during all phases of the leachate system construction. Construction shall be inspected for conformance to the Construction Drawings. Daily observations shall be recorded in the DFRs. Often, as the drainage layer placement advances across the cell, a wrinkle "wave" of geosynthetics develops and grows in front of the advancing face. This may be minimized by placing fingers or piles of drainage layer soil out in front of the face and then backfilling between the fingers or piles or limiting placement to the cooler times of the day. Visual inspection will include, at a minimum:

- Leachate pipe installation will be observed to confirm type, location, size and orientation of the perforations.
- The gravel pack placement around the leachate pipe shall be inspected for deleterious materials, proper pipe alignment and overlap or seaming in conformance with the project drawings.
- The granular drainage layer shall be observed to note any visual indications of significant material change. There are no specific dry density or moisture content requirements for the placement.
- Geotextile seaming shall be observed to verify compliance with the project drawings.
- Geotextile repairs shall be observed and documented.
- Placement of cover materials on the geotextile shall be observed and any damage to the geotextile repaired appropriately.

7.8. Protective Cover

Protective cover will be constructed on side slopes of new cell construction or used as protective covering over closure geosynthetics. The following paragraphs detail CQA requirements related to the construction of protective cover.

7.8.1. Material Acceptance

The protective cover soil shall be composed of soils meeting the general requirements for this material as required in Table 1, as applicable. The material shall be substantially free of organics, over-size rocks, frozen material, foreign objects, or other deleterious materials. In final cover applications the top six inches of protective cover shall be suitable for sustaining vegetative growth and appropriate erosion resistance.

7.8.2. Visual Inspection

The protective cover construction shall be observed and documented by the CQA Field Representative. The construction observations shall be documented in the daily report and in photographs. The protective cover soil shall be placed and pushed from bottom to top or across slopes to prevent excessive tension stresses in the underlying geosynthetic materials. Additionally, the protective cover shall be placed in a way to minimize wrinkling of the geosynthetics. If significant wrinkles or "waves" of geosynthetic materials develop and grow in front of the constructed limit of the protective cover layer, the wrinkling may be minimized by placing fingers or piles of protective cover soil out in front of the advancing face and then backfilling between the fingers or piles or limiting placement to the cooler times of the day.

Low ground pressure (equal to or less than 5 psi) or alternate approved equipment shall be used to place the protective cover layer. The protective layer shall be placed in a single lift at the full thickness of the layer, unless otherwise approved by the CQA Consultant. Damage observed to the underlying materials shall be documented by the CQA Field Representative and repaired by the General Contractor or Geosynthetic Material Installer.

7.9. Final Cover Erosion Layer

An erosion layer will be constructed as part of the final cover system. The following paragraphs detail CQA requirements related to the construction of the erosion layer.

7.9.1. Material Acceptance

The CQA Consultant shall review the supplier's or contractor's submittals for final cover erosion layer soil as applicable, to confirm that these materials meet the project requirements. The erosion layer soils will be sampled and tested according to Table 1.

7.9.2. Visual Observation

The CQC Field Representative shall maintain visual observation during final cover erosion layer placement. Construction shall be observed for conformance to the project. Visual observation during installation of the final cover erosion layer will include, at a minimum:

- Placement of materials on the geosynthetics shall be observed to verify no damage to the geosynthetics and that no significant wrinkles are produced as the erosion layer placement advances.
- The erosion layer soil shall exclude particles in excess of 3-inches in diameter and should generally include loose soil free of large roots, debris and deleterious materials.
- The final cover erosion layer shall be observed to note any visual indications of significant material change. There are no specific dry density or moisture content requirements for the placement.

8. DOCUMENTATION

8.1. Written Documentation

During project activities, construction shall be observed and documented by the CQC and/or CQA Field Representative. Construction observations should be documented in daily field reports (DFRs). Test results and installation data collected will be recorded in data logs. The DFRs should be completed on a daily basis, include a summary of the work activities, observations, testing performed or samples collected and other pertinent information relevant to construction. The following information shall typically be included in a DFR, as appropriate:

- Date, project name, location and other identification;
- Data on weather conditions;

- Meetings held and meeting participants;
- Descriptions of construction activities performed during the time frame of the report;
- Equipment and personnel working on site;
- Description of areas of work being tested;
- Non-conformances encountered including relevant damage observed;
- Description of materials received, including quality verification documentation; and
- Decisions made regarding approval of units of material or of work, and/or corrective actions to be taken in instances of substandard quality.

DFRs should be submitted to the CQA Consultant for review and approval. The CQA Engineer shall have access to the field data of construction, including the DFRs and photographic documentation of the construction at all times during the project.

Test data logs and other geosynthetic logs maintained by the field representative should be submitted to the CQA Consultant for review during the course of construction on a regular basis. The CQA Engineer may not approve a component of construction until all CQC data, logs, reports, photographs and survey data has been submitted and reviewed.

8.2. Photographic Documentation

The CQA Consultant shall document the construction effort through photographic documentation. In general, the photographic documentation shall document the construction progress, equipment used for the construction effort, means and methods of construction, and as-built documentation for construction elements and details. The photographic documentation shall be transmitted to the CQA Consultant Project Manager or CQA Engineer on a routine basis. The photographic documentation shall be suitable to tell the story of who, what, where, when, and how each of the landfill components were constructed.

8.3. CQA Documentation Report

At the completion of the project, the CQA Engineer shall submit a signed CQA Documentation Report describing the construction and quality evaluations performed during the project. The report shall be organized into sections discussing the primary components of liner construction, including subgrade, soil liner, synthetic liner, drainage layer and leachate management system, as applicable. At a minimum, the CQA Documentation Report shall include:

- A narrative including a summary of each primary construction activity associated with composite soil liner installation;
- DFRs and test data sheets (and logs) including sample location plans and supporting field and laboratory test results;
- Color photographs of major project features and means and methods;
- Problem and resolution reports;
- Deviations from design and material specifications;
- As-built documentation noting any deviations from the approved plans; and

- A summary statement regarding the conformance of the construction with the requirements of the CQA/QC Plan, permit requirements, Agency regulations, and acceptable engineering practices, sealed and signed by a professional engineer registered in the State of Mississippi.

The report will include a discussion of the quality control and quality assurance testing required in this CQA/QC Plan. Results of required tests shall be including documentation of failed test results, descriptions of the procedures used to correct the improperly installed material and statements of results of retesting performed. This report shall be issued to the Owner or Operator and the Agency for approval.

TABLES

TABLE 1
Soils Testing Requirements

Component	Test Method	Minimum Frequency	Minimum Criteria[7]
Structural Fill	Laboratory Compaction (Standard Proctor) (ASTM D698)	1/borrow material	N/A
	Plasticity (ASTM D4318)	1/25,000 CY[1]	N/A
	USCS Classification, Wash #200 (ASTM D2487)	1/25,000 CY[1]	Approval by CQA Engineer
	Grain Size Analysis (ASTM D1140)	1/25,000 CY[1]	N/A
	Field Compaction Testing (ASTM D6398 or D1556 or D2937)	1/10,000 SF/lift or 1/200 lf of trench	Dry Density ≥95% MDD
Compacted Soil Liner (Pre-Construction or Borrow Soils)	Laboratory Compaction (Standard Proctor) (ASTM D698)	2/test pad[1,2] or 1/20,000 CY[1]	N/A
	Liquid and Plastic Limits (ASTM D4318)	1/lift/test pad[2] or 1/10,000 CY	LL ≥ 30, PI≥15[4] LL ≥ 25, PI≥10[5]
	Grain Size Analysis-Wash #200 (ASTM D1140)	1/lift/test pad[2] or 1/10,000 CY	≥50% passing #200[4] ≥30% passing #200[5]
	Permeability (ASTM D5084)	1 UD sample/lift/test pad[2] or 1 remolded sample /20,000 CY[1,3] (min. 95% and OMC)	≤ $1x10^{-7}$ cm/sec[4] or ≤ $1x10^{-5}$ cm/sec[5]
Compacted Soil Liner (During Construction)	Field Compaction Testing (ASTM D6398 or D1556 or D2937)	1/10,000 SF/lift	Dry Density ≥95% MDD Moisture ≥ OMC[6]
	Liquid and Plastic Limits (ASTM D4318)	1/10,000 CY[1]	LL ≥ 30, PI≥15[4] LL ≥ 25, PI≥10[5]
	Grain Size Analysis-Wash #200 (ASTM D1140)	1/10,000 CY[1]	≥50% passing #200[4] ≥30% passing #200[5]
	UD Permeability (ASTM D5084)	1/40,000 SF/lift (or 1/80,000 SF/lift with APZ)[3]	≤ $1x10^{-7}$ cm/sec[4] or ≤ $1x10^{-5}$ cm/sec[5]
Granular Drainage Layer (A) and LCS Gravel (B)	Grain Size Analysis (ASTM D6913 and ASTM D1140)	1/10,000 CY[1]	(A) ≤10% passing #200 (B) ≤5% passing 3/8-in.
	Granular Permeability (ASTM D2434)	1/20,000 CY[1]	(A) ≥$1x10^{-3}$ cm/sec (Option 1), or ≥ $2.9x10^{-2}$ cm/sec (Option 2), or N/A (Option 3) (B) ≥1 cm/sec
Protective Cover (A) and Erosion Control Layer (B)	Grain Size Analysis (ASTM D6913)	1/10,000 CY[1]	(A)100% passing 2-in. (B) ≤15% passing #200

1. Or more frequently if necessary to test each borrow or source material used at least once.
2. Test pad and acceptable permeability zone (APZ) testing option.
3. Required frequency is ½ if the test pad and acceptable permeability zone (APZ) testing option is performed.
4. Requirements for soil liner without supplemental GCL.
5. Requirement for soil liner supplemented with GCL.
6. Moisture and density acceptance criteria may need to be more restrictive based upon laboratory permeability testing.
7. Slight deviations from the acceptance criteria may be accepted by the CQA Engineer.

TABLE 2
Geosynthetic Reinforcing Layer Testing Requirements

Item	Test Method	Minimum Frequency	Minimum Criteria
Geogrid or Woven Geotextile	Material Composition	Index Testing (Certification from manufacturer)	Polyethylene, high tenacity polypropylene or other approved by the CQA or Design Engineer
Geogrid or Woven Geotextile	Ultimate Tensile Strength (ASTM D4595 or ASTM D7737)	Index Testing (Certification from manufacturer)	≥ min. 925 lbs/ft (MD) ≥ min. 1400 lbs/ft (CD)
	Tensile Strength at 2% strain (ASTM D4595 or ASTM D7737)	Index Testing (Certification from manufacturer)	≥ min. 300 lbs/ft (MD) ≥ min. 445 lbs/ft (CD)
	Ultimate Tensile Strength (ASTM D4595 or ASTM D7737)	Index Testing (Certification from manufacturer)	≥ min. 1500 lbs/ft (MD) ≥ min. 2260 lbs/ft (CD)

1. MD – machine direction
2. CD – cross machine direction
3. Approval of the material is at the discretion of the CQA Consultant or Design Engineer.

TABLE 3
Geosynthetic Clay Liner Testing Requirements

Properties	Test Method	MQC Test Frequency	CQA Test Frequency	Minimum Criteria
Bentonite Mass/Unit Area	ASTM D5993	1/45,000 SF	1/250,000 SF	0.75 lbs/sf[1]
Bentonite Fluid Loss	ASTM D5891	1/50 tonnes	N/A	18 ml (max)
Bentonite Swell Index	ASTM D5890	1/50 tonnes	N/A	24 ml/2g
GCL Peel Strength	ASTM D6496	1/45,000 SF	1/250,000 SF	(4)
Tensile Strength, MD	ASTM D6768	1/225,000 SF	N/A	23 lbs/in
Permeability or Index Flux[2]	ASTM D5887	1/250,000 SF	1/250,000 SF	Perm: $5x10^{-9}$ cm/sec IF: $1x10^{-6}$ cm^3/sec-cm^2
Internal Shear Strength[3]	ASTM D6243[6]	1/project	N/A	500 psf

1. Bentonite mass per unit area to be reported at 0% moisture content.
2. Either permeability or index flux can be reported. Permeability or index flux testing to be performed with water @ 5 psi maximum effective confining stress and 2 psi head.
3. Typical peak value for specimen, hydrated a minimum of 24 hours and sheared at 200 psf normal stress.
4. The minimum average peel strength shall be 1.0 lb/in. for unreinforced GCLs and 2.1 lb/in. for reinforced GCLs.
5. Test methods, frequencies and values shall be consistent with the latest GRI-GCL3 (Geosynthetic Research Institute).
6. Tested at 500 psf and shear displacement rate 0.004 in/min or as determined by CQA Engineer.
7. Geotextile components of GCL shall be QC tested in accordance with the manufacturer's Quality Control Program.
8. Testing frequencies listed are the minimum.

TABLE 4
60-mil Textured HDPE Geomembrane Testing Requirements

Properties	Test Method	MQC Test Frequency[14]	CQA Test Frequency[14]	Minimum Criteria[12]
Thickness (min. ave.) • Lowest 8 out of 10 values • Lowest for any of the 10 values	ASTM D5994	1/roll	1/250,000 SF	57 mil 54 mil 51 mil
Asperity Height (min. ave.)[1,2]	ASTM D7466	Every 2nd roll	1/250,000 SF	16 mil
Sheet Density (min)	ASTM D792 or D1505	1/50,000 SF	1/250,000 SF	0.940 g/cc
Tensile[3] (min. ave.) • Yield Strength • Break Strength • Yield Elongation • Break Elongation	ASTM D6693	1/50,000 SF	1/250,000 SF	126 lb/in 190 lb/in 12% 100%
Tear Resistance (min. ave.)	ASTM D1004 Die C	1/50,000 SF	1/250,000 SF	42 lbs
Puncture Resistance (min. ave.)	ASTM D4833	1/50,000 SF	1/250,000 SF	90 lbs
Stress Crack Resistance[4]	ASTM D5397 (App.)	(13)	N/A	500 hrs
Carbon Black Content (range)	ASTM D4218 or ASTM D1603[5]	1/50,000 SF	1/250,000 SF	2-3%
Carbon Black Dispersion[6]	ASTM D5596	1/50,000 SF	1/250,000 SF	(6)
Oxidative Inductive Time (OIT)(min. ave.)[7] • Std. OIT, or • High Pressure OIT	ASTM D3895 ASTM D5885	(13)	N/A	100 min. 400 min.
Oven Aging at 85° C[7,8] • Std. OIT (min. ave.), % retained after 90 days • High Pressure OIT (min. ave.), % retained after 90 days	ASTM D5721 ASTM D3895 ASTM D5885	(13)	N/A	55% 80%
UV Resistance[9] • Std. OIT, or • High Pressure OIT	ASTM D7238 ASTM D3895 ASTM D5885	(13)	N/A	(10) 50%

1. Alternate the measurement side for double textured sheet.
2. Test each side of the textured geomembrane recording a measurement every lineal foot of textured roll width.
3. Machine direction (MD) and cross machine direction (XMD) average values should be based on 5 test specimens each direction.
   - Yield elongation is calculated using a gage length of 1.3 inches.
   - Break elongation is calculated using a gage length of 2.0 inches
4. The SP-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the

textured sheet materials. The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing of the same sample.

5. Other methods such as D4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D1603 (tube furnace) can be established.
6. Carbon black dispersion (only near spherical agglomerates) for 10 different views:
   - 9 in Categories 1 or 2, and
   - 1 in Category 3.
7. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane material.
8. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
9. The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
10. Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
11. UV resistance is based on percent retained value regardless of the original HP-OIT value.
12. Test methods, frequencies and values shall be consistent with the latest GRI GM13.
13. Manufacturer may provide certification letter.
14. Testing frequencies listed are the minimum, unless otherwise indicated.

TABLE 5
40-mil Textured LLDPE Geomembrane Testing Requirements

Properties	Test Method	MQC Test Frequency[11]	CQA Test Frequency[11]	Minimum Criteria[9]
Thickness (min. ave.) • Lowest for any of the 10 values	ASTM D5994	1/roll	1/250,000 SF	40 mil 36 mil
Sheet Density (max)	ASTM D792 or D1505	1/50,000 SF	1/250,000 SF	0.939 g/cc
Tensile[1] (min. ave.) • Break Strength • Break Elongation	ASTM D6693	1/50,000 SF	1/250,000 SF	152 lb/in 800%
Tear Resistance (min. ave.)	ASTM D1004 Die C	1/50,000 SF	1/250,000 SF	22 lbs
Puncture Resistance (min. ave.)	ASTM D4833	1/50,000 SF	1/250,000 SF	56 lbs
Carbon Black Content[2] (range)	ASTM D1603	1/50,000 SF	1/250,000 SF	2-3%
Carbon Black Dispersion[3]	ASTM D5596	1/50,000 SF	1/250,000 SF	(3)
Oxidative Inductive Time (OIT)(min. ave.)[4] • Std. OIT, or • High Pressure OIT	ASTM D8117 ASTM D5885	(10)	N/A	100 min. 400 min.
Oven Aging at 85° C[5] • Std. OIT (min. ave.), % retained after 90 days • High Pressure OIT (min. ave.), % retained after 90 days	ASTM D5721 ASTM D8117 ASTM D5885	(10)	N/A	35% 60%
UV Resistance[6] • Std. OIT (min. ave.), or • High Pressure OIT (min. ave.) % retained after 1600 hrs[8]	ASTM D7238 ASTM D8117 ASTM D5885	(10)	N/A	(7) 35%

1. Machine direction (MD) and cross machine direction (XMD) average values should be based on 5 test specimens each direction.
   - Break elongation is calculated using a gage length of 2.0 inches
2. Other methods such as D4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D1603 (tube furnace) can be established.
3. Carbon black dispersion (only near spherical agglomerates) for 10 different views:
   - 9 in Categories 1 or 2, and
   - 1 in Category 3.
4. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane material.
5. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.
6. The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
7. Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
8. UV resistance is based on percent-retained value regardless of the original HP-OIT value.
9. Test methods, frequencies and values shall be consistent with the latest GRI GM17.
10. Manufacturer may provide certification letter.
11. Testing frequencies listed are the minimum.

TABLE 6
60-mil Textured LLDPE Geomembrane Drain Liner Testing Requirements

Properties	Test Method	MQC Test Frequency[11]	CQA Test Frequency[11]	Minimum Criteria[9]
Thickness (min. ave.) • Lowest for any of the 10 values	ASTM D5994	1/roll	1/250,000 SF	60 mil 36 mil
Sheet Density (max)	ASTM D792 or D1505	1/50,000 SF	1/250,000 SF	0.939 g/cc
Tensile[1] (min. ave.) • Break Strength • Break Elongation	ASTM D6693	1/50,000 SF	1/250,000 SF	228 lb/in 800%
Tear Resistance (min. ave.)	ASTM D1004 Die C	1/50,000 SF	1/250,000 SF	33 lbs
Puncture Resistance (min. ave.)	ASTM D4833	1/50,000 SF	1/250,000 SF	84 lbs
Carbon Black Content[2] (range)	ASTM D1603	1/50,000 SF	1/250,000 SF	2-3%
Carbon Black Dispersion[3]	ASTM D5596	1/50,000 SF	1/250,000 SF	(3)
Oxidative Inductive Time (OIT)(min. ave.)[4] • Std. OIT, or • High Pressure OIT	ASTM D8117 ASTM D5885	(10)	N/A	100 min. 400 min.
Oven Aging at 85° C[5] • Std. OIT (min. ave.), % retained after 90 days • High Pressure OIT (min. ave.), % retained after 90 days	ASTM D5721 ASTM D8117 ASTM D5885	(10)	N/A	35% 60%
UV Resistance[6] • Std. OIT (min. ave.), or • High Pressure OIT (min. ave.) % retained after 1600 hrs[8]	ASTM D7238 ASTM D8117 ASTM D5885	(10)	N/A	(7) 35%

1. Machine direction (MD) and cross machine direction (XMD) average values should be based on 5 test specimens each direction.
    a. Break elongation is calculated using a gage length of 2.0 inches
2. Other methods such as D4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D1603 (tube furnace) can be established.
3. Carbon black dispersion (only near spherical agglomerates) for 10 different views:
    a. 9 in Categories 1 or 2, and
    b. 1 in Category 3.
4. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane material.
5. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.
6. The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
7. Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
8. UV resistance is based on percent-retained value regardless of the original HP-OIT value.
9. Test methods, frequencies and values shall be consistent with the latest GRI GM17, as applicable.
10. Manufacturer may provide certification letter.
11. Testing frequencies listed are the minimum.

TABLE 7
Geomembrane Installation Seam Testing Summary

Properties	Test Method[3]	Sample Size	Minimum Field Test Frequency	Minimum Criteria
Shear Test[1,2] (Hot wedge fusion and Fillet extrusion)	ASTM D6392 (excl. Sec. 6.3, Conditioning)	~42-in. along seam, ~12-in. wide	Average of 1/500 lf for extrusion and 1/500 lf for fusion welding	60 mil HDPE – 120 lb/in. (1)(4), 40 mil LLDPE – 60 lb/in. (1)(4), elongation ≥ 50%[5] 60 mil LLDPE – 90 lb/in. (1)(4), elongation ≥ 50%[5]
Peel Test[1,2] (Hot wedge fusion)	ASTM D6392 (excl. Sec. 6.3, Conditioning)	~42-in. along seam, ~12-in. wide	Average of 1/500 lf for fusion welding	60 mil HDPE – 91 lb/in. (1)(4), 40 mil LLDPE – 50 lb/in. (1)(4) peel incursion ≤ 25% (1) 60 mil LLDPE – 90 lb/in. (1)(4), peel incursion ≤ 25% (1)
Peel Test[1,2] (Fillet Extrusion)	ASTM D6392 (excl. Sec. 6.3, Conditioning)	~42-in. along seam, ~12-in. wide	Average of 1/500 lf for extrusion welding	60 mil HDPE – 78 lb/in. (1)(4), 40 mil LLDPE – 44 lb/in. (1)(4) peel incursion ≤ 25% (1) 60 mil LLDPE – 66 lb/in. (1)(4) peel incursion ≤ 25% (1)
Air-Pressure	GRI GM 6	N/A	All dual-track seams	60 mil HDPE – 27-37 psi, max 3 psi drop over 5 mins, 40 mil LLDPE – 20-30 psi, max 4 psi drop over 5 mins4 60 mil LLDPE – 27-37 psi, max 3 psi drop over 5 mins
Vacuum Chamber (Box) min. 3 psig	N/A	N/A	All single-track and extrusion seams	Observe for approx. 10 seconds

1. Maximum of one-non FTB (Film Tear Bond) per five specimens tested is acceptable provided that strength requirements are met on that sample. Film Tearing Bond (FTB) definition: A failure in the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area. Examples of FTB and the associated locus of break codes are provided in ASTM D6392.
2. For double fusion-welded seams, both tracks shall be tested for compliance with the minimum property values listed above.
3. Destructive seams will be evaluated for strength parameters according to ASTM D6392 (excluding Section 6.3 "Conditioning"). Destructive seams will be evaluated for elongation during cold weather seaming.
4. Values listed for shear and peel strengths are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values. Test methods, frequencies and values shall be consistent with the latest GRI GM19.
5. Elongation measurements should be omitted for field-testing.

TABLE 8
Drainage Geocomposite Testing Requirements

Properties	Test Method	MQC Test Frequency[4]	CQA Test Frequency[4]	Minimum Criteria
Geonet Component				
Thickness (min. ave.)	ASTM D5199	1/100,000 SF	1/250,000 SF	250 mil
Density (min. ave.)	ASTM D792 or D1505	1/100,000 SF	1/250,000 SF	0.950 g/cc
Tensile Strength (min. ave.)	ASTM D7179	1/100,000 SF	1/250,000 SF	60 lbs/in
Carbon Black Content (range)	ASTM D1603[3]	1/100,000 SF	1/250,000 SF	1.5-3%
Manufactured Geocomposite				
Ply Adhesion (min. ave.)	ASTM D7005	1/100,000 SF	1/250,000 SF	1.0 lbs/in
Transmissivity[1] (min. ave.)	ASTM D4716	1/project	1/project	$2x10^{-4}$ m^2/sec[5] $1x10^{-3}$ m^2/sec[6]

1. Transmissivity shall be measured in a 12-inch x 12-inch box using the same boundary conditions, load, duration and gradient as those used by the manufacturer to establish the min. avg. for the required test value.
2. Testing for the geonet component shall be performed in accordance with the upper portion of this table. The geotextile component shall meet the required test values from Table 8. Tracking of the frequency of Manufacturer QC testing and Conformance QA testing shall be based on the geocomposite roll numbers.
3. Other methods such as ASTM D4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to ASTM D1603 (tube furnace) can be established.
4. Testing frequencies listed are the minimum. Test methods, frequencies and values shall be consistent with the latest GRI GN4, as applicable
5. Floor and slopes for LCS.
6. Final cover drainage layer.

TABLE 9
Nonwoven Geotextile Testing Requirements

Properties	Test Method	MQC Test Frequency[4]	CQA Test Frequency[4]	Minimum Criteria
Mass/Unit Area (min. ave.)	ASTM D5261	1/100,000 SF	1/250,000 SF	8 oz/sy – 7.2 oz/sy 10 oz/sy – 9.1 oz/sy 16 oz/sy – 15.1 oz/sy
Apparent Opening Size (max.)	ASTM D4751	1/540,000 SF	1/project[1]	8 oz/sy – 0.25 mm 10 oz/sy – 0.25 mm 16 oz/sy – 0.2 mm
Grab Strength (min. ave.)	ASTM D4632	1/100,000 SF	1/250,000 SF	8 oz/sy – 200 lbs 10 oz/sy – 230 lbs 16 oz/sy – 370 lbs
Puncture Strength (min. ave.)	ASTM D6241	1/100,000 SF	1/250,000 SF	8 oz/sy – 430 lbs 10 oz/sy – 700 lbs 16 oz/sy – 900 lbs
UV Resistance[2,3]	ASTM D7238	1/resin formulation	N/A	70%
Permittivity (min.)	ASTM D4491	1/540,000 SF	1/project[1]	8 oz/sy – 1.0 sec^{-1} 10 oz/sy – 0.9 sec^{-1} 16 oz/sy – 0.5 sec^{-1}

1. AOS and Permittivity shall only be tested for geotextiles used in filter applications.
2. Manufacturer may elect to provide certification of values for geotextiles.
3. Evaluation to be on 2.0 inch strip tensile specimens per ASTM D 5035 after 500 hrs of exposure.
4. Testing frequencies listed are the minimum unless otherwise indicated. Test methods, frequencies and values shall be consistent with the latest GRI GT 12a (cushion) and GT13a (separator), as applicable.

PROMUS ENGINEERING
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August 28, 2025

Ms. Michele Lersch
WM Mobile Bay Environmental Center, Inc.
17045 Highway 43
Mt. Vernon, Alabama 36560

RE: Ground Water Monitoring Plan
Chastang Sanitary Landfill

Dear Ms. Lersch:

As requested, we have revised the existing facility Ground Water Monitoring Plan (GWMP) to incorporate the revisions to the groundwater network based on correspondence from the Alabama Department of Environmental Management (ADEM) dated October 1, 2024 and July 24, 2025. The GWMP revisions include the following:

1. Inclusion of January 2025 monitoring well MW-2A and MW-12A abandonments;
2. Section 4.1 and related figures have been revised to include installation of new monitoring wells;
3. Section 4.2 has been revised to reference the correct figure;
4. Section 9.2 regarding background sampling has been corrected;
5. Section 4.2 and Figure 3 have been revised to reflect that the status of MW-11 is "to be abandoned" and the Abandonment Workplan is included as Appendix B;
6. PZ-7R3 has been added as a compliance monitoring well. Figures 3 and 4B, as well as Table 1, have been revised to reflect this addition.
7. Analytes listed in ADEM Admin Code 335-13-15-Appendix III have been added to Table 2B for voluntary monitoring.

Thank you for the opportunity to work with Waste Management in service to this facility. Should you have any questions or comments, please contact us via phone at (888) 811-9066 or email at jbreedlove@promusengineering.com or eperry@promusengineering.com.

Sincerely,
PROMUS ENGINEERING, LLC

EVAN B. PERRY
LIC. #1167
ALABAMA LICENSED PROFESSIONAL GEOLOGIST

Evan Perry, PG
Senior Geologist II

cc: Jeffrey J. Breedlove, PE

230102

GROUND WATER MONITORING PLAN (GWMP)

Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

June 2017
(revised August 2025)
Promus Project No. 230102

Prepared for:
WM Mobile Bay Environmental Center, Inc.

Prepared by:

PROMUS ENGINEERING

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APPENDICES

Revision note: Geosyntec Consultants, Inc. initially prepared this plan as part of the permitting effort in 2000. The plan was subsequently updated and modified in June 2017, July 2023, October 2024, and August 2025 by Waste Management and Promus Engineering, LLC.

[1] Integrity Environmental Solutions, April 10, 2025.

GROUND WATER MONITORING PLAN (GWMP)

Chastang Sanitary Landfill
Mobile County, Alabama

1. INTRODUCTION

This document, titled "Ground Water Monitoring Plan, Chastang Sanitary Landfill" (GWMP) was prepared to demonstrate compliance with Chapter 335-13-4-.27 of the Alabama Department of Environmental Management (ADEM) solid waste program regulations, titled "Groundwater Monitoring and Corrective Action." This GWMP incorporates information from the 1993 and 1999 hydrogeologic investigations conducted by Southern Earth Sciences, Inc. (SES) and Geotechnical Engineering Testing, Inc. (GET), as well as Waste Management Standards, and information and results obtained through ongoing monitoring of the existing groundwater well network.

2. SITE GEOLOGY AND DESCRIPTION

The Chastang Sanitary Landfill is in northeast Mobile County, Alabama, immediately west of U.S. Highway 43 (see Figure 1), in Section 13 of Township 1 North, Range 1 West, as shown on the United States Geological Survey (USGS) Mt. Vernon 7.5-minute quadrangle map (Figure 2). The original unlined landfill, the Subtitle D landfill areas, and the 2000 expansion area are presented on the "Site Plan" (Figure 3).

Chastang Sanitary Landfill is owned by the Solid Waste Disposal Authority of the City of Mobile and operated by WM Mobile Bay Environmental Center, Inc. (formerly, TransAmerican Waste Industries, Inc.)

Two previous site-specific hydrogeologic/geotechnical investigations have been conducted at the Chastang Sanitary Landfill [SES, 1993; GET, 1999]. In each of these reports an extensive discussion is presented of local geology. The SES (1993) report focused on the local conditions adjacent to the unlined pre-Subtitle D areas. The GET (1999) report focused on the local conditions in the 100-acre expansion area west of the unlined landfill. These reports have previously been submitted to ADEM.

3. GROUNDWATER HISTORY

As a primary component of the site-specific hydrogeologic investigations, piezometers were installed to provide data regarding the characterization of groundwater at the site. As part of the SES (1993) investigation, 29 piezometers were installed; as part of the GET (1999) investigation, 20 nested piezometers were installed to provide 40 depth-specific data points within the 100-acre expansion area. In both investigations, groundwater levels were recorded at a minimum of monthly intervals during a period that included the months of January through June, when groundwater levels are typically at their highest. As a result, the groundwater and groundwater flow regime at the Chastang Sanitary Landfill have been well characterized.

GET (1999) used the seasonal high-water levels in the shallow water table, herein referenced as the surficial aquifer (i.e. shallow Miocene and alluvial aquifers), to develop the site hydrogeologic map. Groundwater potentiometric maps have been produced twice a year as part of semi-annual monitoring and reporting. Figures 4A and 4B present the perched water table map and uppermost aquifer potentiometric map, respectively.

4. GROUNDWATER MONITORING WELL PROGRAM

4.1. Revisions to Existing Monitoring Well System

ADEM agreed to monitoring network changes proposed in the April 2024 Workplan, as outlined in correspondence dated September 19, 2024. Monitoring well installations and abandonments were completed during January 2025, within 180 days of ADEM's approval of the Workplan. The monitoring network includes the monitoring of the perched water table, which is present at higher elevations in the southern portion of the site, and the uppermost aquifer, which is present throughout the site.

This monitoring network provides adequate groundwater monitoring for the entire Chastang Sanitary Landfill facility. The installation and abandonment report dated April 10, 2025, is provided in Appendix A.

4.2. Monitoring Well System

The perched water table monitoring network includes four (4) compliance locations: MW-7, MW-9R, MW-10R, and MW-15S[2]. The uppermost aquifer monitoring network includes eleven (11) compliance locations[3]: MW-4A, MW-5R, PZ-7R3, MW-8R, MW-9D, MW-11R, MW-12R, MW-13A, MW-14, MW-15D, and MW-16. One (1) of the locations, MW-11R is hydraulically upgradient from the waste unit. This monitoring network provides adequate groundwater monitoring for the entire Chastang Sanitary Landfill facility.

Additionally, PZ-14R is installed for the downgradient assessment of MW-14. The location of these wells is shown in Figure 3.

4.3. Monitoring Well Construction

Waste Management has standards for construction and development of monitoring wells which meet or exceed state requirements set forth in ADEM Admin Code 335-13-4-.27(2)(c)1. These standards have been used with the construction of most monitoring wells at this facility (Figure 5). Any monitoring wells to be installed in the future will be constructed in a similar manner. In general, the borehole will be drilled down to the zone to be monitored. The drilling will be performed so that a stable borehole can be maintained while the sand pack, the PVC screen and casing, and seal components are installed. The seal above the sand and annular-space seal to the surface will be placed such as not to disturb or contaminate the sand pack as well as to seal off the monitoring zone from

[2] Installed January 2025.
[3] MW-9D, MW-11R, MW-15D, and MW-16 installed during January 2025. PZ-12R renamed MW-12R.

possible higher ground water occurrences. A protective casing will be grouted over the PVC casing with a concrete pad which will be formed so that water is shed away from the borehole. A copy of the construction and development standards will be kept on file at the site office for easy reference during construction and development.

The wells will be equipped with a dedicated pneumatic bladder pump for evacuation of purge water and for sampling. Bladder pumps will consist of QED Well Wizard® Groundwater Sampling Pumps, or equivalent alternate. The pump shall be installed such that the intake screen is located within the middle of the well screen.

4.4. Monitoring Well Installation Documentation

A groundwater monitoring well as-built schematic will be submitted for each installed well as required by ADEM Admin Code 335-13-4-.27(2)(c)4. Information which will be included on the well completion schematic includes the following minimum information: (i) project name, (ii) monitoring well number, (iii) monitoring well construction (for example 2 in. diameter Schedule 40 PVC), (iv) slot size of screened interval, (v) elevations of screened interval, (vi) depth of monitoring well (+/- 0.1 foot), (vii) date well installed(vii) diameter of well, (viii) surface elevation, (ix) name of geologist/engineer installing well, (x) driller's name, (xi) materials used for filter pack and annular sealant, (xii) surface seal design/construction, and (xiii) ground water elevation in the monitoring well (+/-0.01 foot).

5. GROUNDWATER SAMPLING

See attached Appendix C, Environmental Media Sampling Standard, version 1.0, 2012.

6. DETECTION AND ASSESSMENT MONITORING

The groundwater monitoring program identified in this GWMP was developed to fully comply with ADEM 335-13-4.27(3), specifically as related to the location of the groundwater monitoring network, frequency of monitoring, analyzed constituents (i.e., Appendix I parameters + Mercury), and reporting/notification to ADEM. In the event there is a verified statistically significant increase (SSI) over background values of any constituent, WM will notify ADEM of the increase and will establish an assessment monitoring program which is compliant with Section 335-13-4.27(4) of the ADEM regulations.

7. LABORATORY QUALITY CONTROL

7.1. Laboratory Quality Control Checks

Specific laboratory quality control checks will be performed for each group of samples obtained from the field and transported to the laboratory. These include the use of method blanks, calibration checks, spiked duplicates, and standard reference materials as described in this section.

7.1.1. Method Blanks

Method blanks represent an aliquot of analyte-free laboratory water that is carried through the entire analytical protocol each day to demonstrate system contaminants are under control.

7.1.2. Calibration Checks

A calibration standard is run every day to evaluate the continuity of the system calibration and performance. If the system is found to be out of control, then it is recalibrated before any sample analysis is performed.

7.1.3. Matrix Spikes/Spike Duplicates

A matrix spike is a sample which is artificially "spiked" with a known concentration of a specific constituent. To assess laboratory accuracy and precision, a minimum of 10 percent of the samples analyzed per parameter will be spiked in duplicate.

7.1.4. Standard Reference Materials

Quality control samples from the U.S. Environmental Protection Agency (USEPA) or some other certified reference materials are routinely analyzed in the laboratory as a system check standard for each parameter. Control charts are typically utilized in the laboratory to evaluate the accuracy and precision of data for each parameter. The control charts are based on procedures outlined in USEPA guidance. These charts contain both "Warning Limits" which are defined as +/- two standard deviation from the mean and "Control Limits" which are established as upper and lower limit values.

8. CHAIN OF CUSTODY

Figure 6 presents a sample chain of custody form similar to the form that will be used for the project. The selected analytical laboratory provides specific chain of custody forms.

Each sample container will be individually identified by sample number, date, and time taken, as well as the source of the sample. A chain-of-custody record will be prepared for all samples that will include a) name of the person collecting the samples; b) source of each sample; c) container numbers, types, sizes, and preservatives for each sample; d) analytical requirements; and e) sample receipt information.

Custody transfers of samples will be recorded on the chain-of-custody form by signatures of the transferor (relinquisher) and the transferee (receiver). This procedure will be repeated, as necessary, until final delivery is made to the analytical laboratory.

Common carriers (e.g. FedEx, UPS, etc.) will not sign chain-of-custody forms. If shipment of samples via common courier is necessary, the chain of custody records will be sealed in plastic within each cooler containing samples and the coolers sealed with chain-of-custody seals.

A laboratory custodian will note the condition of each sample received as well as questions or observations regarding sample integrity. The laboratory custodian will maintain a sample-tracking record that will follow each sample through all stages of laboratory processing. The sample tracking records must show the date of sample extraction or preparation and sample analysis. These records will be used to determine holding time limits during lab audits and data validation.

9. STATISTICAL EVALUATION OF DATA

9.1. Overview

This section outlines the criteria used to evaluate groundwater monitoring data from the Chastang Sanitary Landfill site. These criteria represent a conservative approach to groundwater analysis and incorporate state-of-the-art statistical and other evaluation methodologies that may be used for the detection of a release from the facility. For the Chastang Sanitary Landfill GWMP, practical quantitation limits (PQLs) will be used as the concentration limits for volatile organic compounds (VOCs), and the Shewart-CUSUM (cumulative sum) control chart and/or normal and non-parametric prediction limits will be used for intra-well comparisons. Prediction Limits for up- to down-gradient statistical comparisons, non-statistical visual evaluation methodologies, or other statistical methods approved by the ADEM may also be used. The remainder of this section is organized to present a discussion regarding: (i) background sampling and testing; (ii) statistical methodologies for VOCs and inorganic constituents; (iii) detection verification procedures; and (iv) assessment monitoring guidelines.

9.2. Background Sampling and Testing

A minimum of eight background samples were collected from each well to establish the background data necessary for implementing the proposed statistical evaluation procedures. For the background samples, the data were examined for outliers (using Dixon's outlier test (see Section 9.3.2)), anomalies, and trends that might be an indication of a release. Outliers and anomalies are inconsistently large or small values that can occur due to sampling, laboratory, transportation, or transcription errors, or even by chance alone. Significant trends indicate a source of systematic error, natural temporal variability (due to flood or drought), or an actual contamination occurrence that must be evaluated and corrected before the detection monitoring program can be implemented. The inclusion of such values in the historical database used for statistical analysis could lead to misinterpretation of the dataset. This could lead to an artificial increase in the magnitude of statistical limits, potentially resulting in a higher false negative rate (i.e., a decrease in the sensitivity of the statistical procedure).

To eliminate the possibility of historical outliers and trends creating false statistical limits, the data for each well and constituent were examined for the presence of outliers during the establishment or update of the background. Outliers may be manually removed from consideration during detection monitoring if an error in sampling or analytical testing is identified. The statistical outlier and trend detection procedure was performed for those wells that have had at least five measurements for a given constituent. Once the background database is established, this outlier procedure can be applied, and appropriate statistical limits can be set in accordance with Section 9.3.

9.3. Statistical Methodology

The statistical approach presented in this GWMP was developed through the collaboration of a qualified statistician (i.e., Dr. Robert Gibbons, professor at the University of Illinois at Chicago) and the Waste Management Corporate Director of Hydrogeology. The approach included herein is consistent with ASTM D 6312-98 titled, "Standard Guide for Developing Appropriate Statistical Approaches for Ground- Water Detection Monitoring Programs" as well as the USEPA Unified Guidance dated March 2009. The use of intra-well statistical comparisons for evaluation of groundwater chemistry data is supported by the USEPA and other State regulators for use on sites that existing landfill facilities have not impacted. Specific methodologies are proposed for VOCs and for inorganic constituents.

9.3.1. Volatile Organic Compounds.

PQLs assure that the quantitative value of the analyte is close to the measured value. Conversely, method detection limits (MDLs), indicate that the analyte is present in the sample with a specified degree of confidence. For analytes with estimated concentrations greater than the MDL but not the PQL, it can only be concluded that the actual concentration is greater than zero. In this case, the exact concentration cannot be determined, and the actual concentration of an analysis result between the PQL and the MDL may be less than the MDL. Comparison of a detected concentration to a maximum contaminant level (MCL), or any other concentration limit, is not meaningful unless the concentration is greater than the PQL.

It is generally accepted that when a landfill facility produces a release to groundwater, multiple constituents contained in the leachate are associated with the source fluids and are subsequently detected by the groundwater monitoring program. A single constituent at very low concentration (i.e., below the PQL) typically is not the signature that is produced from an actual release. VOCs represent very effective indicators of a release from a solid waste unit. Because these compounds are rarely detected in background groundwater samples, establishing monitor well-specific limits for VOCs is generally not an option. Therefore, detection decision rules based on laboratory-specific PQL will be used. The use of a PQL in the absence of a measurable background value is supported by 40 CFR 258.53(h)(5) which states that any PQL used in a statistical analysis “be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.”

The PQLs proposed as the constituent concentration limits will be determined on a compound-specific basis at the selected laboratory. The calculation of laboratory-specific PQLs incorporates a measure of the statistical uncertainty that is associated with the measurement process. Any VOC detected and verified at a concentration above the PQL would be statistically significant and, therefore, trigger alternate source identification activities or assessment monitoring. These decision rules apply only in cases where the constituent has been rarely or never detected in the background.

9.3.2. Inorganic Parameters

The statistical analysis methodology for inorganic parameters will be based on a combined Shewart-cumulative sum (CUSUM) control chart that is capable of detecting both sudden and gradual changes in groundwater chemistry (Gibbons, 1992; Gibbons, 1994; USEPA 2009). Combined Shewart-CUSUM control charts will be constructed for each well and for each monitored parameter to provide a statistical/visual tool for detecting trends and abrupt changes in inorganic groundwater chemistry.

The Dixon Outlier Test is performed during background updates. The Dixon Outlier Test is typically run on parameters detected more than 25% of the time; however, based on comments from ADEM (September 16, 2024, correspondence related to review of the First 2024 Semiannual Groundwater Detection and Assessment Monitoring Report), the test is run for all parameters. In addition to the Dixon Outlier Test, parameters detected less than 25% of the time are reviewed by a qualified groundwater scientist. If an outlier is observed and verified, it is reported to the statistician, who manually marks it as an outlier.

If the Dixon test indicates an outlier, the value is compared to three times the median concentration value for intrawell analyses. If the value fails both criteria of the two-stage screening (the Dixon Outlier Test and comparison to three times the median value), the value is considered a statistical outlier and will not be used in the determination of the mean and variance. Anomalous data is still plotted on the graphs (with a unique symbol) but will not be included in the statistical calculations. Additionally, during the periods that background is not updated, the data is reviewed by a qualified groundwater scientist and if an outlier is observed and verified it is reported to the statistician to be manually marked as an outlier.

The combined Shewart-CUSUM procedure assumes that the data are independent and normally distributed. The most important assumption is independence (Gibbons, 1994). Therefore, care should be taken to never sample wells more frequently than sample independence can be demonstrated based on site-specific hydrogeological factors. The assumption of normality is somewhat less of a concern because the data can usually be adequately transformed for most applications. Non-detects (NDs) can be replaced by one-half of the MDL without serious consequence, although this procedure should be applied only to constituents that are detected in at least 25 percent of all samples.

The combined Shewart-CUSUM procedure requires a minimum of eight historical independent samples (i.e., background data) to provide a reliable estimate of the mean and standard deviation of each constituent in each well. Once background data are obtained from each detection monitor well, subsequent sample results are statistically compared to the estimated control limit both in terms of their absolute magnitude and cumulative sum. A systematic review of statistical options based on the data set and total number of statistical comparisons per event should be conducted for each monitoring event to allow for management of the site-wide false positive list. According to communications with Gibbons (1999), USEPA Unified Guidance Document for Statistical Methods recommends that the selected statistical method provide a site-wide false positive (Type I error) rate of 10 percent or less (calculated on an annual basis) while maintaining a statistical power (i.e., 1 minus the false negative rate) of greater than 50 percent for a 3-sigma release and greater than 80 percent for a 4-sigma release. If this cannot be achieved through a parameter or monitoring point reduction, then options available within DUMPStat® (Gibbons, et al., 1994) can be used. Adjustments to the control chart factor for intra-well control charts and verification re- sampling options, or the use of normal prediction limits may be implemented to achieve the statistical metrics recommended by USEPA and Gibbons.

The statistical analysis program for inorganic parameters DUMPStat® will be based on combined Shewart-CUSUM control charts at all compliance point wells. Future intra-well measurements that do not exceed the statistical limits will be combined with historical data to update these estimates every two years.

For constituents detected at least once but less than 25 percent of the time during background monitoring, a non-parametric prediction limit will be computed, as described by Gibbons (1992). However, it is crucial to have enough background measurements before selection of a non-parametric prediction limit to ensure that the proper confidence level is achieved (i.e., thirteen or more); otherwise, a Poisson prediction limit will be used.

9.4. Detection Verification Procedure

Once groundwater analysis results have been collected, checked for quality assurance/quality control (QA/QC) consistency and determined to be above the appropriate statistical level, the results must be verified in accordance with the objectives of 40 CFR Part 258.53. Verification resampling is an integral part of the statistical methodology described by USEPA's Addendum to Interim Final Guidance Document (USEPA, 1992). Without verification resampling, much larger · statistical limits would be required to achieve site-wide false positive rates of 5 percent or less. Furthermore, the resulting false negative rate would be greatly increased. The following procedures will be performed for each VOC and inorganic constituent determined to be initially above its statistical limit. Only compounds that initially exceed their statistical limit will be sampled for verification purposes. Verification sampling must be appropriately timed. The verification sample should be collected prior to the next consecutive sampling event and within 30-90 days of the initial sampling event in order to avoid seasonal variation effects.

9.4.1. Volatile Organic Compounds

If one or more VOCs are detected above their statistical limit (i.e., PQL), a minimum of one verification resample will be conducted. If two re-sampling events are conducted, the samples will be collected independently, no sooner than 30 days apart. A statistical exceedance will be recorded and alternate source identification or assessment monitoring will initiated if any single VOC is measured above the PQL in each of the verification resamples.

9.4.2. Inorganic Constituents

If one or more of the inorganic parameters are detected above their statistical limit (i.e., Shewart-CUSUM control chart computation value/prediction limit), a minimum of one verification resample will be collected prior to the next consecutive sampling event and within 30-90 days of the initial sampling event in order to avoid seasonal variation effects. A statistical exceedance will be recorded and alternate source identification or assessment monitoring will be initiated if verification of two or more elevated parameters are confirmed for each of the discrete verification resamples.

9.5. Assessment Monitoring

Assessment monitoring will be conducted if during detection monitoring, a statistically significant increase (SSI) over background is detected, verified, and alternate sources ruled out for the constituents identified in Appendix I of the ADEM regulation. Upon commencement of assessment monitoring, a groundwater sample will be collected only from the well (or wells) for which the verified SSI was reported. This sampling will occur within a period of 90 days from the verified exceedance (inclusive of verification re-sampling activities). Samples collected for assessment monitoring will be analyzed for constituents listed in Appendix II of the ADEM regulations in accordance with ADEM 335-13-4.27(4).

Should assessment monitoring reveal a verified detection(s) of an assessment monitoring parameter(s) statistically above its associated groundwater protection standard (GWPS) which is developed in accordance with ADEM regulation during assessment monitoring using EPA-approved methods (e.g., confidence limits), an assessment of corrective measures will be performed assuming no alternate source is demonstrated to have caused the exceedance of the GWPS. A letter addendum to this GWMP will be developed if assessment monitoring is ever required.

10. REPORTING

A semi-annual report will be prepared for submittal to ADEM. In accordance with the ADEM requirements, this report will include the laboratory test results of all groundwater monitoring wells and a statistical evaluation of the data. In addition, a potentiometric map of the shallow water aquifer will be generated and hydraulic gradients will be calculated and provided in this report. Based on available data, flow rates of groundwater will be estimated.

11. LIMITATIONS

This document intends to outline the requirements and procedures for groundwater monitoring at the referenced facility. This plan is not intended to provide all the comprehensive details necessary for groundwater monitoring. The professional environmental manager for Chastang Sanitary Landfill and the professional responsible for implementing groundwater monitoring and other professionals responsible for operation, construction, and maintenance of the facility are expected to supplement the measures in this document with their professional experience and judgment and use discretion in performing their duties. Using alternate means or methods may be allowed at the discretion of the professional. Any exceptions to the requirements of this plan, however, shall be allowed only at the discretion of the professional and with the approval of ADEM.

Further, this plan was developed with reliance upon reports, plans, and designs developed by other professionals for the facility. We have assumed that the information provided to us by others is correct and accurate, unless otherwise noted. The information contained within this plan is, to the best of our knowledge and belief, true, accurate, and complete. If additional information or changes in previous details become available in the future, we request the opportunity to review and change this plan as necessary.

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TABLES

TABLE 1
Ground Water Monitoring Well Network

Well No.[3]	New or Existing	Well Type	Monitoring Status	Action	Comment/Area Monitored
Uppermost Aquifer Monitoring Network					
MW-4A	Existing	Downgradient	Compliance	Maintain	Old Sanitary & Sub-D areas
MW-5R	Existing	Downgradient	Compliance	Maintain	Old Sanitary
MW-8R	Existing	Downgradient	Compliance	Maintain	Sub-D Area
MW-9D	New	Downgradient	Compliance	Maintain	Sub-D Area
MW-11R	New	Upgradient	Compliance	Maintain	Sub-D Area
MW-12R	Existing	Downgradient	Compliance	Maintain	Sub-D Area
MW-13A	Existing	Downgradient	Compliance	Maintain	Sub-D Area
MW-14	Existing	Downgradient	Compliance & Assessment	Maintain	Old Sanitary
MW-15D	New	Downgradient	Compliance	Maintain	Old Sanitary
MW-16	New	Downgradient	Compliance	Maintain	Old Sanitary
PZ-7R3	Existing	Downgradient	Compliance	Maintain	Sub-D Area
PZ-14R	Existing	Downgradient	Assessment	Maintain	Old Sanitary
Perched Water Table Monitoring Network					
MW-7	Existing	Downgradient	Compliance & Assessment	Maintain	Sub-D Area
MW-9R	Existing	Downgradient	Compliance & Assessment	Maintain	Sub-D Area
MW-10R	Existing	Downgradient	Compliance & Assessment	Maintain	Sub-D Area
MW-15S	New	Downgradient	Compliance	Maintain	Old Sanitary

Per Solid Waste Permit Section IV, specific condition E, Table IV.1:
"The entire monitoring well network will be reevaluated periodically due to anticipated changes in flow rate and direction of groundwater after the decommissioning and relocation of the sedimentation pond within the Subtitle D expansion area."
[3] MW-11 is approved for abandonment by ADEM. Abandonment is planned following the submission of a new Workplan and ADEM's approval of that plan.

TABLE 2A
Semi Annual Parameters and Testing Methods

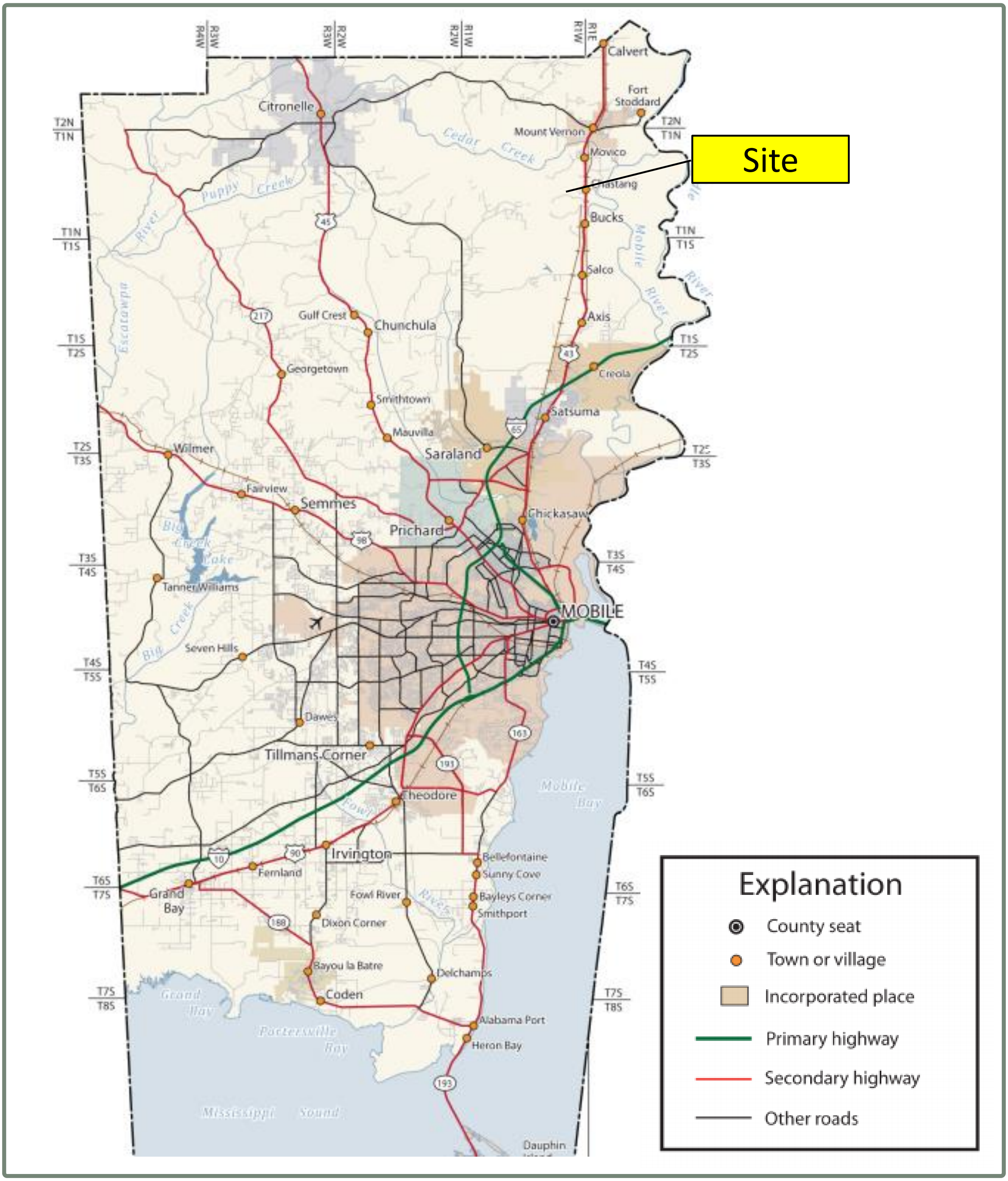
Parameter	Method[5]
pH and Specific Conductance	Field
eH/ORP	Field
ADEM Appendix I	
15 Metals (Appendix I list)	6010, 6020
Mercury	7470
47 Volatiles (Appendix I list)	8011, 8260

TABLE 2B
Selected Voluntary Parameters

Parameter[4]	Method[5]
Fluoride	9056A
Chloride	9056A
Sulfate	9056A
Total Alkalinity	SM 2320
Total Dissolved Solids (TDS)	SM 2540C
Boron	6010
Calcium	6010
Magnesium	6010
Potassium	6010
Sodium	6010
Ammonia	350.1

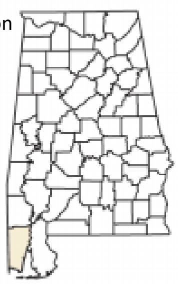
[4] Additional non-compliance parameters may be added at the facility's discretion.
[5] Other equivalent EPA-approved analysis methods may be used as appropriate.

FIGURES



Note:

Map Location

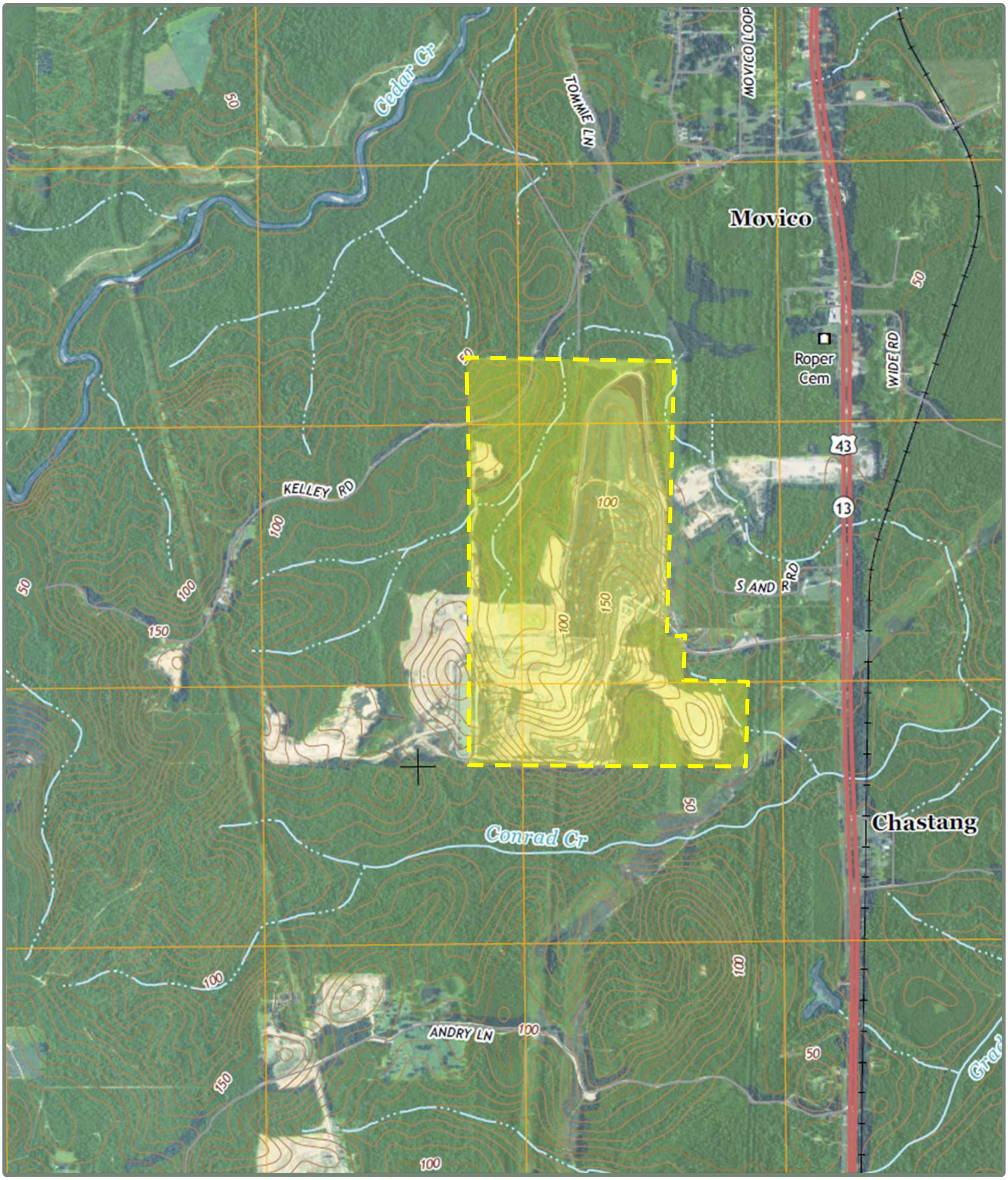


SITE LOCATION MAP
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

PROMUS ENGINEERING

Drawn: JJB
Engineer: JJB
Proj. No.: 170061

FIGURE 1



Note:
Source USGS 7.5' Quadrangle
Mt. Vernon, Alabama
Property Boundary Approximate

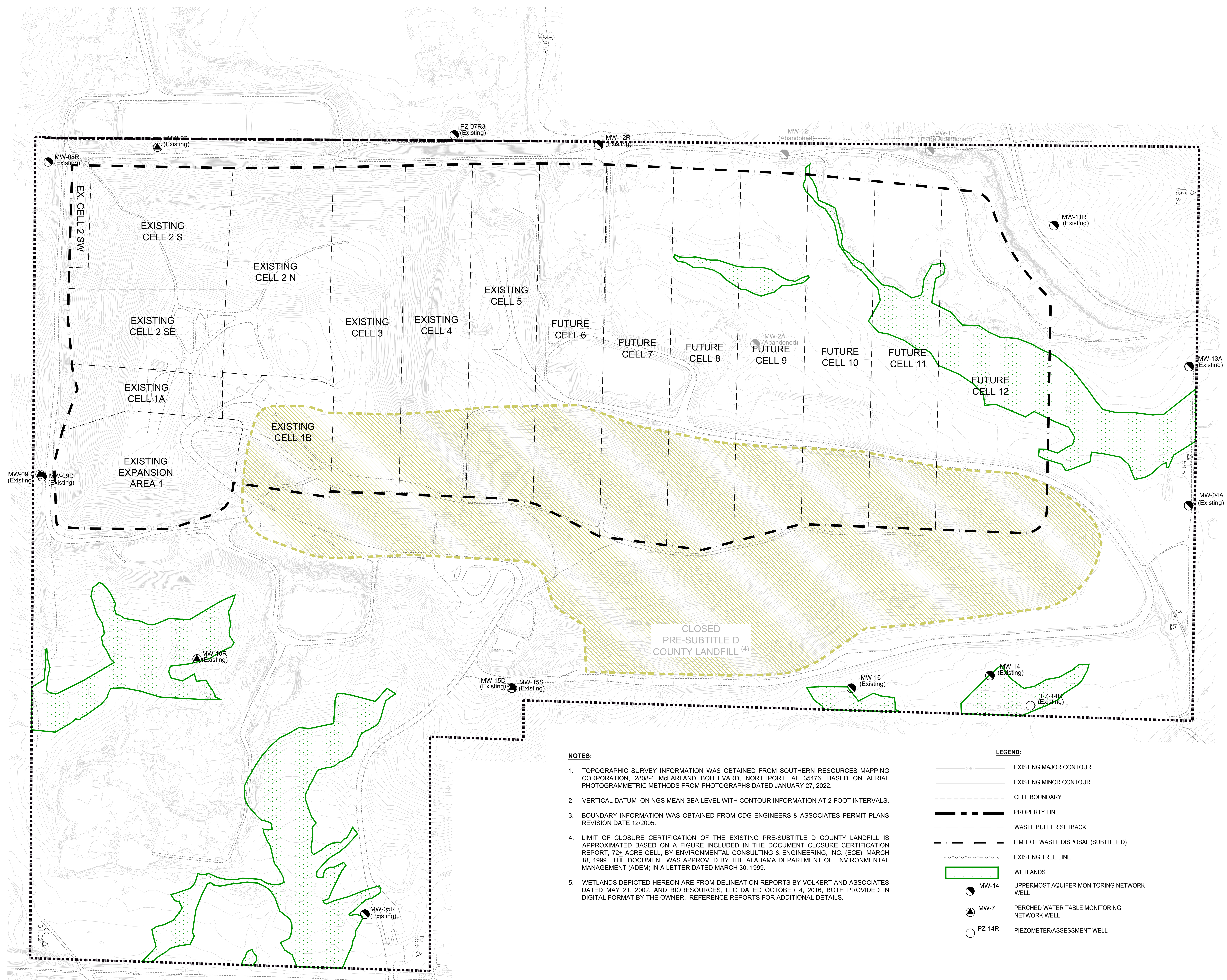
Map Location

PROMUS ENGINEERING

SITE VICINITY MAP
Chastang Sanitary Landfill
Mt. Vernon, Mobile County, Alabama

Drawn: JJB
Engineer: JJB
Proj. No.: 170061

FIGURE 2



NOTES:

1. TOPOGRAPHIC SURVEY INFORMATION WAS OBTAINED FROM SOUTHERN RESOURCES MAPPING CORPORATION, 2808-4 McFARLAND BOULEVARD, NORTHPORT, AL 35476. BASED ON AERIAL PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHS DATED JANUARY 27, 2022.
2. VERTICAL DATUM ON NGS MEAN SEA LEVEL WITH CONTOUR INFORMATION AT 2-FOOT INTERVALS.
3. BOUNDARY INFORMATION WAS OBTAINED FROM CDG ENGINEERS & ASSOCIATES PERMIT PLANS REVISION DATE 12/2005.
4. LIMIT OF CLOSURE CERTIFICATION OF THE EXISTING PRE-SUBTITLE D COUNTY LANDFILL IS APPROXIMATED BASED ON A FIGURE INCLUDED IN THE DOCUMENT CLOSURE CERTIFICATION REPORT, 72± ACRE CELL, BY ENVIRONMENTAL CONSULTING & ENGINEERING, INC. (ECE), MARCH 18, 1999. THE DOCUMENT WAS APPROVED BY THE ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (ADEM) IN A LETTER DATED MARCH 30, 1999.
5. WETLANDS DEPICTED HEREON ARE FROM DELINEATION REPORTS BY VOLKERT AND ASSOCIATES DATED MAY 21, 2002, AND BIORESOURCES, LLC DATED OCTOBER 4, 2016, BOTH PROVIDED IN DIGITAL FORMAT BY THE OWNER. REFERENCE REPORTS FOR ADDITIONAL DETAILS.

LEGEND:

280	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	CELL BOUNDARY
	PROPERTY LINE
	WASTE BUFFER SETBACK
	LIMIT OF WASTE DISPOSAL (SUBTITLE D)
	EXISTING TREE LINE
	WETLANDS
MW-14	UPPERMOST AQUIFER MONITORING NETWORK WELL
MW-7	PERCHED WATER TABLE MONITORING NETWORK WELL
PZ-14R	PIEZOMETER/ASSESSMENT WELL

REV	DATE	DES. BY	DRA. BY	APPR. BY	DESCRIPTION

PREPARED FOR:
WM MOBILE BAY ENVIRONMENTAL CENTER, INC.
WASTE MANAGEMENT

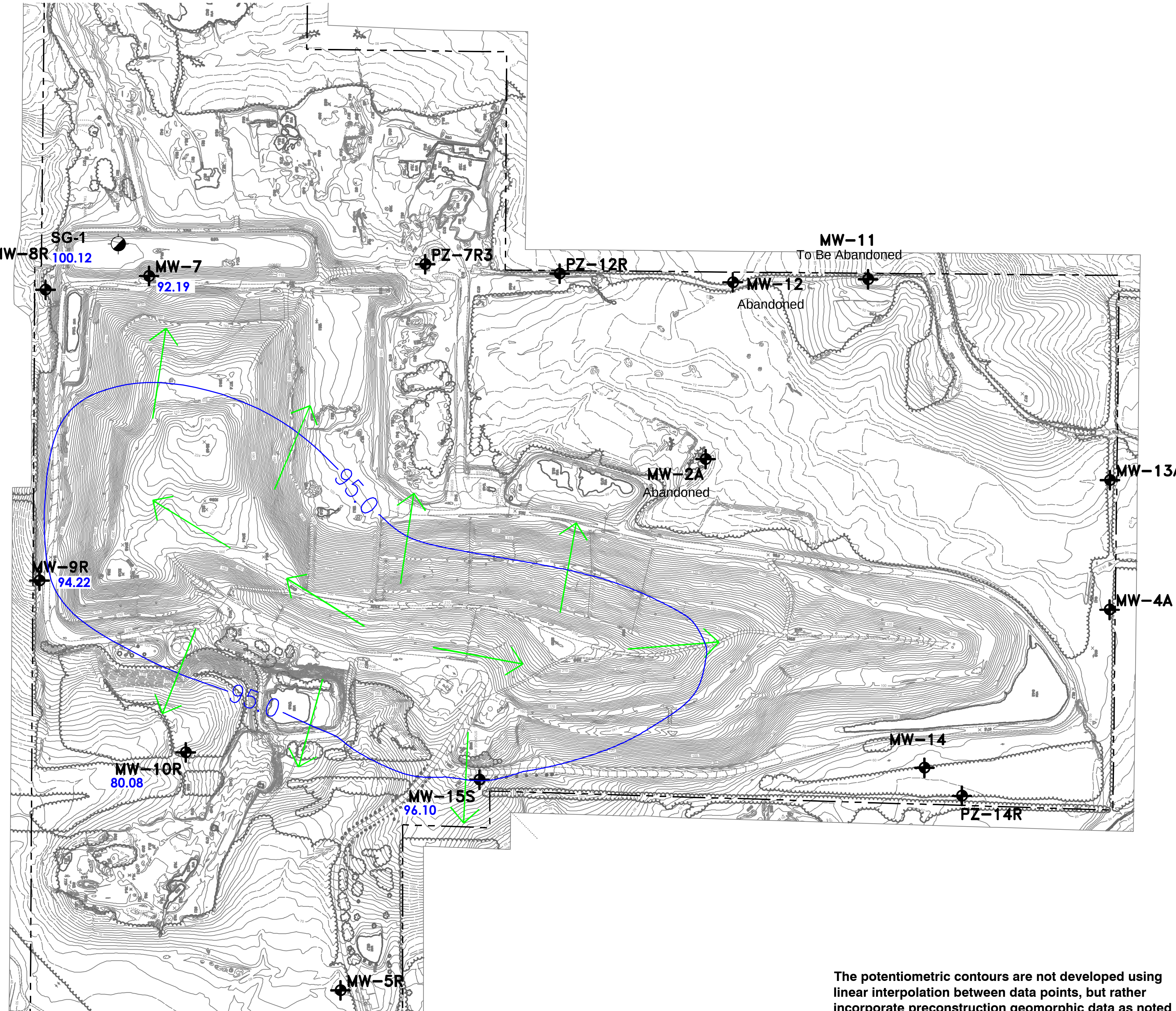
PREPARED BY:
PROMUS ENGINEERING
1200 MTN CREEK RD SUITE 102 CHATTANOOGA, TENNESSEE 37405

SITE PLAN

CHASTANG SANITARY LANDFILL
MOUNT VERNON, ALABAMA

PROJECT NO.: 230102
FIGURE
3

Last Saved By: EVAN PERRY Date: 8/14/2025 4:46 PM File Path: C:\USERS\EVAN PERRY\PROMUS ENGINEERING DROPBOX\PROJECTS-ACTIVE\230102_WMCG_CHASTANG_PERMITRENEWAL_MMOD\DRAWINGS\230102-GWMP SITE PLAN.DWG



LEGEND

2' CONTOURS

10' CONTOURS

95.0 POTENTIOMETRIC CONTOURS AT 10 FOOT ELEVATION INTERVALS

i2 GROUNDWATER FLOW DIRECTION WITH HORIZONTAL FLOW GRADIENT

MW-11 GROUNDWATER MONITORING WELL OR PIEZOMETER

SG-1 STAFF GAGE

56.65 WATERTABLE ELEVATION (IN FEET) IN GROUNDWATER MONITORING WELL OR PIEZOMETER MEASURED ON 03/17/2025

The potentiometric contours are not developed using linear interpolation between data points, but rather incorporate preconstruction geomorphic data as noted on the 1992 USGS topographic map.

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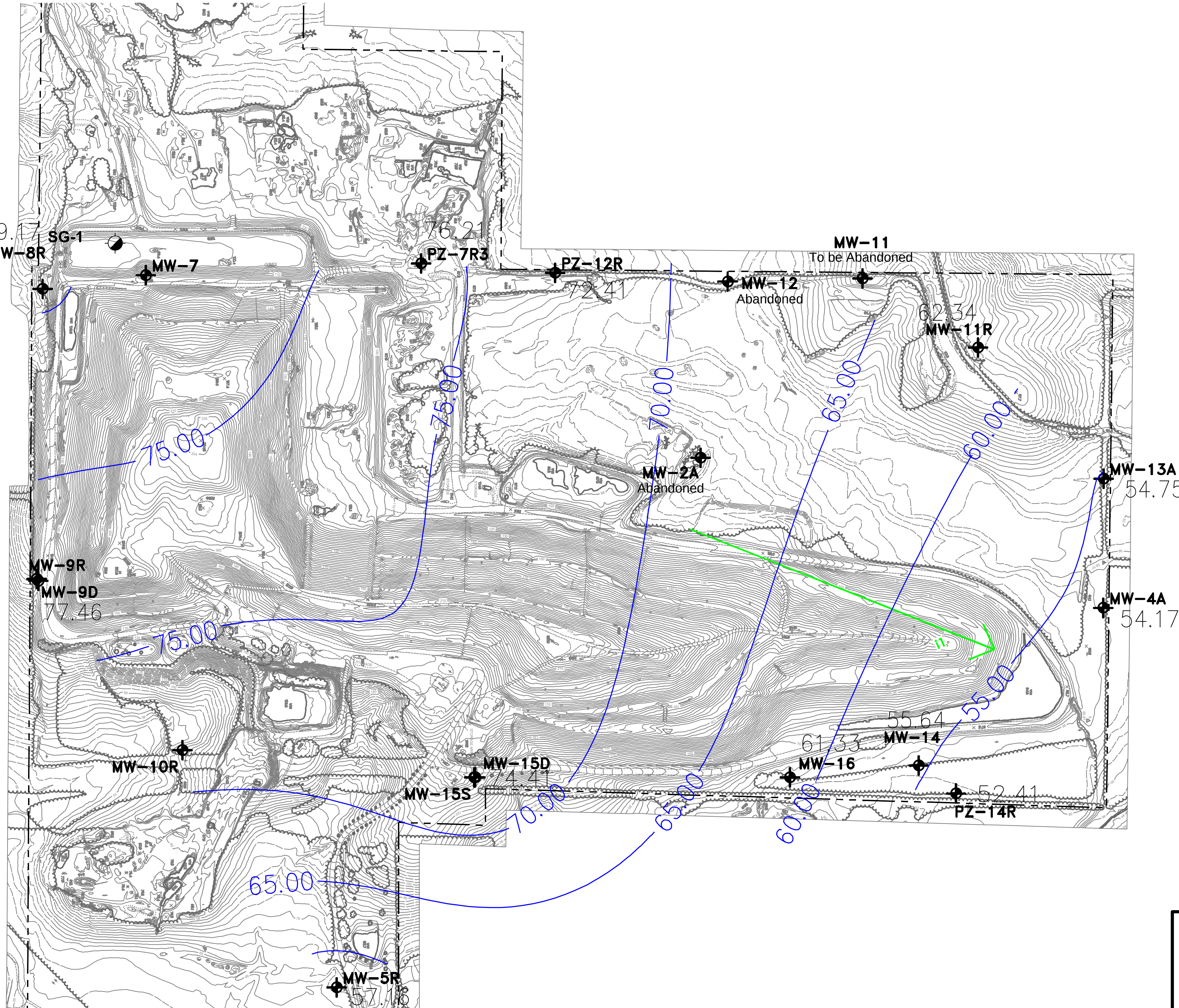
**FIGURE 4A: PERCHED WATER TABLE MAP 03/17/2025
CHASTANG LANDFILL
MT. VERNON, AL**



0 500 1000

GRAPHIC SCALE (FEET)

LEGEND

- 2' CONTOURS
- 10' CONTOURS
- 60.0 — POTENTIOMETRIC CONTOURS AT 10 FOOT ELEVATION INTERVALS
- i2 — GROUNDWATER FLOW DIRECTION WITH HORIZONTAL FLOW GRADIENT
- MW-11 — GROUNDWATER MONITORING WELL OR PIEZOMETER
- SG-1 — STAFF GAGE
- 56.65 — WATERTABLE ELEVATION (IN FEET) IN GROUNDWATER MONITORING WELL OR PIEZOMETER MEASURED ON 03/17/2025.

NOTES:
THE GROUNDWATER FLOW DIRECTION WITH HORIZONTAL FLOW GRADIENT:
i1 = 0.01 TO THE NE

integrity

FIGURE 4B: UPPERMOST AQUIFER POTENTIOMETRIC MAP
3/17/2025CHASTANG LANDFILL
MT. VERNON, AL

FIGURE 5

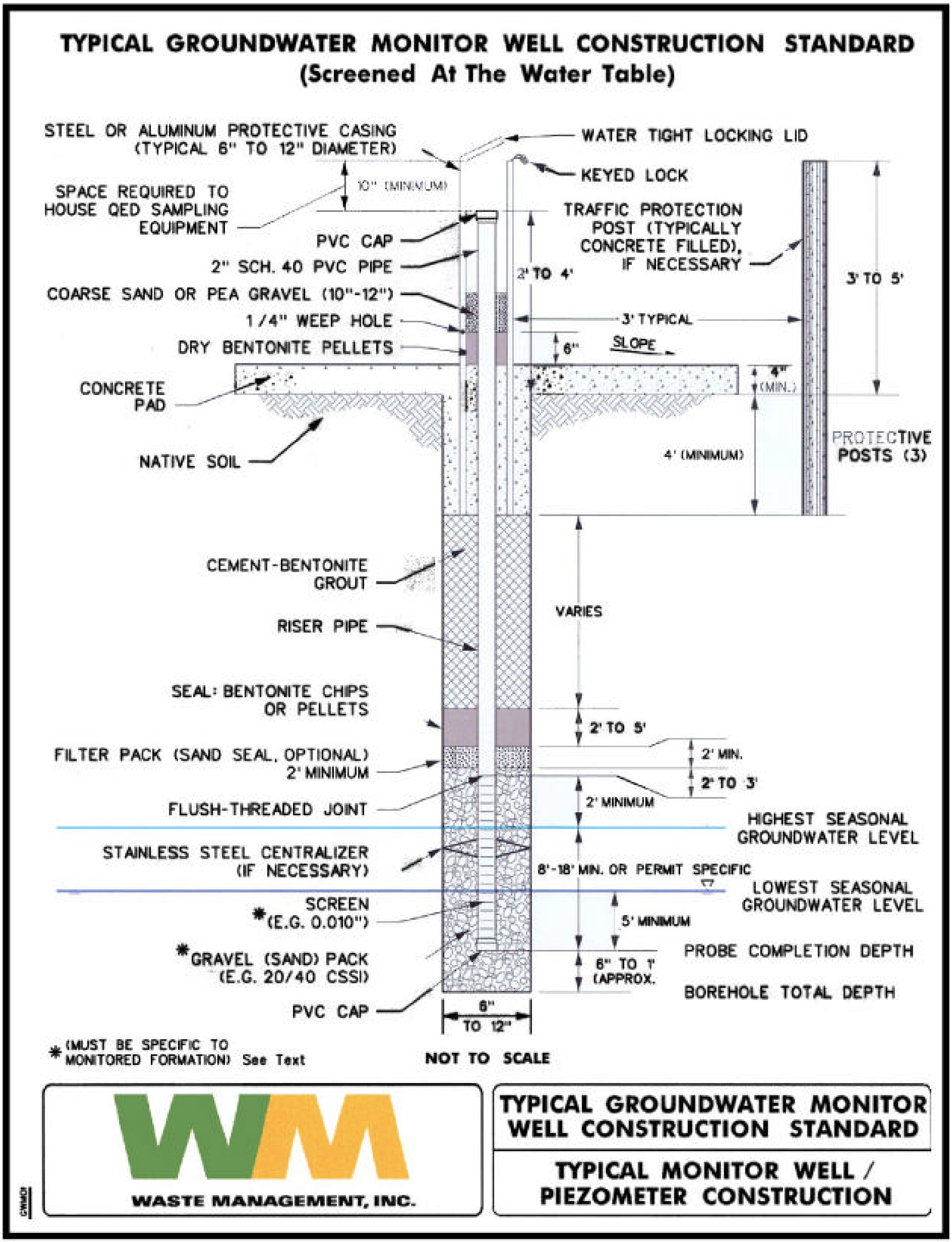

TYPICAL GROUNDWATER MONITOR WELL CONSTRUCTION STANDARD
(Screened At The Water Table)
STEEL OR ALUMINUM PROTECTIVE CASING (TYPICAL 6" TO 12" DIAMETER)
WATER TIGHT LOCKING LID
KEYED LOCK
10" (MINIMUM)
SPACE REQUIRED TO HOUSE QED SAMPLING EQUIPMENT
TRAFFIC PROTECTION POST (TYPICALLY CONCRETE FILLED), IF NECESSARY
PVC CAP
2" SCH. 40 PVC PIPE
2' TO 4'
3' TO 5'
COARSE SAND OR PEA GRAVEL (10"-12")
1/4" WEEP HOLE
3' TYPICAL
DRY BENTONITE PELLETS
6"
SLOPE
4" (MIN.)
CONCRETE PAD
NATIVE SOIL
4' (MINIMUM)
PROTECTIVE POSTS (3)
CEMENT-BENTONITE GROUT
RISER PIPE
VARIES
SEAL: BENTONITE CHIPS OR PELLETS
2' TO 5'
FILTER PACK (SAND SEAL, OPTIONAL) 2' MINIMUM
2' MIN.
2' TO 3'
FLUSH-THREADED JOINT
2' MINIMUM
HIGHEST SEASONAL GROUNDWATER LEVEL
STAINLESS STEEL CENTRALIZER (IF NECESSARY)
8'-18' MIN. OR PERMIT SPECIFIC
LOWEST SEASONAL GROUNDWATER LEVEL
SCREEN *(E.G. 0.010")
5' MINIMUM
*GRAVEL (SAND) PACK (E.G. 20/40 CSSI)
PROBE COMPLETION DEPTH
6" TO 1' (APPROX.
BOREHOLE TOTAL DEPTH
PVC CAP
6" TO 12"
* (MUST BE SPECIFIC TO MONITORED FORMATION) See Text
NOT TO SCALE
WASTE MANAGEMENT, INC.
TYPICAL GROUNDWATER MONITOR WELL CONSTRUCTION STANDARD
TYPICAL MONITOR WELL / PIEZOMETER CONSTRUCTION

FIGURE 6

Chain of Custody Record

Eurofins Denver
4955 Yarrow Street

Arvada, CO 80002-4517
phone 303.736.0100 fax 303.431.7171

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Eurofins Environment Testing America

Client Contact	Project Manager:	Site Contact:	Date:	COC No:
Your Company Name here	Tel/Fax:	Lab Contact:	Carrier:	_______ of ______ COCs
Address	**Analysis Turnaround Time**			Sampler:
City/State/Zip	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx Phone	TAT if different from Below __________			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)																Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____________

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for__________ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_________ Corr'd:__________ Therm ID No.:___________

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

APPENDIX A

1519 Johnson Ferry Rd., Suite 300
Marietta, GA 30062
(470) 308-4650
www.integrityenvsol.com

April 10, 2025

Ms. Dawn Autrey
Compliance and Enforcement Section
Solid Waste Branch
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36130
via email only: *Dawn.Autrey@adem.alabama.gov*

Subject: Groundwater Monitoring Well Installation and Abandonment Report
Chastang Landfill - Permit Number 49-05

Dear Ms. Autrey,

On behalf of WM Mobile Bay Environmental Center, Inc. (WMMBEC), Integrity Environmental Solutions, LLC (Integrity – fka Carlson Environmental Consultants) is submitting this Groundwater Monitoring Well Installation and Abandonment Report for the Chastang Landfill. Integrity was retained to install two temporary piezometers (Temp-PZ and Temp MW-11RS), install five permanent monitoring wells (MW-9D, MW-11R, MW-15S, MW-15D, and MW-16), and abandon three monitoring wells (MW-2A, MW-11, and MW-12) at the Chastang Landfill. This report documents the installation and abandonment activities. As explained further in the report, MW-11 was not able to be abandoned during the January event but ~~and~~ will be abandoned at a later date.

A site location map is provided as Figure 1, Attachment A. The piezometer/monitoring well installation and construction activities and this installation report were completed in general accordance with requirements of the facility's ADEM approved Workplan dated October 16, 2024 (Workplan), Groundwater Monitoring Plan (GWMP) dated June 20, 2017, and complies with ADEM Administrative Code 335-13-4-.27. The well abandonments and temporary piezometer~~s~~ and monitoring well~~s~~ installations were ~~installed~~ conducted under the direction of a professional geologist registered in the State of Alabama. Initial and future sampling of the monitoring wells will be discussed in separate reports.

FIELD ACTIVITES

Well Installation

The temporary piezometers and monitoring wells were installed on January 14 through 28, 2025 using sonic drilling techniques. Prior to installation, the drilling equipment was decontaminated. During drilling, Integrity personnel collected continuous lithologic data to evaluate the lithology and depth to groundwater at each location prior to monitoring well installation and that data was recorded in lithologic logs provided in Attachment B. The temporary piezometers and monitoring wells were constructed with 10 feet of 0.010-slotted screen. The annulus around the well screen was filled with 20/30 silica sand to approximately three feet above the top of the well screen. Approximately two feet of pelletized bentonite was used to form the seal above the sand pack. The remainder of the annulus space was sealed with Portland Type I Cement Grout with approximately 5 percent bentonite. The monitoring wells were completed to above grade with a sealed cap and lockable aluminum protective surface casing (4″x4″x5′) set in a concrete pad (3′x3′x4″). Four steel bollards (4″x4″x5′) were installed around the monitoring well areas. The monitoring wells were developed to remove silt and sediment. The monitoring wells were pumped and surged until the groundwater was clear and free of silt/sediment. Construction details are provided in Table 1, Attachment C.

Well Abandonment

Monitoring well MW-2A was abandoned on January 17, 2025. The area around MW-2A was brought to ground level and the protective casing pad and riser were removed. Prior to initiating the abandonment procedures, the bottom of the well was measured at 28 feet below land surface. Monitoring well MW- 2A was then over-drilled using the sonic drilling method. The sonic drill casing was advanced to the bottom of the borehole, removing the filter pack, seal, and grout materials from the hole. The PVC well casing was attempted to be removed, however, the last 11 feet of PVC casing and screen broke off and was not able to be retrieved. The borehole was then backfilled with grout by using a tremmie pipe. The grout was pumped from the bottom to land surface. Approximately four 94-pound bags of neat cement were used.

Monitoring well MW-12 was abandoned on January 28, 2025. The area around MW-12 was brought to ground level and the protective casing pad, and riser were removed. Prior to initiating the abandonment procedures, the bottom of the well was measured at 39 feet below land surface. Monitoring well MW- 12 was then over-drilled using the sonic drilling method. The sonic drill casing was advanced to the bottom of the borehole, removing the filter pack, seal, and grout materials from the hole. The PVC well casing was attempted to be removed, however, only eight feet of PVC casing was removed, the PVC was brittle and broke off and was not able to be retrieved. The borehole was then backfilled with grout by using a tremmie pipe. The grout was pumped from the bottom to land surface. Approximately eight 94-pound-bags of neat cement were used.

An attempt was made to abandon MW-11 during the site visit; however, due to the location of the well near the edge of a steep drop off the drill rig was not able to safely mobilize to the area of the monitoring well. A new abandonment plan is being formulated to safely abandon Monitoring Well MW-11. Monitoring well MW-11 will be abandoned during a subsequent mobilization to the site.

Survey

An Alabama-Licensed Professional Surveyor surveyed and certified the northing, easting, and elevation coordinates of these newly installed temporary piezometers and monitoring wells. A monitoring well diagram is included in Attachment B. The location and elevation of the piezometer/well was documented in a survey prepared by Wattier Surveying, Inc., dated February 10, 2025 (Attachment D).

CLOSING

WM Mobile Bay Environmental Center, Inc. and Integrity appreciate the Department's review of this Groundwater Monitoring Well Installation and Abandonment Report. If you have any questions, please contact Ken Guilbeault directly at 813-240-4568.

Sincerely,

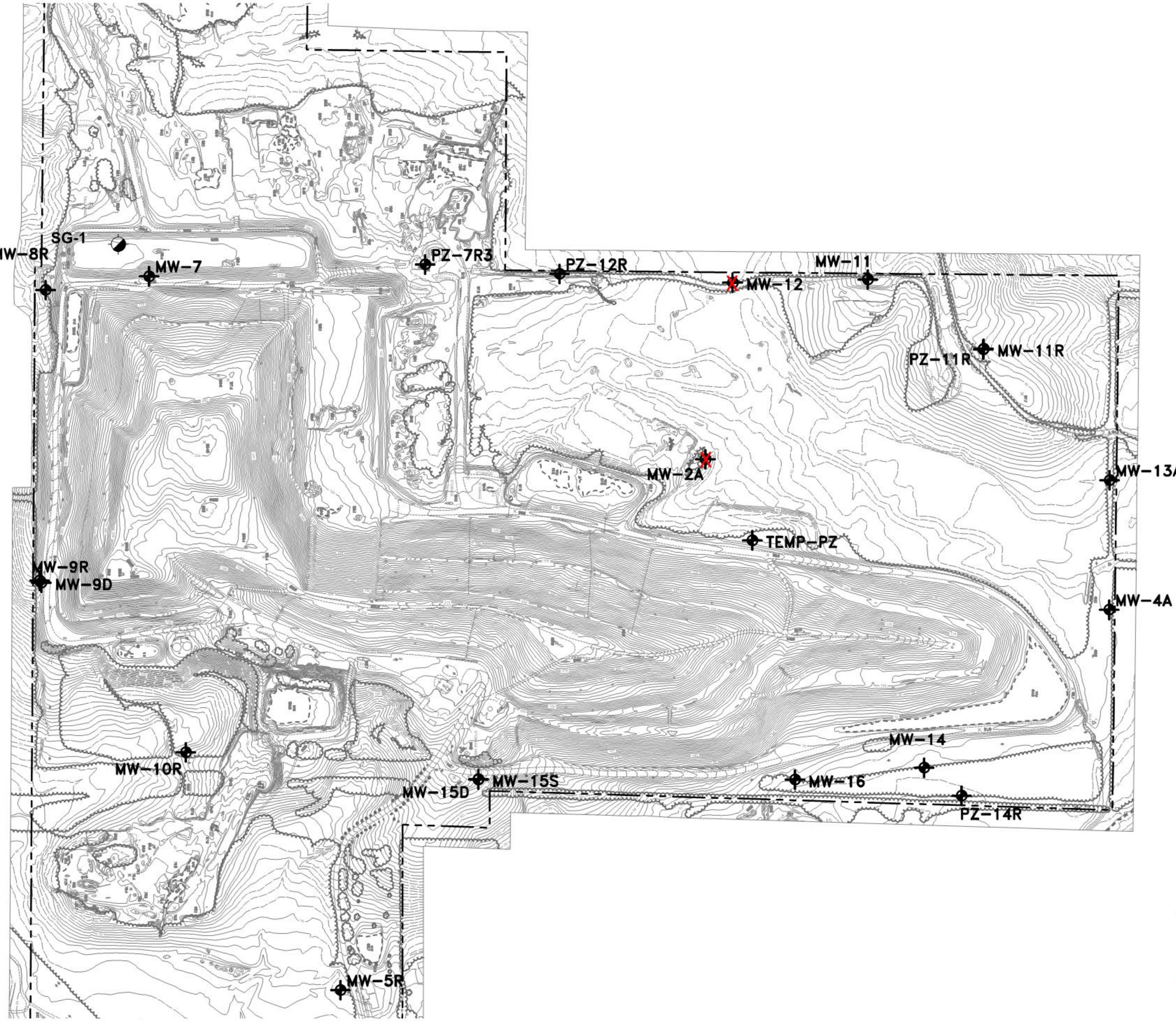
KEN GUILBEAULT
ALABAMA LICENSED PROFESSIONAL GEOLOGIST
LIC. 1553

4/10/2025

Ken Guilbeault, P.G.
Project Director
Integrity Environmental Solutions, LLC

cc: Michael Caldwell, WMMBEC
Michele Lersch, WMMBEC

ATTACHMENT A
FIGURE



0 500 1000

GRAPHIC SCALE (FEET)

LEGEND

	2' CONTOURS
	10' CONTOURS
MW-4A	GROUNDWATER MONITORING WELL OR PIEZOMETER
MW-12	ABANDONED MONITORING WELL (2025)
SG-1	STAFF GAGE

NOTES:
MONITORING WELLS MW-9D, MW-11R, MW-15S, MW-15D, AND MW-16 AND TEMPORARY PIEZOMETERS TEMP-PZ AND PZ-11R WERE INSTALLED IN JANUARY 2025.

MONITORING WELLS MW-2A AND MW-12 WERE ABANDONED IN JANUARY 2025.

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FIGURE 1: SITE PLAN
CHASTANG LANDFILL
MT. VERNON, AL

ATTACHMENT B
MONITORING WELL
CONSTRUCTION AND BORING LOGS

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Soil Boring Log

BORING NO. MW-9D

PAGE 1 OF 4

PROJECT: Chastang Landfill Well Boring Project 2025
CLIENT: Waste Management
CONTRACTOR: Preferred Drilling Solutions
EQUIPMENT: Terrasonic Sonic Drill Rig

PROJECT NO: 1014842
LOCATION: MW-9D
ELEVATION: 132.43
DATE START: 1/24/2025
DATE FINISH: 1/24/2025
DRILLER: L. Fowler
PREPARED BY: M. Breithaupt
REVIEWED BY

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	379258.86			TYPE	PVC	Bag Core	Sonic
Easting	1801047.52	78'	80'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0						0 - 4' = SM: reddish brown, little clay, little silt, loose, moist
4						4 - 10' = CH: variagated (gray, yellowish brown, reddish brown), dense, moist
5		Core Sample #1				
10			0 - 63' Grout To Surface		0 - 68' Solid Interval	10 - 34' = SM: white to tan, few silt, loose, dry
15		Core Sample #2				
20						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

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Soil Boring Log

BORING NO. MW-9D
PAGE 2 OF 4

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
						10 - 34' = SM: white to tan, few silt, loose, dry
25		Core Sample #3				
30		Core Sample #4	0 - 63' Grout To Surface		0 - 68' Solid Interval	moist at 34'
35						34 - 52' = SM: yellowish brown to reddish brown, little silt, loose, moist
40		Core Sample #5				
45						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO. MW-9D
PAGE 3 OF 4

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
		Core Sample #5				34 - 52' = SM: yellowish brown to reddish brown, little silt, loose, moist
50						
		Core Sample #6	0 - 63' Grout To Surface			52 - 56' = SP: gray, some clay, little silt, medium-dense, moist
55					0 - 68' Solid Interval	56 - 65' = CH: gray to whitish pink, little sand, dense, moist
60						Temporary casing set to 60' within clay layer
		Core Sample #7	63 - 65' Bentonite Plug			
65			65 - 78' Sand To 3' Above Screen			65 - 70' = CH: yellowish brown to gray, few sand, dense, moist
					68 - 78' Screened Interval	
70						wet at 70'

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

integrity environmental solutions

BORING NO. MW-9D

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
75		Core Sample #8	65 - 78' Sand To 3' Above Screen		68 - 78' Screened Interval	70 - 78' = SM: tan to yellowish brown, little clay, little silt, loose, wet
80			78 - 80' Sand To Set Depth		BOC 78'	78 - 80' = CH: dark gray, dense, moist Bottom of bore hole at 80'

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO.	MW-11R
PAGE	1 OF 2

PROJECT:	Chastang Landfill Well Boring Project 2025
CLIENT:	Waste Management
CONTRACTOR:	Preferred Drilling Solutions
EQUIPMENT:	Terrasonic Sonic Drill Rig
PROJECT NO:	1014842
LOCATION:	MW-11R
ELEVATION:	93.99
DATE START:	1/27/2025
DATE FINISH:	1/27/2025
DRILLER:	L. Fowler
PREPARED BY:	M. Breithaupt
REVIEWED BY	

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	383783.12			TYPE	PVC	Bag Core	Sonic
Easting	1799924.82	45'	45'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	CORE SAMPLE NUMBER	BACKFILL DEPTHS	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0				0 - 6' = SP: yellowish brown, some clay, loose, wet
5	Core Sample # 1			
6				6 - 10' = SP: yellowish brown, striations of reddish brown to gray, some clay, loose, wet
10		0 - 30' Grout To Surface	0 - 35' Solid Interval	Temporary casing set to 10' at clay layer
10				10 - 19' = CH: red, few sand, dense, moist
15	Core Sample # 2			
19				19 - 45' = SM: yellowish brown, loose, dry
20				

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

BORING NO. MW-11R
PAGE 2 OF 2

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
						19 - 45' = SM: yellowish brown, loose, dry
						Moist at 22'
25		Core Sample # 3	0 - 30' Grout To Surface			
					0 - 35' Solid Interval	
30						
			30 - 32' Bentonite Plug			
35		Core Sample # 4				
			32 - 45' Sand to 3' Above Screen			
40					35 - 45' Screened Interval	
						Wet at 41'
		Core Sample #5				
45						BOC and bottom of bore hole at 45'

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

integrity environmental solutions

BORING NO.	Temp-11R-S
PAGE	1 OF 1

PROJECT:	Chastang Landfill Well Boring Project 2025
CLIENT:	Waste Management
CONTRACTOR:	Preferred Drilling Solutions
EQUIPMENT:	Terrasonic Sonic Drill Rig
PROJECT NO:	1014842
LOCATION:	Temp-11R-S
ELEVATION:	94.21
DATE START:	1/28/2025
DATE FINISH:	1/28/2025
DRILLER:	L. Fowler
PREPARED BY:	M. Breithaupt
REVIEWED BY	

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	383781.31			TYPE	PVC	Bag Core	Sonic
Easting	1799928.3	15'	15'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0		Core Sample # 1	0 - 2' Bentonite Plug		0 - 5' Solid Interval	0 - 6' = SP: yellowish brown, some clay, loose, wet
5			2 - 15' Sand to 3' Above Screen		5 - 15' Screened Interval	6 - 10' = SP: yellowish brown, striations of reddish brown to gray, some clay, loose, wet
10		Core Sample # 2				10 - 15' = CH: red, few sand, dense, moist
15					BOC 15'	Bottom of bore hole at 15'
20						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

integrity environmental solutions

BORING NO.	MW-15S
PAGE	1 OF 3

PROJECT:	Chastang Landfill Well Boring Project 2025
CLIENT:	Waste Management
CONTRACTOR:	Preferred Drilling Solutions
EQUIPMENT:	Terrasonic Sonic Drill Rig

PROJECT NO:	1014842
LOCATION:	MW-15S
ELEVATION:	133.88
DATE START:	1/23/2025
DATE FINISH:	1/23/2025
DRILLER:	L. Fowler
PREPARED BY:	M. Breithaupt
REVIEWED BY	

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	381361.59			TYPE	PVC	Bag Core	Sonic
Easting	1801993.71	54'	54'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0		Core Sample #1 (0 - 10')	0 - 39' Grout To Surface		0 - 44' Solid Interval	0 - 12' = SM: yellowish brown, loose, dry
5						
10		Core Sample #2 (10 - 20')				
12						12 - 14' = SM: reddish brown, little silt, little clay, loose, dry
14						14 - 19' = SM: tan, intermittent little clay, loose, dry
15						
17						moist at 17'
19						19 - 20' = SM: reddish brown, little silt, little clay, loose, moist
20						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
20 - 45						20 - 55' = SM: tan with intermittent striations of yellish and reddish brown (with little silt and little clay), loose, moist
25		Core Sample #3				
30		Core Sample #4	0 - 39' Grout To Surface		0 - 44' Solid Interval	
35						
40		Core Sample #5	39 - 41' Bentonite Plug			
45			41 - 54' Sand To 3' Above Screen		Screen	

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO. MW-15S

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
		Core Sample #5	41 - 54' Sand To 3' Above Screen		44 - 54' Screened Interval	20 - 54' = SM: tan with intermittent striations of yellish and reddish brown (with little silt and little clay), loose, moist
50		Core Sample #6				Bottom of bore hole at 54'
55					BOC 54'	
60						
65						
70						wet at 70'

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

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Soil Boring Log

BORING NO. MW-15D

PROJECT:	Chastang Landfill Well Boring Project 2025
CLIENT:	Waste Management
CONTRACTOR:	Preferred Drilling Solutions
EQUIPMENT:	Terrasonic Sonic Drill Rig

PROJECT NO:	1014842
LOCATION:	MW-15D
ELEVATION:	134.75
DATE START:	1/23/2025
DATE FINISH:	1/23/2025
DRILLER:	L. Fowler
PREPARED BY:	M. Breithaupt
REVIEWED BY	

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	381357.64			TYPE	PVC	Bag Core	Sonic
Easting	1801993.26	75'	80'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0		Core Sample #1 (0 - 10')	0 - 60' Grout To Surface		0 - 65' Solid Interval	0 - 12' = SM: yellowish brown, loose, dry
12		Core Sample #2 (10 - 20')				12 - 14' = SM: reddish brown, little silt, little clay, loose, dry
14						14 - 19' = SM: tan, intermittent little clay, loose, dry
17						moist at 17'
19						19 - 20' = SM: reddish brown, little silt, little clay, loose, moist
20						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

BORING NO. MW-15D
PAGE 2 OF 4

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
20–30		Core Sample #3	0 - 60' Grout To Surface		0 - 65' Solid Interval	20 - 55' = SM: tan with intermittent striations of yellish and reddish brown (with little silt and little clay), loose, moist
30–40		Core Sample #4				
40–45		Core Sample #5				

Depth scale: 25, 30, 35, 40, 45

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO. MW-15D

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
		Core Sample #5				20 - 55' = SM: tan with intermittent striations of yellish and reddish brown (with little silt and little clay), loose, moist
50		Core Sample #6	0 - 60' Grout To Surface			
55					0 - 65' Solid Interval	55 - 56' = CH: reddish brown, dense, moist
						56 - 57' = SM: reddish brown, some clay, dense, moist
						57 - 70' = CH: gray, dense, moist
60		Core Sample #7	60 - 62' Bentonite Plug			Temporary casing set to 60' within clay layer
65			62 - 75' Sand To 3' Above Screen		65 - 75' Screened Interval	
70						wet at 70'

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

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BORING NO. MW-15D
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DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
			62 - 75' Sand To 3' Above Screen		65 - 75' Screened Interval	70 - 75' = SM: gray, some silt, loose, wet
75		Core Sample #8	75 - 80' Sand To Set Depth		BOC 75'	75 - 80' = CH: gray, dense, moist Bottom of bore hole at 80'
80						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

Soil Boring Log

integrity environmental solutions

BORING NO. MW-16
PAGE 1 OF 2

PROJECT:	Chastang Landfill Well Boring Project 2025
CLIENT:	Waste Management
CONTRACTOR:	Preferred Drilling Solutions
EQUIPMENT:	Terrasonic Sonic Drill Rig
PROJECT NO:	1014842
LOCATION:	MW-16
ELEVATION:	61.39
DATE START:	1/21/2025
DATE FINISH:	1/21/2025
DRILLER:	L. Fowler
PREPARED BY:	M. Breithaupt
REVIEWED BY	

Survey:		Depth to: BOTTOM OF CASING	Depth to: BOTTOM OF HOLE		CASING	SAMPLER	CORE BARREL
Northing	382877.01			TYPE	PVC	Bag Core	Sonic
Easting	1801993.93	25'	25'	SIZE ID	2"	4.75" x 10'	4.75"
				HAMMER WT			
				HAMMER FALL			

DEPTH IN FEET	CORE SAMPLE NUMBER	BACKFILL DEPTHS	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
0	Core Sample # 1	0 - 10 Grout To Surface	0 - 10' Solid Interval	0 - 2' = SM: yellowish brown, loose, dry wet at 2'
				2 - 5' = SM: black, little silt, loose, wet
5				5 - 17' = SM: gray to yellowish tan, little silt, loose, moist
10	Core Sample # 2	10 - 12' Bentonite Plug		
		12 - 25' Sand To 3' Above Screen		
15			15 - 25' Screened Interval	
				17 - 18' = CH: gray, dense, moist
				18 - 25' = SM: tan, little silt, loose, moist
20				

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO. MW-16
PAGE 2 OF 2

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
		Core Sample # 3	12 - 25' Sand To 3' Above Screen		15 - 25' Screened Interval	18 - 25' = SM: tan, little silt, loose, moist
25						Bottom of bore hole at 25'
					BOC 25'	
30						
35						
40						
45						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

integrity environmental solutions

Soil Boring Log

BORING NO. Temp-PZ

DEPTH IN FEET	BORING GEOLOGIC SYMBOL	CORE SAMPLE NUMBER	BACKFILL DEPTHS	WELL INSTALL DATA	CASING DEPTHS	FIELD CLASSIFICATION AND REMARKS
			0 - 25' Grout To Surface			15 - 40' = SM: tan to yellow, intermittent little silt and clay, loose, dry Moist at 21'
25		Core Sample 3#	25 - 27' Bentonite Plug		0 - 30' Solid Interval	
30						
35		Core Sample #4	27 - 40' Sand to 3' Above Screen		30 - 40' Screened Interval	
40					BOC 40'	Bottom of bore hole at 40'
45						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.		DESCRIPTIONS		NOTES	
0-4	VERY LOOSE	0-2	VERY SOFT	SS	SPLIT SPOON	MOSTLY	50-100%	WD	WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST	SHELBY TUBE	SOME	30-45%	NE	NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G	GRAB SAMPLE	LITTLE	15-25%	UR	NOT READ
31-50	DENSE	9-15	STIFF	MC	MACRO-CORE	FEW	5-10%	NR	NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF	CR	CORE RUN	TRACE	<5%	R	RECOVERY
100+	pwr	31+	HARD					wgt	WGT OF HAMMER

ATTACHMENT C
TABLE

Table 1. Monitoring Well and Piezometer Construction Details

MW-ID	Easting	Northing	Zone Monitored	Top of Casing Elevation (feet MSL)	Ground Surface Elevation (feet MSL)	Total Well Depth (feet)	March 20, 2025 Depth to Water (feet BTOC)	March 20, 2025 Groundwater Elevation (feet MSL)
MW-9D	1801047.522	379258.8606	Alluvial Aquifer	129.53	132.43	83.35	52.07	77.46
MW-11R	1799924.821	383783.0498	Alluvial Aquifer	97.28	93.99	48.35	34.94	62.34
PZ-11Rs	1799928.303	383781.3105	Perched Zone	96.85	94.22	17.8	5.5	91.35*
MW-15S	1801993.715	381361.5879	Perched Zone	137.59	133.88	57	41.49	96.1
MW-15D	1801993.264	381357.642	Alluvial Aquifer	137.44	134.75	79.4	63.03	74.41
MW-16	1801993.932	382877.0125	Alluvial Aquifer	65.09	61.39	28.81	3.76	61.33
Temp PZ	1800844.288	382672.7778	Alluvial Aquifer	96.02	92.91	44.51	25.33	70.69

Notes:
1. MSL = Mean Sea Level
2. BTOC = Below Top of Casing
3. * = Water level was measured on January 23, 2025.

ATTACHMENT D
WATTIER SURVEYING INC. SURVEY

PointNo.	Northing(Y)	Easting(X)	Elev(Z)	Description
BR10010	383783.049800	1799922.738600	93.991600	gs MW-11R
BR10017	383781.060700	1799925.440200	94.214500	gs PZ 11r-s
BR10018	383783.124200	1799924.820900	97.280200	top casing MW-11R
BR10020	383781.310500	1799928.303300	96.850800	top pvc 11r-s
BR10021	379260.566900	1801045.887700	132.430000	gs MW-9d
BR10029	379258.860600	1801047.521600	129.532900	top casing MW-9d
BR10031	381363.570900	1801992.371400	133.877800	gs MW-15s
BR10032	381356.378300	1801991.298400	134.745800	gs MW-15d
BR10043	381357.642000	1801993.263800	137.443200	top casing MW-15d
BR10044	381361.587900	1801993.714500	137.588200	top casing MW-15s
BR10048	382877.012500	1801993.932200	65.091800	top casing MW-16
BR10056	382875.049000	1801992.819300	61.392000	gs MW-16
BR10057	382672.294900	1800844.686700	92.904900	gs temp pz
BR10058	382672.777800	1800844.288400	96.024400	top pvc temp pz
BR10059	382037.183500	1800754.998200	104.557800	top pvc pz 2s
BR10060	382031.836700	1800754.069900	104.610900	top pvc pz 2d
BR10062	382038.605400	1800753.982500	101.709100	gs PZ 2s
BR10064	382030.357700	1800754.943500	101.443200	gs PZ 2d
BR10074	381950.948000	1800462.674400	99.638000	gs PZ 3d
BR10075	381960.300200	1800464.697400	99.556200	gs PZ 3s
BR10085	381951.928700	1800464.155400	102.548100	top pvc pz 3d
BR10086	381958.831600	1800465.279900	102.952400	top pvc pz 3s
BR10087	381915.983700	1800366.373900	87.778000	top pvc pz 4d
BR10093	381917.841300	1800366.040500	84.377300	gs PZ 4d
BR10097	381604.712200	1800596.578900	115.239100	gs PZ 1s
BR10099	381597.147300	1800598.555200	115.356600	gs PZ 1d
BR10108	381603.491400	1800597.888900	118.198200	top pvc pz 1s
BR10109	381598.404800	1800597.497200	118.260500	top pvc pz 1d

APPENDIX B

integrity environmental solutions
Construction O&M Engineering Permitting Compliance

1519 Johnson Ferry Rd., Suite 300
Marietta, GA 30062
(470) 308-4650
www.integrityenvsol.com

August 28, 2025

Mrs. Stacy Stevens
Solid Waste Engineering Section
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36130

Subject: Work Plan for Monitoring Well MW-11 Abandonment
Chastang Landfill - Permit No. 49-05

Dear Mrs. Stevens,

On behalf of WM Mobile Bay Environmental Center, Inc. (WMMBECI), Integrity Environmental Solutions, LLC (Integrity) is submitting this Work Plan for the Abandonment of Monitoring Well MW-11 for the Chastang Landfill. The following scope of work is generally consistent with ADEM's recommendations in the December 14, 2023 letter, WMMBECI's January 24, 2024 response, and ADEM's recommendations in the September 19, 2024 letter. During the January 2025 monitoring well abandonment event, an attempt was made to abandon MW-11; however, the drill rig was not able to safely mobilize to the area of the MW-11 during that event. This work plan was developed to allow for the safe abandonment of MW-11.

The abandonment of monitoring well MW-11 will be completed in general accordance with 335-13-4-27(2)(e) and the "ADEM, Groundwater Branch, Guidelines for Well Abandonment (Section specific to Solid Waste Facilities)." The following describes the well abandonment procedure.

- The well will be measured for depth prior to sealing to ensure that it is free from any obstructions that may interfere with the sealing operation.
- As a WMMBECI BMP, if possible and can be performed safely, well materials will be completely removed through overdrilling or pulling of the well or casing prior to sealing the resultant borehole, to ensure that all potential vertical migration pathways have been sealed. If the casing cannot be readily removed, it should be perforated to ensure that proper sealing is obtained. If the well is installed in unconsolidated lithologies, and there is the potential for collapse, the casing must be left in place.
- Liner pipe will be removed from the well in order to ensure placement of an effective seal (if the liner pipe cannot be readily removed, it shall be perforated to ensure that proper sealing is obtained).
- Concrete, cement grout, or neat cement will be used as primary sealing material and placed from the bottom upwards using methods to avoid segregation or dilution of material.
- The well or the borehole will be completely filled with neat cement (if the well or borehole cannot be completely filled, the sealing material for the top 20 feet must be neat cement and no material that could impart taste, odor, or toxic components to water will be used in the sealing process).

- Complete, accurate records of the abandonment procedure will be kept for the well abandoned. The record of abandonment will include, at a minimum, the depth of each layer of all sealing and backfill material, the quantity of sealing materials used, measurements of static water levels and depths, and any changes made in the well during the sealing. A copy of these records will be submitted to ADEM and a copy placed in the operating record.

WM Mobile Bay Environmental Center, Inc. appreciates the Department's assistance on this issue and looks forward to your concurrence on this work plan. If you have any questions, please contact Ken Guilbeault directly at 813-240-4568.

Sincerely,

KEN GUILBEAULT
ALABAMA LICENSED PROFESSIONAL GEOLOGIST
LIC. 1553
8/28/2025

Ken Guilbeault, P.G.
Sr. Project Director
Integrity Environmental Solutions

cc. Mike Caldwell, WMMBECI
Michele Lersch, WMMBECI
Facility Operating Record
Jim McNaughton, SWDA of the City of Mobile

APPENDIX C

Environmental Media Sampling Standard

Appendix A

GROUNDWATER SAMPLING

Version: 1.0 - October 2012

Prepared by:

Waste Management
Groundwater Protection Program

Table of Contents

Attachments

1. Meter Calibration Log
2. Well Condition Ispection Form
3. Well Condition Summary Form
4. Field Information Form
5. Procedure for Low-Flow (Minimal Drawdown) Purging and Sampling

1.0 SCOPE

Appendix 1, Groundwater Sampling (Appendix 1), presents WM's requirements for collecting groundwater samples at WM sites. This Appendix must be read in conjunction with the Environmental Media Sampling Standard.

2.0 OVERVIEW OF THE MEDIA

Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the water table. Groundwater is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands. Groundwater is typically withdrawn for environmental testing by constructing monitoring or observation wells.

3.0 SAMPLING OBJECTIVES

The objective when sampling groundwater is to assure that samples: (1) are representative of the groundwater in the formation screened by the well, (2) satisfy sampling requirements of applicable regulations and permits, and (3) are collected using methods and procedures consistently applied throughout WM.

The primary goal when sampling groundwater is to assure that 'Representative Groundwater Samples' are collected. A Representative Groundwater Sample is:

1. Characteristic of formation water screened by the well.
2. Not measurably altered by:
   - Sampling equipment
   - Container handling or storage
   - Sample collection procedures

4.0 GROUNDWATER SAMPLING EQUIPMENT

WM requires the use of QED bladder pumps for groundwater sampling. The use of other equipment must be approved by the WM Groundwater Protection Program (GPP) Director. The WM GPP Director may approve:

1. Dedicated bailers
2. Disposable bailers
3. Electric submersible pumps

5.0 WELL CONDITION INSPECTION

During each sampling event, samplers must inspect and document the condition of each well prior to collecting samples. The condition of each monitoring well and surrounding area must be recorded on the WM Well Condition Summary Form (WCSF) included in the Attachments to this Appendix. Samplers must inspect the well and surrounding area and document basic well maintenance needs as well as any condition that may affect sample integrity. The WCSF must be left with the WM Representative upon completion of the sampling event.

Conditions that should be noted on the form include:

1. Missing locks, labels, or weep holes
2. Damaged casing or concrete pad
3. Inoperable pumps
4. Excessive vegetation growth
5. Poor well visibility
6. Other maintenance needs

When samplers encounter unusual conditions at a well that could affect sample integrity (i.e. result in collecting a non-representative sample) samplers must notify the WM Representative before collecting the sample. With input from sampling personnel, the WM Representative will decide whether to delay sampling, or collect a sample.

Some examples of unusual conditions that could affect sample integrity include:

- A damaged well or sample pump
- Evidence of tampering
- Gas emanating from well
- Strong or unusual odors
- Significant soil staining or other evidence that a spill may have occurred near the well
- Excessive turbidity

At the completion of the sampling event the WCSF is left with the WM Representative.

6.0 PURGING AND SAMPLING

6.1 Water Level Measurement

Water levels must be measured:

- With an electronic instrument to the nearest hundredth of a foot (i.e. 0.01-ft)
- With an instrument that has been rinsed with deionized or distilled water before use at each well
- Prior to purging
- During purging when feasible

Where significant groundwater level fluctuation occurs over a short time period, pre-purging water levels must be obtained from all wells in one day or in as short a period as practical.

Samplers must assure that water level measuring tapes are properly calibrated and have not stretched or shortened.

6.2 Field Parameters

Field parameters must be recorded (1) during purging, and (2) when collecting laboratory samples. Measurements must be taken with calibrated electronic meters. Although WM prefers the use of in-line flow-through cells, hand-held instruments may be used.

WM requires:

- pH
- Temperature
- Specific conductance

WM recommends:

- Dissolved oxygen
- Turbidity
- Oxidation reduction potential (Eh/ORP)

Field measurements must be taken in the field as soon as possible and no more than 15 minutes after collection. Samples are not to be sent to the laboratory for field measurements or field filtering, if required.

6.2.1 Inconsistent Measurements

Samplers must identify inconsistent measurements by comparing current data to results from the prior sampling event. Inconsistent data are results between 2 sampling events that vary more than the following:

- pH: +/- 1 unit
- Specific conductance: +/- 25%
- Turbidity: Significant change in clarity

Where inconsistent data are observed, samplers must verify the calibration of the meters. If calibration is not the problem, a reasonable attempt must be made to resolve the issue by performing additional purging. Where this does not resolve the issue, samplers must report the data to the WM Rep before collecting a sample. For other field parameters such as temperature, dissolved oxygen, and Eh/ORP, simply records any significant variability on the Field Information Form (FIF).

6.2.2 Excessive Turbidity

WM's goal is for groundwater samples to have a turbidity of less than 50 NTU.

- Where turbidity falls between approximately 50 NTU and 500 NTU, samplers must attempt to reduce the turbidity by performing additional purging for a reasonable period, or reducing the purge rate. Following these activities, document the activities performed and any change in turbidity on the FIF, then proceed with sample collection.

- Where turbidity exceeds 500 NTU and cannot be reduced below 500 NTU, samplers must contact the WM Representative and only collect a sample when authorized.

6.3 Sampling

6.3.1. Low-flow Purging Method

Included in the attachments is WM's Procedure for Low-Flow (Minimal Drawdown) Purging and Sampling, which provides WM's general methodologies for low-flow sampling and parameter stabilization criteria. These methods must be followed if specific methods are not approved by a state or specified in site controlling documents.

Low flow purging is the preferred method for sampling at WM facilities where approved by regulation or permit. Pump flow rates must be selected to approximate the yield of the well such that minimal drawdown of the water level in the well is observed or so that a stabilized pumping water level is achieved as quickly as practical.

Measurement of stabilization of parameters must begin with purging and continue at regular intervals until stabilization is achieved. Typically stabilization measurements are recoded every 3 to 5 minutes; however, the frequency of measurements may vary based on the purge rate and the volume of the sampling system -- the goal is to purge at least one volume of the pump and tubing between readings.

Once stabilization has been achieved, sampling can be conducted at the same pumping rate or at a lower flow rate if necessary. The flow rate for sampling must not be increased over the purging flow rate.

6.3.2 Traditional Purging

When low-flow purging is not utilized, monitoring wells must be pumped prior to sample collection according to site-specific requirements -- typically until 3 to 5 well volumes are removed. Samplers must record water levels during purging, and pump the well at a flow rate that minimizes drawdown. Drawdown during purging will vary depending on a number of field considerations, including: permeability of the formation, water column height within the well, pump intake depth, and recharge rate. The pump intake must never be exposed.

When using traditional purging methods, the goal is to stabilize field parameters with as little drawdown in the well as possible. Samplers must record field parameters during purging. Measurement of stabilization of parameters must begin with purging and continue at regular intervals until stabilization is achieved. If parameters are not stabilized after the requisite numbers of well volumes are purged, samplers must make a reasonable effort to achieve stabilization by performing additional purging and recording stabilization measurements. The frequency of measurements will vary based on the purge rate and the volume of the sampling system.

Stabilization has been achieved when 3 successive measurements meet the following stabilization criteria:

pH:	+/- 0.2 pH units
Conductance:	+/- 5 %
Dissolved oxygen:	+/- 10.0% or 0.2 mg/L.

6.3.3 Wells that Purge Dry

When a well purges dry, recharge is very slow, drawdown is excessive, and the well is almost completely evacuated when pumping at a low flow rate (0.5 liter per minute is used as a rule-of-thumb). Field parameters do not stabilize; therefore, field parameters are only recorded when samples are collected.

WM generally uses one of two methods to sample wells that purge dry:

1. The Complete Evacuation method, where the well is purged nearly dry, allowed to recover, and then sampled.
2. Minimal Purge sampling, where only the water within the dedicated sampling equipment is purged prior to sampling the water within the well screen area.

Complete Evacuation Method: When using the Complete Evacuation method, wells are purged dry then allowed to recover before collecting samples. When using this method:

- Document the date and time for both well evacuation and sample collection.
- Evacuate the well until it yields little or no water.
- Record the total volume of water removed.
- Allow the well to recover as specified in the site's controlling documents.
    - If recovery criteria are not specified, collect samples:
        - after the water level has recovered to 50% of the original water level
        - when there is sufficient water to fill all sample bottles
        - 24 hours after evacuation.
- Record field parameters after collecting the samples for laboratory analysis.

Minimal Purge Method: This method is not approved for use in all states; therefore it must only be used when specified in the controlling documents or authorized by the WM GPP Director. When using this method, dedicated sampling pumps are required; bailers or non-dedicated pumps may not be used. To perform this method, samplers must:

- Calculate the volume of water within the dedicated sample pump and tubing
- Purge 1 to 3 times that volume
- Record the total volume of water purged.
- Record field parameters after samples for laboratory analysis are collected

The pumping rates used for minimal purge sampling are generally 100 ml/minute or less.

6.4 Bailers

Bailers may only be used when approved by the WM GP Director. WM prefers using disposable bailers -- non-dedicated bailers must not be used. When bailers are approved for use, samplers must:

- Attach new unused nylon line to the bailer each time it is used, regardless of whether the bailer is dedicated or disposable.

- Thoroughly rinse the bailer and line with distilled or deionized water prior to use.
- Minimize splashing and bubbling as the bailer fills by slowly lowering the bailer below the water surface.
- Lower the bailer to the midpoint of the well screen when performing traditional purging or to the bottom of the well screen if sampling with the complete evacuation method.
- Prevent the bailer or bailer line from touching the ground.

Where dedicated bailers are used, they must be hung within the well above the water level between sampling events and the bailer line discarded.

6.5 Purge Water Handling

Where the controlling documents do not specify purge water handling, the purge water must be discharged to the ground at least 20 feet from the wellhead and draining away from the well.

6.6 Collecting Samples

Groundwater samples must be collected in the shortest possible time subsequent to purging the well and stabilization of field parameters. Samplers must assure that bottles placed in the coolers are clean and free of external contaminants.

6.6.1 Filling Sample Bottles

Sample bottles must be filled directly from the sampling pump or filter apparatus with minimal air contact. Volatile Organic Analyses (VOA), Total Organic Halides (TOX), and alkalinity bottles must be headspace-free (i.e. no air bubbles in the sample bottle).

When filling the sample bottles, the samplers must follow these procedures:

1. Place bottle caps threads up on a clean surface.
2. Do not place sample tubing in the sample bottles or allow the discharge tubing to touch the ground.
3. Do not overfill any containers that have been pre-preserved.
4. Collect VOA vials last.
5. Place samples in ice-packed coolers immediately after collection.

6.6.2 Sample Filtration

When sample filtration is required, the samples must be filtered in the field using an in-line 0.45-micron membrane filter. Filters must be conditioned prior to filling sample bottles. To condition filters, at least 2 filter volumes of water must pass through the filter before filling sample bottles. A new filter must be used for each well and each sampling event.

6.7 Blanks

Trip Blanks, Field Blanks and Equipment Blanks must be collected as stated in the site controlling documents.

6.7.1 Trip Blanks

- A trip blank is prepared at the laboratory and shipped with the bottle set. They remain with the sample bottles while in transit to the site, during sampling, and during the return trip to the laboratory.
- Trip Blank sample bottles are not opened at any time. If Trip Blank sample bottles are accidentally opened, note this fact on the Chain-of-Custody (COC) form.
- Trip Blanks must be identified on the COC form using the designations TB- (#) as the recommended sample designation.
- If the number of trip blanks is not specified in the controlling documents then the frequency must be determined by the WM Representative.

6.7.2 Field Blanks

- Field blanks are prepared in the field at the sampling site using laboratory-supplied bottles and deionized or laboratory-supplied water.
- Field blanks must be prepared by filling the sample bottles at the location of one of the wells in the sampling program.
- Prepare field blanks at the sample location most likely to be affected by external influences such as blowing dust, odors, or vehicle traffic.
- Identify the well at which the field blank is prepared on the FIF along with any information or observations that may explain anomalous results.
- Field blanks are not filtered.
- Identify field blanks on the COC form using the designations FB- (#) as the recommended sample designation.
- If the frequency of field blanks is not specified in the site controlling documents then they must be collected on a frequency determined by the WM Representative.

6.7.3 Equipment Blanks

- Equipment blanks are required for all sampling events where non-dedicated pumps or bailers are used.
- Equipment blanks are prepared by pouring the deionized or laboratory-supplied water into or over the sampling device after it has been properly decontaminated, then pouring the water into the equipment blank bottles with the appropriate preservative.
- The well at which the Equipment Blank is prepared must be identified on the FIF.
- A minimum of one equipment blank for each day that monitor wells are sampled with non-dedicated equipment is required.

7.0 DOCUMENTATION

Proper documentation is a crucial part of the monitoring program's quality assurance and quality control (QA/QC). Complete, consistent, and accurate documentation of field measurements, procedures, meter calibration, and field observations is required.

During each sampling event, the sampling team must fill out 3 forms: (1) FIF, (2) COC Form, and (3) WCSF. Copies of these forms are included in the Attachments. All forms must be filled out completely and legibly.

7.1 Field Information Form

The FIF provides information related to each sample collected and must be completed by the sampling team for each well where sampling is required – even if the well is not sampled. The original FIF must be submitted to the laboratory with the samples and COC form, and a copy must be retained by the samplers.

7.2 Well Condition Summary Form

The purpose of the WCSF is to communicate well maintenance needs to the WM Representative. Unless required, the form is not submitted to the laboratory with the FIF or COC.

7.3 Chain of Custody Form

Strict chain-of-custody procedures are required. From the time the sample bottles leave the laboratory until the issuance of the analytical laboratory results, the samples and/or sample containers must be in the custody of assigned WM personnel, an assigned agent, or the laboratory.

8.0 SAMPLE PACKAGING AND SHIPMENT

Groundwater samples must be packed to avoid breakage during transport to the laboratory. Sample coolers must contain adequate amounts of water ice to cool samples to 4 degrees Celsius. When packing and shipping coolers, samplers must:

- Double-bag ice to prevent water from leaking into the cooler.
- Protect bottles from potential breakage.
- Avoid over-packing the coolers with samples.
- Pack leachate or other highly impacted samples in separate coolers.
- Place the COC Forms and FIFs in a sealed plastic bag inside the sample cooler.
- Affix custody seals over the lid opening and secure the cooler by taping over the seals.

Samples must be delivered to the analytical laboratory as soon as practical and within any required sample hold times. Typically overnight sample shipment is pre-arranged by WM's contract laboratory. It is the sampling team's responsibility to verify shipping arrangements or arrange for sample delivery.

ATTACHMENTS

WASTE MANAGEMENT

METER CALIBRATION LOG

PROJECT NAME:________________________ DATE:________________________

PROJECT NUMBER:________________________ SAMPLER:________________________

MODEL:________________________ SERIAL NO.:________________________

pH METER

Time	pH 10 Buffer Check	pH 7 Buffer Check	pH 4 Buffer Check	Temp of Calibration Soln (°C)

Buffer Lot Numbers: pH 4:______________ pH 7:__________ pH 10:__________

CONDUCTIVITY METER

Temp. of Calibration Soln	Corrected Cond. @ 25°C	Time

Calibration Solution Lot Number:____________________

Calibration Range for Solution ____________________

REDOX METER

Temp (°C)	E_H Reading (mV)	Time

Calibration Solution Lot Number:________________

Calibration Range for Solution ________________

MODEL:____________________________ **SERIAL NO.:**______________________

Turbidity Meter

Gel Value (NTU)	Reading (NTU)	Time
0 – 10 range		
0 – 100 range		
0 – 1,000 range		
0 – 10 range		
0 – 100 range		
0 – 1,000 range		

Problems/Corrective Actions:____

____

Signature:________________________ Date:________________________

QC'd By:________________________ Date:________________________

WELL CONDITION INSPECTION FORM

WASTE MANAGEMENT

Site: ______________________ Personnel: ______________________

Date: ______________________ Page ____ of ______

Well ID	Protective Casing	Well Casing	Label	Lock	Sample Equipment Type	General Turbidity	Well Yield	Comments/Observations *
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	
	☐ OK ☐ Damaged	☐ OK ☐ Damaged	☐ OK ☐ Inadequate	☐ Yes ☐ No		☐ Clear ☐ Turbid	☐ OK ☐ Inadequate	

* Note ponding water, weep holes, or any other information pertaining to well condition. Provide additional details on listed items.

Return this form to Site Manager - FOR INTERNAL USE ONLY.

WASTE MANAGEMENT

Well Condition Summary Form

Facility: ____________________________ Well/Piezometer Name: ______________________

Evaluator: ___________________________ Evaluation Date: ___________________________

	Y	N	N/A
Is the well's location appropriately shown on a facility map?			
Is the well adequately flagged if hard to find?			
Is the well elevation information inscribed at or on the well correct?			
Is the well: ❑ flush with surface? ❑ above ground?			
Is the well free of physical damage?			
Is the well labeled on the inside?			
Is the well labeled on the outside?			
Does the well have protective posts, if necessary?			
Do above ground wells have weep holes at the base of the protective casing?			
Does the area around the well appear clean?			
Is the casing secure (attempt to move along two perpendicular axes)?			
Is the surface seal void of differential erosion around and under the base?			
Is the surface seal free of cracks that might affect the integrity of the seal?			
Is the surface seal sloped to prevent ponding around the well?			
Is the well free from standing or ponded water?			
Is the well locked to prevent unauthorized access?			
Is the protective casing cap void of large gaps which would breach security?			
Is the locking cap free of rust?			
Is there a survey mark on the riser/wellhead assembly cap?			
Is the riser cap vented?			
Is the annular space free of animal/insect nests?			
Is the annular space appropriately filled with filtering material?			
If a pump, can it be lifted a few inches? (do not test prior to sampling)			
Is the well free of kinks or bends?			

COMMENTS: ____

____

____

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name:

Site No.: Sample Point: Sample ID

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark changes, record field data, below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment … Dedicated: Y or N

Filter Device: Y or N 0.45 µ **or** µ (circle or fill in)

Purging Device A- Submersible Pump D-Bailer
B-Peristaltic Pump E-Piston Pump
Sampling Device C-QED Bladder Pump F-Dipper/Bottle
X-Other:

Filter Type: A-In-line Disposable C-Vacuum
B-Pressure X-Other

Sample Tube Type: A-Teflon C-PVC X-Other:
B-Stainless Steel D-Polypropylene

WELL DATA

Well Elevation (at TOC) (ft/msl) **Depth to Water (DTW) (from TOC)** (ft) **Groundwater Elevation (site datum, from TOC)** (ft/msl)

Total Well Depth (from TOC) (ft) Stick Up (from ground elevation) (ft) Casing ID (in) Casing Material

Note: Total Well Depth, Stick Up, Casing Id, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and Groundwater Elevation must be current.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit		pH (std)		Conductance (SC/EC) (µmhos/cm @ 25 °C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st		1st						
		2nd		2nd						
		3rd		3rd						
		4th		4th						
Suggested range for 3 consec. readings or note Permit/State requirements:			+/- 0.2		+/- 3%	--	--	+/- 10%	+/- 25 mV	Stabilize

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (umhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L-ppm)	eH/ORP (mV)	Other: ______ Units ______

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.*

FIELD COMMENTS

Sample Appearance: ______ Odor: ______ Color: ______ Other: ______

Weather Conditions (required daily, or as conditions change): Direction/Speed: ______ Outlook: ______ Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required):

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
____/____/____			
____/____/____			

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Procedure for Low-Flow (Minimal Drawdown) Purging and Sampling

(December 3, 2009)

Introduction

The Low-Flow purging and sampling technique is the preferred procedure for groundwater sampling under a wide range of hydrogeologic settings. The objective of low-flow/minimal drawdown purging is to obtain a sample that is most representative of the ambient groundwater conditions near the well, taking into consideration aquifer heterogeneities and site-specific subsurface conditions, without imparting bias due to excessive pump rates or formation stress.

The Low-Flow method of purging and sampling involves using a pump to purge water at a constant low rate to achieve field parameter stabilization, while minimizing stress on the aquifer. This method has been well documented as a preferred methodology for collecting representative samples from groundwater (*Low-Flow (Minimal Drawdown), Ground-Water Sampling Procedures*, Puls and Barcelona, USEPA, April 1996). Low-Flow purging is considered by leading researchers as superior to bailing and high-rate pumping and results in a more representative sample than the typical “three volume” well purge methodology or well evacuation.

This procedure is accomplished by measuring field parameters at periodic intervals during purging with a flow cell container. The flow cell is an inline purge cell, which will allow the sample technician to constantly monitor field water quality parameters such as temperature, pH, dissolved oxygen, and conductivity. Other techniques or containers can be used to collect samples for periodic measurements, provided that periodic and representative samples can be collected.

The following sections provide a general discussion on each aspect of the Low-Flow procedure with bulleted items being procedural steps.

Equipment

Dedicated pumps are ideal for low flow purging. Sites that have observation wells without dedicated pumps will require the use of portable (non-dedicated) pumps (bailers cannot to be used for low-flow purging). The sampling team should have all equipment necessary for purging and sampling wells at low flow rates. Other equipment may include:

- Water Level Tape or other water level measuring device;
- Flow cell to monitor field parameters;
- Calibrated purge water container;
- Dedicated pump system or disposable sample tubing (for non-dedicated pumps); and
- Field Meters for pH, Temperature, Dissolved Oxygen, and Conductivity/Specific Conductance.

Prior to each sampling event the field probes will be calibrated in accordance with the owner’s manual provided and the site-specific sampling plan. Field probes should be checked for drift every four hours or at the end of the day at a minimum.

It is important to identify the range, resolution and accuracy of the instruments used to determine if the selected stabilization criteria can be measured. If the instruments available *cannot accurately measure the stabilization criteria above, consult with the regulatory program manager to determine if different criteria values would be appropriate for your sampling program.*

Decontamination

Sites that have observation wells without dedicated pumps will require the use of non-dedicated pumps. All non-dedicated equipment used during the purging and sampling process must be decontaminated prior to each use, including tubing, unless it is disposable):

- Downhole equipment, such as a water level indicator, is to be triple-rinsed between well locations.
- Discard disposable polyethylene tubing used with non dedicated pumps after use at each well.

Sample bottles will be provided and properly prepared by the analytical laboratory scheduled to perform the analysis. No cleaning or preparation of sampling bottles by field personal will be performed.

Purge Volumes and Monitoring Frequency

Low-flow purging does not require the calculation of the water volume in the well, since purging is based solely on indicator parameter stabilization. Rather, the volume of the pump and discharge tubing are necessary for making calculations needed to determine field measurement frequency and/or the minimum purge ("passive") sampling system purge volume. Pump chamber or bladder volumes can be obtained from the manufacturer. Volumes of the sample tubing can be calculated or taken from the table below.

Discharge Tubing Volumes	
Tubing Diameter	**Volume/foot**
1/2" OD/3/8" ID	20 ml
3/8" OD/1/4" ID	10 ml
1/4" OD/1/8" ID	5 ml

Well casing volumes should only be calculated if required by Permit or State Regulation and recorded on field information forms. In addition, well casing volumes may be needed in any case where parameter stabilization is not achieved after a three-casing-volume purge (see below).

Sampling equipment volumes are calculated or recorded for use in determining the frequency of field measurements. Depending on the equipment configuration, calculate and record the volume of the pump and sample tubing using the methodology described above (the volumes are typically converted to liters). The frequency of field readings is based on the time required to purge at least one volume of the pump and tubing system. For example, a pump and tubing volume of 500-ml purged at a rate of 250 ml/minute will be purged in two minutes; readings should be at least two minutes apart. In any case, it is important to ensure that the field parameters are measured on independent samples of water.

Purge Rates

The objective of the purging process is to remove sufficient water from within the well screen zone to result in a sample that is representative of actual aquifer conditions adjacent to the well. The sampling pump or pump intake should be located within the well screen. This pump location is already established for dedicated pumps. For non-dedicated pumps, the intake is placed within the screened interval, typically in the center of the screen. If the water column in the screen is shorter than the overall screen length, the pump should be placed lower in the screen but no lower than about 6-12 inches from the bottom of the screen to avoid picking up any settled solids in the well.

A low pumping rate (typically less than 1,000 ml/min) is used to minimize drawdown within the well and formation and mobilization of formation solids. Lower flow rates may be required during sampling. Flow rate is determined by measuring the time it takes to fill a calibrated container, or by measuring the volume of one pump discharge cycle and multiplying this volume by the number of cycles per minute (e.g., 125 ml/cycle x 4 CPM = 500 ml/min). Drawdown is monitored by measuring the water level below the top of the well casing with a water level indicator or similar device (e.g. transducer) while pumping. Drawdown will be stabilized during purging. Flow rates and drawdown are recorded on a field log, field data form or with a data logger.

- Measure water levels prior to initiating purging;
- Calculate well volumes, if required by permit;
- Calculate sampling system volume and determine indicator parameter measurement frequency;
- Lower water level meter probe to 1-2 feet below static water level;
- Connect the flow cell to the discharge tube from the pump;
- Begin purge at a rate of 100-200 ml/min (or at a rate determined from prior events);
- Check drawdown with a water level tape while pumping;
- If drawdown stabilizes quickly, increase the pumping rate in increments of 100 ml/min until drawdown increases, then reduce the rate slightly after a few minutes to achieve a stable pumping water level;
- If the water level continues to drop, reduce purge rate by 100 ml/min increments until the water level stabilizes;
- Once water level stabilization is achieved, proceed to indicator parameter stabilization.

Parameter Stabilization

Parameter stabilization ensures that the well is adequately purged and sampled groundwater is representative of formation water. In order to determine when a well has been adequately purged, samplers should:

- Monitor pH, specific conductance, and dissolved oxygen of the ground water removed during purging;
- Observe and record the water level drawdown; and

- Record the purge rate and note the volume of water removed if required by guidance or permit.

A well is adequately purged when the pH, specific conductance, and dissolved oxygen stabilize. Stabilization occurs as follows:

pH: +/- 0.2 pH units
Conductance: +/- 5 % of reading value
Dissolved oxygen: +/- 10.0% or 0.2 mg/L, whichever is greater.

Temperature is not a reliable indicator of stabilization, being affected by ambient temperature at the well head, sunlight, and some sampling devices such as electric pumps. Temperature is typically measured to provide correction for temperature dependent parameters (e.g., DO % saturation, pH, and specific conductance).

While turbidity is not a direct measurement of water chemistry and is not used as an indicator parameter of stabilization, it is useful to support data from metals analyses. To avoid artifacts in sample analysis, turbidity should be as low as possible when samples are taken. Turbidity should be measured at least three times, once when purging is initiated, again after the water level in the well stabilizes, and again when the water chemistry indicator parameters being measured are stable. Turbidity should also be measured any time the pumping rate is increased or the water level in the well drops noticeably. If the initial turbidity reading is high (>50 NTU) and the second reading is not significantly lower, the pump rate should be reduced. The turbidity value measured prior to sampling will be recorded. If this value exceeds 50 NTU, procedures should be reviewed and the source of the elevated turbidity determined.

Sampling

Wells should be sampled immediately upon completion of purging operations. Once the water level stabilizes, the purge rate should remain constant during low-flow sampling (generally less than 500 ml/min). For VOCs, lower sampling rates (100 - 200 milliliters/minute) may be required.

- Record field parameters prior to sampling;
- Record depth to water levels prior to sampling (note if the well has not stabilized).
- Record the flow rate determined using a calibrated measuring device;
- Disconnect the flow cell other equipment from the pump discharge tube;
- Collect samples from the pump discharge tube
- Collect large volume samples first (e.g.,1 liter bottles), then VOC samples, and any filtered samples last;

If, after three well volumes have been removed, the chemical parameters have not stabilized according to the above criteria, the sampling team may elect to collect a sample. The conditions of sampling should be noted in the field log or field information form.

Low Yield Formations

In some situations, even with very slow purge rates, the well drawdown may not stabilize. In this case, sampling the water within the well screen zone provides the best opportunity to determine the formation water chemistry; as well evacuation can greatly affect sample chemistry through changes in dissolved gas levels, dissolved metals and VOCs.

Attempts should be made to avoid purging wells to dryness. This can usually be accomplished by slowing the purge rate. If the well is evacuated during the purging procedures shown above, the sample may be collected as soon as a sufficient volume of water has recovered in the well. If the well goes dry repeatedly (i.e. over multiple monitoring events) prior to sampling, then a minimum purge or “passive” sampling approach should be used in lieu of well evacuation.

Minimum Purge (“Passive”) Sampling

For wells that cannot achieve a stabilized water level and purge dry even at very low pumping rates, an alternative to the traditional evacuation approach is to use minimum purge (sometimes called “passive”) sampling techniques to avoid the pitfalls of well evacuation and obtain a better estimation of the formation water quality. Sampling the water present in the screen zone provides the greatest chance of obtaining samples with minimal alteration of the chemistry. Although the low movement rate of the ground water in the screen provides only a limited exchange, avoiding the alteration caused by the factors mentioned above is really the best alternative.

The minimum purge approach requires the removal of the smallest possible purge volume prior to sampling, generally limited to the volume of the sampling system. The sampling system volume is minimized by using very small diameter tubing and the smallest possible pump chamber volume. Plastic tubing should have sufficient wall thickness to minimize the potential for oxygen transfer through the tubing when pumping at very low flow rates. After purging 1-3 volumes of the sampling system, samples are taken from the subsequent water pumped. Since minimum purge sampling requires the minimum possible disturbance to the water column and surrounding formation, dedicated sampling systems are required for this approach.

The pumping rates used for minimum purge sampling are much lower than for low-flow purging, generally 100 ml/minute or less. Drawdown is expected, since it cannot be avoided; however, it is still advisable to pump at the lowest possible rate to limit drawdown to the minimum possible. Monitoring indicator parameters for stability is not part of this approach, since the intention is not to purge until stabilization of these measurements. The pH, specific conductance and turbidity or any other required field parameters should be measured during collection of the sample from the recovered volume. *Regulatory approval should be obtained prior to collecting a sample using this method.*

Field Records

Field information must be recorded during purging and sampling. At a minimum, the following information should be included in the field forms for each groundwater monitoring well.

- Purge Information (pumping rate, purge volume if required);
- Equipment Specifications (pump type, filter type and pore size if used);
- Well Data (depth to water, total depth, groundwater elevation);
- Field Measurements during purging and at the time of sample collection; and
- General weather conditions or other comments

This data is to be recorded on field forms and/or in a data logger.

Other Technical Issues

The following are other technical issues addressed as follows by the facility:

- Dedicated pump intakes are generally set at the middle of the screen. Where water levels have dropped due to drought conditions, the sampling team may lower the pump in order to obtain sufficient sample.
- For wells installed in bedrock, packers are only required to seal off the zone of interest if the bedrock has been determined to be competent (e.g. is not highly fractured).
- The flow cell system does not require decontamination between wells, because the act of purging removes any liquids from other wells and because sampling takes place upstream of the flow cell and only after disconnecting the pump discharge tubing.

APPENDIX D

LIST OF REVISIONS:

Number	Date	Author	Revisions
DRAFT A	12/16/14	PROMUS – J. Breedlove	Initial draft
Rev 1	07/06/23	PROMUS - APD	Draft
Rev 2	10/11/24	Promus – E. Perry	Updated per ADEM comment letter dated 2024-10-01
Rev 3	12/20/24	Promus – E. Perry	Updated Table 1 per J. Conners comments dated 2024-12-06
Rev. 4	8/4/2025	Promus – E. Perry	Update Well Installation and Abandonment Status; Include Appendix III Analytes in Table 2B
Rev 5	8/12/2025	WM / Promus	Include MW-11 Abandonment Plan; Revised PZ-7R3 status to compliance well.

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ATTACHMENT F

Landfill Gas Monitoring Plan

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1. PURPOSE AND SCOPE

The purpose of this Landfill Gas Monitoring Plan is to describe the procedures that will be implemented by Chastang Landfill during operations of the landfill to monitor landfill gas conditions at the site.

Landfill gas is primarily composed of methane and carbon dioxide. The methane component of landfill gas is lighter than air and will rise toward the ceiling of an enclosed space. If the methane is in the 5 to 15 percent by volume concentration range, a potential exists for a source of ignition to set off an explosion. Landfill gas generated within the landfill has the potential to migrate by diffusion and under a pressure gradient along routes that could allow it to escape from the landfill.

In accordance with ADEM Chapter 335-13-4-.16, the following requirements must be met:

> *"(1)(a) Explosive gases shall not exceed the lower explosive limit at the facility boundary.*
>
> *(1)(b) Explosive gases shall not exceed twenty-five (25) percent of the lower explosive limit in facility structures except for gas control or recovery system components. and,*
>
> *(1)(c) Facility structures shall be designed and constructed so as not to allow explosive gases to collect in, under, or around structures in concentrations exceeding the requirements of this Rule."*

The purpose of this Landfill Gas Monitoring Plan (LGMP) is to provide guidance to the landfill operator on conducting gas monitoring to verify compliance with the ADEM Chapter 335 regulations. The LGMP presents the methods to be used to monitor for the presence of combustible gas (such as methane) around or in facility structures or at the facility boundary. The term "gas" used in this LGMP is intended to mean methane or combustible gas or explosive gas.

2. EXISTING ON-SITE FACILITY STRUCTURES

The existing onsite structures consist of the following:

- Maintenance building (Bld)
- Operations/employee trailer (Etr)
- Scalehouse/office building (ScH)
- Vetiver irrigation control shed (Shd)

3. MONITORING PLAN

Landfill gas monitoring will be conducted quarterly during the active life of the landfill. The measurement of gas concentration will be conducted with a portable gas monitoring device utilizing a catalyst and combustible gas indicator. This device reads out the percentage of LEL for explosive gases and will be calibrated for methane. Results will be reported as percentage of LEL for methane and as percent methane by volume. The device has a method for drawing an air sample and measuring the gas content using catalytic combustion. The barhole probe method will be used to obtain samples. The procedure to be used is as follows: (i) the worker will use a steel probe, to advance a 1 in. diameter hole to a minimum depth of 4 ft; (ii) the gas probe will be inserted into the hole immediately, and (iii) a gas reading will be taken. The result of each test measurement will be recorded along with the position of the hole on a form. Within 30 days of the monitoring event, a gas monitoring report will be placed into the landfill operating record and submitted to ADEM.

The general location of each gas monitoring barhole is marked with a stake and sign to ensure valid readings from event to event over the active life of the site and post-closure care period. The actual gas monitoring barhole locations will be determined in the field during each monitoring event. There will be a gas monitoring barhole every 300 ft along the landfill perimeter boundaries except when a dwelling exists within 1000 ft of the boundary, in which case gas monitoring locations will be located every 100 ft. The delineation of perimeter areas requiring 300-ft spacings and 100-ft spacings is shown on Figure 1.

In addition to monitoring at barhole probe locations, monitoring will be performed within on-site facility structures where the potential for methane gas to collect exists. The same portable gas monitoring device used for barhole probe monitoring will be used for this work. Monitoring locations and results will be recorded along with barhole monitoring data, and a report placed in the operating record at the landfill and submitted to ADEM within 30 days of each monitoring event.

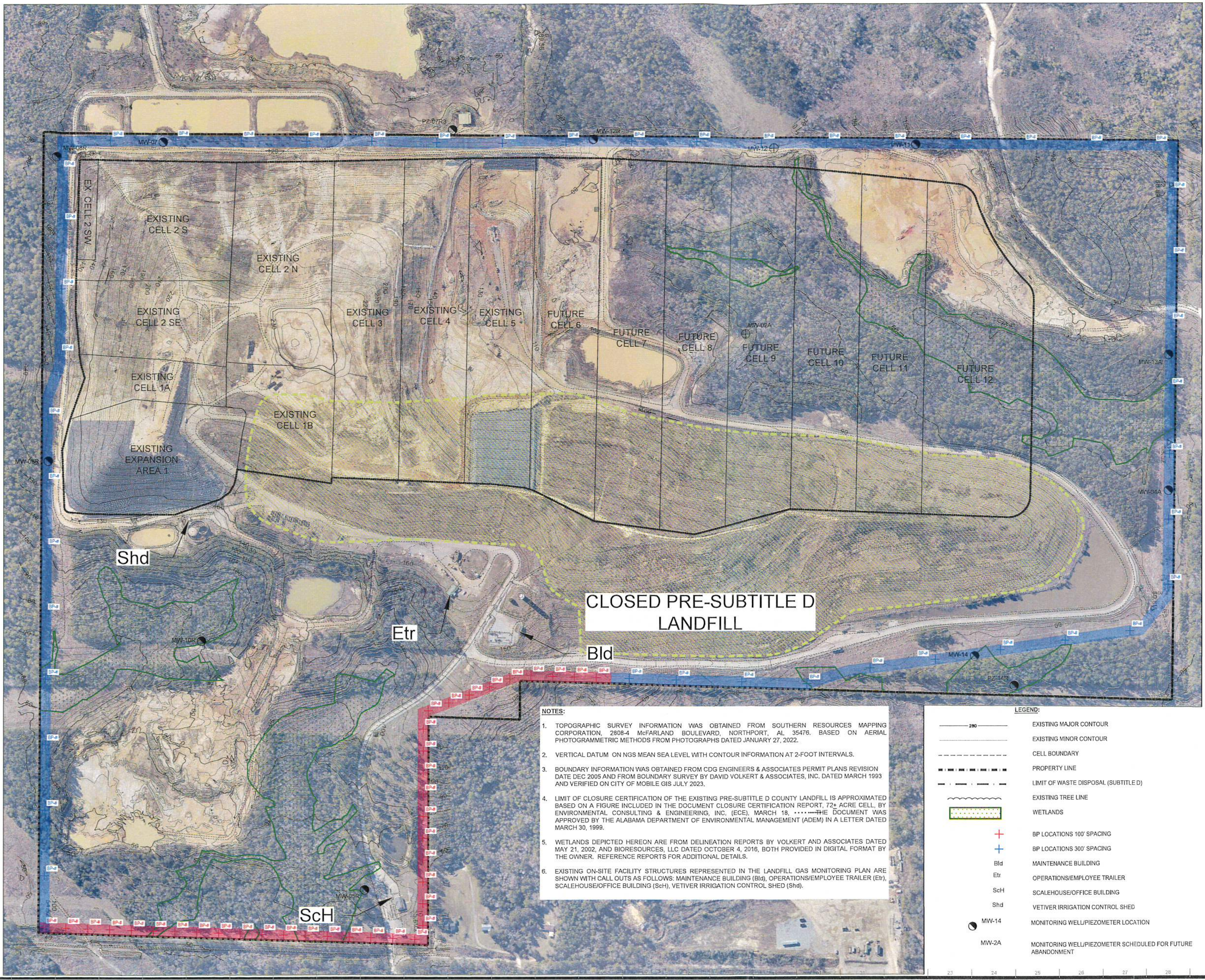
4. CONTINGENCY PLAN

This section of the LGMP describes the contingency plan to be implemented if methane gas levels exceed allowable limit as outlined in Section 1. The contingency plan includes the following steps:

- CHASTANG LANDFILL will take immediate actions to protect human health and notify ADEM. If methane gas levels exceed allowable limits within an on site structure, CHASTANG LANDFILL management will immediately cease operations within the structure, evacuate all personnel from within the structure, and notify ADEM of the exceedance and actions being taken. If methane gas levels exceed allowable limits at any of the gas monitoring barholes, CHASTANG LANDFILL will: (i) locate and illustrate on a map the location of the barhole; (ii) resample the barhole to confirm the exceedance; (iii) resample at a predetermined regular interval (e.g., every 24 hours) until the corrective action outlined below is implemented; and (iv) notify ADEM of the action taken.

- CHASTANG LANDFILL will place into the Landfill Operating Record, within seven days of an exceedance, the methane gas levels detected and a description of the steps taken to protect human health. For confirmed exceedances at a gas monitoring barhole location, CHASTANG LANDFILL will conduct additional methane gas monitoring surrounding the gas monitoring barhole location where exceedances were detected, using bar holes, to define the lateral extent of areas of presence. CHASTANG LANDFILL will place this information into the Landfill Operating Record within seven days and notify ADEM of the actions being taken.

- CHASTANG LANDFILL will develop within 20 days and implement within 60 days of exceedance, a remediation plan for the methane gas releases, and will notify ADEM after the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.



NOTES:

1. TOPOGRAPHIC SURVEY INFORMATION WAS OBTAINED FROM SOUTHERN RESOURCES MAPPING CORPORATION, 2808-4 McFARLAND BOULEVARD, NORTHPORT, AL 35476. BASED ON AERIAL PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHS DATED JANUARY 27, 2022.
2. VERTICAL DATUM ON NGS MEAN SEA LEVEL WITH CONTOUR INFORMATION AT 2-FOOT INTERVALS.
3. BOUNDARY INFORMATION WAS OBTAINED FROM CDG ENGINEERS & ASSOCIATES PERMIT PLANS REVISION DATE DEC 2005 AND FROM BOUNDARY SURVEY BY DAVID VOLKERT & ASSOCIATES, INC. DATED MARCH 1993 AND VERIFIED ON CITY OF MOBILE GIS JULY 2023.
4. LIMIT OF CLOSURE CERTIFICATION OF THE EXISTING PRE-SUBTITLE D COUNTY LANDFILL IS APPROXIMATED BASED ON A FIGURE INCLUDED IN THE DOCUMENT CLOSURE CERTIFICATION REPORT, 72± ACRE CELL, BY ENVIRONMENTAL CONSULTING & ENGINEERING, INC. (ECE), MARCH 18, ········ THE DOCUMENT WAS APPROVED BY THE ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (ADEM) IN A LETTER DATED MARCH 30, 1999.
5. WETLANDS DEPICTED HEREON ARE FROM DELINEATION REPORTS BY VOLKERT AND ASSOCIATES DATED MAY 21, 2002, AND BIORESOURCES, LLC DATED OCTOBER 4, 2016, BOTH PROVIDED IN DIGITAL FORMAT BY THE OWNER. REFERENCE REPORTS FOR ADDITIONAL DETAILS.
6. EXISTING ON-SITE FACILITY STRUCTURES REPRESENTED IN THE LANDFILL GAS MONITORING PLAN ARE SHOWN WITH CALL OUTS AS FOLLOWS: MAINTENANCE BUILDING (Bld), OPERATIONS/EMPLOYEE TRAILER (Etr), SCALEHOUSE/OFFICE BUILDING (ScH), VETIVER IRRIGATION CONTROL SHED (Shd).

LEGEND:

280	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	CELL BOUNDARY
	PROPERTY LINE
	LIMIT OF WASTE DISPOSAL (SUBTITLE D)
	EXISTING TREE LINE
	WETLANDS
+	BP LOCATIONS 100' SPACING
+	BP LOCATIONS 300' SPACING
Bld	MAINTENANCE BUILDING
Etr	OPERATIONS/EMPLOYEE TRAILER
ScH	SCALEHOUSE/OFFICE BUILDING
Shd	VETIVER IRRIGATION CONTROL SHED
MW-14	MONITORING WELL/PIEZOMETER LOCATION
MW-2A	MONITORING WELL/PIEZOMETER SCHEDULED FOR FUTURE ABANDONMENT

REV	DATE	DES. BY	DRA. BY	APPR. BY	DESCRIPTION

PREPARED FOR:
WM MOBILE BAY ENVIRONMENTAL CENTER, INC.
WASTE MANAGEMENT

PREPARED BY:
PROMUS ENGINEERING
1200 MTN CREEK RD SUITE 102 CHATTANOOGA, TENNESSEE 37405

PERIMETER MONITORING LOCATIONS

CHASTANG SANITARY LANDFILL
MOUNT VERNON, ALABAMA

PROJECT NO.: 230102
FIGURE
1

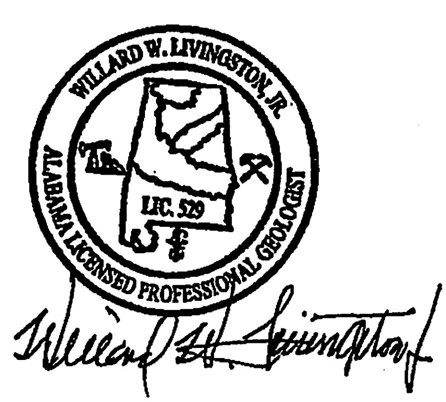
ATTACHMENT G

Response to ADEM Comments of October 1, 2024
Hydrogeological Evaluation – 1999
Current Cell (Cell 5) Certification Approval Letters

HYDROGEOLOGIC REPORT

SOILS EXPLORATION AND INVESTIGATION OF HYDROGEOLOGIC CONDITIONS FOR SUBTITLE D EXPANSION AREA CHASTANG SANITARY LANDFILL MOBILE COUNTY, ALABAMA JULY 1999

Prepared for Waste Management
By Geotechnical Engineering-Testing, Inc.
GET JOB NO. 98-392



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(11X17)

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1.0 INTRODUCTION

1.1 Purpose

This report has been prepared in conclusion to a hydrogeologic investigation of a proposed Subtitle D expansion area at the Chastang Landfill in north Mobile County. The investigation was conducted in response to Alabama Department of Environmental Management (ADEM) requirements for a major permit modification to expand Waste Management's current operation of the City of Mobile's sanitary landfill. Geotechnical Engineering-Testing, Inc. of Mobile, Alabama was retained by Waste Management for the investigation. All services were conducted in accordance with the ADEM Solid Waste Regulation 335-13-4.13.

1.2 Location

The Chastang Landfill is located about 30 miles north of downtown Mobile, in north central Mobile County. The facility lies about 1/2 mile west of U.S. Highway 43, just north of Conrad Creek near the Chastang community. It is located in the West 1/2 of Sec. 13, T1N, R1W. Specifically, the subject investigation addresses approximately 100 acres in the northern 3/4 of the West 1/4 of Sec. 13 which lies north of current operations and west of the main closed section of the facility (Figure 1-1).

2.0 FIELD METHODS FOR INVESTIGATION

2.1 Reconnaissance and Location of Soil Borings

Geologists from Geotechnical Engineering-Testing, Inc. conducted a thorough site reconnaissance. Borings were topographically located for the collection of more pertinent hydrogeologic data. The overall physical setting was observed and compared with a 7-1/2 minute USGS quadrangle map and a more accurate site topographic map with a 2- foot contour interval. Basic site hydrology and physiography were carefully noted as described in Section 4.2.1.

2.2 Soil Boring Procedure

The subsurface of the site was investigated by drilling soil test borings at 20 sites and installing piezometers in each borehole for groundwater observations. A 4x4 ATV buggy mounted rotary core boring rig and a truck mounted core boring rig were used for all borehole drilling. The mud rotary method of drilling was used at each borehole site.

All soil test borings were conducted in general accordance with ASTM D 1586, "Standard Method for Penetration Test and Split Barrel Sampling of Soils." Where cohesive soils were encountered, undisturbed tube samples were collected in accordance with standards set forth in ASTM D 1587, "Standard Practice For Thin-Wall Tube Sampling of Soils." Standard penetration tests were performed continuously in the top 7.5 feet, at 2.5-foot center-to-center intervals to a depth of 20 feet and at standard 5-foot intervals to boring termination. The closer sampling interval provided greater delineation for evaluating the lithology for the shallow aquifer. All soil samples were logged in the field by experienced field technicians. A geologist then took the samples to the laboratory for examination. Laboratory tests were assigned to pertinent samples. Boring logs of the deepest borehole at each location were prepared.

2.3 Piezometer Installation

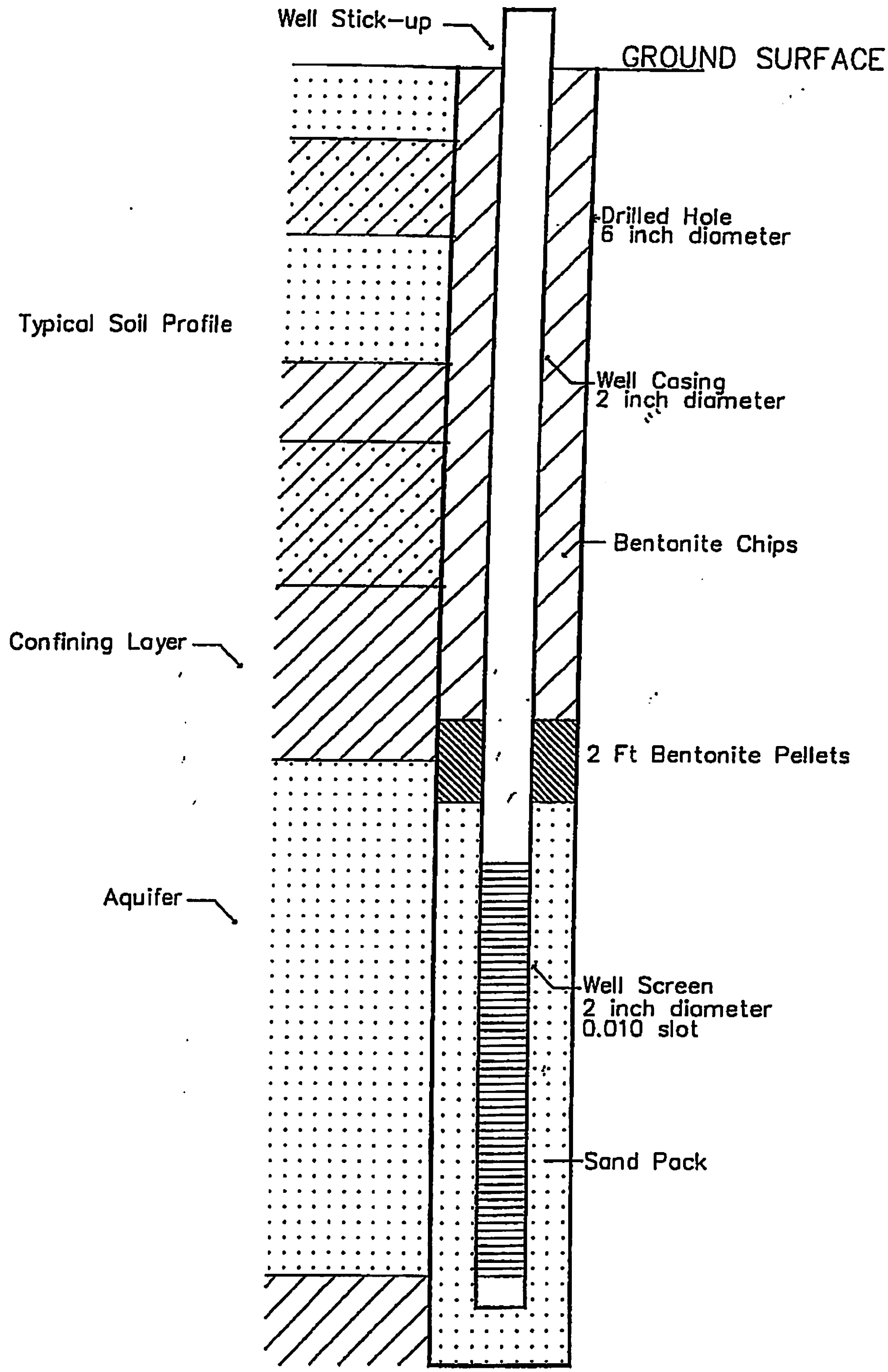
Piezometers were installed in all boreholes drilled at each location. At most locations, two piezometers were installed to check for vertical gradients, perched water and aquifer interconnection. The installation procedure was as follows: after a 6 inch diameter borehole was completed, a 2 inch diameter PVC pipe was inserted in the borehole with a 2 or 3 foot stick-up left above the ground surface. The bottom 10 or 20 foot (typically) section was a .010 inch slotted screen (Figure 2-1). A filter sand was placed in the borehole annulus to two feet above the top of the screen. Then a one foot thick layer of bentonite pellets was installed on top of the sand pack. The installation was completed by filling the rest of the borehole annulus with bentonite chips from the top of the bentonite pellets to the land surface. Following the completed piezometer installation, development was performed by bailing until water was free of drilling mud.

2.4 Water Level Measurements

Water level measurements were conducted weekly from January through April and in June and July in an effort to obtain the high water table and observe the site response to recharge from local rain events (Appendix E). The highest readings each month are presented in Table 2-1. All readings were made by a field technician or geologist using a Solinst water level measuring device (indicator) consisting of a battery charged meter with an electrode on the end of a calibrated conductor. When contact is made with the water table, a light comes on and a beeper sounds.

FIGURE 2-1

PIEZOMETER INSTALLATION SCHEMATIC



GEOTECHNICAL ENGINEERING-TESTING, INC.

TABLE 2-1

Well Number		CHASTANG LANDFILL GROUNDWATER ELEVATIONS (MSL) FEBRUARY - APRIL					
		2/3	2/10	2/24	3/11	3/25	4/14
GB-1	S	94.4	94.0	93.3	94.0	93.5	93.5
GB-1	I	92.6	92.9	92.2	92.4	92.2	92.1
GB-1	D	68.3	68.3	68.3	67.9	68.0	67.9
GB-2	S	85.0	84.8	84.4	84.6	84.5	84.2
GB-2	D	72.9	72.8	71.4	72.4	72.8	72.2
GB-3	S	85.9	85.4	84.8	86.1	84.7	85.3
GB-3	D	54.3	54.1	53.9	54.0	54.2	53.8
GB-4	S	76.8	76.5	NM	77.1	76.6	76.5
GB-4	D	73.4	73.1	NM	73.2	72.5	72.6
GB-5	S	80.9	79.9	78.4	82.4	81.1	78.2
GB-5	D	73.3	73.1	71.5	73.1	72.8	72.5
GB-6	S	73.1	72.4	71.6	73.4	71.6	72.0
GB-7	S	72.3	71.7	70.8	73.0	71.2	71.2
GB-7	D	70.7	70.5	69.8	70.3	70.2	69.8
GB-8	D	68.6	70.4	70.2	70.4	70.6	70.0
GB-9	S	69.3	69.0	68.6	69.9	68.6	69.0
GB-9	D	67.9	67.7	67.4	68.2	67.2	67.6
GB-10	S	67.7	67.6	67.4	67.9	67.0	67.8
GB-10	D	48.5	48.5	48.4	49.1	48.7	48.5
GB-11	S	70.1	70.1	69.8	70.0	70.1	69.8
GB-11	D	67.5	67.3	66.9	67.5	67.1	67.0
GB-12	S	71.1	70.4	69.4	71.9	71.3	69.4
GB-12	D	66.4	66.1	65.8	66.6	68.3	65.8
GB-13	S	65.1	65.1	65.0	65.3	64.9	65.0
GB-13	D	64.4	64.1	64.0	63.3	63.7	64.0
GB-14	S	66.5	66.2	65.9	66.6	65.7	66.2
GB-14	D	44.3	44.3	44.1	44.1	44.5	44.1
GB-15	S	66.6	66.1	65.6	66.7	65.4	66.0
GB-15	D	63.3	62.9	62.6	63.2	62.5	62.8
GB-16	S	62.3	62.0	59.7	62.8	61.5	61.8
GB-16	D	42.2	42.3	42.1	42.1	42.5	42.0
GB-17	S	89.5	89.0	88.1	89.0	88.7	87.7
GB-17	I	68.0	68.0	67.5	67.8	68.2	67.5
GB-17	D	65.4	65.3	64.9	65.2	65.6	64.8
GB-18	S	59.0	58.6	58.1	59.1	58.4	58.1
GB-18	D	41.7	41.7	41.8	41.2	41.4	41.3
GB-19	S	89.8	89.2	87.8	89.0	90.3	89.3
GB-19	D	62.9	62.8	62.4	62.6	63.2	62.4
GB-20	S	53.9	53.7	53.2	54.0	53.1	53.6
GB-20	D	49.3	49.2	48.9	48.9	51.3	48.9
		PREVIOUS BORINGS					
P-2	S	67.7	67.5	67.3	68.0	67.1	67.4
P-2	D	44.3	44.2	44.0	44.0	44.3	43.9
P-5		77.2	77.1	76.9	77.5	77.1	76.9
P-6	S	93.7	93.9	93.7	94.1	93.6	93.8
P-6	D	74.8	74.8	74.6	74.5	74.5	74.6
P-10	S	81.2	81.2	81.1	81.1	81.0	81.1
P-10	D	74.9	74.8	74.3	74.7	74.4	74.3
P-11	S	83.9	83.8	83.6	83.7	NM	83.8
P-11	D	81.0	80.8	80.6	81.4	NM	80.5
P-14		NM	NM	NM	NM	NM	68.9

2.5 Piezometer Slug Tests

Slug tests were performed in twelve (12) shallow piezometers to determine aquifer hydraulic characteristics. The tests were performed in the field by geologists using state of the art instrumentation for data collection. Specifically, the TROLL SP4000-232 by In-Situ, Inc. of Laramie, WY was used for recording rising and falling water level data relative to the slug-in and slug-out procedure for slug testing. The TROLL is basically a one-unit device consisting of a pressure transducer and a computer, encased in a 1-½ inch diameter stainless steel casing connected to a power cable that is attached to a laptop computer for downloading data in the field. Associated software (Win-Situ) allows the data transfer.

2.6 Site Survey Control

A 7-1/2 minute USGS Mount Vernon quadrangle map was used initially for site orientation with respect to local and regional topography. A more detailed site-specific topographic map provided by David Volkert and Associates, Inc. of Mobile, Alabama was used for detailed site reconnaissance and soil boring layout.

Following the drilling of soil borings and piezometer installations, each location was surveyed by Glass Land Surveying, Inc. of Gulfport, MS to establish exact coordinates for horizontal control. Vertical control was established for the land surface at each piezometer, as well as, the top of casing used for groundwater measurements. All elevations were rounded to the nearest 1/10 of a foot.

3.0 LABORATORY METHODS AND PROCEDURES

3.1 Soil Classification Tests

Standard soil classification tests were performed on samples taken from each deep borehole location. Test data sheets presented in the Appendices address the results for the particle size distribution tests. Results for percent passing # 200 sieve, Atterberg limits and moisture content tests are indicated on the Boring Logs. All laboratory tests were performed in accordance with ASTM standards.

3.2 Permeability Tests

Permeability testing was performed on selected samples using a Flexible Wall Permeameter System. The samples were extracted from Shelby tube samplers, encased in a flexible latex membrane and placed in a triaxial confining cell where confining pressure was applied. The sample was allowed to saturate prior to permeability measurement. The results are presented on the Permeability Test Report sheets as well as the boring logs in the Appendices.

4.0 GEOLOGY

4.1 Regional

4.1.1 Physiography

Mobile County lies in the Southern Pine Hill division of the southern most part of the East Gulf Coastal Plain (EGCP), a section of the Coastal Plain Physiographic Province. It is bordered by Mobile Bay and the Mobile River and delta on the east, the Mississippi Sound (Gulf of Mexico) on the South, the state of Mississippi on the west and Washington County, Alabama on the north. The topography and regional geomorphic development in north Mobile County reflects a dissected plain of a southward sloping cuesta (GSA Circular 47). Elevations range from 400 feet above mean sea level (msl) just north of Mobile County to 50 feet above msl along the Mobile River near the area of investigation. Tops of hills and ridges in the area range from 100 to around 170 feet above msl. Slopes average from flat to 12%. (Figure 1-1)

4.1.2 Geology

Geologic units exposed in the region are of Tertiary and Quaternary age and consist primarily of sand, gravel, silt, clay and sandstone (GSA Circular 47). The ages of these units in chronological order of deposition are: Miocene Series undifferentiated; Citronelle Formation in the Pliocene Series; high terrace deposits in the Pleistocene Series; and alluvial, low terrace coastal deposits in the Pleistocene and Holocene Series (GSA map 93, Appendix E).

Regarding structure, strata in the Miocene Series and Citronelle Formation maintain a northwest strike and typically reflect a southwest dip of 10 to 45 feet per mile and 5 to12 feet per mile respectfully. The Miocene Series ranges in thickness from 400 feet in northern Mobile County to 3400 feet in the southern part of the county. The alluvial deposits may reach a thickness of 150 feet in the Mobile River basin and less than 70 along tributaries to the Mobile River.

4.2 SITE

4.2.1 Physiography

The site is situated on a large drainage plain of a tributary of Conrad Creek

(Figure 1-1). The topography of the site is characteristic of the region. The site drainage does not appear to be perennial as no base stream flow has been observed. The main drainage route enters the site on the west and runs northeastwardly until it exits the site on the north (Plate 1). There are three drainage swales joining the main pathway. The largest of these runs along the west side of the site from south to north. The other two are located in the northwest corner and on the east side of the site, respectfully.

The hydraulic gradient of the main drainage path is about 1%, while the swales range from 1% on the south to 3 and 4% on the east and northwest respectfully. There is very little channel development along the main drainage path. Observations indicate that flash flooding occurs during intense rain events leaving braided flow patterns on the north end of the site as flow decreases. Highest elevations range from about 100 ft to104 ft above msl on the south side of the site to around 98 ft msl in the northwest corner. Lowest points range from 67 ft to 56 ft msl along the main drainage route. Existing topography reflects grades of up to 12% in the northwest corner of the site, 5 to 6% at the south end and from flat to 3 or 4% at right angles to most drainage routes.

4.2.2 Geology

There are two geologic units exposed on the site: alluvial deposits and the Miocene Series undifferentiated (Plate 1). The alluvial deposits cover most of the site area and are found exclusively along the main surface drainage routes and the swales draining to this route. These deposits are over 50 feet thick at the north end of the site and about 35 feet thick on the west side where the main drainage route enters the site (Plate 5). They thin to zero along the largest swale on the west side of the site at boring P-10. This marks the southern most extent of the alluvial deposits. As shown on the Site Geologic Map (Plate 1), the contact between the alluvial deposits and the underlying Miocene Series appears to follow the 85-foot contour in general. These deposits consist of white, gray, orange and brown, partly carbonaceous, locally fossiliferous, very fine to coarse-grained sand that is gravely at some locations. Grayish to orange or brown silts, clays and silty sands are also common alluvial lithologies. The deposits appear to be somewhat stratified horizontally or slightly undulating in cross sections that are at 90 degrees to the swales or main site drainage routes. Along directions parallel with drainage routes, the alluvial deposits exhibit some dip down gradient.

Although stratification along directions noted above is very evident, continuity of lithology is not. As shown on the boring logs (Appendix A), permeabilities of the cohesive deposits in the alluvium in general, run two orders of magnitude greater than do the same materials in the Miocene Series (i.e. 10^{-5} to 10^{-6} cm/sec. in comparison with 10^{-8} to 10^{-9} cm/sec.).

The stratigraphy of the Miocene Series undifferentiated as described by Reed, 1971, GSA Map 93, (Appendix F) reflects laminated to massive marine and estuarine deposits of gray, orange and red, very fine to coarse grained sand, red ferruginous sandstone and gray, olive, blue and green sandy silty clay. Some sand beds contain gravel and petrified plant fossils and clays that contain carbonized leaf remains. Key indicators of the Miocene Series in many exposures in Mobile County are the varicolored sands and red to brown and orange mottled clays. These lithologic descriptions are easily seen on the boring logs in the appendices.

The Miocene crops out in the northwest corner, southern and southeast parts of the site. It is found above elevations 85 ft – 90 ft msl. It underlies the alluvial deposits and generally exhibits denser, harder, stiffer and more impermeable material than the alluvium. The base of the alluvium on the north end of the site appears to be a very dense, hard, bluish gray Miocene clay as shown on Geologic cross section B-B'. This clay stratum is not conformable with regional dip and appears to underlie the entire site. Over most of the site it occurs between elevations 23 ft and 35 ft msl. However, at the extreme north end of the site, where the alluvium is the thickest, this stratum exhibits a one percent grade downward to the north. This is believed to be an erosional feature, which probably occurred during the alluvial deposition or during a non-marine period.

The Miocene has an apparent dip to the south in the area of investigation as seen by the bedding planes on geologic cross sections A-A' and B-B' (Plates 4 and 5). The other geologic cross sections in this report run east-west or northwest, which is the true strike of the Miocene. As seen on these cross sections, bedding planes appear more horizontal or are showing only a slight dip to the west, which is consistent with the maximum dip to the southwest. The apparent dip of the Miocene under the site appears to be about 4 feet per 500 feet or 42 feet per mile, which is consistent with the regional structure.

5.0 GROUND .WATER

5.1 Aquifer Description and Behavior

Regarding ground water, no flowing springs or seeps were observed during site reconnaissance. Wet areas along drainage swales in the vicinity of borings GB-4 and GB-6 were observed. These areas are believed to exist as a result of slow drainage from surficial soils recharged by the last rain event. Along the main site drainage path at borings GB-10 (Hydrogeologic cross section A – A', Plate 4) and between borings GB-16 and GB-15 (Hydrogeologic cross section H – H', Plate 8) the water table is at the land surface. The Miocene shallow aquifer appears to be recharging the alluvium at these locations. However, no springs or seeps have been observed.

The subsurface was investigated by installing nested piezometers at all locations but GB-6 and GB-8. A single deep piezometer was installed at these locations while two were installed at the other locations except for GB-1 and GB-17, which received three (Table 5-1). The purpose of nested piezometers is to check for vertical gradients, perched water and aquifer interconnection in the subsurface.

As seen on hydrogeologic cross sections (Plates 4-8), the site appears to have a shallow water table aquifer underlain by multiple artesian aquifers. Vertical gradients exist that suggest a deeper aquifer under artesian pressure. This is seen clearly on hydrogeologic cross section A-A' (Plate 3) by the vertical distribution of water levels in the piezometers. A very prevalent bluish gray Miocene clay appears to underlie the entire site around elevations 20 ft - 35 ft msl. This clay varies in thickness and is

TABLE 5-1

CHASTANG LANDFILL
PIEZOMETER INSTALLATION DATA

Well Number		Well Depth (Ft.)	Screen Length (Ft.)	Ground Elevation (MSL)
GB-1	D	83.5	10.0	98.6
GB-1	I	32.1	10.0	98.6
GB-1	S	15.8	10.0	98.5
GB-2	D	60.5	10.0	100.8
GB-2	S	34.1	10.0	101.0
GB-3	D	74.0	10.0	87.7
GB-3	S	17.9	10.0	87.7
GB-4	D	46.0	20.0	77.3
GB-4	S	26.1	10.0	77.3
GB-5	D	58.4	10.0	94.5
GB-5	S	24.0	10.0	94.3
GB-6	S	30.5	20.0	76.2
GB-7	D	63.3	20.0	82.0
GB-7	S	24.0	10.0	82.1
GB-8	D	34.9	10.0	89.3
GB-9	D	38.3	20.0	72.3
GB-9	S	13.6	5.0	72.5
GB-10	D	58.6	20.0	67.6
GB-10	S	14.6	10.0	67.4
GB-11	D	50.0	10.0	90.6
GB-11	S	34.0	20.0	90.5
GB-12	D	37.5	20.0	73.2
GB-12	S	11.2	10.0	72.9
GB-13	D	26.2	10.0	67.5
GB-13	S	12.1	10.0	67.0
GB-14	D	68.5	10.0	69.6
GB-14	S	37.5	20.0	69.8
GB-15	D	47.2	10.0	67.8
GB-15	S	11.5	10.0	68.1
GB-16	D	77.2	10.0	65.5
GB-16	S	16.5	10.0	65.8
GB-17	D	72.5	10.0	101.9
GB-17	I	49.2	10.0	102.2
GB-17	S	15.2	10.0	102.4
GB-18	D	53.8	10.0	61.4
GB-18	S	26.0	20.0	61.4
GB-19	D	67.4	20.0	95.8
GB-19	S	14.6	10.0	96.2
GB-20	D	49.8	10.0	54.1
GB-20	S	12.7	10.0	54.8

very dense and stiff with an estimated permeability of 10^{-8} to 10^{-9} cm/sec. This stratum marks the approximate depth of this investigation. There is clearly an artesian aquifer below this clay as indicated by the 30 ft - 40 ft of hydraulic head above the piezometer screens in borings GB-1, 3,10,14 and P-2. Recharge to this aquifer does not appear to be associated with on site or near site sources.

Above the Miocene clay, there appears to be another artesian system. One is in the alluvium and the other in the upper Miocene. The alluvial system is not easily seen because of the variable, non-continuous lithology and the low gradient off site recharge from the west. Slight differences in nested piezometer water levels indicate a very interconnected system reflecting minor artesian characteristics. The off site recharge from the west in the alluvium does not offer much elevation change; therefore, only small hydraulic head differences in piezometers result. The alluvial deposits are primarily recharged by surface water runoff from off site as well as on site. The Miocene is the other subsurface recharge source as seen on Hydrogeologic cross section A-A', (Plate 4).

The upper Miocene artesian aquifer is found south and east of the alluvium above the bluish gray Miocene clay (Plate 1 and 4). It exists as a result of the regional dip of the Miocene and the apparent recharge from the alluvial deposits. A comparison of the hydraulic heads in piezometers GB-2D and GB-5D with the one in GB-7S support this conclusion (Table 2-1).

The shallow Miocene aquifer is found in the southern and eastern portions of the site south of the alluvium. It ties into and offers some recharge to the alluvial deposits. Presently, the most prevalent influence on this aquifer is the stormwater impoundment located on the east side of the site. This impoundment is recharging the shallow aquifer through downward infiltration and from surface water discharging to the south, which flows through the major drainage swale of the area.

The shallow aquifer is a water table aquifer in the Miocene and alluvial deposits. It is also present in the northwest corner of the site at borings GB-17 and GB-19. At this location the aquifer is a water table aquifer in the Miocene, however, it is not shallow but 35 feet below land surface as seen on Hydrogeologic cross section A-A' (Plate 4). It appears to offer recharge to the alluvial deposits down dip to the south and is believed to receive recharge at some distance north of Kelly Road, the northwest boundary of this investigation. Directly above this Miocene water table aquifer, as seen at boring GB-17 and 19, there is a perched water table within the upper 10 feet of the ridge top identified by the location of Kelly Road. This perched water table has no known connection with the underlying groundwater regime.

5.2 Groundwater Flow Regime

As seen on Plate 3, Site Potentiometric Map, the shallow water table aquifer has been modeled for this investigation. Although technically, a "water table" is not a potentiometric surface (Freeze/Cherry, 1979, Groundwater), it seems to be used synonymously for these types of investigations.

Following all slug tests, aquifer hydraulic conductivity was calculated with Super Slug (Aquifer Slug Test Analysis for Windows 95/NT) by Starpoint Software. This program offers several methods for data analysis and determination of aquifer parameters. The Bouwer and Rice method was selected for this report. This method plots a graph of the log of head ratio (Ht/Ho) on the vertical axis and the time on the horizontal axis. A straight line is fit through the data points. The slope and the intercept of the line are used to calculate the time for a head ratio of 0.01. The calculated time, the head ratio 0.01 and the other variables described above are used in the equation below to determine hydraulic conductivity (Appendix D).

Equation: $$k = \frac{r_c^2 \ln (R_e/r_w)}{2L_{scr}} \times \frac{1}{t} \times \ln \frac{(H_0)}{(H_t)}$$

Where:

k= aquifer hydraulic conductivity

r_c = radius of the well casing

t = time since slug removal or injection

H_t = head in the well at time t

H_0 = initial head change from static water level

R_e = radius of influence of the test

r_w = effective radius of the well (radius of well and gravel pack)

L_{scr} = length of the well screen or open hole

Table 5-2 presents k values for the twelve (12) piezometers selected. The average of the slug-in and slug-out k value can be used for calculating groundwater flow velocities anywhere on the site. As seen on Table 5-2, highest k values are found in the alluvium, particularly at the north end of the site. The groundwater flow velocity was calculated at this location since this is the north property line, and as seen on the site Potentiometric Map, Plate 3, all groundwater flow leaving the site follows this path. Using an average value of k between GB-18 and 20, the groundwater exit velocity was calculated to be 2.62 ft/yr. The equation below was used for the calculation.

V = ki (Darcy's Law)

Where:

V = groundwater velocity

k = Hydraulic conductivity (Average of GB-18 and GB-20)

i = Hydraulic gradient of water table between GB-18 and GB-20

Calculations:

k = 2.53 x 10^{-4} cm/sec x 1in/2.54 cm x 1ft/12 in

= 8.30 x 10^{-6} ft/sec

i = dh/dl (Hydraulic head differences in GB-18 and 20 divided by the distance between them) in ft/ft

= 5.2 ft/361.5ft = 0.01

V = (8.30 x 10^{-6} ft/sec x 60sec/min x 60 min/hr x 24 hr/day x 365 day/yr) x 0.01

= 2.62ft/yr.

Table 5-2

Slug Test Data

Boring Number	Aquifer	K Slug-In	K Slug-Out	Average K
GB-1S	Tmu	3.585×10^{-5}	2.977×10^{-6}	1.94×10^{-5}
GB-2S	Tmu	1.293×10^{-5}	No Value	1.29×10^{-5}
GB-3S	Tmu	6.712×10^{-5}	2.479×10^{-5}	4.60×10^{-5}
GB-6D	Qal	1.946×10^{-5}	1.234×10^{-4}	7.10×10^{-5}
GB-7S	Qal	8.463×10^{-5}	4.88×10^{-4}	2.86×10^{-4}
GB-11S	Qal	5.331×10^{-5}	No Value	5.33×10^{-5}
GB-14S	Qal	2.182×10^{-5}	4.843×10^{-5}	3.51×10^{-5}
GB-16S	Qal	1.143×10^{-4}	5.493×10^{-5}	8.50×10^{-5}
GB-17I	Tmu	3.101×10^{-5}	2.883×10^{-5}	2.99×10^{-5}
GB-18S	Qal	4.563×10^{-4}	9.539×10^{-5}	2.76×10^{-4}
GB-19D	Tmu	1.207×10^{-5}	3.035×10^{-6}	7.60×10^{-6}
GB-20S	Qal	3.423×10^{-4}	1.155×10^{-4}	2.29×10^{-4}

Note: K = Hydraulic Conductivity cm/sec
Aquifers: Tmu =Miocene Series Undifferentiated
Qal = Alluvial

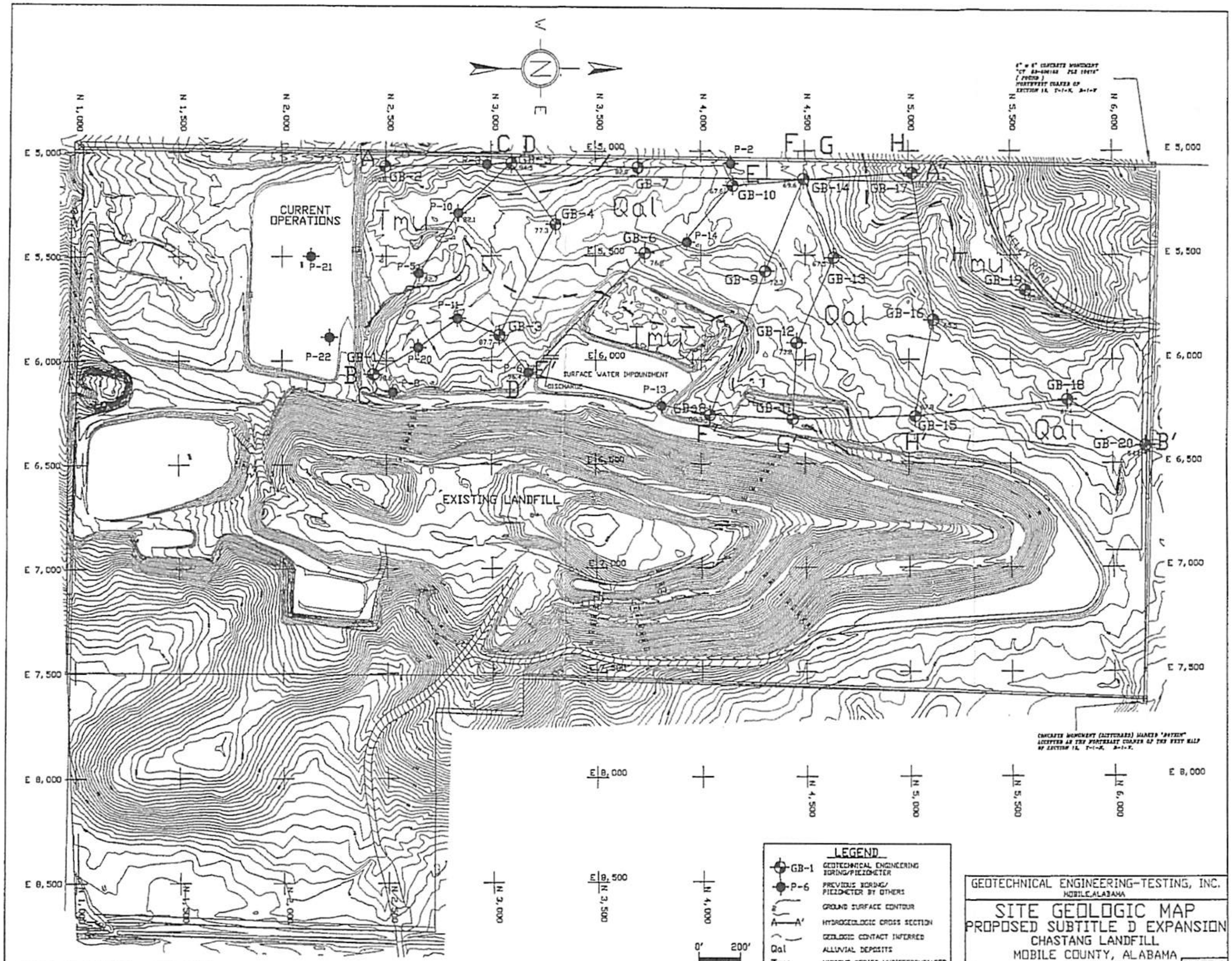
The geology and topography are the controlling factors with respect to groundwater flow in the shallow aquifer. Table 5-2 reflects k values in the alluvial aquifer, which are an order of magnitude greater than those in the Miocene aquifer. The heterogeneity of the shallow aquifer is reflected by these k values and becomes discontinuous stratigraphically at the alluvial – Miocene contact.

6.0 SUMMARY/CONCLUSIONS

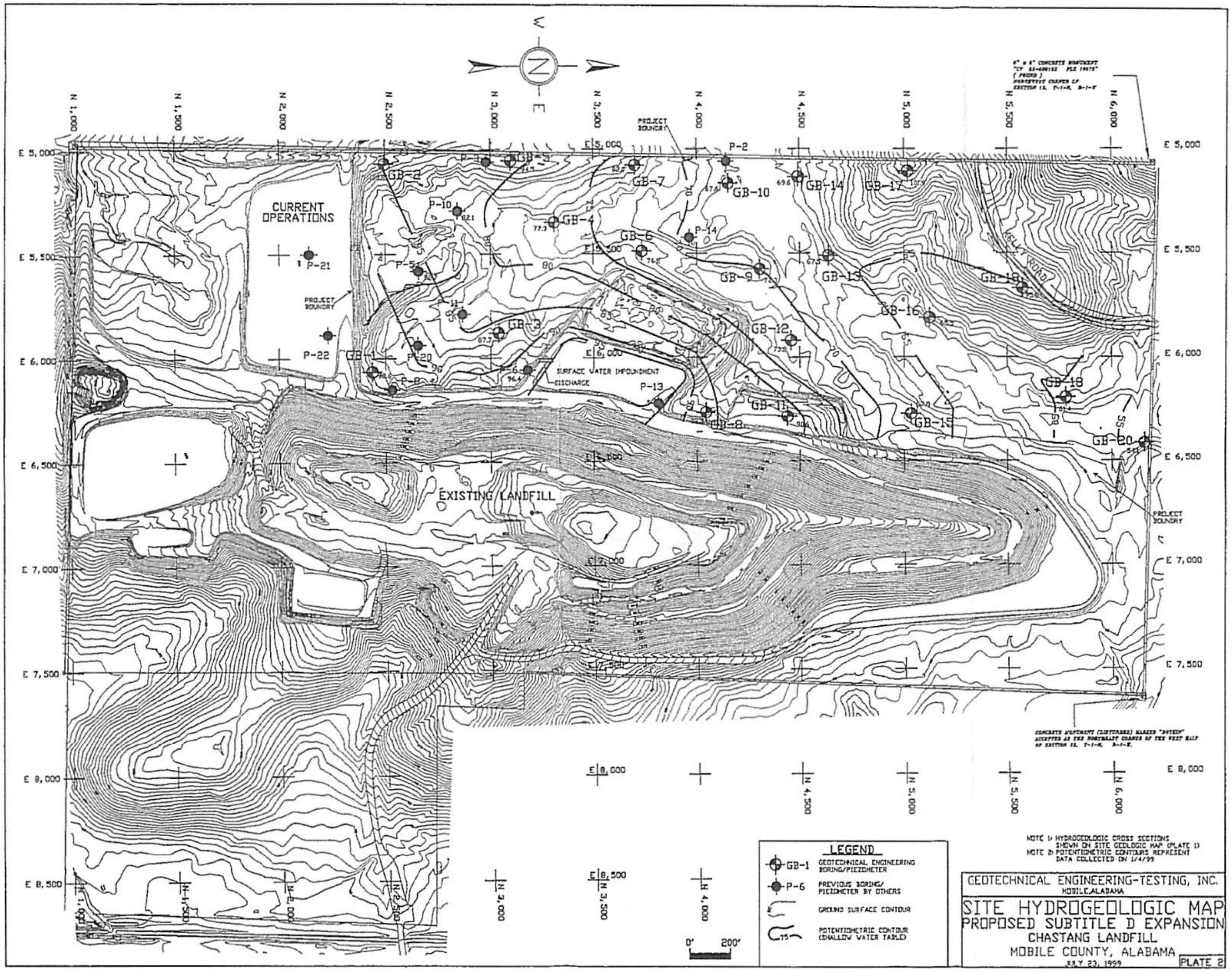
Two geologic units underlie the site: alluvial deposits and the Miocene Series undifferentiated. The alluvial deposits cover most of the site and are a result of erosion and deposition through and over the Miocene respectively. The Miocene is a major unit of the region, which strikes northwest and dips southwest. This fact is evident from the results of the investigation and has a direct bearing on the hydrogeology of the site.

There are three aquifers identified under the site. One, a shallow water table aquifer is found in both the Miocene and the alluvium. The other two are artesian and are found in the Miocene. An unconformable stratum of blueish gray clay separates the Miocene artesian aquifers. The upper artesian aquifer results from the regional dip of the unit and recharge from the alluvial deposits north of the outcrop in the southern part of the site. The lower Miocene artesian aquifer, which exhibits greater head, is recharged from offsite.

The shallow water table aquifer exhibits groundwater flow that basically follows the topography as it moves to the north where it exits the site property. This shallow aquifer is interconnected with the upper Miocene artesian system as it changes from the shallow Miocene to the alluvium. Interconnection between the upper and lower Miocene artesian aquifers may be possible as seen by some water level data in Appendix E. However, deeper exploration may be required for confirmation.



CURRENT OPERATIONS
EXISTING LANDFILL
SURFACE WATER IMPOUNDMENT
KELLY ROAD
Tmu
Qal
LEGEND
GB-1 GEOTECHNICAL ENGINEERING BORING/PIEZOMETER
P-6 PREVIOUS BORING/PIEZOMETER BY OTHERS
GROUND SURFACE CONTOUR
A—A' HYDROGEOLOGIC CROSS SECTION
GEOLOGIC CONTACT INFERRED
Qal ALLUVIAL DEPOSITS
Tmu MIOCENE SERIES UNDIFFERENTIATED
0' 200'
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
SITE GEOLOGIC MAP
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
PLATE 1



N
W
E
CURRENT OPERATIONS
PROJECT BOUNDARY
EXISTING LANDFILL
SURFACE WATER IMPOUNDMENT DISCHARGE
KELLY ROAD
GB-1
GB-2
GB-3
GB-4
GB-5
GB-6
GB-7
GB-8
GB-9
GB-10
GB-11
GB-12
GB-13
GB-14
GB-15
GB-16
GB-17
GB-18
GB-19
GB-20
P-2
P-5
P-6
P-8
P-9
P-10
P-13
P-14
P-20
P-21
P-22
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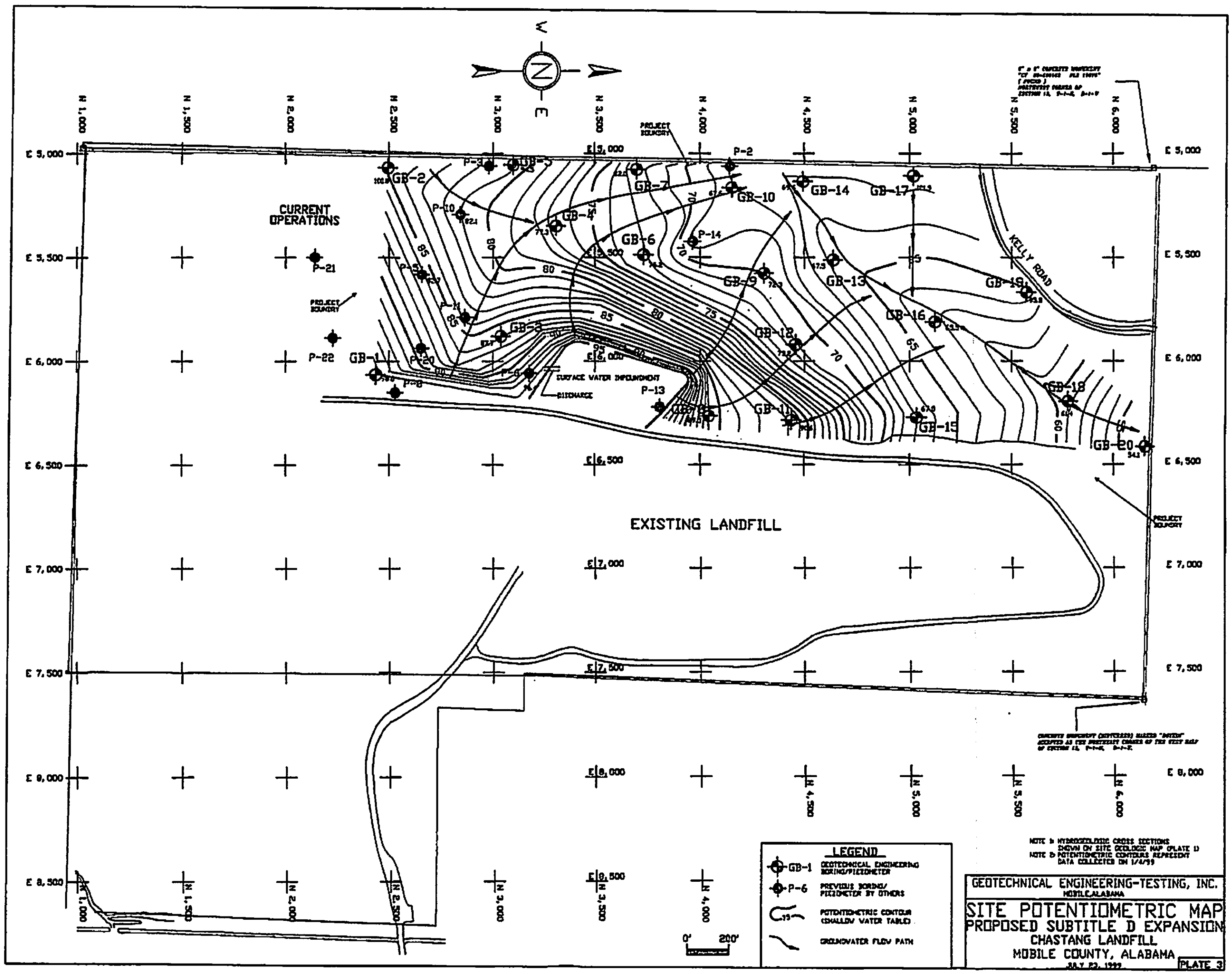
E 6,500
E 7,000
E 7,500
E 8,000
E 8,500
LEGEND
GB-1 GEOTECHNICAL ENGINEERING BORING/PIEZOMETER
P-6 PREVIOUS BORING/ PIEZOMETER BY OTHERS
GROUND SURFACE CONTOUR
POTENTIOMETRIC CONTOUR (SHALLOW WATER TABLE)
0' 200'
NOTE 1: HYDROGEOLOGIC CROSS SECTIONS SHOWN ON SITE GEOLOGIC MAP (PLATE 1)
NOTE 2: POTENTIOMETRIC CONTOURS REPRESENT DATA COLLECTED ON 1/4/99
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
SITE HYDROGEOLOGIC MAP
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999
PLATE 2



CURRENT OPERATIONS
EXISTING LANDFILL
KELLY ROAD
SURFACE WATER IMPOUNDMENT
PROJECT BOUNDARY
GB-1
GB-2
GB-3
GB-4
GB-5
GB-6
GB-7
GB-9
GB-10
GB-11
GB-12
GB-13
GB-14
GB-15
GB-16
GB-17
GB-18
GB-19
GB-20
P-2
P-3
P-5
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P-10
P-11
P-13
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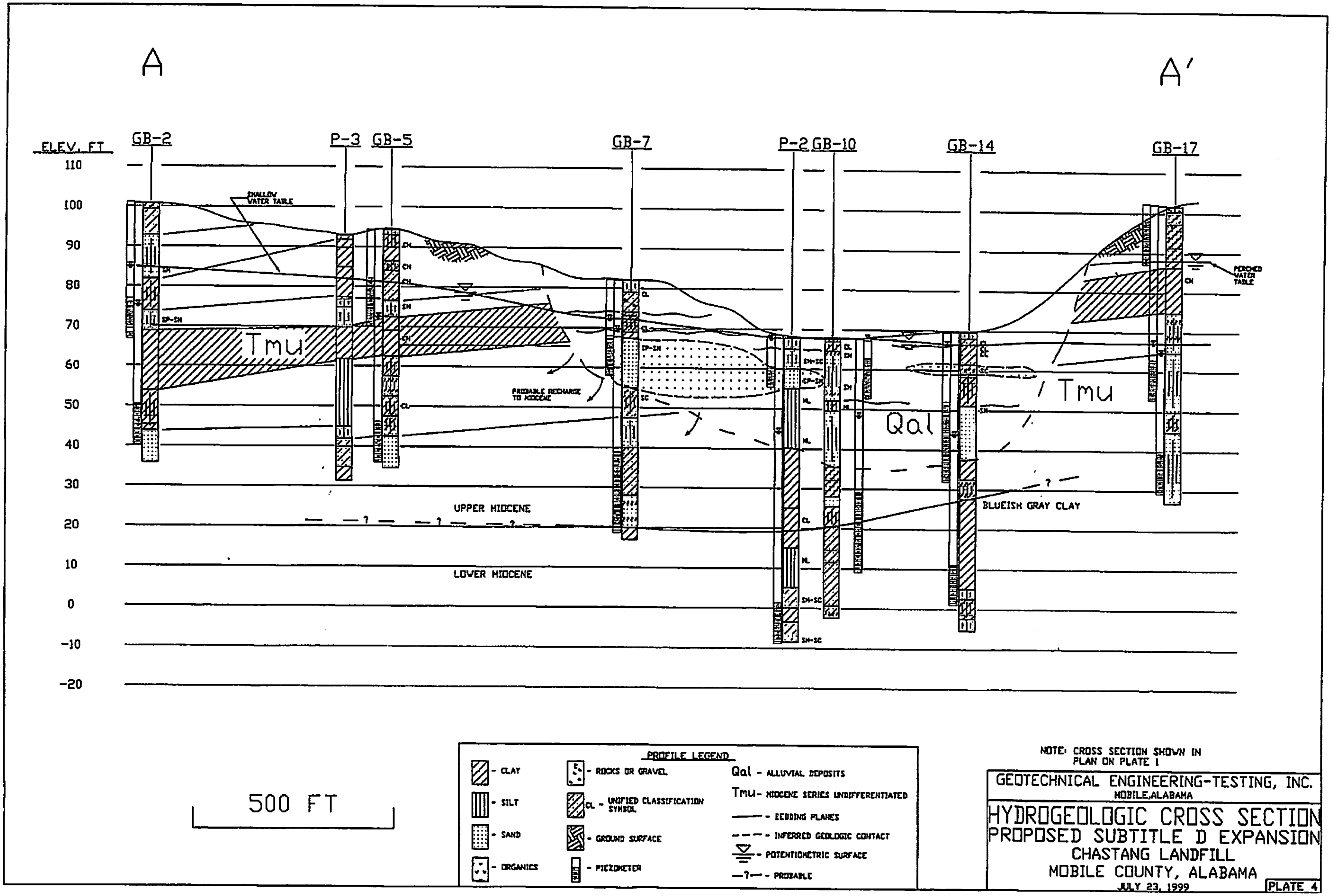
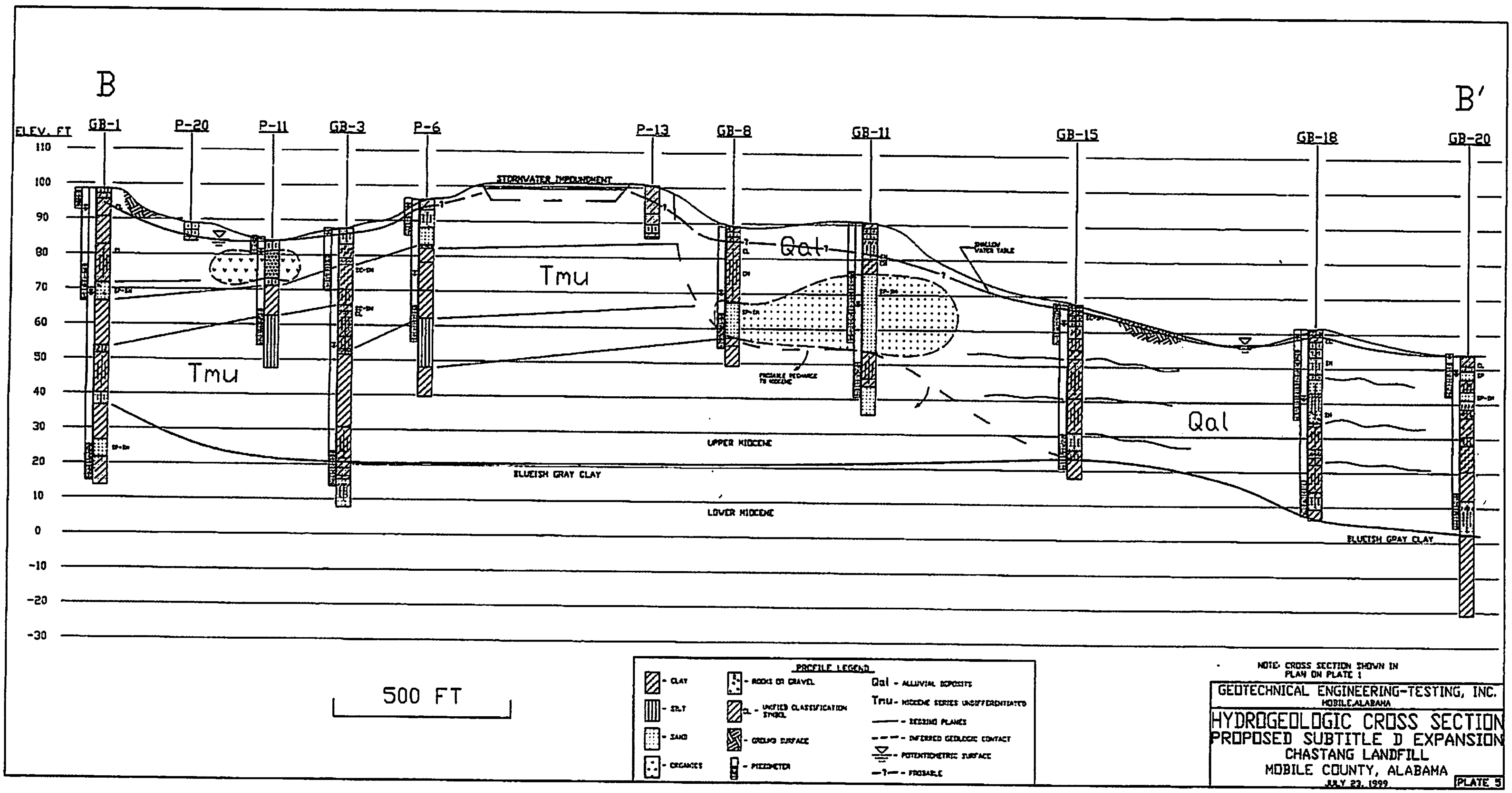
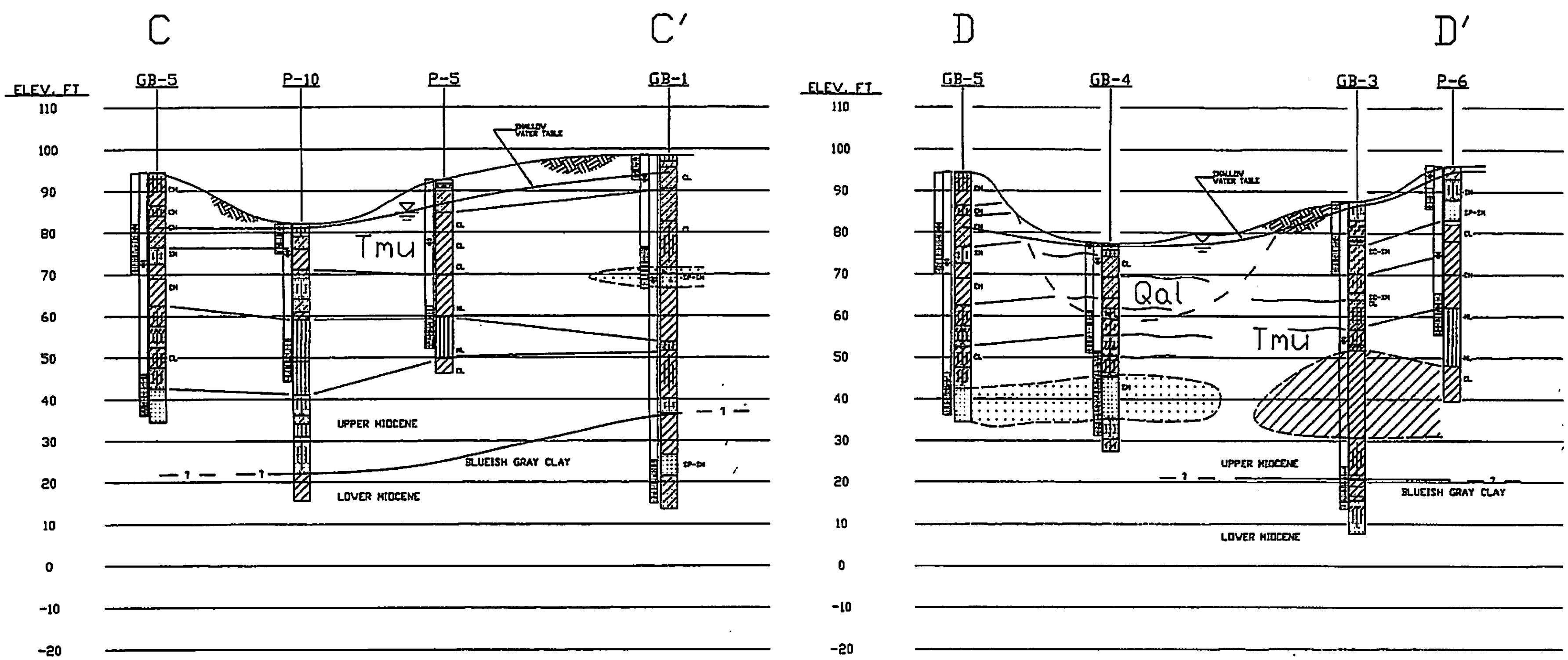
E 8,000
E 8,500
N 1,000
N 1,500
N 2,000
N 2,500
N 3,000
N 3,500
N 4,000
N 4,500
N 5,000
N 5,500
N 6,000
LEGEND
GB-1 GEOTECHNICAL ENGINEERING BORING/PIEZOMETER
P-6 PREVIOUS BORING/ PIEZOMETER BY OTHERS
POTENTIOMETRIC CONTOUR (SHALLOW WATER TABLE)
GROUNDWATER FLOW PATH
0' 200'
NOTE 1: HYDROGEOLOGIC CROSS SECTIONS SHOWN ON SITE GEOLOGIC MAP (PLATE 1)
NOTE 2: POTENTIOMETRIC CONTOURS REPRESENT DATA COLLECTED ON 1/4/99
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
SITE POTENTIOMETRIC MAP
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
PLATE 3


A
A'
ELEV. FT
GB-2
P-3
GB-5
GB-7
P-2
GB-10
GB-14
GB-17
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
SHALLOW WATER TABLE
Tmu
PROBABLE RECHARGE TO MIOCENE
Qal
Tmu
PERCHED WATER TABLE
UPPER MIOCENE
LOWER MIOCENE
BLUEISH GRAY CLAY
500 FT
PROFILE LEGEND
- CLAY
- SILT
- SAND
- ORGANICS
- ROCKS OR GRAVEL
CL - UNIFIED CLASSIFICATION SYMBOL
- GROUND SURFACE
- PIEZOMETER
Qal - ALLUVIAL DEPOSITS
Tmu - MIOCENE SERIES UNDIFFERENTIATED
- BEDDING PLANES
- INFERRED GEOLOGIC CONTACT
- POTENTIOMETRIC SURFACE
—?— - PROBABLE
NOTE: CROSS SECTION SHOWN IN PLAN ON PLATE 1
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
HYDROGEOLOGIC CROSS SECTION
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999
PLATE 4


B
B′
ELEV. FT
GB-1
P-20
P-11
GB-3
P-6
P-13
GB-8
GB-11
GB-15
GB-18
GB-20
STORMWATER IMPOUNDMENT
Qal
Tmu
Tmu
Qal
SHALLOW WATER TABLE
PROBABLE RECHARGE TO MIOCENE
UPPER MIOCENE
BLUEISH GRAY CLAY
LOWER MIOCENE
BLUEISH GRAY CLAY
500 FT
PROFILE LEGEND
CLAY
SILT
SAND
ORGANICS
ROCKS OR GRAVEL
UNIFIED CLASSIFICATION SYMBOL
GROUND SURFACE
PIEZOMETER
Qal - ALLUVIAL DEPOSITS
Tmu - MIOCENE SERIES UNDIFFERENTIATED
BEDDING PLANES
INFERRED GEOLOGIC CONTACT
POTENTIOMETRIC SURFACE
PROBABLE
NOTE: CROSS SECTION SHOWN IN PLAN ON PLATE 1
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
HYDROGEOLOGIC CROSS SECTION
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999
PLATE 5



500 FT

PROFILE LEGEND

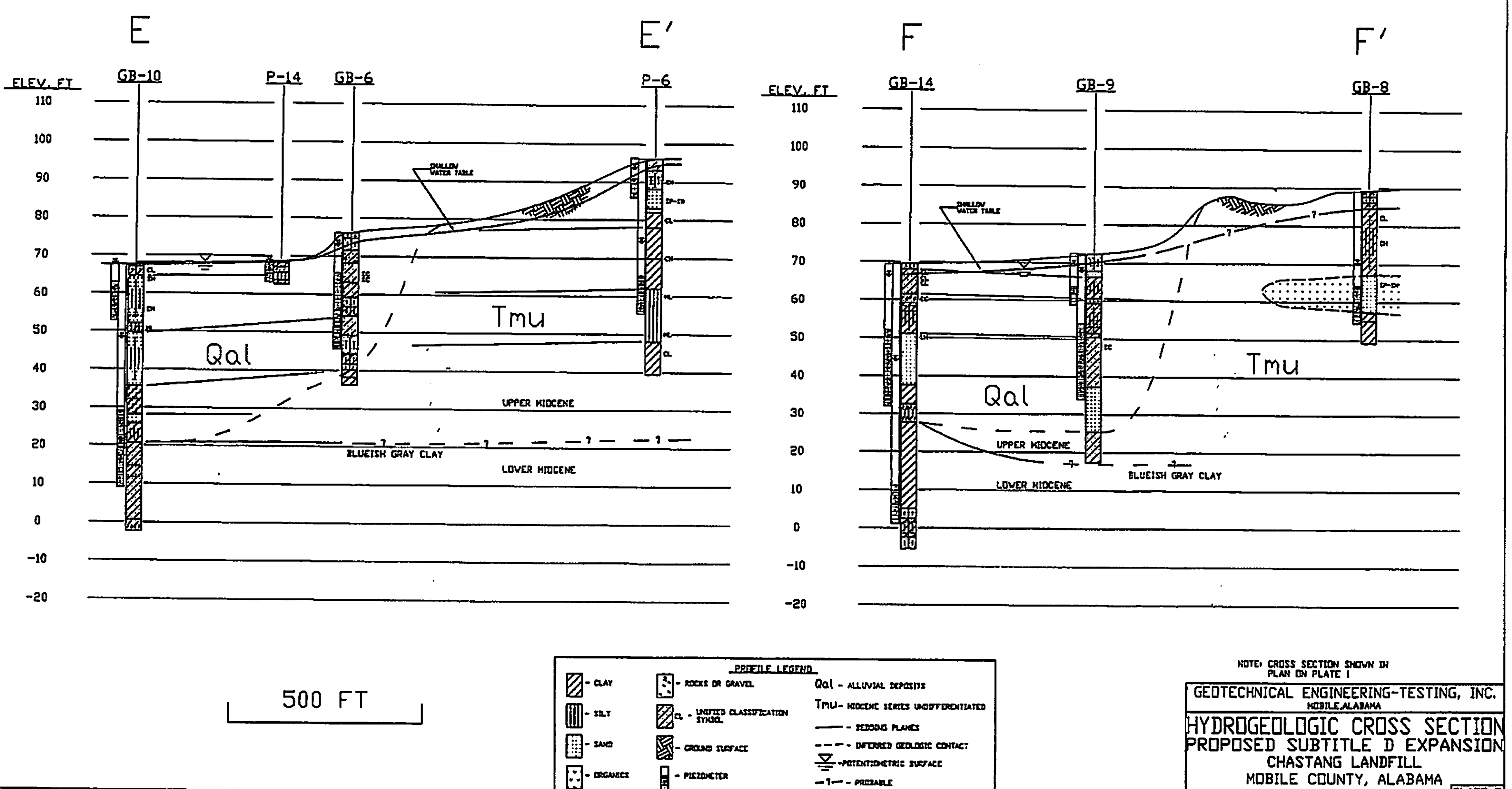
- CLAY
- SILT
- SAND
- ORGANICS
- ROCKS OR GRAVEL
- CL - UNIFIED CLASSIFICATION SYMBOL
- GROUND SURFACE
- PIEZOMETER
- Qal - ALLUVIAL DEPOSITS
- Tmu - MIOCENE SERIES UNDIFFERENTIATED
- BEDDING PLANES
- INFERRED GEOLOGICAL CONTACT
- POTENTIOMETRIC SURFACE
- ? - PROBABLE

NOTE: CROSS SECTION SHOWN IN PLAN ON PLATE 1

GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA

HYDROGEOLOGIC CROSS SECTION
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999

PLATE 6

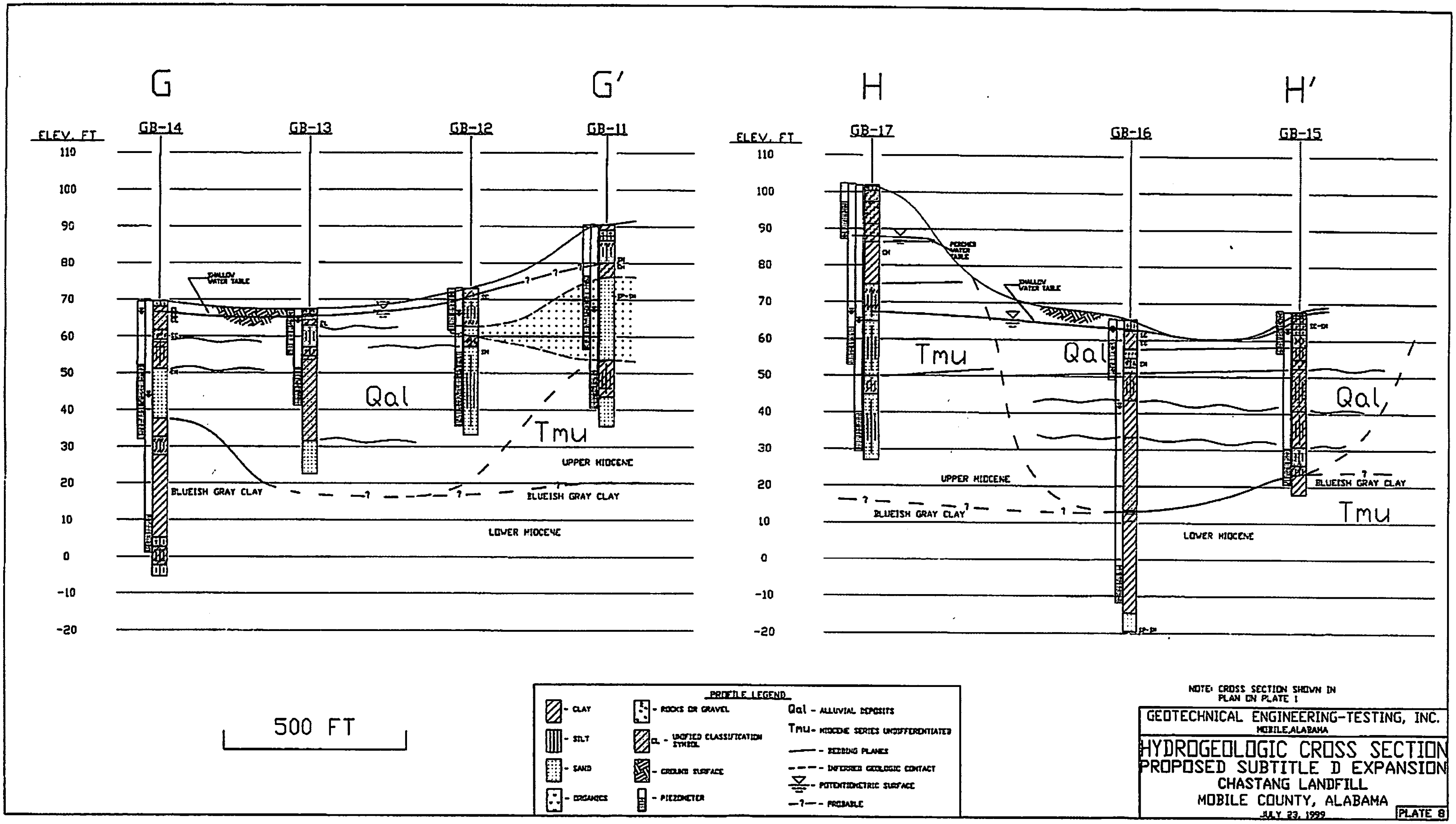


NOTE: CROSS SECTION SHOWN IN PLAN ON PLATE 1

GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA

HYDROGEOLOGIC CROSS SECTION
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999

PLATE 7


G
G'
H
H'
ELEV. FT
GB-14
GB-13
GB-12
GB-11
GB-17
GB-16
GB-15
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
SHALLOW WATER TABLE
PERCHED WATER TABLE
Qal
Tmu
UPPER MIOCENE
LOWER MIOCENE
BLUEISH GRAY CLAY
500 FT
PROFILE LEGEND
- CLAY
- SILT
- SAND
- ORGANICS
- ROCKS OR GRAVEL
CL - UNIFIED CLASSIFICATION SYMBOL
- GROUND SURFACE
- PIEZOMETER
Qal - ALLUVIAL DEPOSITS
Tmu - MIOCENE SERIES UNDIFFERENTIATED
- BEDDING PLANES
- INFERRED GEOLOGIC CONTACT
- POTENTIOMETRIC SURFACE
—?— - PROBABLE
NOTE: CROSS SECTION SHOWN IN PLAN ON PLATE 1
GEOTECHNICAL ENGINEERING-TESTING, INC.
MOBILE, ALABAMA
HYDROGEOLOGIC CROSS SECTION
PROPOSED SUBTITLE D EXPANSION
CHASTANG LANDFILL
MOBILE COUNTY, ALABAMA
JULY 23, 1999
PLATE 8

GEOTECHNICAL ENGINEERING—TESTING, INC.

LOG OF BORING

ROJECT:	JOB NO.:	ELEVATION:
BORING NO.: LEGEND	TYPE BORING:	DATUM:
LOCATION:	DATE:	GR. WATER:

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T.		w.c. %	ATTERBERG LIMITS		UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH tsf	UNIFIEC CLASS
				N_f	N_c		L.L.	P.I.				
0		WATER										
		SAND										
10		CLAY										
		SILT										
20		ORGANICS										
		GRAVEL										
30		SHELLS										
		LIMESTONE										
40												
		SPLIT-SPOON SAMPLE (STANDARD PENETRATION TEST)										
50		UNDISTURBED TUBE SAMPLE										
		SAMPLE NOT RECOVERED										
60												
70												

- Nf – Standard penetration test value determined in field–ASTM D 1586 (WOH indicates penetration of sampler under weight of 140 lb hammer)
- Nc – Standard penetration test value of sand corrected for overburden pressure by Peck–Hansen–Thornburn, 1974
- w.c. % – Percent water content based on dry soil weight
- L.L. – Liquid Limit
- P.I. – Plasticity Index
- Unit Wt., pcf – Dry unit weight of soil, pounds per cubic foot
- % Minus #200 – Percent by weight of soils finer than #200 sieve
- c – Cohesion, tons per square foot
- ∅ – Angle of internal friction, degrees
- s – Vane shear strength, tons per square foot
- Classification according to the Unified Classification System

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 98.6

BORING NO.: GB-1 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 24+38, E 60+65 CHASTANG LANDFILL | DATE: 12-2-98 | GR. WATER: 4.0' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose light brown silty sand	1	3								
		Loose light brown clayey sand	2	7								
			3	10								
		Stiff light brown sandy clay w/ gray mottling	4	11		17.9				59.4		CL
			5	14								
10		Stiff gray sandy clay w/ w/ trace sandstone & light brown mottling	6	10								
			T-1			18.2						
			7	8								
		Very stiff gray silty sandy clay w/ brown mottling	T-2			17.7	43.4	31.7	114.9	70.8	3.55E-09	CL
20			8	18								
			9	17		18.8	40.5	28.0				
30		Dense light gray sand w/ trace sandstone	10	45		24.7				8.3		SP-SM
		Stiff to very stiff light gray clay w/ some light brown mottling	11	10								
			T-3			25.4	31.6	14.6				
40			12	22								
			T-4									
		Dense dark gray sandy clayey silt	13	35								
50		Stiff to very stiff light gray silty clay w/ sand lense	14	12		18.4						
			15	28								
60		Very dense gray silty sand	16	50/5"								
		Hard blueish gray clay	17	33								
70			18	47								
		Very dense gray sand	19	87		22.9				10.7		SP-SM

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

ROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 98.6

BORING NO.: GB-1 (cont.) | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 24+38,E 60+65 CHASTANG LANDFILL | DATE: 12-2-98 | GR. WATER: 4.0' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
75		Very dense gray sand										
		Dense to very dense light gray clayey sand	20	48								
85			21	51								
		B.T. @ 85.0 FT										
95												
105												
115												
125												
135												
145												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 100.8

BORING NO.: GB-2 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 24+95, E 50+67 CHASTANG LANDFILL | DATE: 12-2-98 | GR. WATER: 16.1' BGS ON 1/4/9

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	Soft brown sandy clay w/ light gray mottling	1	3								
		2	4								
	Loose to firm brown clayey sand	3	10		16.3				36.4		
		4	13								
		5	19								
10		6	19		14.1						
	Firm to dense brown silty sand w/ some light gray mottling	7	30								
		8	36								
		9	26		24.6				26.2		SM
20		10	20		15.0	28.7	12.8				
	Stiff gray silty clay w/ light brown mottling	T-1									
		11	42		16.9						
30	Dense light brown silty sand	12	30		26.6				10.3		SP-SM
		13	18		32.7	55.2	39.8				
40	Very stiff to stiff light gray clay	14	16								
		15	12		34.1						
50		16	10								
	Stiff to hard dark gray clay w/ sand lenses										
		17	32								
60		18	50/5"								
	Very dense gray & light brown sand										
		19	50/4"								
	B.T. @ 65.0 FT										
70											

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL.87.7

BORING NO.: GB-3 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 30+38, E 58+79 CHASTANG LANDFILL | DATE: 11-18-98 | GR. WATER: 1.5' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T.		w.c. %	ATTERBERG LIMITS		DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
				N_f	N_c		L.L.	P.I.				
0		Loose brown silty sand	1	4								
			2	5								
			3	8		16.2						
		Very loose brown clayey sand w/ clay lenses & some light gray mottling	4	2								
			5	2		19.2				40.5		
			T-1									
		Firm brown silty sand w/ clay lenses	6	25								
10												
		Loose brown clayey sand w/ gray mottling	7	9		18.2	22.0	5.3		42.0		SC-SM
			8	7								
		Soft light brown silty clay w/ gray mottling	T-2									
			9	4								
20												
		Loose gray clayey sand	T-4			21.8	21.1	6.6		48.3	k=6.86E-07	SC-SM
			10	3		19.5				54.9		CL
		Soft gray sandy silty clay	T-3									
			11	6								
0												
		Medium to stiff dark gray silty clay										
		Firm dark gray silty sand w/ clay lenses	12	29								
			13	11		19.7						
40												
		Stiff to very stiff light gray clay	14	17								
			15	19								
50												
			16	15								
60			17	29								
		Very stiff gray silty clay w/ some sand lenses										
			18	25		17.5						
		Hard blueish gray sondy sandy clay w/ sand lenses	19	39								
70												
		Dense gray silty sand w/ clay lenses	20	36								

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

'OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98–392 | ELEVATION: EL. 87.7

BORING NO.: GB–3 (cont.) | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 30+38, E 58+79 CHASTANG LANDFILL | DATE: 11–18–98 | GR. WATER: 1.5' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
75		Very dense gray silty sand	21	58								
		B.T. @ 80.0 FT										
85												
95												
)5												
115												
125												
135												
145												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 77.3

BORING NO.: GB-4 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 33+04, E 53+50 CHASTANG LANDFILL | DATE: 12-11-98 | GR. WATER: 0.4' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very soft brown clayey sand	1	WOH								
		Very loose light brown silty sand	2	2		19.1						
		Stiff & very stiff light brown sandy clay w/ sand lenses & orange & gray mottling	3	15								
			T-1			18.3	39.0	23.8	109.9	64.6	k=2.70E-06	CL
			4	20								
			5	14								
10		Stiff light brown sandy clay w/ gray mottling	6	11		19.4	35.9	19.6				
			7	14								
		Medium consistency gray clay w/ orange mottling	8	7								
		Loose dark gray silty clayey sand w/ wood fragments	9	4		23.2				34.6		
20		Soft gray sandy silty clay	10	3		17.0						
		Firm light gray silty sand w/ sandy clay lenses	11	22								
30		Very stiff gray silty clay w/ sand lenses	12	26								
		Very dense gray sand	13	50/4"		22.1				18.5		SM
40			14	56								
		Dense dark brown silty sand	15	34								
		Very dense light gray silty clayey sand	16	62								
50		B.T. @ 50.0 FT										
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

.ROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 94.5

BORING NO.: GB-5
TYPE BORING: ASTM D 1586, 1587
DATUM: MSL

LOCATION: N 31+00, E 50+50 CHASTANG LANDFILL
DATE: 12-12-98
GR. WATER: 13.0' BGS ON 1/4/

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	3" Topsoil										
	Loose light brown silty sand	1	WOH								
	Stiff light brown & orange silty clay	2	2								
		3	15		27.0				93.6		CH
	Very stiff light brown clay w/ orange & gray mottling	4	20								
		5	14								
10	Very stiff light brown sandy silty clay w/ gray mottling	6	11		23.2				83.9		CH
	Very stiff to hard light gray sandy silty clay w/ brown mottling	7	14								
		T-4			14.9	51.0	36.6	120.4	53.4	k=3.67E-08	CH
		8	7								
		9	4								
20	Dense light brown silty sand	10	3		22.0				12.7		SM
	Very stiff brown clay w/ light gray mottling	11	22								
	Stiff light gray clay	T-1			30.6	69.8	52.6	94.3	99.9	k=3.68E-09	CH
30		12	26								
	Stiff light gray silty sandy clay	T-2									
		13	50/4"		26.2						
40	Loose dark gray silty sand w/ clay lenses	14	56								
	Hard dark gray silty sandy clay	15	34		19.4				77.5		CL
50	Dense gray silty clayey sand	16	62								
	Very dense to dense gray fine sand	17	50/5"								
60		18	33								
	B.T. @ 60.0 FT										
70											

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION	JOB NO.: 98-392	ELEVATION: EL. 76.2
BORING NO.: GB-6	TYPE BORING: ASTM D 1586, 1587	DATUM: MSL
LOCATION: N 37+33, E 54+89 CHASTANG LANDFILL	DATE: 12-16-98	GR. WATER: 2.9' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose brown silty sand w/ trace organics	1	6								
		Loose to firm light brown silty sand w/ red mottling	2	6								
			3	26								
		Stiff brown sandy clay w/ light gray & red mottling & some sandstone	4	12		17.3						
			T-1									
			5	12		18.6	32.8	19.7				
10		Firm to loose light gray clayey sand w/ brown mottling	6	13								
			T-2			18.0	30.8	19.8	110.4	37.4	k=7.58E-06	SC
			7	8		19.8	33.7	20.1		38.4		SC
		Stiff light gray sandy clay w/ sand lenses	8	14								
		Firm orange & brown silty sand	9	22								
20		Medium consistency gray silty clay	10	9		27.1						
		Firm light gray clayey sand w/ brown mottling	11	10		20.0				44.1		
30		Dense gray silty sand	12	32								
		Soft light gray silty clay w/ brown mottling										
		Firm light gray silty sand	13	14								
		Very stiff light gray clay w/ sand seams										
40		B.T. @ 40.0 FT	14	17								
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 82.0
BORING NO.: GB-7 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL
LOCATION: N 37+00, E 50+75 CHASTANG LANDFILL | DATE: 12-16-98 | GR. WATER: 9.7' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose brown silty sand w/ trace organics	1	4								
			2	8								
		Stiff to very stiff brown sandy clay w/ trace sandstone & gray mottling	T-1			19.8	46.4	30.5	109.6	69.6	k=2.70E-07	CL
			3	10								
			4	22								
			5	17								
10		Very stiff light gray sandy silty clay w/ light brown sand lenses & red mottling	6	16								
			7	16		18.5				56.4		CL
		Stiff light brown clay w/ gray mottling	8	37		19.5	51.6	34.6				
			9	84		22.1				7.4		SP-SM
20		Very dense light brown sand	10	50/4"								
			11	41								
30		Loose gray silty clayey sand w/ silt & clay lenses	12	7		25.5				46.5		SC
			13	25								
		Firm light gray silty sand										
40			14	26								
			15	27								
50		Very stiff to hard light gray sandy clay	16	29		15.4						
			17	71								
60		Very dense light gray sand w/ trace clay lenses	18	74								
		Hard blueish gray clay w/ brown mottling	19	31								
		B.T. @ 65.0 FT										
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION	JOB NO.: 98-392	ELEVATION: EL. 89.3
BORING NO.: GB-8	TYPE BORING: ASTM D 1586, 1587	DATUM: MSL
LOCATION: N 40+44, E 62+63 CHASTANG LANDFILL	DATE: 12-12-98	GR. WATER: 19.2' BGS ON 1/4/9

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	Very soft orangish brown sandy silty clay	1	2								
	Loose light brown silty sand	2	5								
	Soft dark brown sandy silty clay	3	3		20.8						
		4	3								
		5	4		23.7				55.9		CL
10		6	7								
	Soft to stiff light gray sandy silty clay w/ red & brown mottling	7	4								
		T-1			22.8	52.2	35.1	105.4	75.8	k=8.98E-08	CH
		8	9								
		9	11								
20		10	8		22.0						
	Dense to very dense light brown sand	11	48		19.0				11.5		SP-SM
30		12	73								
	Medium to stiff light gray clay w/ coarse sand layer & red & brown mottling	13	5		18.9						
40		14	8								
	B.T. @ 40.0 FT										
50											
60											
70											

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

.OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
BORING NO.: GB-9
LOCATION: N 43+08, E 55+76 CHASTANG LANDFILL

JOB NO.: 98-392
TYPE BORING: ASTM D 1586, 1587
DATE: 12-17-98

ELEVATION: EL. 72.3
DATUM: MSL
GR. WATER: 2.6' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose to firm light brown silty sand	1	7								
			2	8								
		Very dense light brown sand w/ pea gravel	3	19		16.4						
			4	50/4"								
		Stiff light gray sandy silty clay w/ brown mottling	5	12								
			T-1									
10			6	7								
		Firm light gray silty sand w/ brown mottling	7	21								
			T-2			15.7	19.5	5.7				
			8	9								
		Medium & stiff light gray sandy clay w/ sand layers	9	4								
20			10	26								
			11	14		21.3				42.4		SC
30		Firm light gray clayey sand w/ brown mottling	12	15								
			13	22		20.6						
40		Firm light brown sand	14	17		31.4						
			15	15								
50		Stiff light brown sandy clay w/ orange mottling	16	14								
			17	9								
		B.T. @ 55.0 FT										
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 67.6

BORING NO.: GB-10
TYPE BORING: ASTM D 1586, 1587
DATUM: MSL

LOCATION: N 41+54, E 51+63 CHASTANG LANDFILL
DATE: 12-08-98
GR. WATER: 0.6' AGS ON 1/4/!

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		6 " Topsoil	1	WOH								
		Very soft to soft gray sandy silty clay	T-2			22.0	25.4	7.5	106.8	52.8	k=1.87E-06	CL
			2	3								
			3	20		24.0				28.3		SM
			4	22								
			5	10								
		Loose & firm light gray silty sand w/ clay lenses w/ some brown mottling	6	15								
10			7	16		24.3				33.9		SM
			8	8								
		Loose gray sandy clayey silt	9	8		22.7	NP	NP		69.7		ML
20			10	9								
		Loose & firm light gray silty sand w/ brown mottling	11	21								
.0			12	7								
		Soft light gray sandy clay w/ sand lenses & brown mottling	13	3		24.2	22.0	8.9				
40		Dense brown fine sand	14	39								
		Stiff gray silty clay	15	13								
50			16	26								
			17	26		24.1				62.0		
		Very stiff blueish gray sandy clay w/ sand lenses										
60			18	15								
			19	22								
70		Firm gray silty clayey sand w/ clay lenses	20	19								
		B.T. @ 70.0 FT										

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 90.6

BORING NO.: GB-11 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 44+40, E 62+86 CHASTANG LANDFILL | DATE: 12-14-98 | GR. WATER: 20.7' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Medium brown sandy clay w/ orange & gray mottling	1	6								
		Firm light brown silty clayey sand	2	22								
			3	8								
		Loose light gray silty sand	4	26		14.1						
		Firm light brown silty sand w/ gray clay lenses	5	16								
10			6	32		11.5				17.9		SM
		Very stiff light gray clay w/ red & brown mottling	T-1			18.8	50.9	37.1	112.1	84.8	k=2.64E-08	CH
			7	22								
			T-2									
			8	32								
20			10	62		16.7				9.7		SP-SM
		Very dense light brown sand	11	59								
30			12	20								
			13	11								
40		Stiff to very stiff light gray silty clay w/ some sand lenses & brown & red mottling	14	9		18.9	19.7	5.2				
			15	28								
50		Dense to very dense light gray sand w/ brown mottling	16	35								
			17	68		13.2						
		B.T. @ 55.0 FT										
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
BORING NO.: GB-12
LOCATION: N 44+56, E 59+20 CHASTANG LANDFILL

JOB NO.: 98-392
TYPE BORING: ASTM D 1586, 1587
DATE: 12-18-98

ELEVATION: EL. 73.2
DATUM: MSL
GR. WATER: 1.7' BGS ON 1/4/9

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	3" Topsoil										
	Very loose to loose brown clayey sand	1	2								
		2	7		16.2				47.4		SC
	Firm to dense brown silty sand w/ clay lenses	3	12								
		4	19								
		5	21		18.9						
10		6	31								
	Firm light gray sand	7	23								
	Very soft black sandy silty clay w/ trace wood	8	WOH		30.2						
	Dense to firm light gray silty sand w/ brown mottling	T-1			19.3	NP	NP	112.4	29.7	k=1.94E-05	SM
20		10	45		12.6				31.9		
		11	35								
3		12	29								
		13	16								
40	B.T. @ 40.0 FT	14	24								
50											
60											
70											

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

'OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98–392 | ELEVATION: EL. 67.5
BORING NO.: GB–13 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL
LOCATION: N 46+39, E 55+09 CHASTANG LANDFILL | DATE: 12–07–98 | GR. WATER: 1.4' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very soft dark gray sandy silty clay w/some wood	1	WOH								
		Very loose light brown silty clayey sand	2	WOH		23.4						
		Stiff light gray sandy clay w/ brown mottling	3	21		17.7	14.8	2.0		50.8		CL
			4	29								
		Firm light brown silty sand	5	26								
10			6	29								
		Very stiff orangish brown sandy silty clay w/ sandstone	7	17		21.4						
			8	7								
			T–1			22.3	21.5	1.8				
20			9	18								
		Medium to very stiff light gray sandy clay w/ some sand lenses	10	15		25.9						
0			11	15								
			T–2									
			12	10		21.3						
			T–3									
40		Firm gray fine sand	13									
			14	27		20.1						
		B.T. @ 45.0 FT										
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 69.6

BORING NO.: GB-14
TYPE BORING: ASTM D 1586, 1587
DATUM: MSL

LOCATION: N 44+95, E 51+32 CHASTANG LANDFILL
DATE: 12-01-98
GR. WATER: 3.1' BGS ON 1/4/9

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	Very loose gray silty sand	1	3								
	Soft light gray & brown sandy clay	2	4		18.2				62.1		CL
	Stiff light gray & brown sandy clay w/ red mottling	3	12		16.0	27.5	12.6				CL
		T-2			18.6	28.4	15.0	107.3		k=1.61E-06	CL
		4	18								
		5	14		20.2						
10	Firm red & brown clayey sand w/ clay lenses	6	12		19.6				42.4		SC
	Stiff to medium gray & brown silty clay w/ sand lenses	7	10								
		8	4		24.0						
		T-1			17.0	18.5	8.4	117.8		k=5.14E-07	
20	Firm light gray fine sand	9	26		21.2				14.0		SM
		10	19								
		11	15								
	Stiff blueish gray clay	12	13		22.6						
40	Firm light gray silty sand w/ some clay lenses	13	28								
	Stiff to very stiff blueish gray clay	14	14								
50		15	23		18.1	30.4	19.5				
		16	31								
60		17	25								
		18	25								
	Firm gray silty sand										
70	Very stiff gray silty clay w/ sand lenses	19	17								
	Loose gray silty sand B.T. @ 75.0 FT	20	7								

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 67.8

BORING NO.: GB-15 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 50+33, E 62+71 CHASTANG LANDFILL | DATE: 12-14-98 | GR. WATER: 1.2' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T.		w.c. %	ATTERBERG LIMITS		DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
				N_f	N_c		L.L.	P.I.				
0		9" Topsoil										
		Very loose brown silty sand	1	3								
		Soft brown sandy silty clay	2 T-1	2		37.4	19.9	6.6		58.3 42.7		SC-SM
		Very soft brown silty clay	3	WOH								
		Dark brown silty clayey sand	4 T-2	WOH		34.3				35.2		
		Loose light gray silty clayey sand	5	5		17.2				32.2		
			6	7								
10		Stiff light gray sandy silty clay	T-3 7	8								
		Medium consistency dark brown organic clay	8 T-4	5		56.1						
			9	2		21.4						
20		Soft to stiff gray sandy silty clay w/ trace organics	10 T-5	WOH		27.5	NP	NP				
			11	10								
0		Stiff light gray silty clay w/ brown mottling	12	9		23.0						
			13	15								
40		Firm brown silty sand w/ gray clay lenses	14	21		21.2				49.8		
		Soft gray sandy silty clay w/ trace organics										
			15	22								
		Very stiff blueish gray clay w/ sandstone & some brown mottling										
50			16	17								
		B.T. @ 50.0 FT										
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 65.5

BORING NO.: GB-16 | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 51+19, E 58+08 CHASTANG LANDFILL | DATE: 12-08-98 | GR. WATER: 2.8' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose to loose light brown silty sand	1	3								
			2	9		15.0						
		Firm to loose light gray clayey sand w/ brown & red mottling	3	12		14.3				43.4		SC
			4	14								
			T-2			17.4	26.8	16.8	110.5	39.6	k=1.56E-05	SC
			5	6								
10		Firm orangish brown sand w/ light gray clay lenses	6	16								
		Very loose black silty sand w/ wood	7	3		37.4				18.0		SM
		Loose brown fine sand	8	4								
		Medium consistency gray sandy silty clay	T-1			20.2						
20			9	8		18.5						
		Very stiff gray clay w/ brown mottling	10	22								
30			11	22								
		Very stiff gray sandy clay	12	27		22.4				78.0		
40			13	17								
			14	16								
50			15	27								
		Very stiff blueish gray clay w/ sand seams	16	33		24.8						
60			17	16								
			18	17								
70			19	21								
			20	16		25.9	42.0	30.4				

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

ROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 65.5

BORING NO.: GB-16 (cont.) | TYPE BORING: ASTM D 1586, 1587 | DATUM: MSL

LOCATION: N 51+19, E 58+08 CHASTANG LANDFILL | DATE: 12-08-98 | GR. WATER: 2.8' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
75		Very stiff blueish gray clay	21									
		Very dense orange & brown sand										
85			22	50/3"		15.8				6.5		SP-SM
		B.T. @ 85.0 FT										
95												
.05												
115												
125												
135												
145												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

.ROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION — JOB NO.: 98-392 — ELEVATION: EL. 101.9

BORING NO.: GB-17 — TYPE BORING: ASTM D 1586, 1587 — DATUM: MSL

LOCATION: N 50+18, E 51+05 CHASTANG LANDFILL — DATE: 11-24-98 — GR. WATER: 14.3' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		4" Topsoil; Very loose brown & orange silty sand w/ organics	1	WOH								
		Very loose light brown & orange clayey sand	2	WOH								
			3	4		23.6				43.6		
		Very stiff light brown sandy clay w/ trace organics and red & gray mottling	4	18								
			5	31								
10			6	25								
		Very stiff light gray sandy clay w/ red & yellow mottling	7	22		18.4				70.4		
			8	22								
		Very stiff & hard orange & light gray clay	9	44								
			T-1			19.6	54.4	40.9	110.3	87.1	k=7.47E-09	CH
20			10	24								
			11	40								
30		Very dense light brown silty sand w/ clay lenses	12	54		20.6				40.0		
			13	63								
40		Dense & very dense orangish brown silty sand	14	53								
			15	37		17.1				12.7		
50			16	79								
		Loose light gray silty clayey sand w/ red & yellow mottling	17	7		26.2						
60		Dense & very dense gray & brown sand	18	28								
			19	50/3"								
70			20	53								
		B.T. @ 75.0 FT	21	50/5"								

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

:OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION — JOB NO.: 98-392 — ELEVATION: EL. 61.4

BORING NO.: GB-18 — TYPE BORING: ASTM D 1586, 1587 — DATUM: MSL

LOCATION: N 57+80, E 61+91 CHASTANG LANDFILL — DATE: 12-04-98 — GR. WATER: 2.1' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose dark brown silty sand w/ organics	1	2								
		Stiff brown silty sandy clay	2	8								
			T-1			16.9	24.8	11.7		52.4		CL
		Very dense light gray silty sand	3	53								
			4									
		Very stiff light gray silty sandy clay	5	16		15.9						
10		Dense to firm light gray silty sand	6	33		16.8				28.4		SM
			7	17								
		Firm gray silty clayey sand	8	14		24.1						
			9	14								
20		Firm orange & brown silty sand w/ clay layer & some sandstone	10	16								
			11	16		24.8				12.5		SM
.0		Very stiff light gray silty clay w/ sand seams	12	22								
			T-2									
		Dense light brown silty sand w/ clay layer	13	41								
		Stiff orange silty clay										
40			14	12								
		Very stiff gray silty clay	15	30								
50		Dense gray silty sand	16	34								
		Stiff blueish gray clay	17	14		24.7	42.5	30.0				
		B.T. @ 55.0 FT										
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION — JOB NO.: 98-392 — ELEVATION: EL. 95.8

BORING NO.: GB-19 — TYPE BORING: ASTM D 1586, 1587 — DATUM: MSL

LOCATION: N 55+70, E 56+66 CHASTANG LANDFILL — DATE: 11-23-98 — GR. WATER: 0.7' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose to loose brown silty sand	1	3								
			2	7								
		Firm brown silty sand w/ light gray clay lenses	3	13								
		Dense light brown clayey sand w/ red & gray mottling	4	43		15.1				25.5		SC
			5	50								
10			6	33								
		Very stiff light gray sandy clay w/ brown mottling	7	15								
			8	20		19.1				62.7		CL
			9	17								
20		Very stiff gray clay w/ sand lenses	10	19		26.7						
			11	13								
30		Dense to very dense brown sand	12	43		19.4				8.7		SP–SM
			13	80								
40			14	56								
			15	28								
50			16	32								
			17	26								
60			18	81								
			19	50/4"								
70			20	79								
		Hard gray & brown sandy silty clay; B.T. @ 75.0 FT	21	33		21.5	48.6	33.3				

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

JJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION — JOB NO.: 98-392 — ELEVATION: EL. 54.1

ƅORING NO.: GB-20 — TYPE BORING: ASTM D 1586, 1587 — DATUM: MSL

LOCATION: N 61+56, E 64+14 CHASTANG LANDFILL — DATE: 12-02-98 — GR. WATER: 0.7' ON 1/4/99

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Soft gray sandy clay	1	2								
		w/ orange & brown mottling	2	4		21.6				57.7		CL
		Firm gray clayey sand	3	14								
		Dense light brown sand w/ trace gray clay lense	4	38		20.8				4.4		SP
			5									
10		Very stiff light gray silty clay w/ sand seams	6	16		27.0						
		Firm light gray sand w/ orange mottling	7	19		24.0				7.6		SP-SM
		Loose light gray sand w/ clay lenses	8	3								
		Medium dark gray silty clay w/ wood	9	5		84.6						
20		Soft dark brown organic clay	10	4		257.	281.4	101.2				
			T-1			125.						
		Very soft dark gray silty clay w/ trace organics	11	2								
			T-2			22.0						
ɔ		Medium gray silty sandy clay	12	5								
			T-3			20.5						
			13	16								
		Very stiff greenish gray clay										
40			14	18								
			15	13								
		Firm gray silty sand w/ clay lenses										
50			16	22								
			17	21								
60			18	39								
		Very stiff to hard blueish gray clay	19	30								
70			20	31								
		B.T. @ 75.0 FT	21	50=5"								

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 68.4

BORING NO.: P-2 | TYPE BORING: ASTM D 1586 | DATUM: MSL

LOCATION: N 41+44, E 50+58 CHASTANG LANDFILL | DATE: 11-20-92 | GR. WATER: 0.5' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose tan silty sand over clayey silty sand	1	8								
		Very firm light gray to tan silty sand	2	22		19.4				39.8		SM-SC
10		Firm orange & tan sand	3	13		23.8				6.8		SP-SM
			4	7		21.0	22	5		58.7		ML
20		Firm to hard light gray and pale orange silt & clayey silt w/ occasional silty clay interbeds	5	15								
			6	36		18.0	22	5		91.3		ML
30			7	23								
		Very stiff to hard light gray, light green, & green w/ olive mottling clay to silty clay. Few lenses of silty sand	8									
40			9	34								
		Very stiff light green silty clay w/ 1" silty sand seam @ about 51 ft	10	23		18.4	33	18		75.7		CL
50			11	25								
			12	24		20.7	27	6		60.4		ML
		Stiff light green clayey silt										
60			13	12								
		Very firm green silty fine sand to clayey silty sand	14	28						30.0		SM-SC
70		Very stiff gray silty clay w/ a 1/4" peat layer @ 70.5'	15	27								
		Gray silty sand over gray clayey silty sand										

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98–392 | ELEVATION: EL. 68.4

BORING NO.: P–2 (cont.) | TYPE BORING: ASTM D 1586 | DATUM: MSL

LOCATION: N 41+44, E 50+58 CHASTANG LANDFILL | DATE: 11–20–92 | GR. WATER: 0.5' BGS ON 1/4/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
75		Gray silty sand over gray clayey silty sand	16							24.0		SM–SC
		B.T. @ 76.5 FT										
85		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study.										
95												
105												
115												
125												
135												
145												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING—TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 92.8

BORING NO.: P-3
TYPE BORING: ASTM D 1586
DATUM: MSL

LOCATION: APPROX N 29+80, E 50+60 CHASTANG LANDFILL
DATE: 11-23-92
GR. WATER: 19.2' BGS ON 12/3/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose light brown clayey silty sand Firm orange to pale orange silty clay	1	4								
		Stiff mottled light gray, red & pale orange silty clay	2	6		18.5	29	11		87.7		CL
10		Hard mottled pale orange, light gray & red sandy clay	3	35								
		Dense pale orange & light gray clayey sand Dense pale orange & light gray silty sand	4	39								
20		Dense pale orange silty sand to clayey silty sand	5	45		19.2				13.0		SM
		Stiff light gray clay w/ few small pockets of silty clay	6	12		29.0	62	44		98.0		CH
30			7	28								
			8	11								
40		Very soft to very stiff/firm light to medium gray silt to silty sand. Some clayey silt @ 41 ft	9	0								
			10	19		17.6	20	4		71.3		ML
50		Dense light gray silty sand Dense medium gray clayey silty sand	11	31								
		Very firm light greenish gray clayey silty sand	12	28								
60		Very stiff light gray clay to silty clay w/ dark orange mottling	13	24		19.4	55	40		86.4		CH
		B.T. @ 61.5 FT Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING—TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
BORING NO.: P-5
LOCATION: N 26+57, E 55+79 CHASTANG LANDFILL

JOB NO.: 98-392
TYPE BORING: ASTM D 1586
DATE: 11-30-92

ELEVATION: EL. 92.7
DATUM: MSL
GR. WATER: 15.4' BGS ON 1/12/9

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0	Brown clayey sand to silty sand Limonite										
	Firm orange & light gray clayey sand to clayey silty sand	1	20								
10		2	9		23.2	24	5		91.8		CL
	Firm light gray, pale orange & pale red silty clay	3	13		18.9				63.3		CL
20		4	14		19.9	45	31		79.5	k=3x10	CL
	Very stiff medium gray to greenish gray clay w/ several 1/8 to 1". Interbeds of gray silty sand	5	16								
30		6	50		21.1	22	2		68.3		ML
	Hard to very dense medium to dark gray silt to silty sand 1/2" silty clay @ 36'. Light gray silt @ base	7	31								
40		8	50		23.6				56.1		ML
	Hard light gray clay to silty clay w/ dark orange mottling	9	43		17.1	48	32		84.8		CL
	B.T. @ 46.5 FT										
50	Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study.										
60											
70											

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL. 96.1

BORING NO.: P-6 | TYPE BORING: ASTM D 1586 | DATUM: MSL

LOCATION: N 31+76, E 60+57 CHASTANG LANDFILL | DATE: 11-30-92 | GR. WATER: 21.5' BGS ON 1/4/

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose to firm orangish brown clayey silty sand to sandy silty clay	1	5								
		Dense white silty sand	2	31		12.9				29.2		SM
10		Firm orange to pale orange sand interbedded w/ 1/2 to 1" silty sand & sandy silty clay	3	12		21.3				8.3		SP-SM
		Limonite										
		Firm mottled pale orange, light gray & pale red clay to silty clay	4	6		23.5	43			69.4		CL
20		Stiff light gray clay to silty clay w/ dark orange mottling	5	14								
			6	21		22.1	55			93.2		CH
30		Very stiff greenish gray to green clay to silty clay w/ olive mottling & a 1/2" lense of silt @ 30.0 ft	7	20								
			8	17		24.9	24			51.1		ML
40		Very stiff medium gray silt to clayey silt	9	20								
			10	21		21.1				57.5		ML
50		Hard to very stiff light to medium gray clay to silty clay w/ dark orange mottling	11	30		16.5	32			82.8		CL
			12	22								
		B.T. @ 56.5 FT										
60		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 100.3

BORING NO.: P-8
TYPE BORING: ASTM D 1586
DATUM: MSL

LOCATION: APPROX. N 25+30, E 61+50 CHASTANG LANDFILL
DATE: 12-17-92
GR. WATER: 8.0' BGS ON 12/17/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Loose gray, brown & orange silty clayey sand (fill)	1	9								
10		Very soft to soft peat	2	0								
			3	2								
20		Firm tan & gray fine to medium silty clayey sand	4	18								
		Very firm tan & brown medium to coarse sand w/ some pea gravel	5	25								
30			6	8								
			7	14								
40		Very stiff to firm mottled light gray & orange silty sandy clay	8	16								
			9	8								
50			10	20								
		Very stiff to hard gray sandy clayey silt	11	16								
60			12	50=6"								
		Very dense gray fine silty clayey sand	13	68								
70		Hard mottled gray & brown silty sandy clay	14	31								

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 100.3

BORING NO.: P-8 (cont.)
TYPE BORING: ASTM D 1586
DATUM: MSL

LOCATION: APPROX. N 25+30, E 61+50 CHASTANG LANDFILL
DATE: 12-17-92
GR. WATER: 8.0' BGS ON 12/17/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
75		Hard mottled gray & brown silty sandy clay	15	31								
		B.T. @ 76.5 FT										
		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
85												
95												
105												
115												
125												
135												
145												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 82.1

BORING NO.: P-10
TYPE BORING: ASTM D 1586
DATUM: MSL

LOCATION: N 28+39, E 52+95 CHASTANG LANDFILL
DATE: 01-29-93
GR. WATER: 7.3' BGS ON 1/18/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose tan silty sand w/ interbedded vegetation	1	2								
		Loose dark gray clayey silty sand	2	5								
		Firm light gray silty sandy clay										
10		Loose light to medium gray clayey silty sand to silty sand	3	9								
		Firm light gray silty sand to sandy silt	4	16								
20		Very loose light gray clayey sand to sandy clay										
		Soft pale green silty clay	5	4								
		Firm to stiff medium gray silt interbedded w/ light gray silty clay from 31 to 31.5 ft	6	8								
30			7	9								
		Hard light gray silt to sandy silt	8	69								
40			9	41								
		Dense light gray silty sand over loose tan silty sand										
		Loose light gray clayey silty sand	10	8								
		Hard light gray sandy silt to silty sand										
50			11	64								
		Very dense medium gray silty sand w/ dark brownish gray organic layer @ 56.5 ft	12	60								
60			13	21								
		Very stiff light gray clay w/ dark orange mottling	14	28								
		B.T. @ 66.5 FT										
70		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: EL.
BORING NO.: P-11 | TYPE BORING: ASTM D 1586 | DATUM: MSL
LOCATION: CHASTANG LANDFILL | DATE: 02-04-93 | GR. WATER: 4.1' BGS ON 01/18/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose tan silty sand & vegetation	1	0								
		Very soft to firm black peat	2	0								
10		Loose light gray silty sand to clayey silty sand w/ rare white pebbles	3	10								
		Firm to stiff pale green clay to silty clay w/ some olive to dark orange mottling. More silty at base	4	6								
20			5	13								
		Firm to very stiff pale green silt to clayeysilt. 2"-3" interbeds of silty clay over black clay at 31 ft	6	23								
30			7	8								
			8	30								
		B.T. @ 36.5 FT										
40		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING—TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION | JOB NO.: 98-392 | ELEVATION: 100.6

BORING NO.: P-13 | TYPE BORING: ASTM D 1586 | DATUM: MSL

LOCATION: APPROX N 38+10, E 62+15 CHASTANG LANDFILL | DATE: 06-29-93 | GR. WATER: 13.0' BGS ON 7/27/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Very loose orange clayey silty sand over mixed black clayey silty sand & light brown silty sand	1	4								
10		Very loose orange clayey silty sand	2	2								
		Very loose grayish light brown silty sand										
		Light gray silty sand to clayey silty sand										
		Limonite										
		B.T. @ 15.0 FT										
20		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
30												
40												
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

.OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION	JOB NO.: 98-392	ELEVATION:
BORING NO.: P-14	TYPE BORING: ASTM D 1586	DATUM: MSL
LOCATION: CHASTANG LANDFILL	DATE: 06-29-93	GR. WATER: 0.0' BGS ON 1/12/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T.		w.c. %	ATTERBERG LIMITS		DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
				N_f	N_c		L.L.	P.I.				
0		Tan silty sand Pale orange & tan silty clay Dark gray clayey silty sand Dark gray & orange clayey silt to clayey silty sand Light gray & pale orange clayey silty sand										
		B.T. @ 6.0 FT										
10		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
20												
30												
40												
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 88.9
BORING NO.: P-20
TYPE BORING: ASTM D 1586
DATUM: MSL
LOCATION: N 26+50, E 59+35 CHASTANG LANDFILL
DATE: 08-06-93
GR. WATER: 4.0' BGS ON 8/6/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Pale orange silty to fine/ medium grained sand. Slightly clayey toward base										
		Medium gray silty sand										
		Medium gray silty clay										
		B.T. @ 5.0 FT										
		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
10												
20												
30												
40												
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

GEOTECHNICAL ENGINEERING–TESTING, INC.
LOG OF BORING

.OJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 89.5

BORING NO.: P-21
TYPE BORING: ASTM D 1586
DATUM: MSL

LOCATION: N 21+40, E 55+00 CHASTANG LANDFILL
DATE: 08-06-93
GR. WATER: 3.0' BGS ON 8/6/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Pale orange silty to fine/ medium grained sand.										
		Tan silty sand w/ peat										
		Medium gray silty sand										
		B.T. @ 5.0 FT										
		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
10												
20												
30												
40												
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

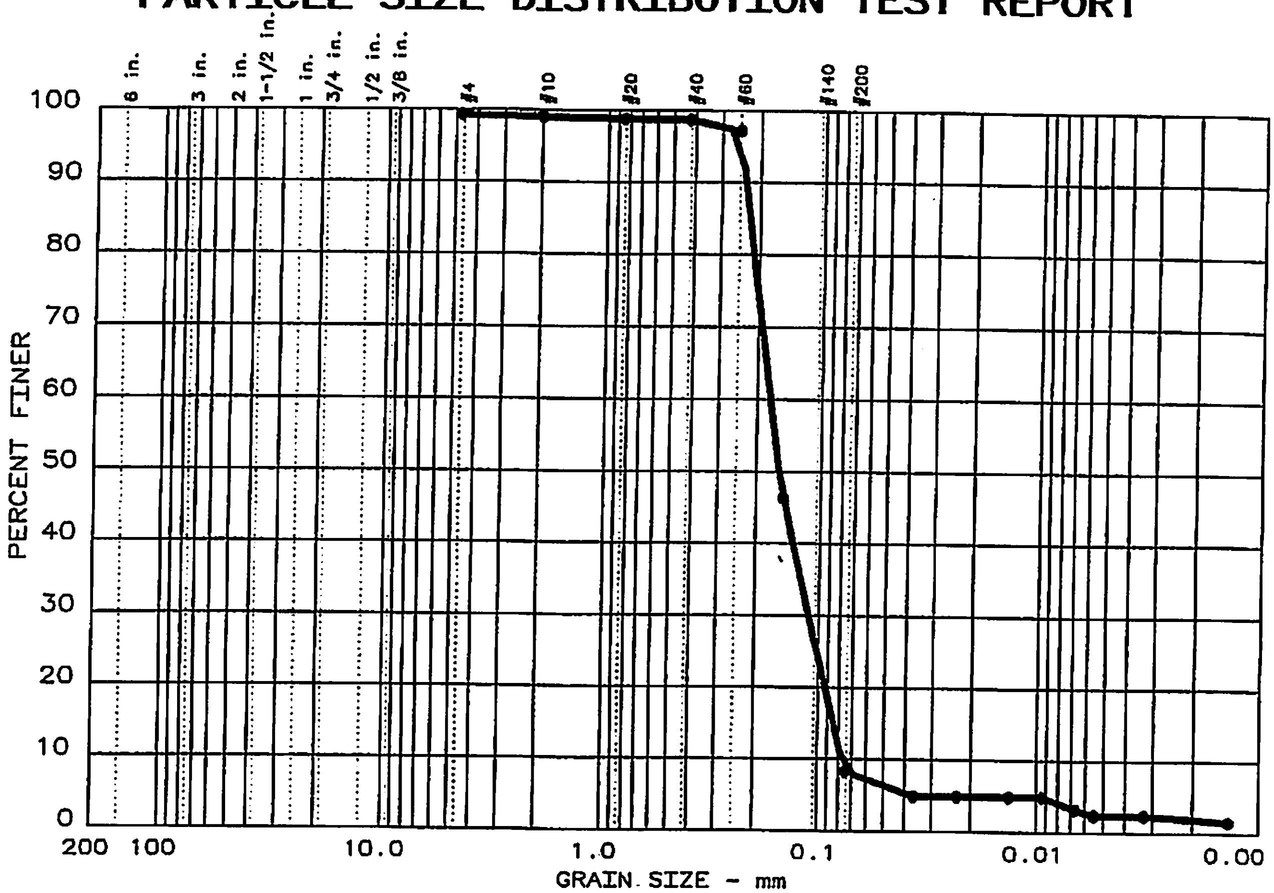
GEOTECHNICAL ENGINEERING-TESTING, INC.
LOG OF BORING

PROJECT: PROPOSED SUBTITLE D LANDFILL EXPANSION
JOB NO.: 98-392
ELEVATION: EL. 89.4
BORING NO.: P-22
TYPE BORING: ASTM D 1586
DATUM: MSL
LOCATION: N 22+30, E 58+90 CHASTANG LANDFILL
DATE: 08-06-93
GR. WATER: 2.5' BGS ON 8/6/9

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	w.c. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	PERMEABILITY (cm/sec)	UNIFIED CLASS
0		Pale orange & pale red interbedded silty sand & clay										
		Pale red, pale orange & light gray silty clay interbedded w/ silty sand										
		Tan/light gray silty sand. Pale red & pale orange color										
		Tan & pale orange silty sand w/ some silty clay										
		Pale orange & tan silty sand										
		B.T. @ 5.0 FT										
		Note: Soil boring and lab tests were performed by Southern Earth Sciences, Inc. in a previous study										
10												
20												
30												
40												
50												
60												
70												

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	1	0.0	0.7	91.0	6.0	2.3	SP-SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.17		
D_{30}	0.11		
D_{10}	0.07		

	COEFFICIENTS		
C_c	0.93		
C_u	2.3		

SIEVE number size	PERCENT FINER ●		
4	99.3		
10	99.0		
20	98.8		
40	98.7		
60	97.2		
100	46.2		
200	8.3		

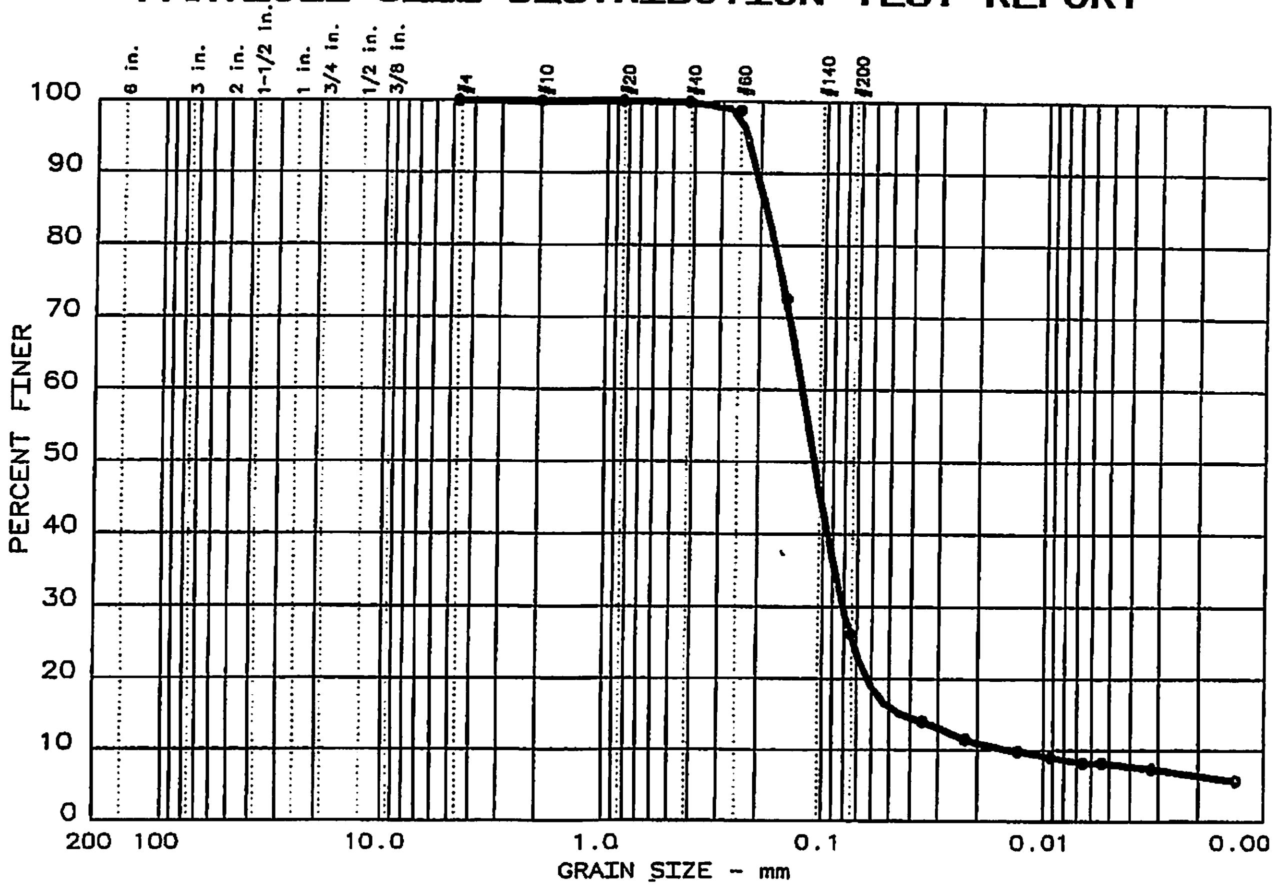
Sample information:
● GB-1, S-10, 28.5'-30.0'
LT.GRAY/YELLOW POORLY
GRADED SAND W/SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 1

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	2	0.0	0.0	73.8	18.2	8.0	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.13		
D_{30}	0.08		
D_{10}	0.01		
	COEFFICIENTS		
C_c	3.69		
C_u	9.0		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	100.0		
40	99.9		
60	98.7		
100	72.7		
200	26.2		

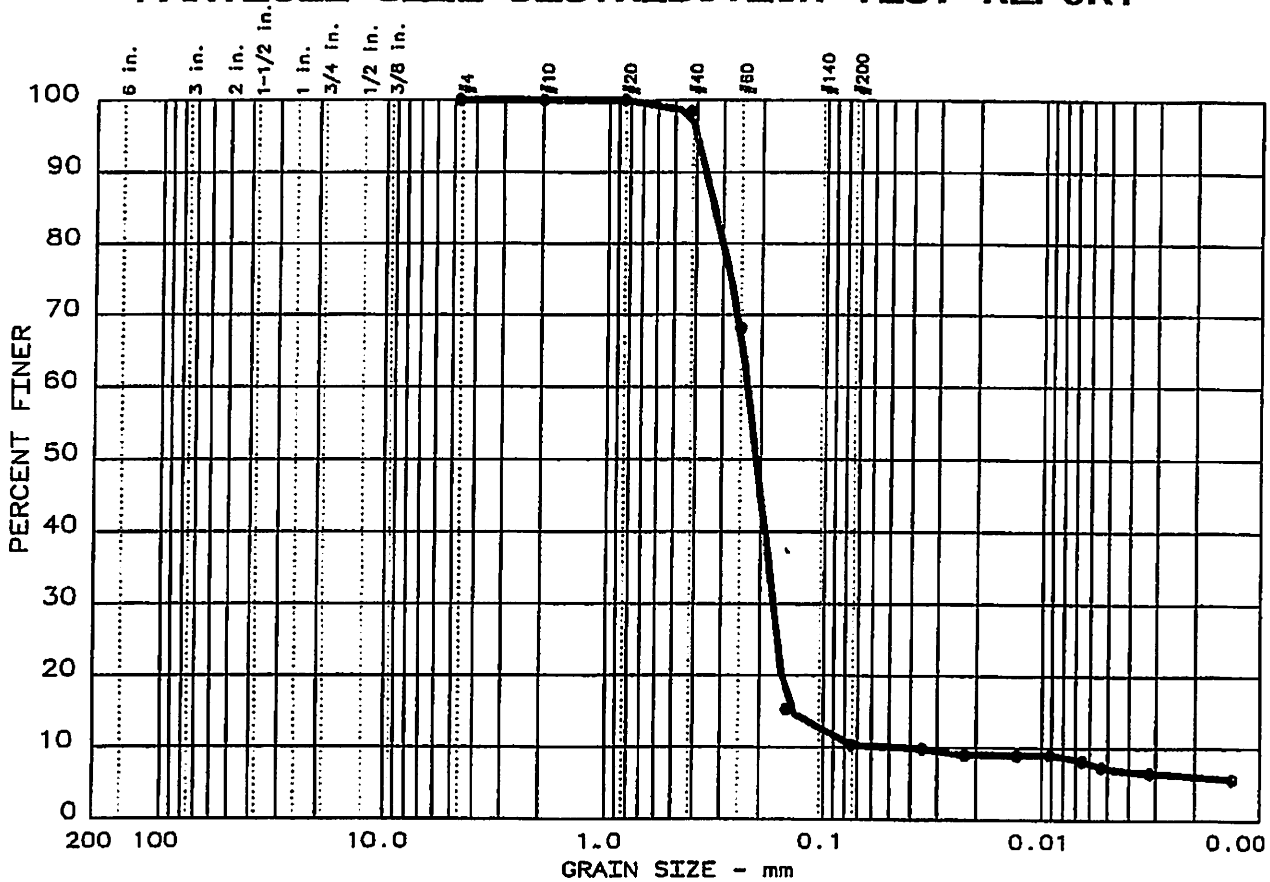
Sample information:
● GB-2, S-9, 16.0'-17.5'
YELLOW SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 2

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	3	0.0	0.0	89.7	3.2	7.1	SP-SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.23		
D_{30}	0.17		
D_{10}	0.04		
	COEFFICIENTS		
C_c	3.09		
C_u	5.5		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	100.0		
40	98.4		
60	68.2		
100	15.3		
200	10.3		

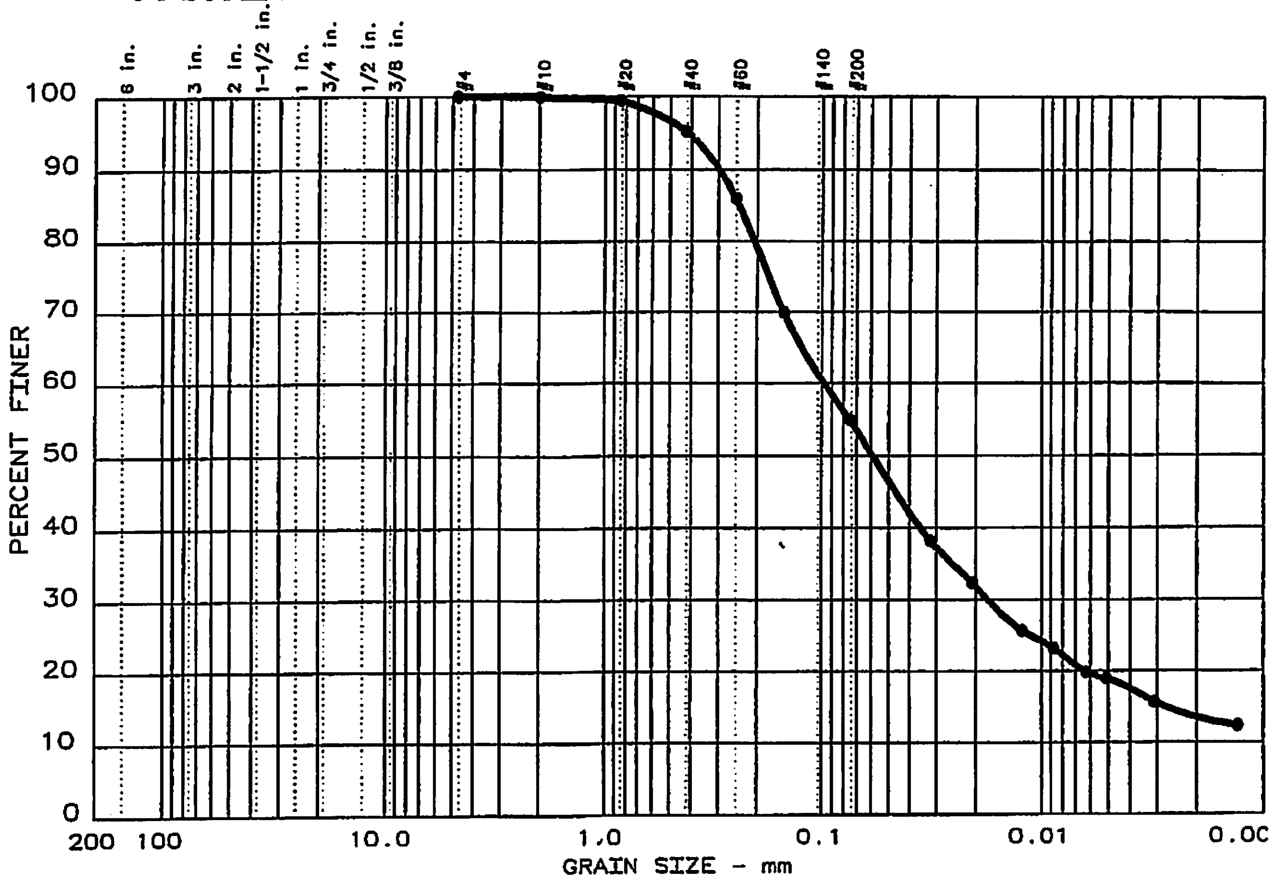
Sample information:
● GB-2, S-12, 28.5-30.0'
LT.YELLOW POORLY
GRADED SAND W/SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 3

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	4	0.0	0.0	45.1	36.0	18.9	CL		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.10		
D_{30}	0.02		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.5		
40	95.3		
60	86.0		
100	70.0		
200	54.9		

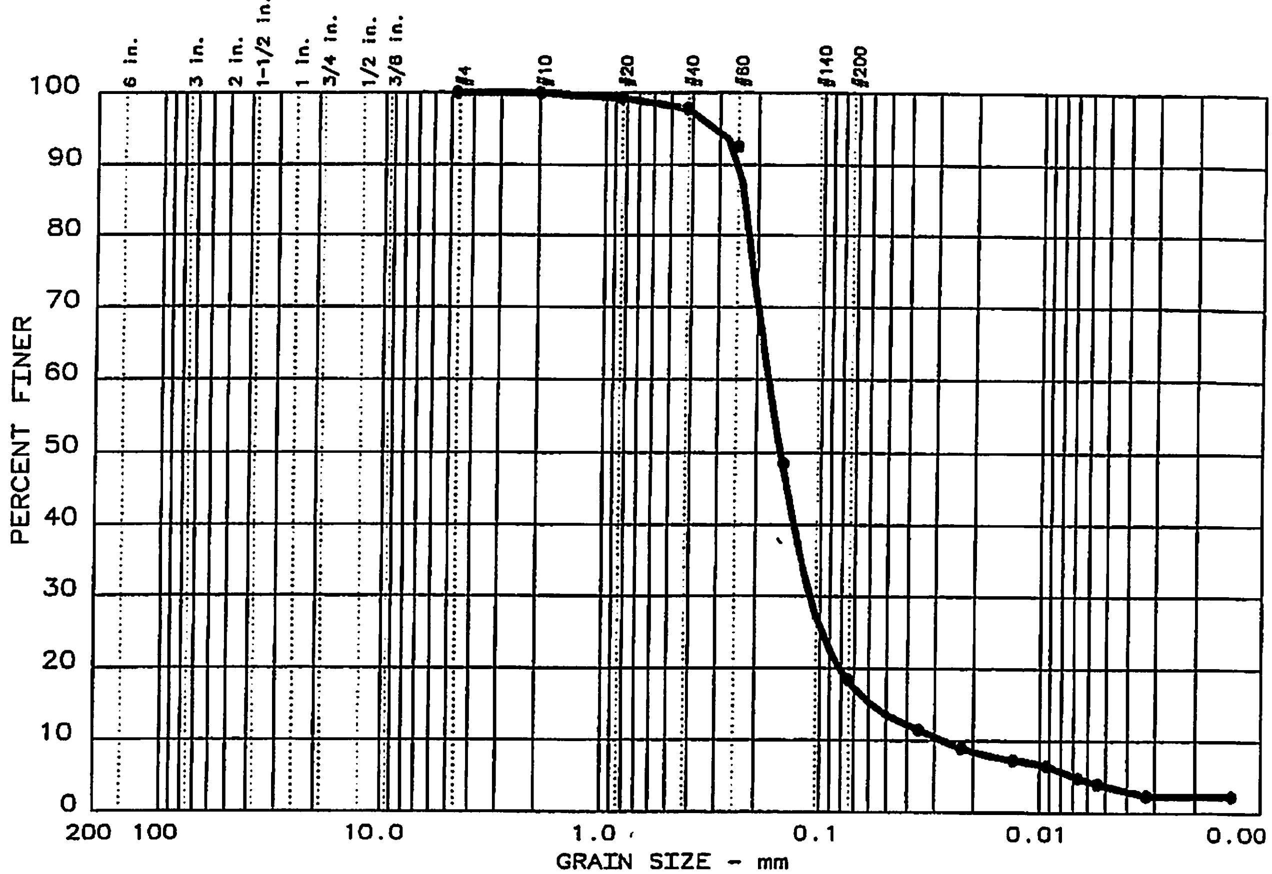
Sample information:
● GB-3, S-10, 23.5-25.0'
LT.GRAY TO GRAY
LEAN CLAY W/SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 4

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	5	0.0	0.0	81.5	14.7	3.8	SM		

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}	0.18		
D_{30}	0.11		
D_{10}	0.02		
COEFFICIENTS			
C_c	2.58		
C_u	6.4		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.9		
20	99.3		
40	97.8		
60	92.6		
100	48.5		
200	18.5		

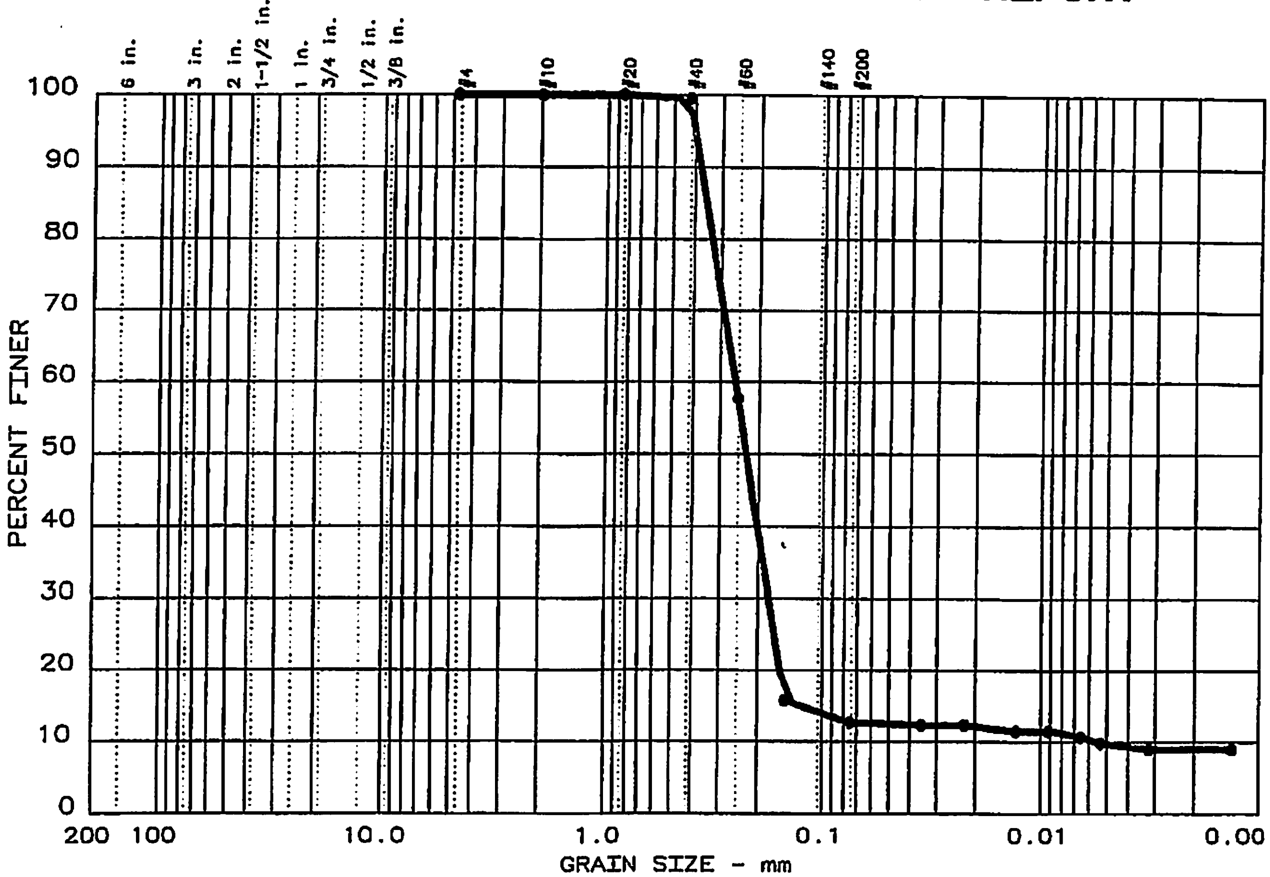
Sample information:
● GB-4, S-13, 33.5-35.0'
LT.GRAY SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 5

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	6	0.0	0.0	87.3	3.0	9.7	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.26		
D_{30}	0.18		
D_{10}	0.00		
	COEFFICIENTS		
C_c	22.41		
C_u	46.7		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	100.0		
40	99.5		
60	57.7		
100	15.8		
200	12.7		

Sample information:
● GB-5, S-10, 18.5-20.0'
YELLOW SILTY SAND

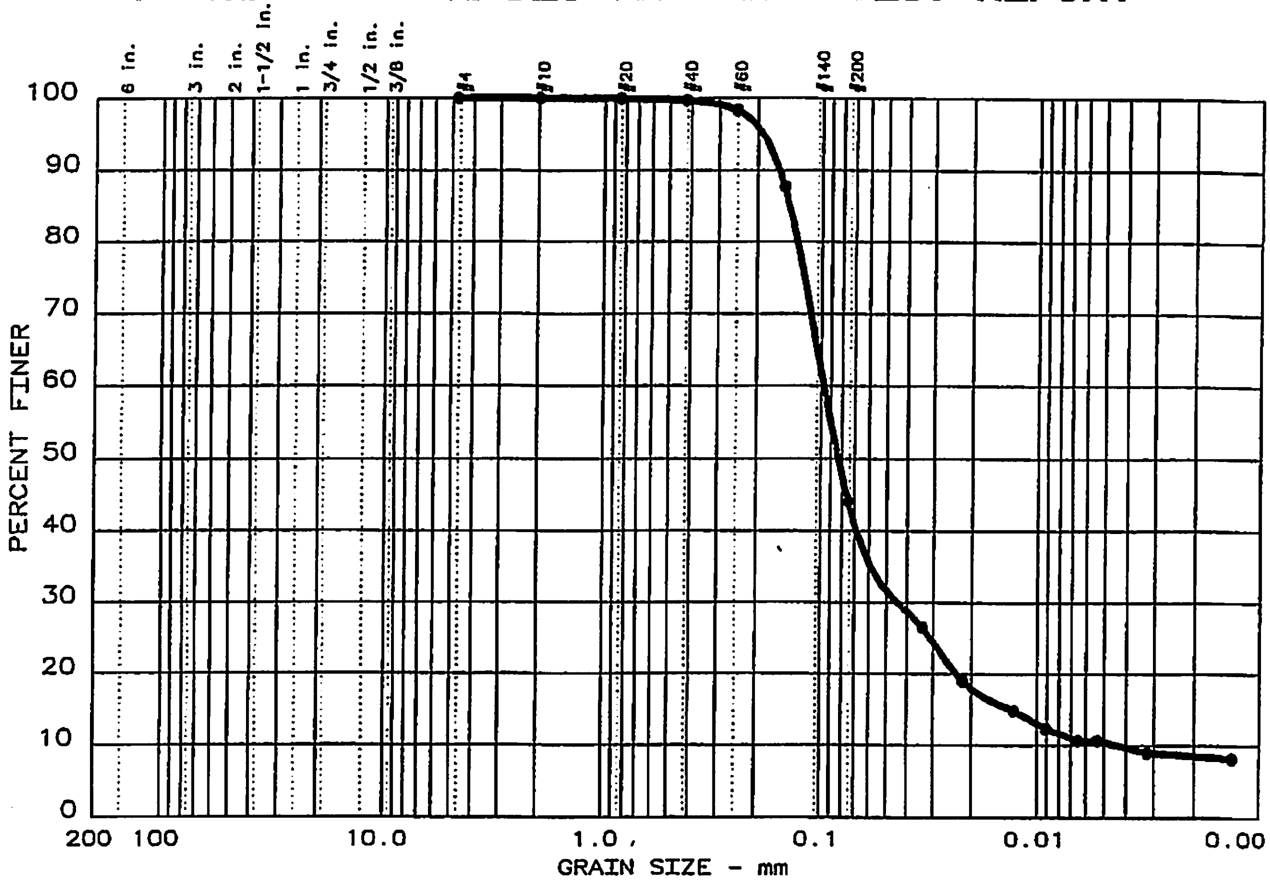
Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION

Date: 03-20-1999 Data Sheet No. 6

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	7	0.0	0.0	55.9	33.6	10.5	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.10		
D_{30}	0.04		
D_{10}	0.00		
	COEFFICIENTS		
C_c	4.78		
C_u	22.9		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	100.0		
40	99.7		
60	98.3		
100	87.8		
200	44.1		

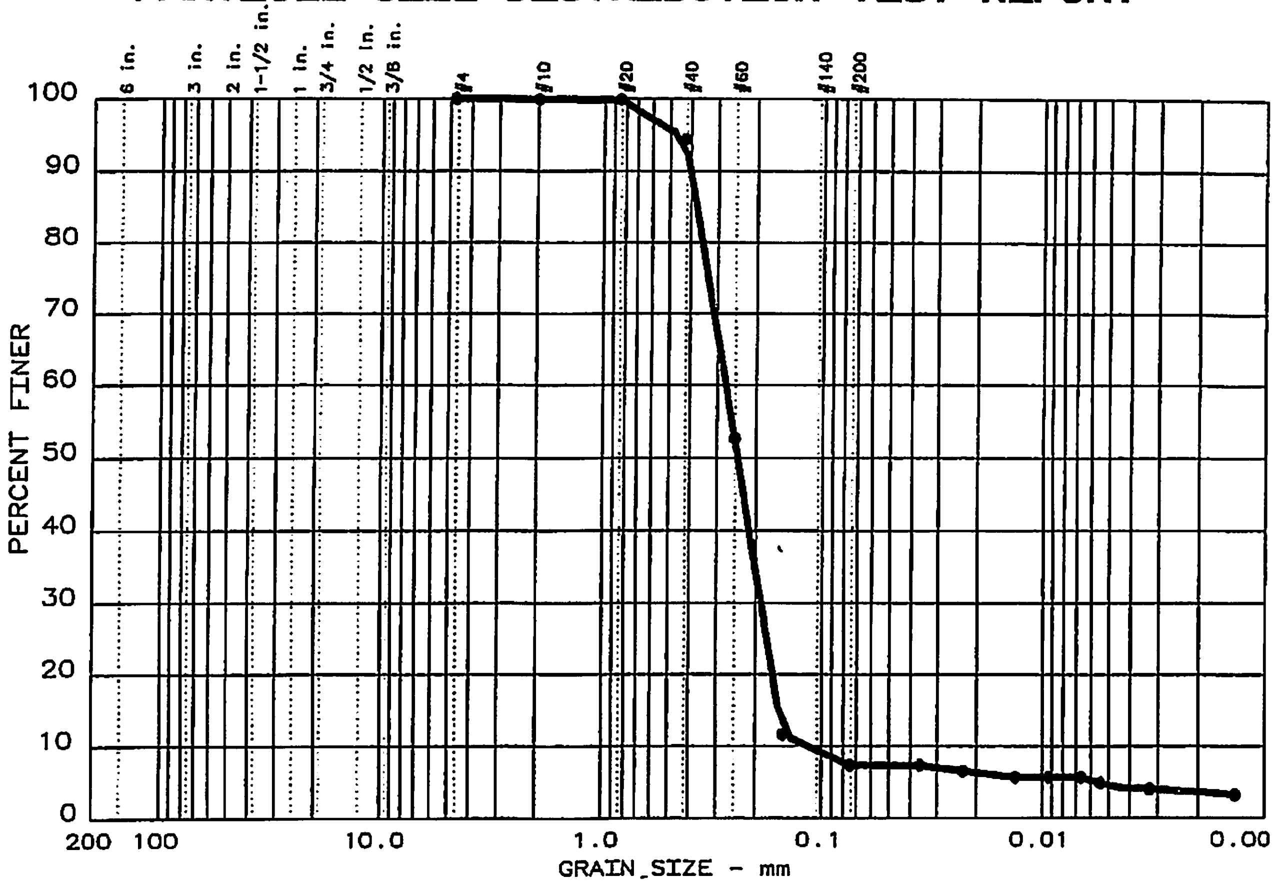
Sample information:
● GB-6, S-11, 23.5-25.0'
LT.GRAY WITH YELLOW
SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 7

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	8	0.0	0.0	92.7	2.8	4.5	SP-SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.27		
D_{30}	0.19		
D_{10}	0.11		
	COEFFICIENTS		
C_c	1.13		
C_u	2.4		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.9		
20	99.8		
40	94.4		
60	52.7		
100	11.7		
200	7.4		

Sample information:
● GB-7, S-9, 16.0-17.5'
YELLOW/DK.YELLOW POORLY GRADED SAND W/SILT

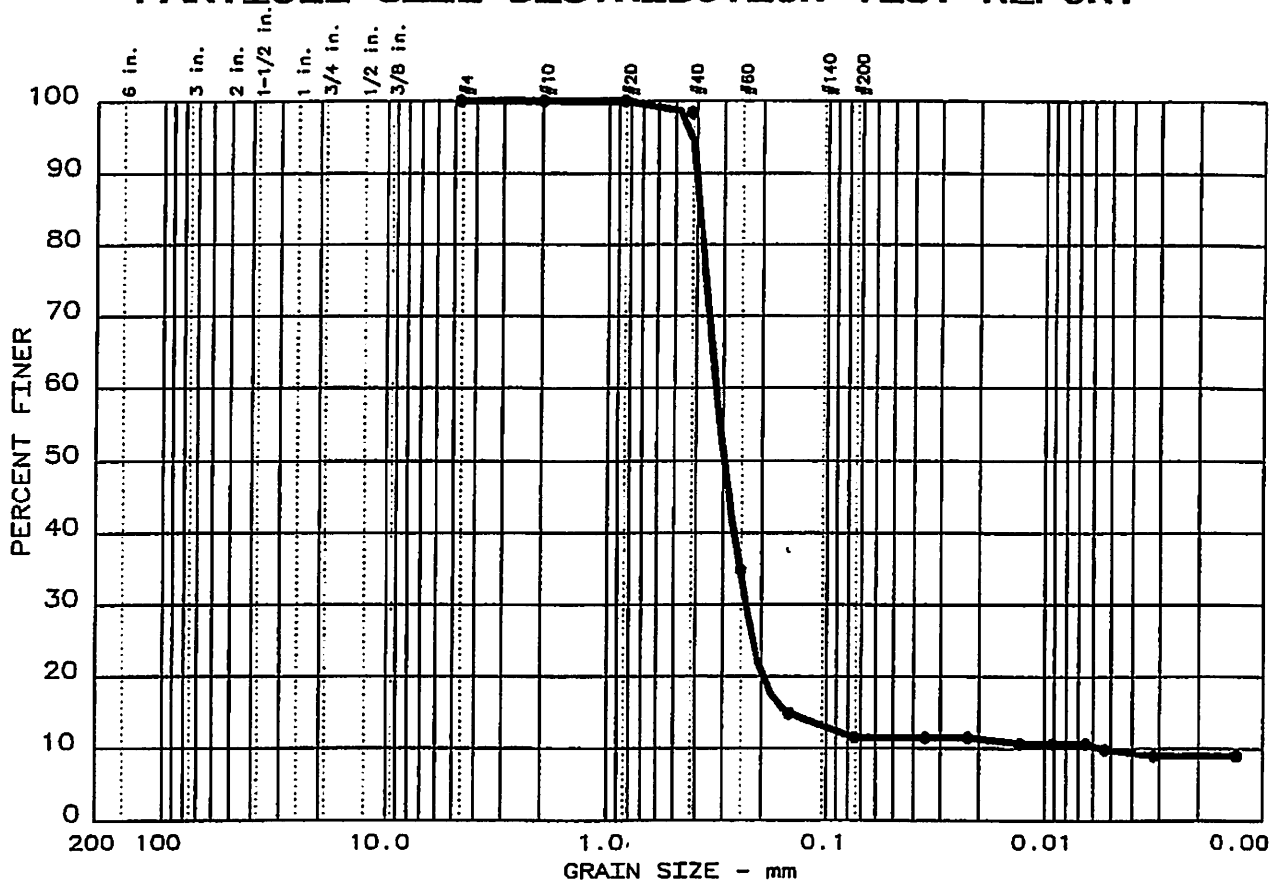
Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION

Date: 03-20-1999 Data Sheet No. 8

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	9	0.0	0.0	88.5	1.8	9.7	SP-SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.32		
D_{30}	0.24		
D_{10}	0.00		
	COEFFICIENTS		
C_c	31.12		
C_u	58.5		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	100.0		
40	98.4		
60	34.9		
100	14.9		
200	11.5		

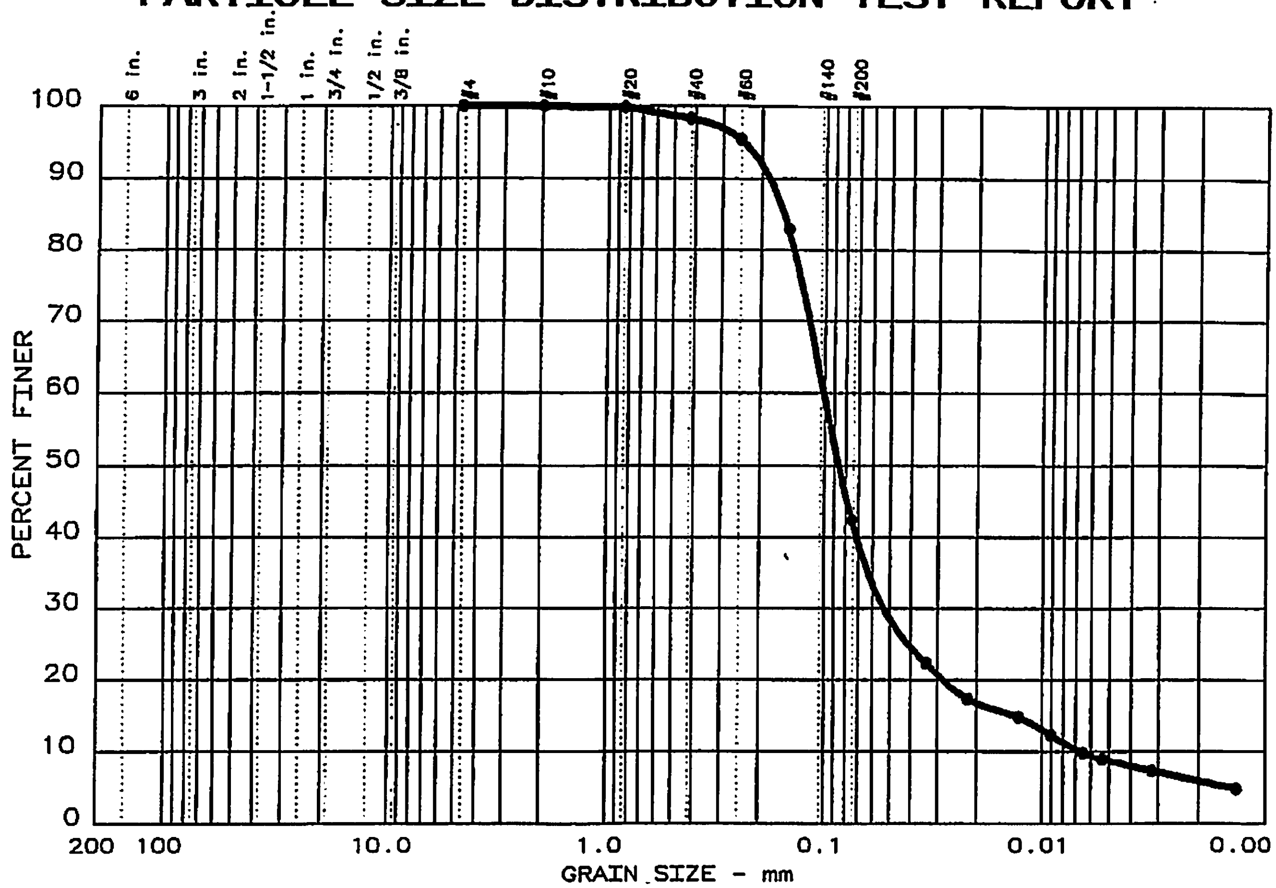
Sample information:
● GB-8, S-11, 23.5-25.0'
YELLOW POORLY GRADED
SAND WITH SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 9

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	10	0.0	0.0	57.6	33.6	8.8	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.10		
D_{30}	0.05		
D_{10}	0.00		
	COEFFICIENTS		
C_c	4.17		
C_u	15.1		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.8		
40	98.3		
60	95.4		
100	83.0		
200	42.4		

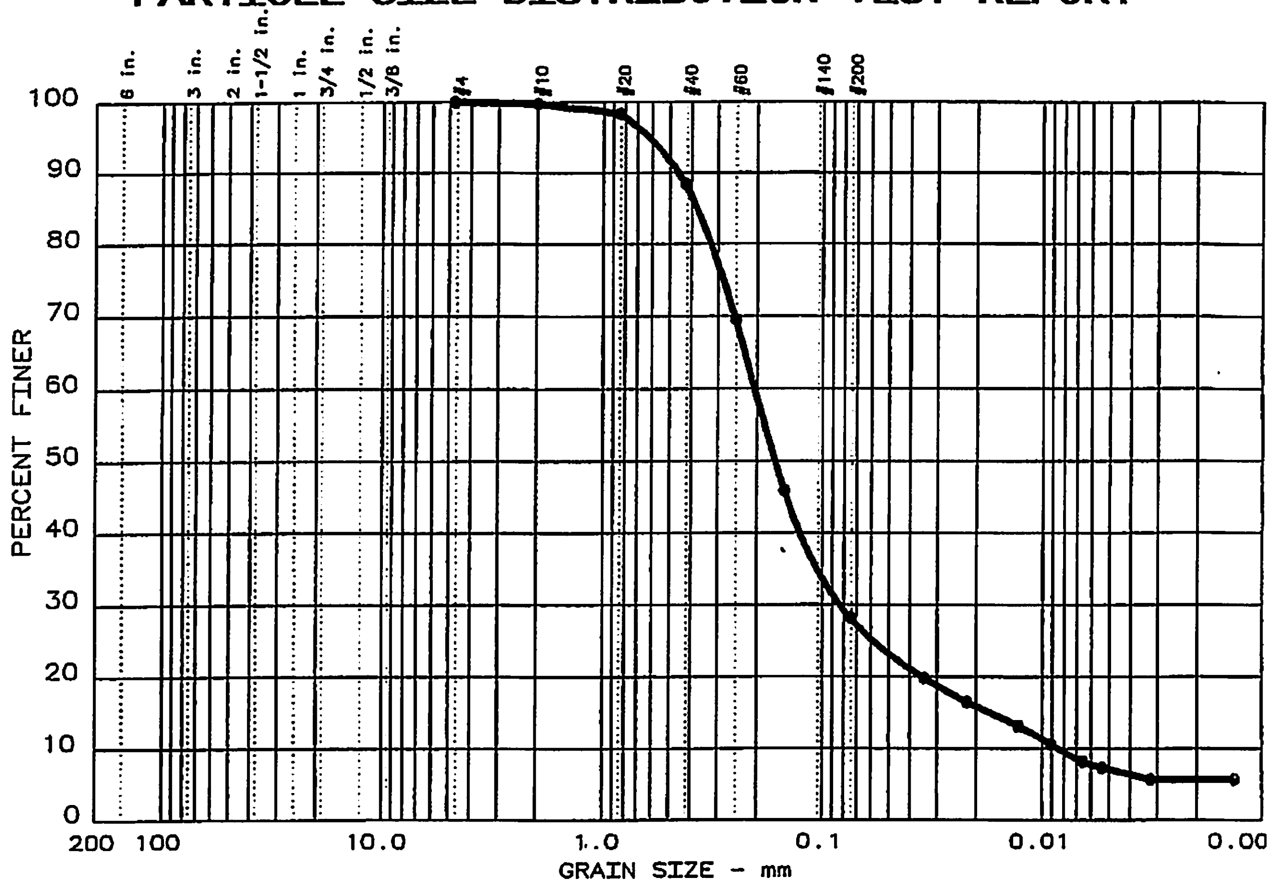
Sample information:
● GB-9, S-11, 23.5-25.0'
LT.GRAY W/YELLOW
SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 10

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	11	0.0	0.0	71.7	21.2	7.1	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.20		
D_{30}	0.08		
D_{10}	0.00		
	COEFFICIENTS		
C_c	4.01		
C_u	24.4		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.7		
20	98.3		
40	88.4		
60	69.5		
100	45.9		
200	28.3		

Sample information:
● GB-10, S-3, 3.0'-4.5'
LT.GRAY & YELLOW
SILTY SAND

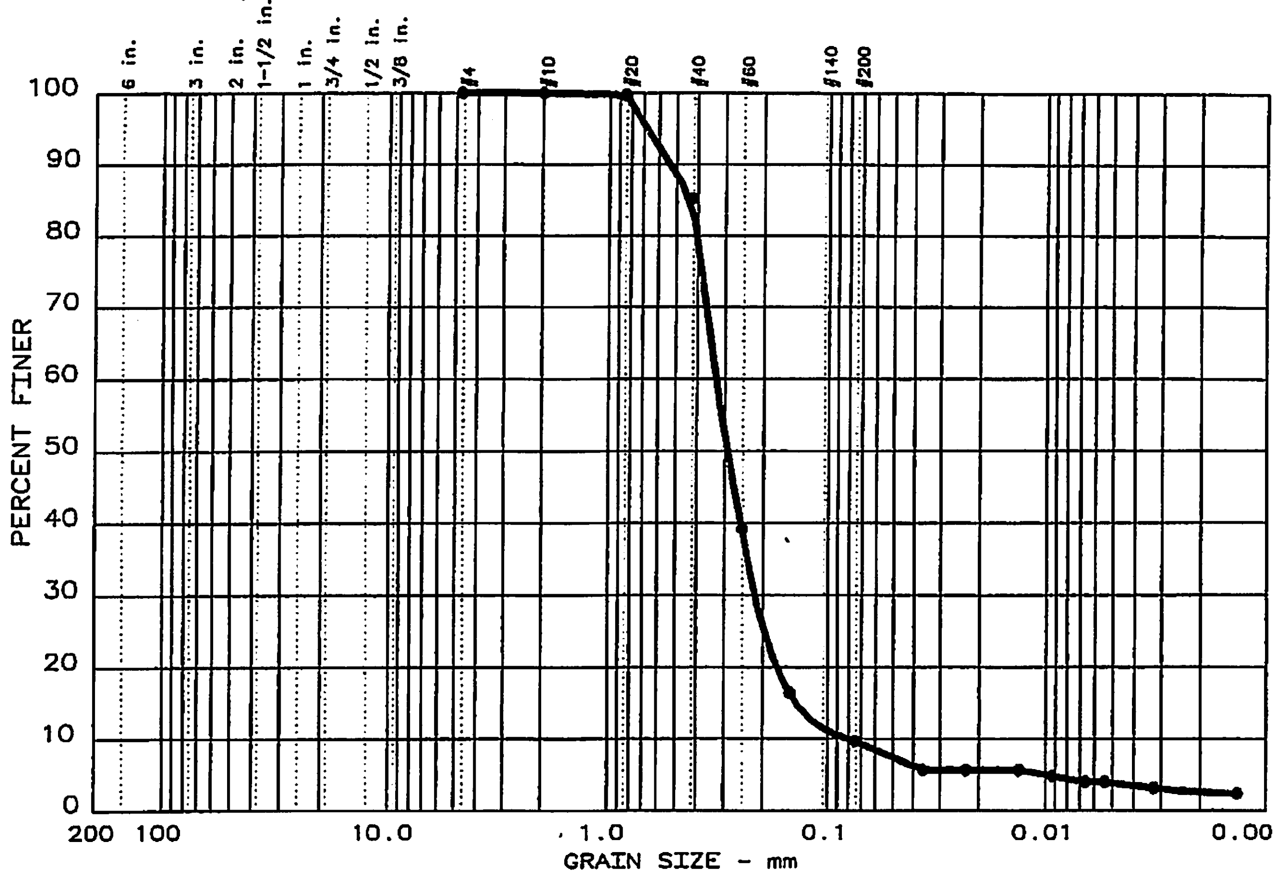
Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION

Date: 03-20-1999 Data Sheet No. 11

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	12	0.0	0.0	90.3	5.8	3.9	SP-SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.33		
D_{30}	0.22		
D_{10}	0.07		

	COEFFICIENTS		
C_c	1.85		
C_u	4.2		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.7		
40	85.2		
60	39.2		
100	16.5		
200	9.7		

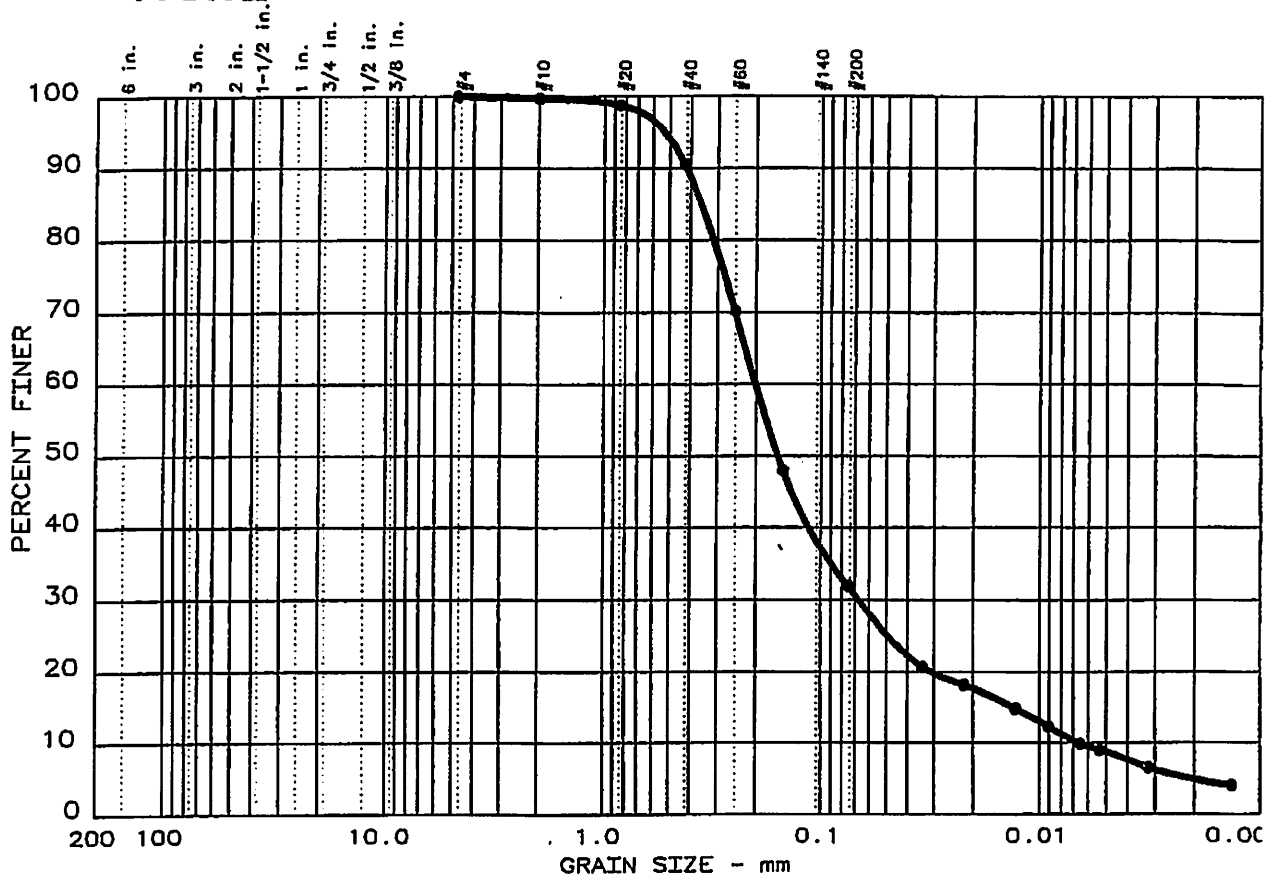
Sample information:
● GB-11, S-10, 18.5'-20.0'
PALE BROWN POORLY
GRADED SAND WITH SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 12

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	13	0.0	0.0	68.1	23.2	8.7	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.20		
D_{30}	0.07		
D_{10}	0.00		
	COEFFICIENTS		
C_c	3.33		
C_u	30.0		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.7		
20	98.8		
40	90.5		
60	70.2		
100	47.9		
200	31.9		

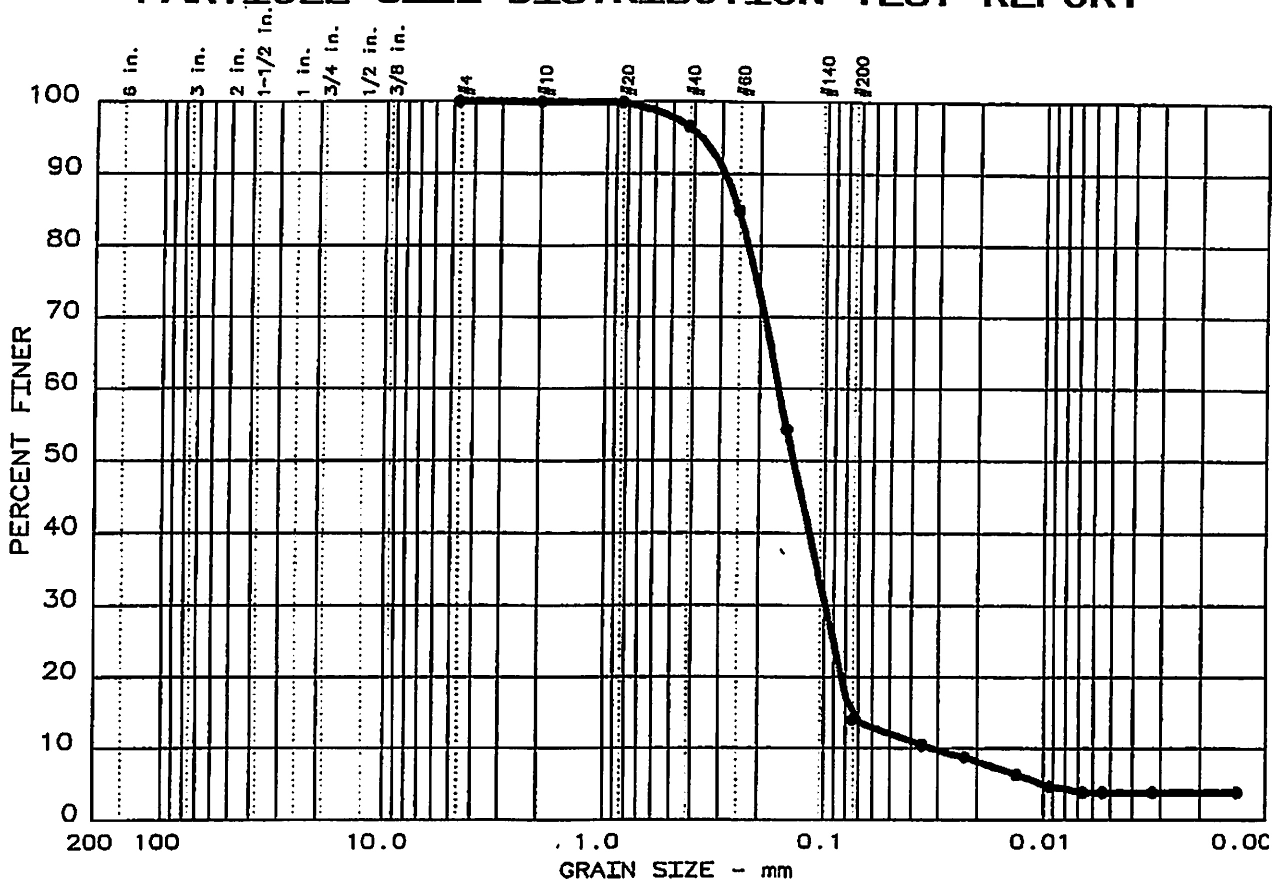
Sample information:
● GB-12, S-10,18.5'-20.0'
LT.GRAY SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 13

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	14	0.0	0.0	86.0	10.2	3.8	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.16		
D_{30}	0.10		
D_{10}	0.03		
	COEFFICIENTS		
C_c	1.87		
C_u	5.1		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.9		
40	96.5		
60	84.9		
100	54.4		
200	14.0		

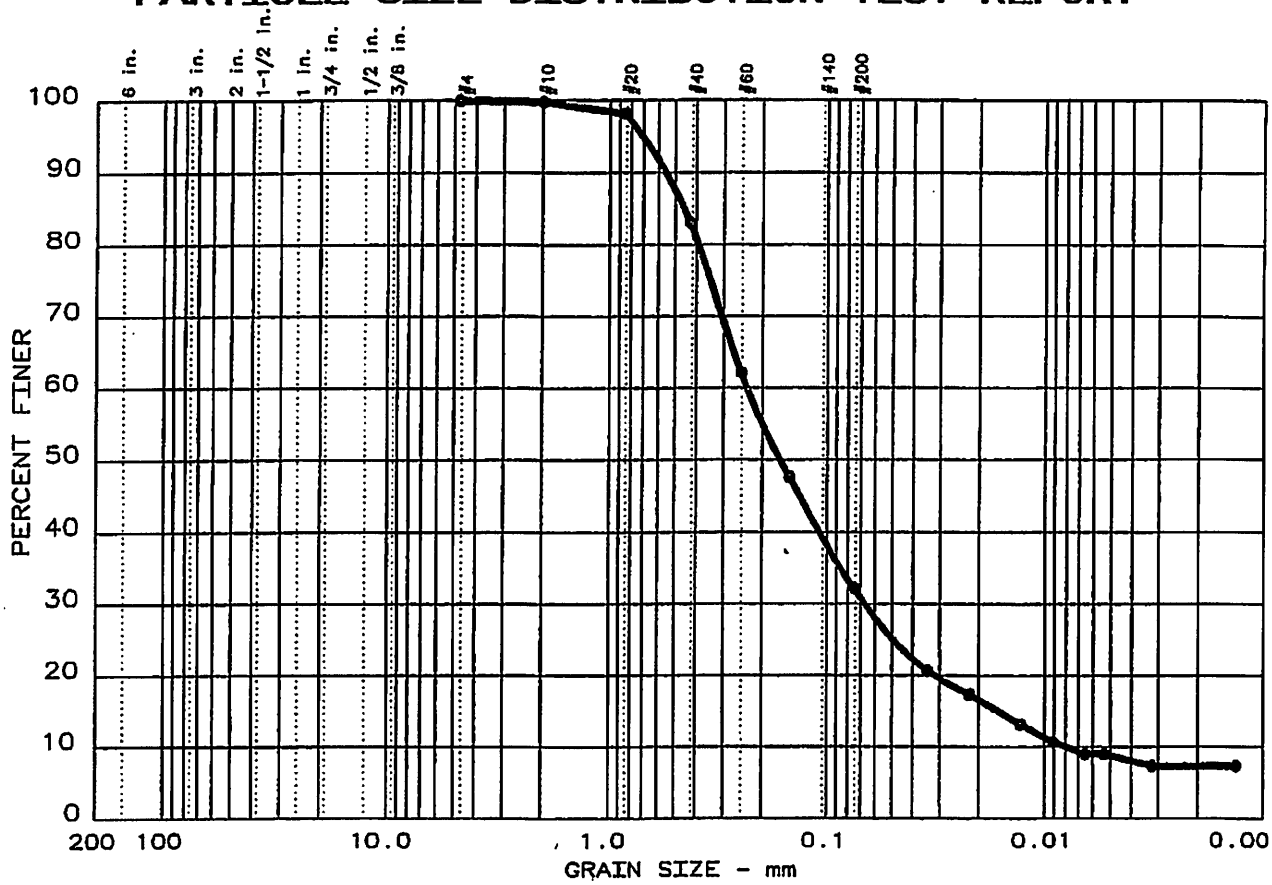
Sample information:
● GB-14, S-9, 18.5'-20.0'
PALE YELLOW TO WHITE
SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 14

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	15	0.0	0.1	67.7	23.4	8.8	SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.23		
D_{30}	0.07		
D_{10}	0.00		

	COEFFICIENTS		
C_c	2.34		
C_u	29.5		

SIEVE number size	PERCENT FINER ●		
4	99.9		
10	99.7		
20	98.1		
40	83.1		
60	62.2		
100	47.6		
200	32.2		

Sample information:
● GB-15, S-5, 6.0'-7.5'
LT.GRAY SILTY SAND

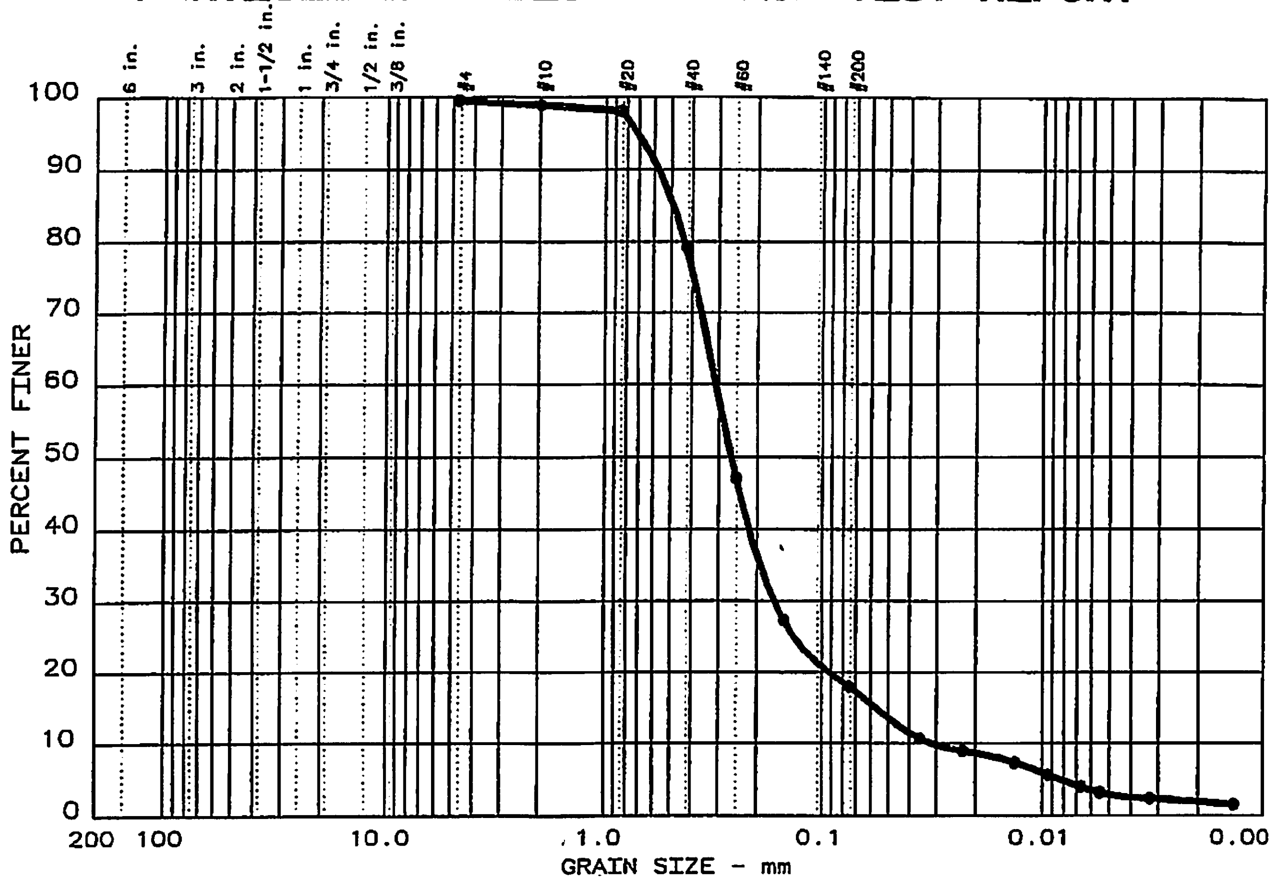
Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION

Date: 03-20-1999 Data Sheet No. 15

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	16	0.0	0.5	81.5	15.1	2.9	SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.31		
D_{30}	0.17		
D_{10}	0.03		

	COEFFICIENTS		
C_c	2.82		
C_u	9.8		

SIEVE number size	PERCENT FINER ●		
4	99.5		
10	98.9		
20	98.1		
40	79.2		
60	47.1		
100	27.3		
200	18.0		

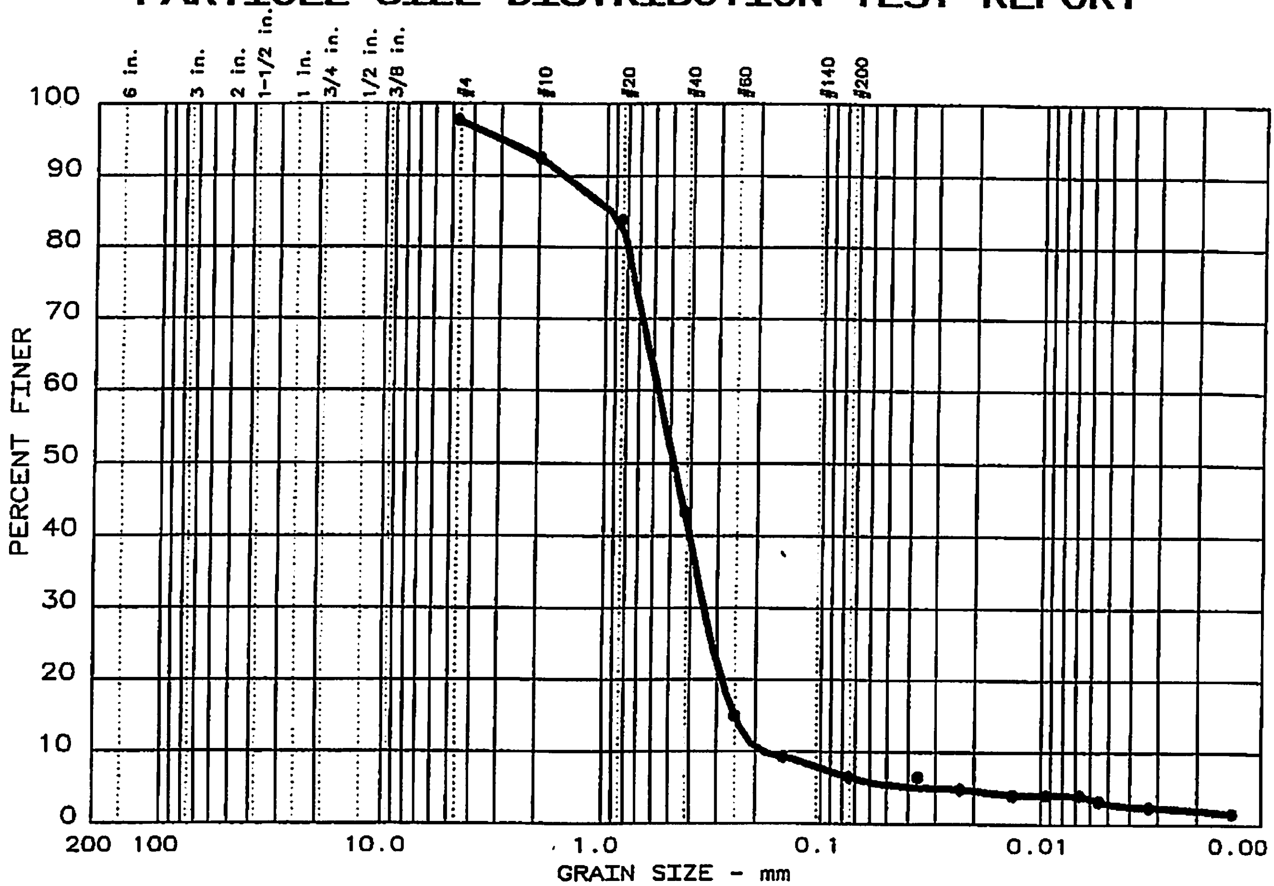
Sample information:
● GB-16, S-7, 11.0'-12.5'
BLACK SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 16

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	17	0.0	2.3	91.3	3.6	2.8	SP-SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.57		
D_{30}	0.35		
D_{10}	0.18		
	COEFFICIENTS		
C_c	1.14		
C_u	3.1		

SIEVE number size	PERCENT FINER ●		
4	97.8		
10	92.5		
20	83.9		
40	43.2		
60	15.0		
100	9.3		
200	6.5		

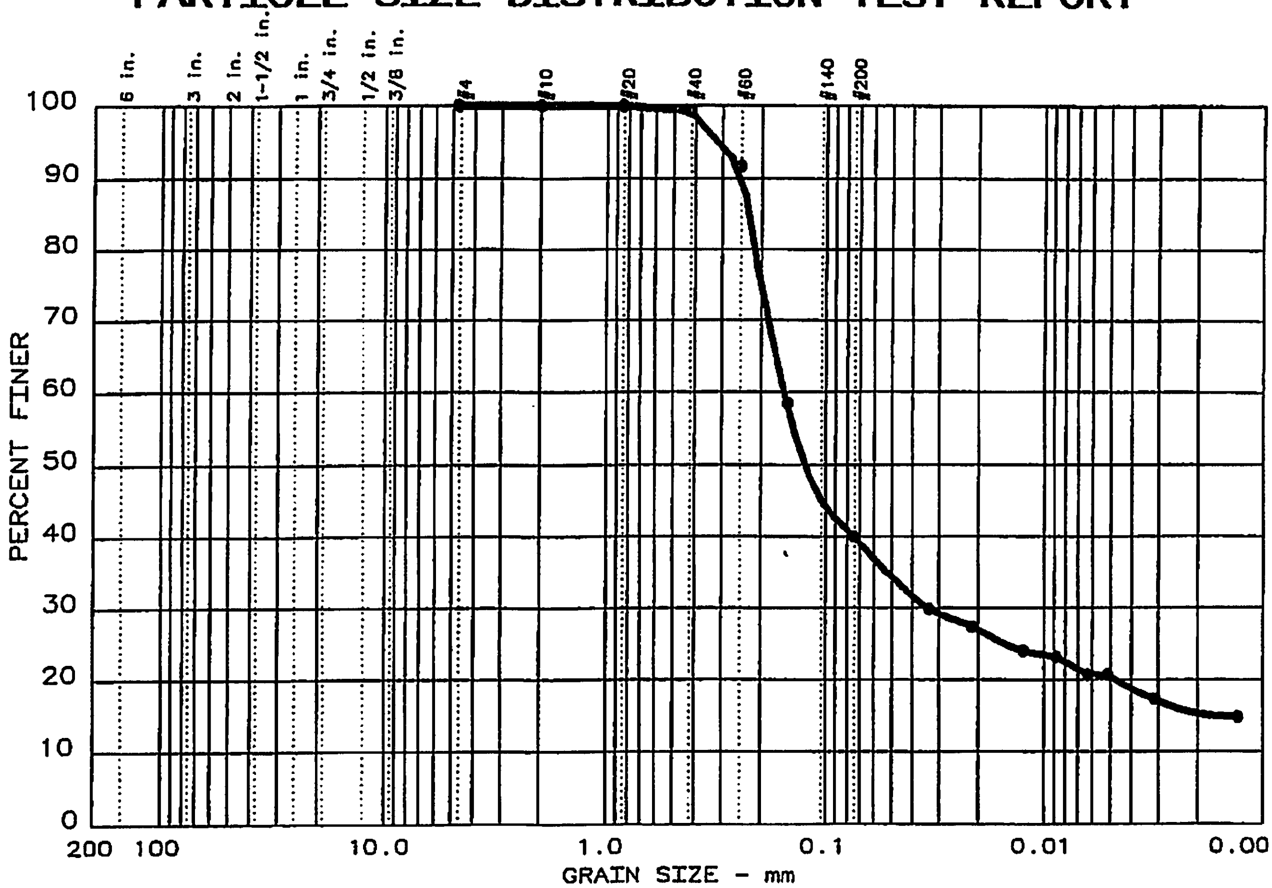
Sample information:
● GB-16, S-22, 83.5'-85.0'
DARK YELLOW POORLY
GRADED SAND WITH SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 17

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	18	0.0	0.0	60.0	19.6	20.4	SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.15		
D_{30}	0.03		
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.9		
40	99.3		
60	91.7		
100	58.5		
200	40.0		

Sample information:

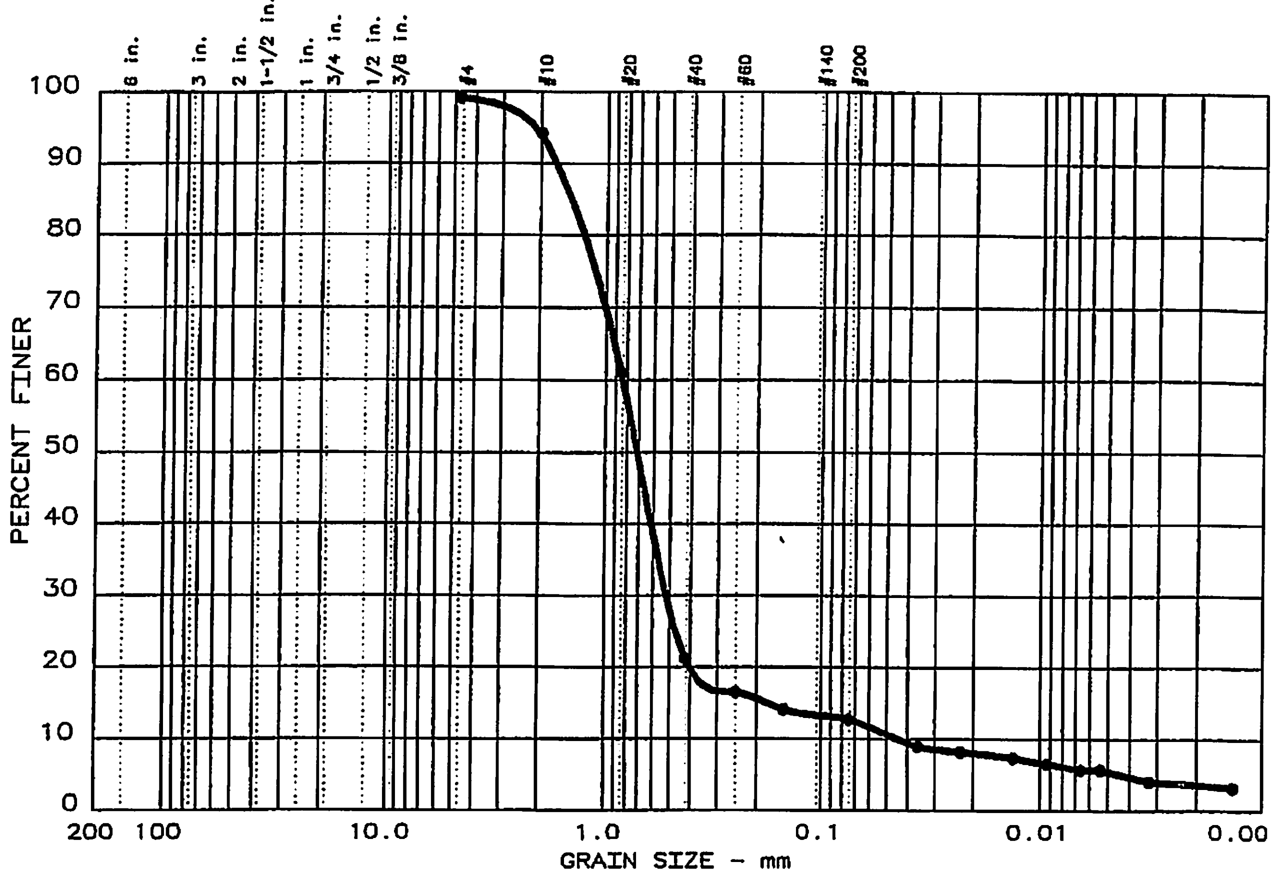
● GB-17, S-12, 28.5'-30.0'
VERY LT. GRAY W/YELLOW
SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 18

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	19	0.0	0.8	86.5	7.3	5.4	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.84		
D_{30}	0.52		
D_{10}	0.04		
	COEFFICIENTS		
C_c	7.29		
C_u	18.9		

SIEVE number size	PERCENT FINER ●		
4	99.2		
10	94.2		
20	61.0		
40	21.2		
60	16.5		
100	14.1		
200	12.7		

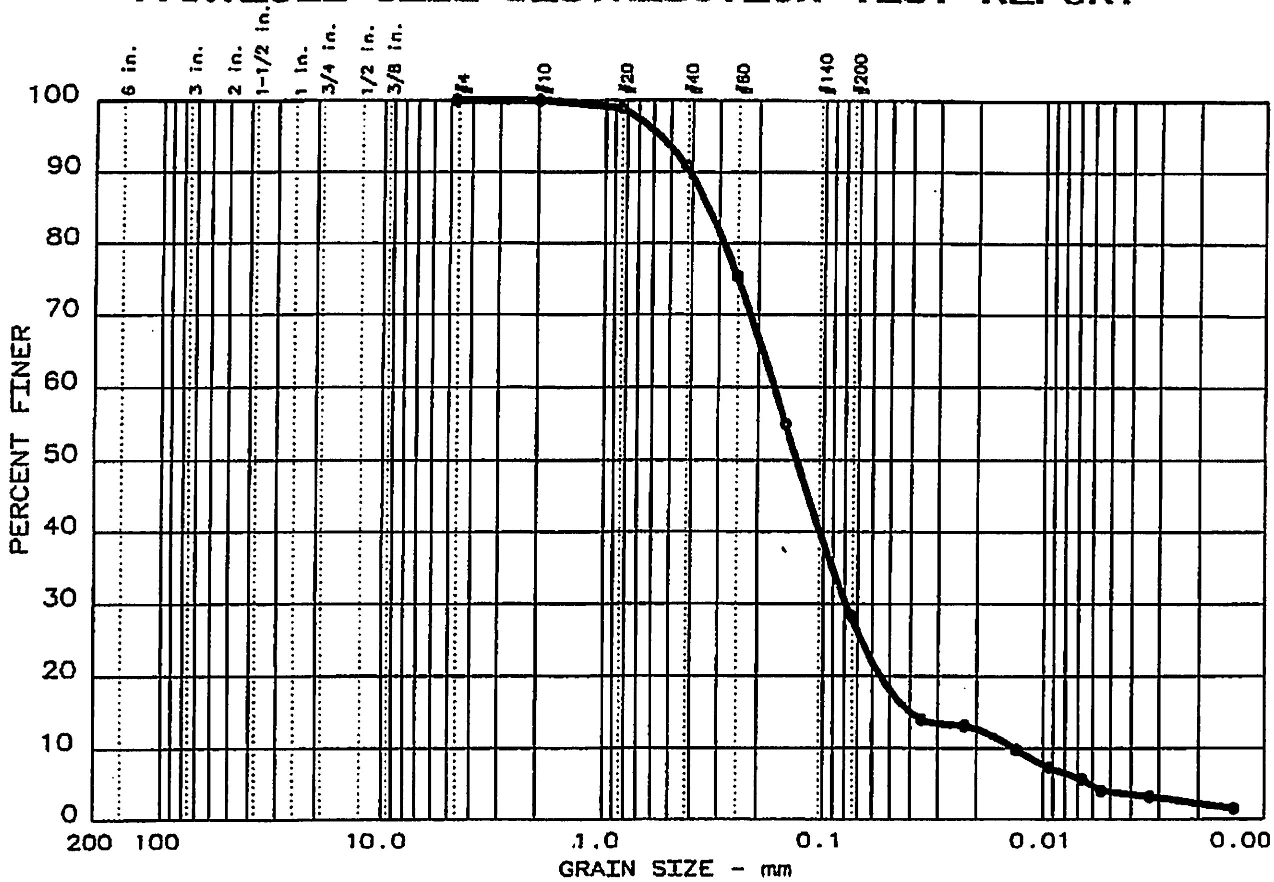
Sample information:
● GB-17,S-15, 43.5'-45.0'
YELLOW/LT.GRAY SILTY
SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 19

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	20	0.0	0.0	71.7	24.5	3.8	SM		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.17		
D_{30}	0.08		
D_{10}	0.01		
	COEFFICIENTS		
C_c	2.75		
C_u	12.6		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.0		
40	90.8		
60	75.4		
100	55.0		
200	28.4		

Sample information:
● GB-18, S-6, 8.5'-10.0'
LT.GRAY SILTY SAND

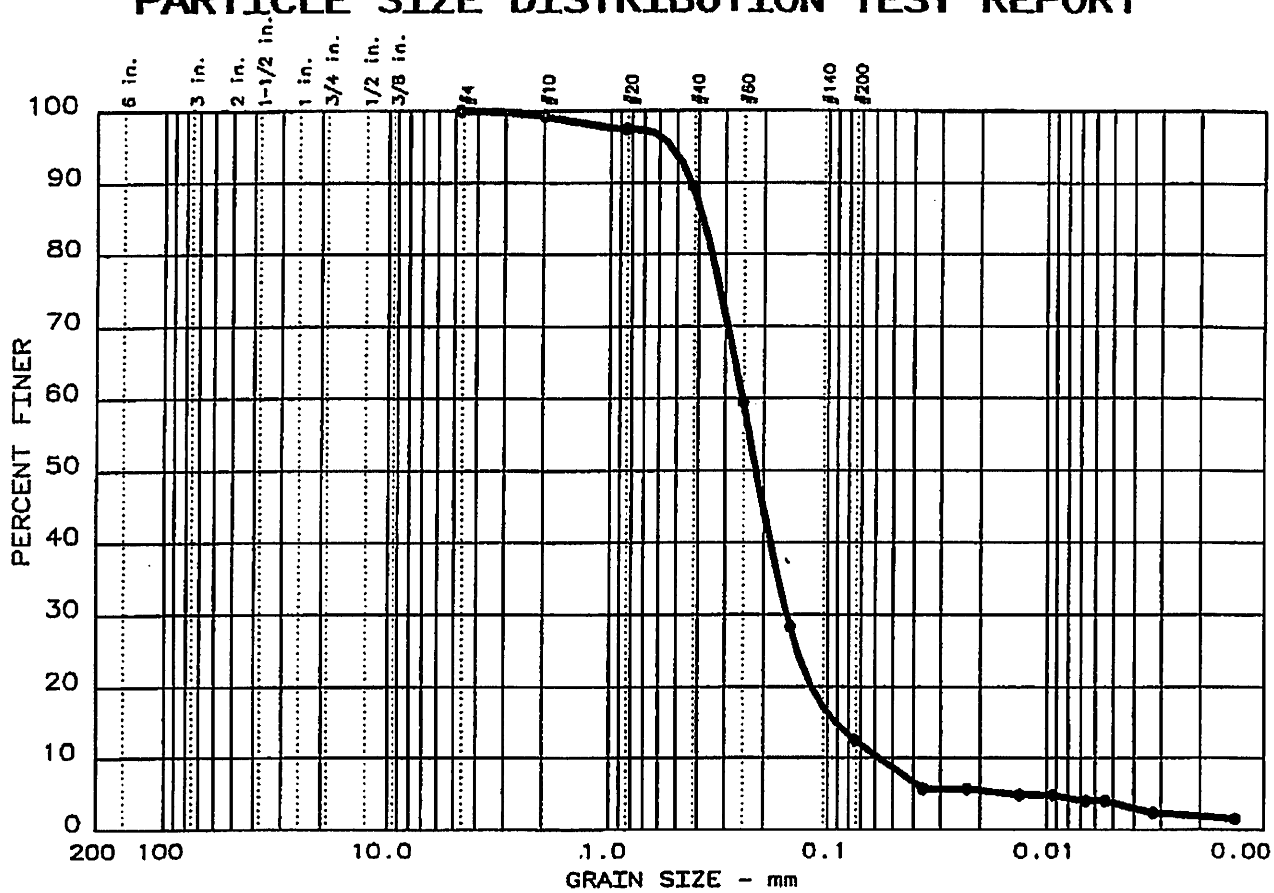
Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION

Date: 03-20-1999 Data Sheet No. 20

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	1	0.0	0.0	87.5	8.7	3.8	SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.25		
D_{30}	0.16		
D_{10}	0.05		

	COEFFICIENTS		
C_c	1.68		
C_u	4.4		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.3		
20	97.6		
40	89.5		
60	59.5		
100	28.3		
200	12.5		

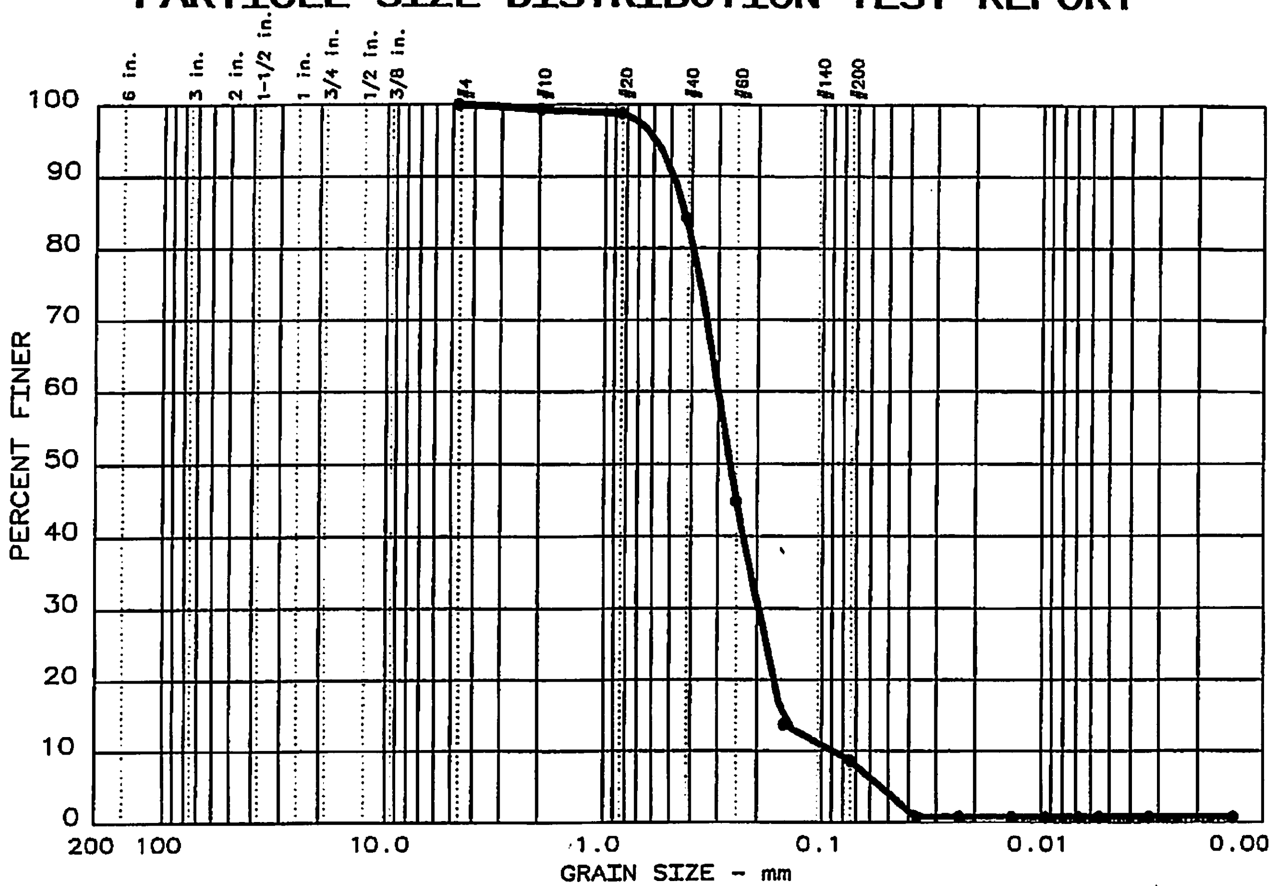
Sample information:
● GB-18, S-11, 23.5'-25.0'
YELLOW W/TR. LT.RED
SILTY SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 21

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	2	0.0	0.0	91.3	8.0	0.7	SP-SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.30		
D_{30}	0.20		
D_{10}	0.08		

	COEFFICIENTS		
C_c	1.44		
C_u	3.4		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.4		
20	98.8		
40	84.2		
60	44.8		
100	13.8		
200	8.7		

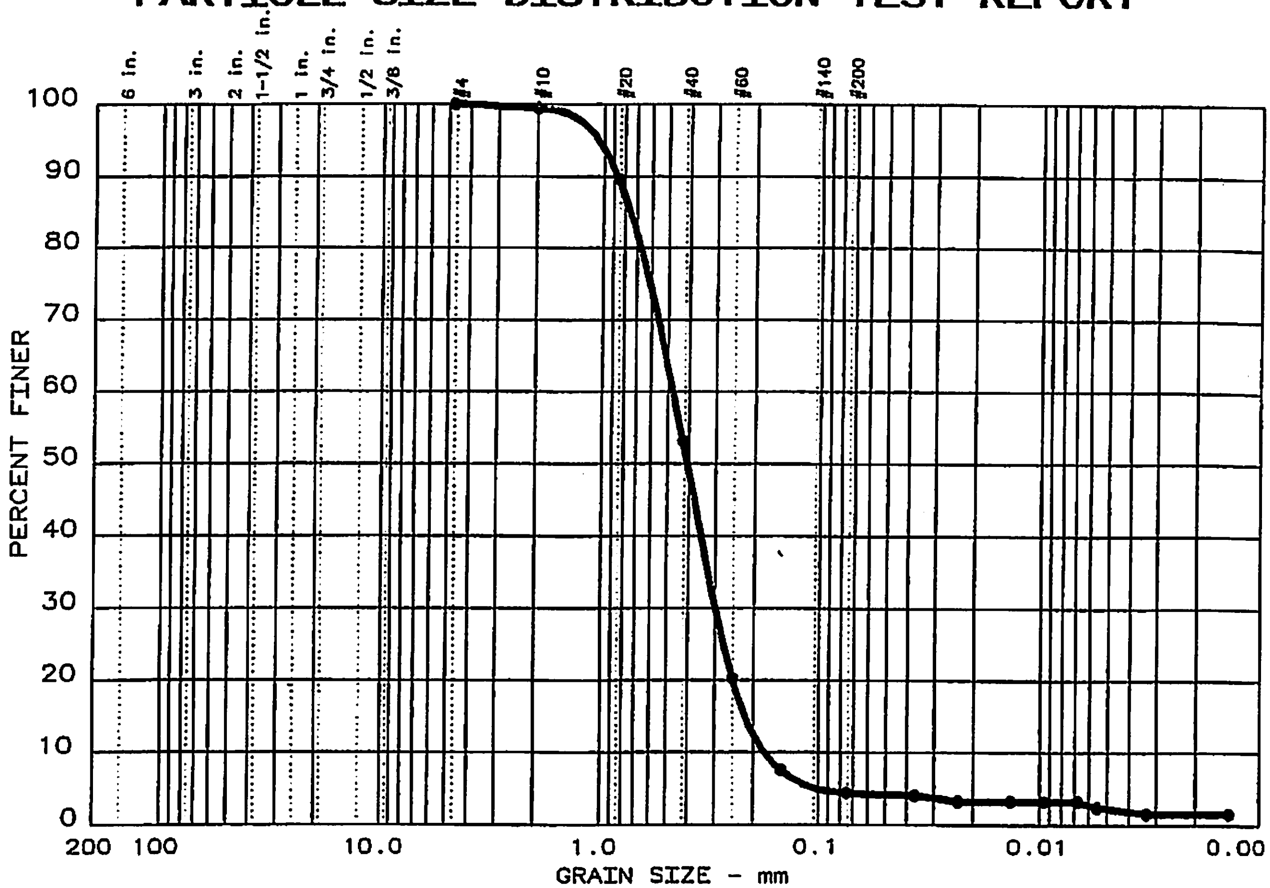
Sample information:
● GB-19, S-12, 28.5'-30.0'
YELLOW POORLY
GRADED SAND W/SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 22

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	3	0.0	0.0	95.6	2.2	2.2	SP		

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.47		
D_{30}	0.30		
D_{10}	0.17		
	COEFFICIENTS		
C_c	1.08		
C_u	2.7		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	99.4		
20	89.6		
40	53.1		
60	20.3		
100	7.6		
200	4.4		

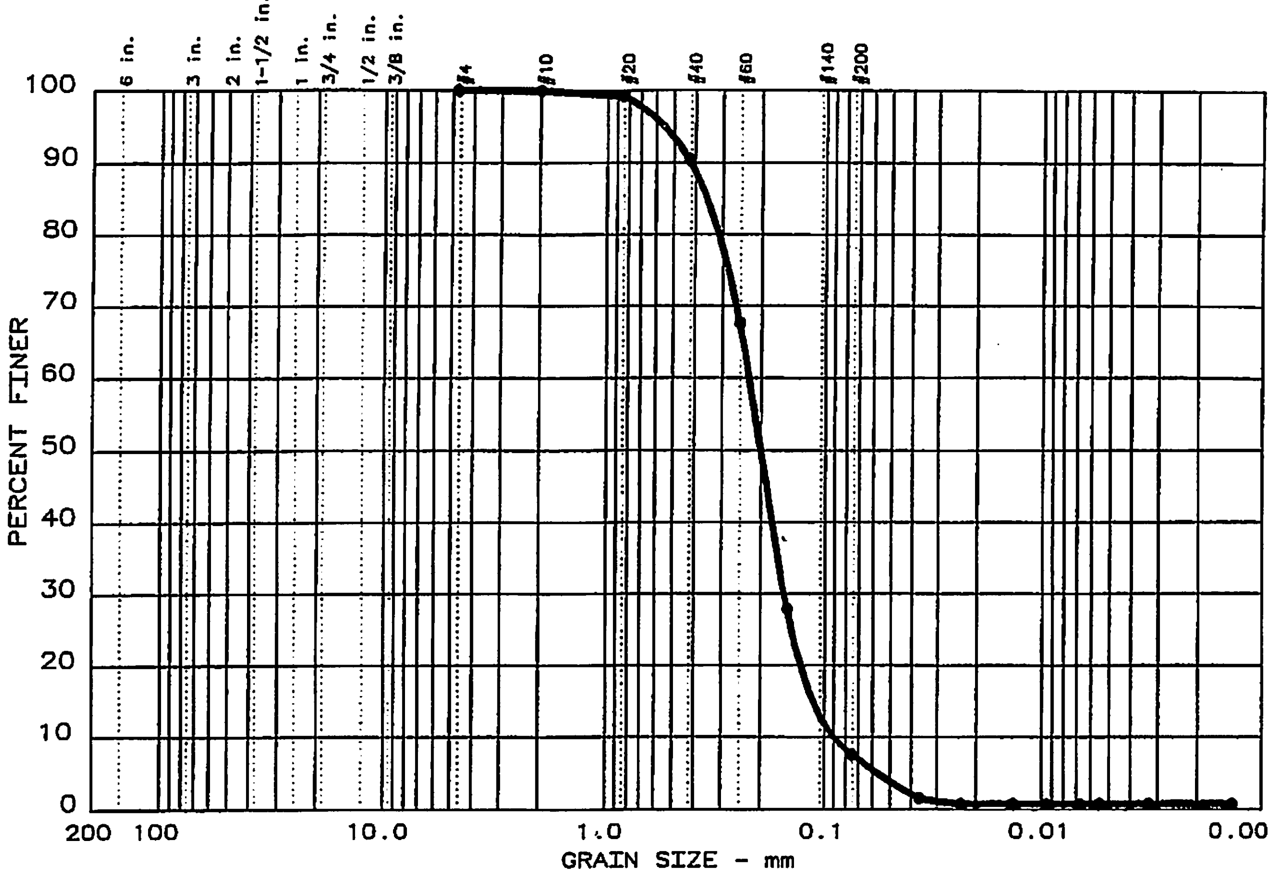
Sample information:
● GB-20, S-4, 4.5'-6.0'
VERY LT.GRAY POORLY GRADED SAND

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999
Data Sheet No. 23

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	4	0.0	0.0	92.4	6.9	0.7	SP-SM		

SIEVE inches size	PERCENT FINER ●		

	GRAIN SIZE		
D_{60}	0.23		
D_{30}	0.15		
D_{10}	0.09		

	COEFFICIENTS		
C_c	1.18		
C_u	2.5		

SIEVE number size	PERCENT FINER ●		
4	100.0		
10	100.0		
20	99.2		
40	90.4		
60	67.6		
100	27.9		
200	7.6		

Sample information:
● GB-20, S-7, 11.0'-12.5'
LT.GRAY/WHITE POORLY
GRADED SAND W/SILT

Remarks:

GEOTECHNICAL ENGINEERING TESTING, INC.

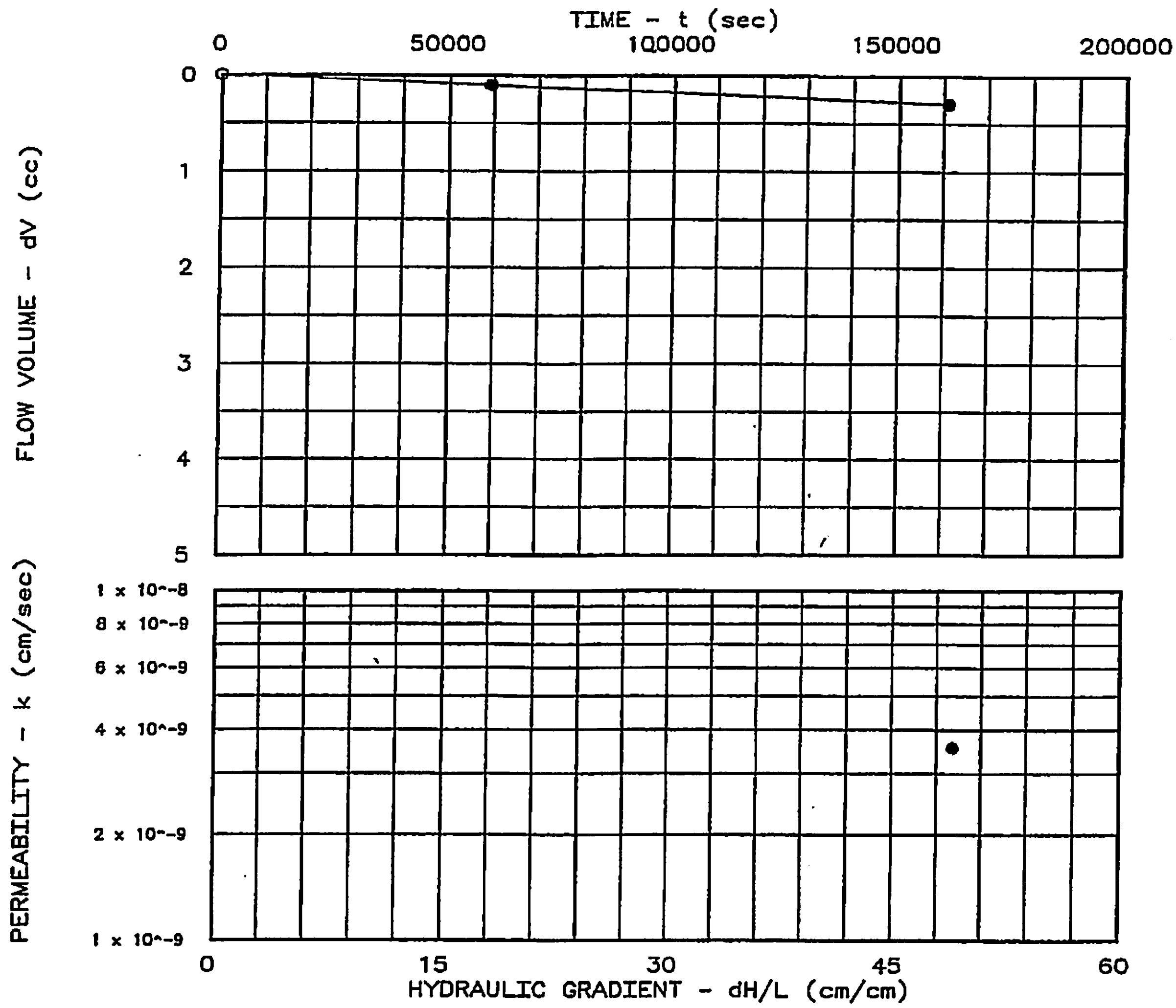
Project No.: 98-392
Project: CHASTANG LANDFILL SUBTITLE D EXPANSION
Date: 03-20-1999 Data Sheet No. 24

PERMEABILITY TEST REPORT

TEST DATA:
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 114.9
Moisture Before Test (%): 17.7
Moisture After Test (%): 18.1
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 85.0
VACUUM PRESSURE(psi): 80.0
Diff. Head (psi): 5.0
Flow Rate (cc/sec): 1.86 x 10^-6
Perm. (cm/sec): 3.55 x 10^-9

SAMPLE DATA:
Sample Identification: GB-1, T-2, 17.0'-18.5'
Visual Description: LT.BLUE/GRAY W/TRACE LT.RED, YELLOW, LEAN CLAY W/SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 01-28-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

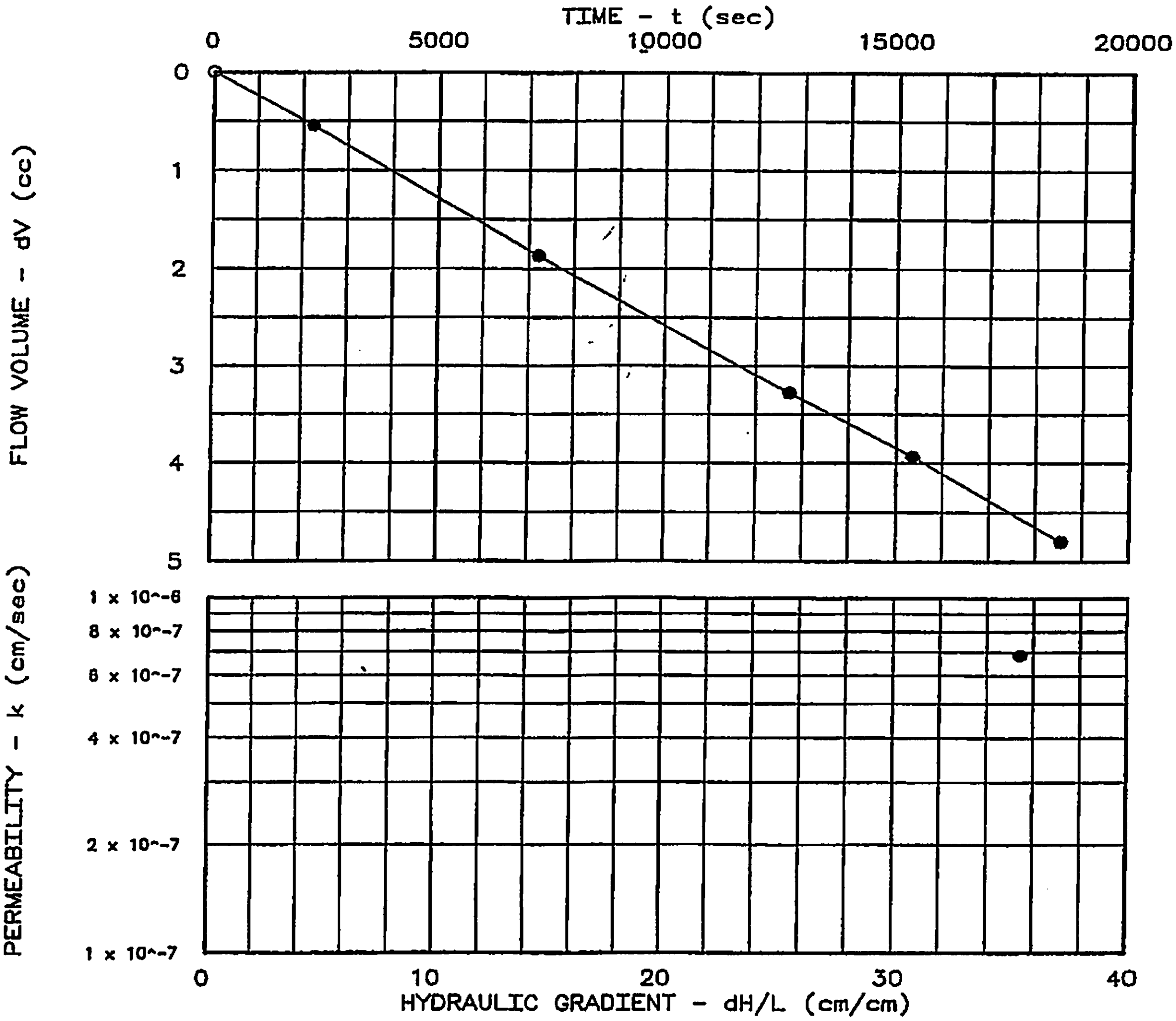
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 105.4
Moisture Before Test (%): 22.6
Moisture After Test (%): 21.4
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 83.0
BACK PRESSURE(psi): 83.0
VACUUM PRESSURE(psi): 79.4
Diff. Head (psi): 3.6
Flow Rate (cc/sec): 2.59 x 10^-4
Perm. (cm/sec): 6.86 x 10^-7

SAMPLE DATA:

Sample Identification: GB-3, T-4, 22.0'-23.5'
Visual Description: GRAY SILTY, CLAYEY SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 02-01-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

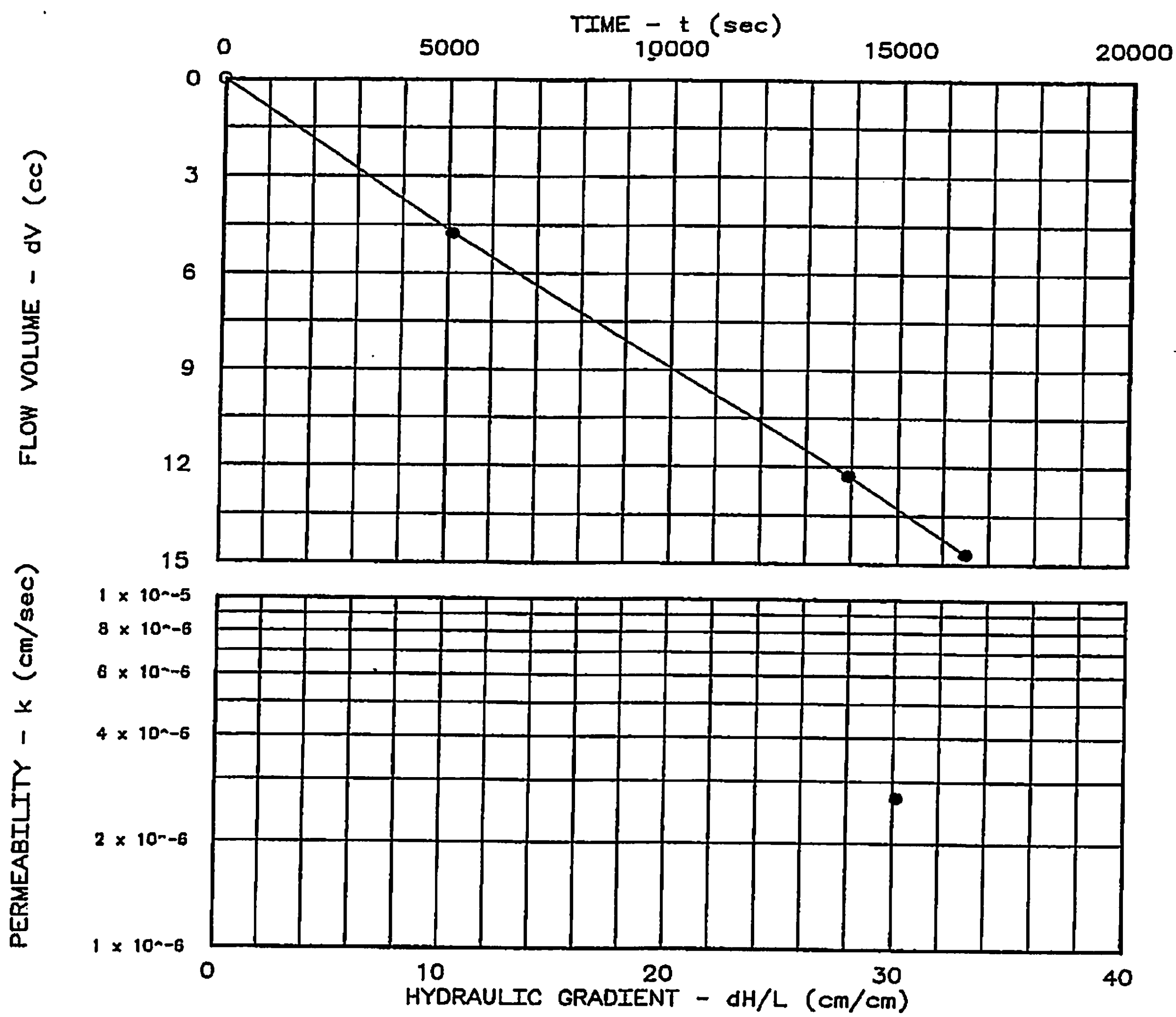
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 109.9
Moisture Before Test (%): 18.3
Moisture After Test (%): 19.9
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 83.0
BACK PRESSURE(psi): 83.0
VACUUM PRESSURE(psi): 80.0
Diff. Head (psi): 3.0
Flow Rate (cc/sec): 8.66 x 10^-4
Perm. (cm/sec): 2.70 x 10^-6

SAMPLE DATA:

Sample Identification: GB-4, T-1, 4.0'-6.0'
Visual Description: LT.GRAY/ LT.RED, YELLOW MOTTLED SANDY LEAN CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 02-01-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.:
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

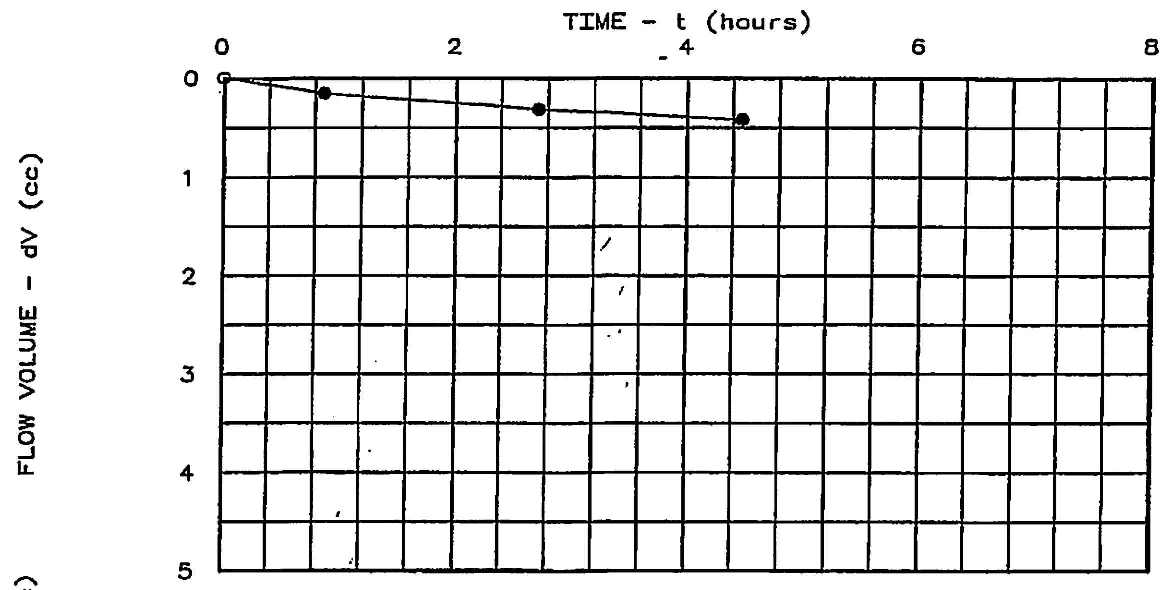
TEST DATA:

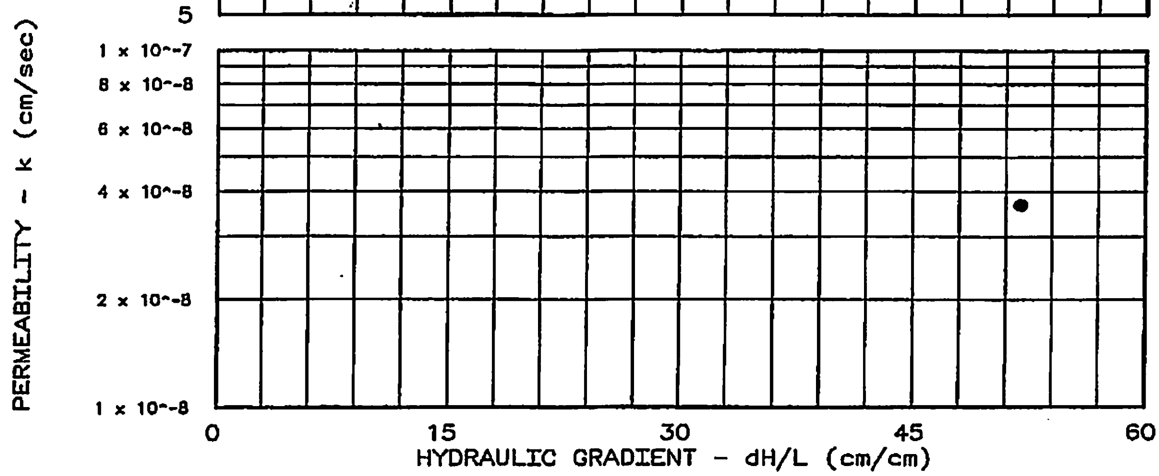
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 120.4
Moisture Before Test (%): 14.9
Moisture After Test (%): 16.0
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 93.0
BACK PRESSURE(psi): 95.0
VACUUM PRESSURE(psi): 89.7
Diff. Head (psi): 5.3
Flow Rate (cc/sec): 2.03 x 10^-5
Perm. (cm/sec): 3.67 x 10^-8

SAMPLE DATA:

Sample Identification: GB-5, T-4, 12.0'-14.0'
Visual Description: LT.GRAY/ DARK RED YELLOW MOTTLED SANDY FAT CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE





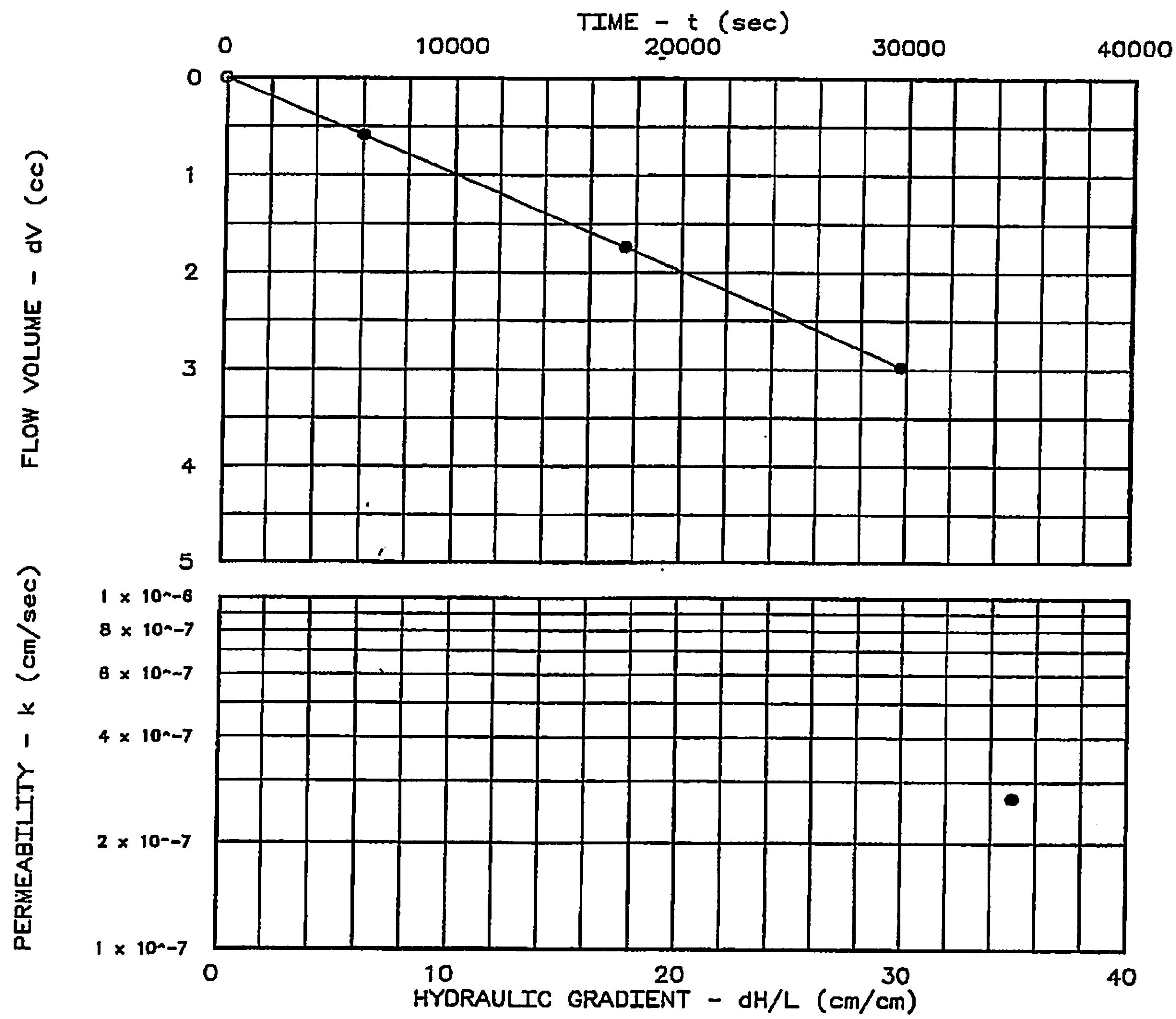
Project: CHASTANG LANDFILL SUBTITLE "D" Location: CHASTANG, ALABAMA Date: 02-04-1999	Project No.: 98-392 File No.: 1 Lab No.: 1
PERMEABILITY TEST REPORT **GEOTECHNICAL ENGINEERING-TESTING, INC.**	Tested by: RGP Checked by: HO Test: CH - Constant head

PERMEABILITY TEST REPORT

TEST DATA:
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 109.6
Moisture Before Test (%): 19.8
Moisture After Test (%): 21.4
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 83.0
BACK PRESSURE(psi): 83.0
VACUUM PRESSURE(psi): 79.5
Diff. Head (psi): 3.5
Flow Rate (cc/sec): 1.00 x 10^-4
Perm. (cm/sec): 2.70 x 10^-7

SAMPLE DATA:
Sample Identification: GB-7, T-1, 3.0'-5.0'
Visual Description: YELLOWISH RED TO RED MOTTLED SANDY LEAN CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 02-23-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 94.3
Moisture Before Test (%): 30.6
Moisture After Test (%): 32.3

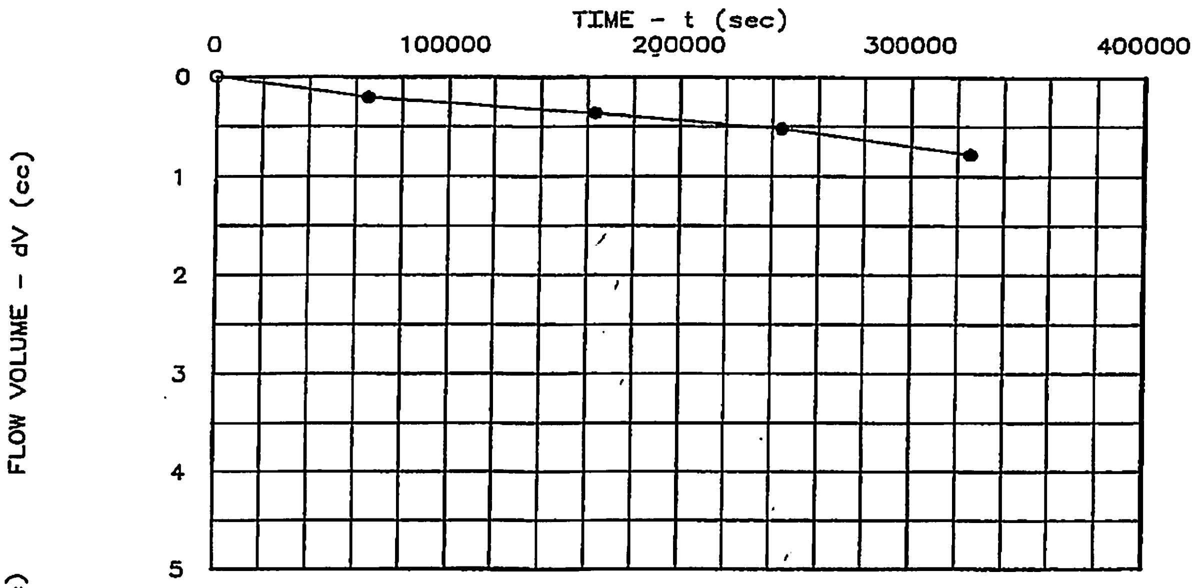
Run Number:	1 ●	2 ▲
Cell Pressure (psi):	88.0	
BACK PRESSURE(psi):	85.0	
VACUUM PRESSURE(psi):	79.4	
Diff. Head (psi):	5.6	
Flow Rate (cc/sec):	2.16 x 10^-6	
Perm. (cm/sec):	3.68 x 10^-9	

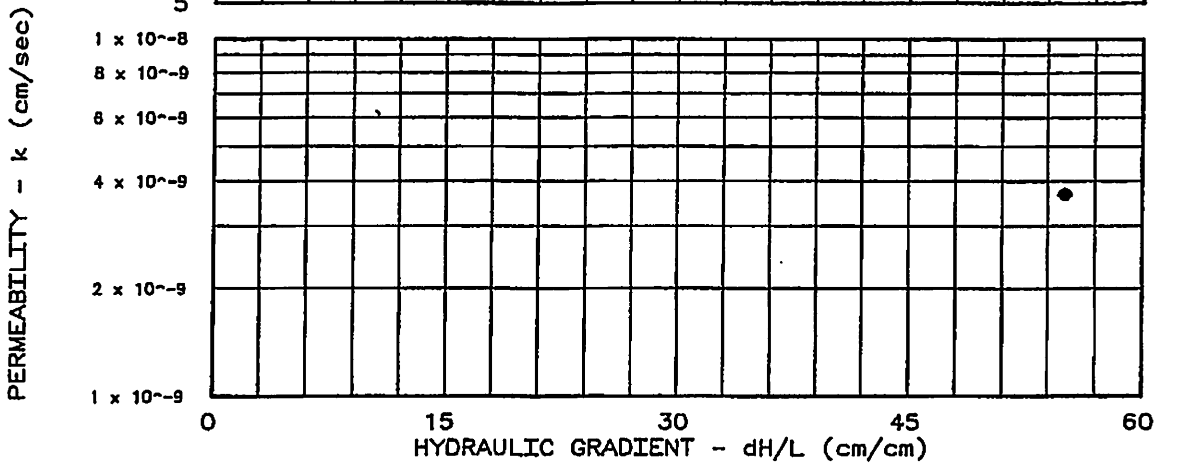
SAMPLE DATA:

Sample Identification: GB-5, T-1, 26.5'-28.5'
Visual Description: LT.GRAY FAT CLAY

Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE





Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

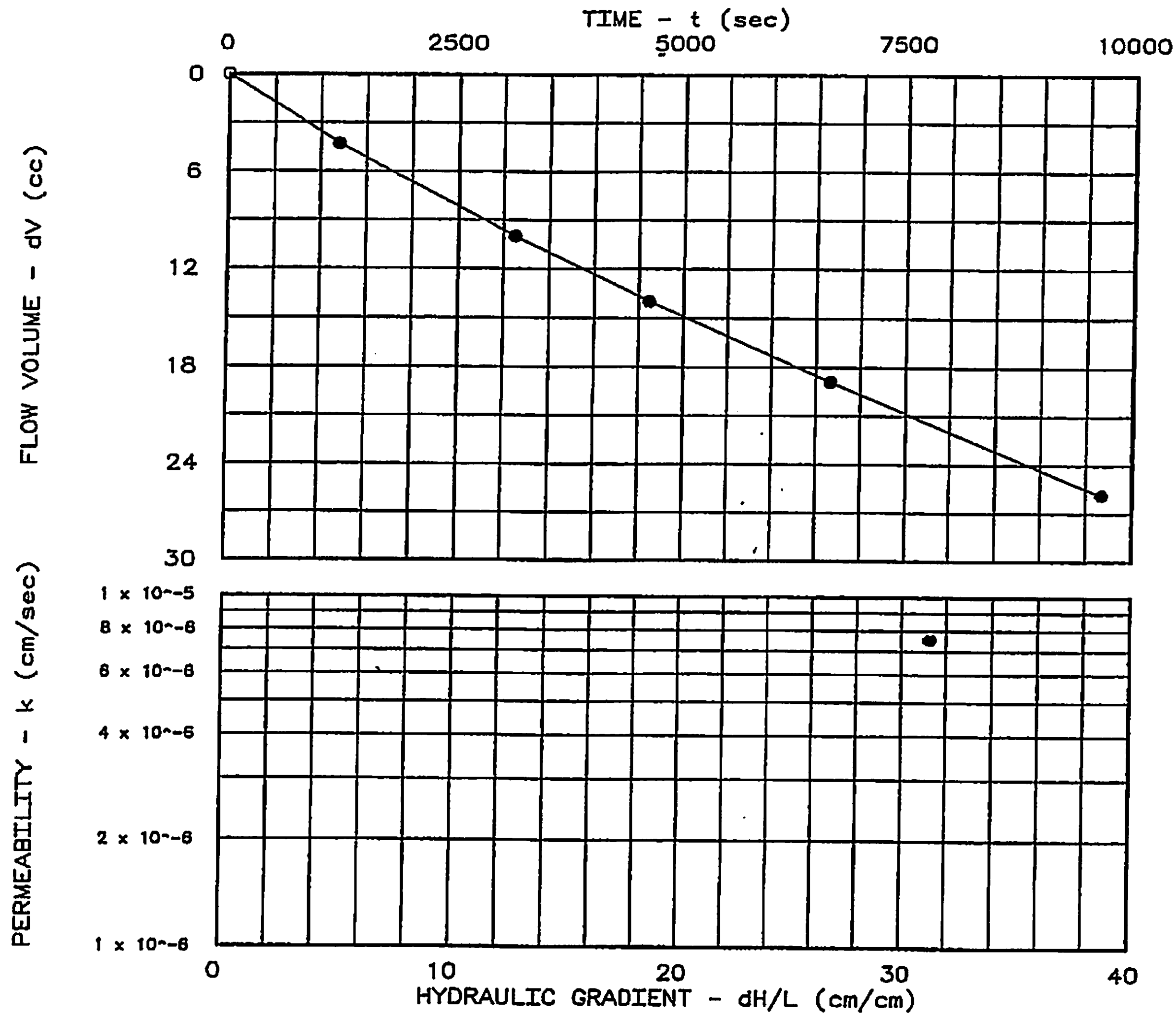
PERMEABILITY TEST REPORT

TEST DATA:
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 110.4
Moisture Before Test (%): 18.0
Moisture After Test (%): 18.4

Run Number:	1 ●	2 ▲
Cell Pressure (psi):	85.0	
BACK PRESSURE(psi):	83.0	
VACUUM PRESSURE(psi):	79.8	
Diff. Head (psi):	3.2	
Flow Rate (cc/sec):	2.53 x 10^-3	
Perm. (cm/sec):	7.58 x 10^-6	

SAMPLE DATA:
Sample Identification: GB-6, T-2, 11.0'-13.0'
Visual Description: LT.RED/YELLOW/LT.GRAY MOTTLED CLAYEY SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

TEST DATA:

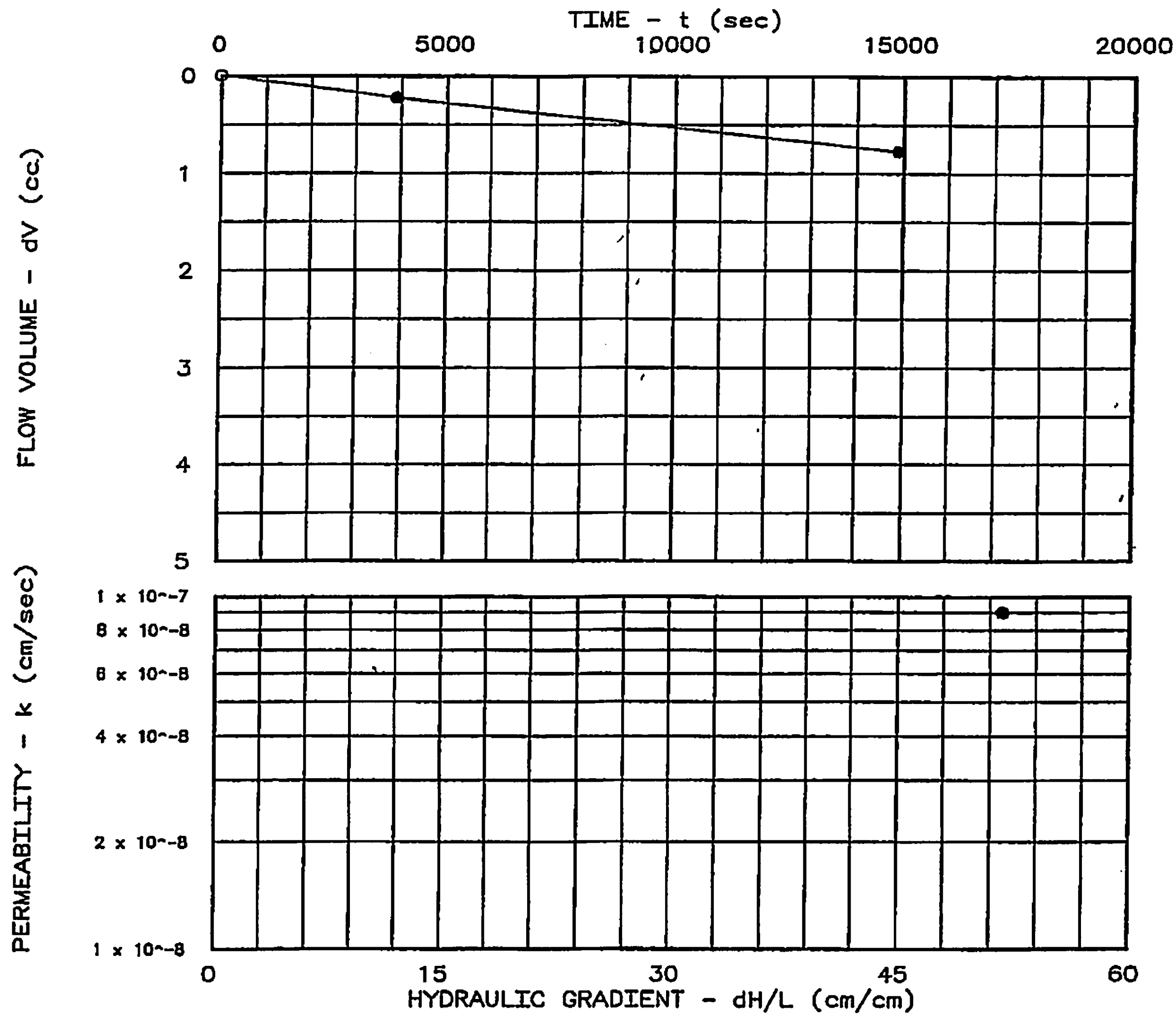
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 105.4
Moisture Before Test (%): 22.8
Moisture After Test (%): 22.8

Run Number:	1 ●	2 ▲
Cell Pressure (psi):	85.0	
BACK PRESSURE(psi):	85.0	
VACUUM PRESSURE(psi):	79.8	
Diff. Head (psi):	5.2	
Flow Rate (cc/sec):	4.96 x 10^-5	
Perm. (cm/sec):	8.98 x 10^-8	

SAMPLE DATA:

Sample Identification: GB-8, T-1, 13.0'-15.0'
Visual Description: LT.GRAY/YELLOW W/TR. RED MOTTLED FAT CLAY WITH SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

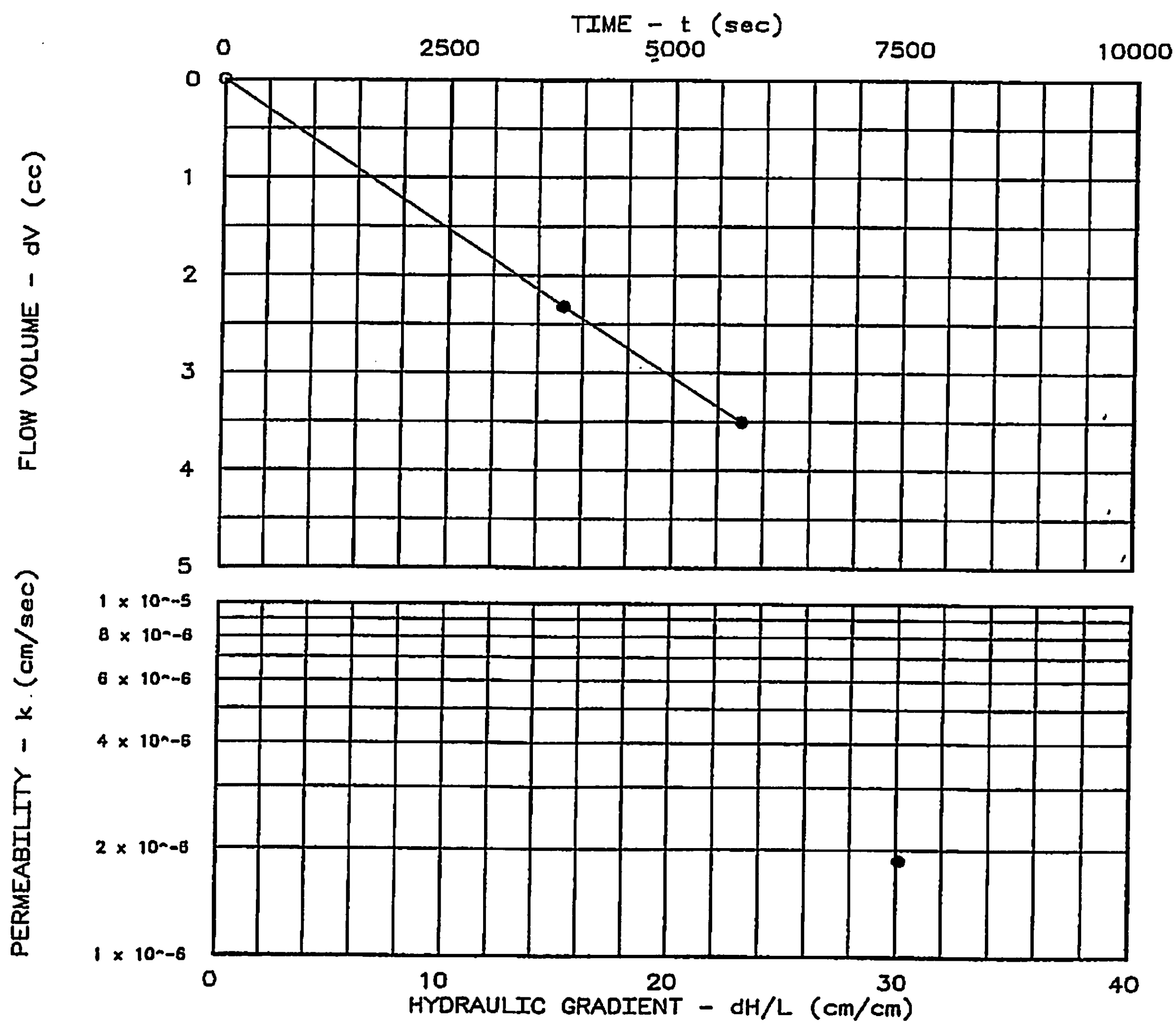
Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

TEST DATA:
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 106.8
Moisture Before Test (%): 22.0
Moisture After Test (%): 20.6
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 86.0
BACK PRESSURE(psi): 83.0
VACUUM PRESSURE(psi): 80.0
Diff. Head (psi): 3.0
Flow Rate (cc/sec): 6.00 x 10^-4
Perm. (cm/sec): 1.87 x 10^-6

SAMPLE DATA:
Sample Identification: GB-10, T-2, 1.0'-3.0'
Visual Description: GRAY TO DARK GRAY SANDY LEAN CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D" Location: CHASTANG, ALABAMA Date: 03-30-1999	Project No.: 98-392 File No.: 1 Lab No.: 1
PERMEABILITY TEST REPORT **GEOTECHNICAL ENGINEERING-TESTING, INC.**	Tested by: RGP Checked by: HO Test: CH - Constant head

PERMEABILITY TEST REPORT

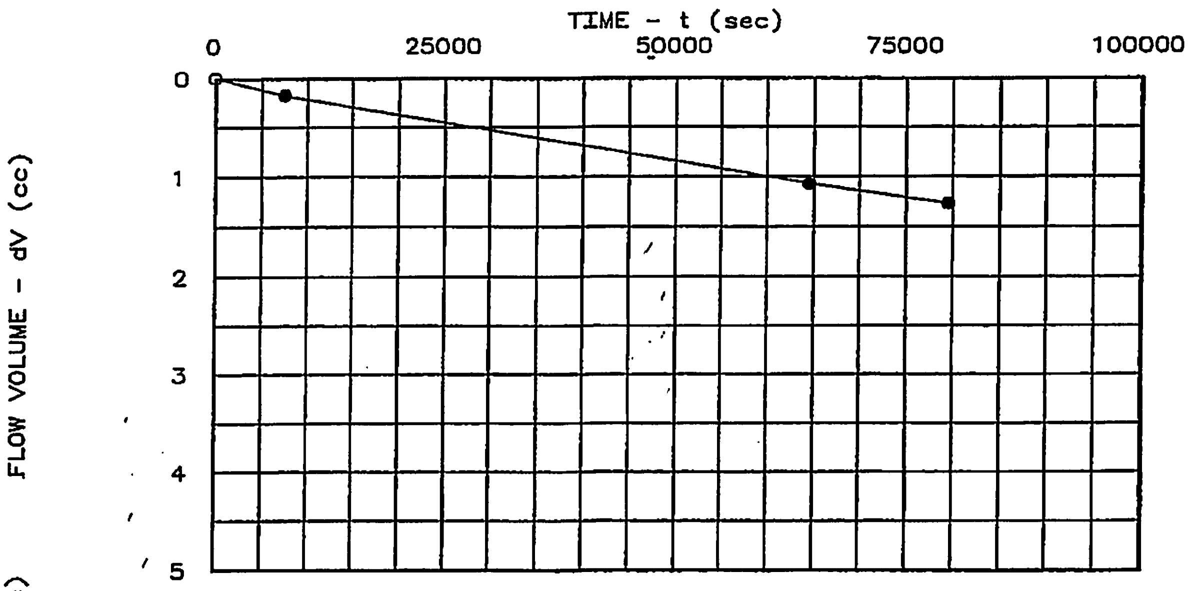
TEST DATA:

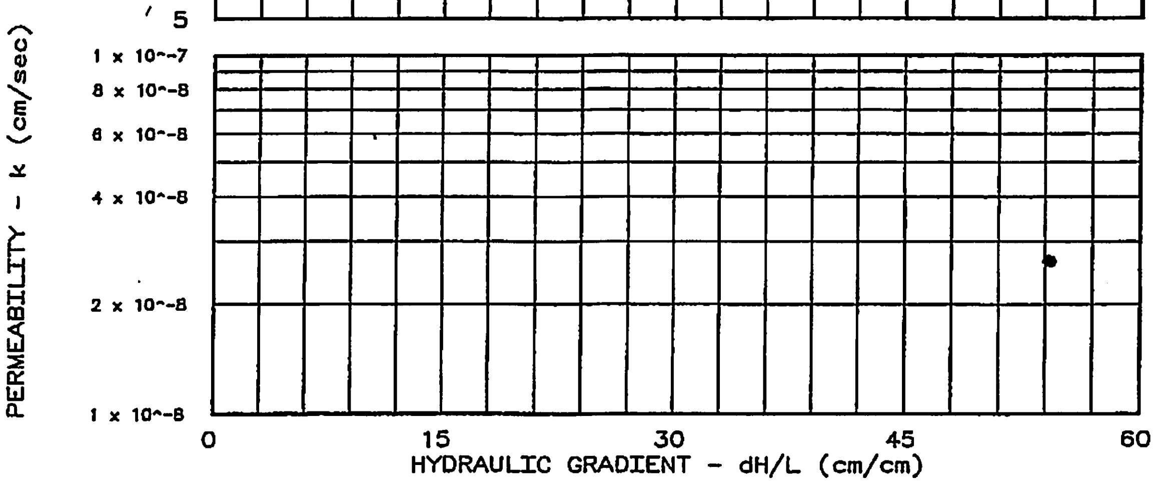
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 112.1
Moisture Before Test (%): 18.8
Moisture After Test (%): 19.7
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 85.0
VACUUM PRESSURE(psi): 79.5
Diff. Head (psi): 5.5
Flow Rate (cc/sec): 1.53 x 10^-5
Perm. (cm/sec): 2.64 x 10^-8

SAMPLE DATA:

Sample Identification: GB-11, T-1, 11.0'-13.0'
Visual Description: LT.GRAY/DUSKY RED/ YELLOW MOTTLED FAT CLAY WITH SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE





Project: CHASTANG LANDFILL SUBTITLE "D"	Project No.: 98-392
Location: CHASTANG, ALABAMA	File No.: 1
Date: 03-30-1999	Lab No.: 1
PERMEABILITY TEST REPORT	Tested by: RGP
	Checked by: HO
GEOTECHNICAL ENGINEERING-TESTING, INC.	Test: CH - Constant head

PERMEABILITY TEST REPORT

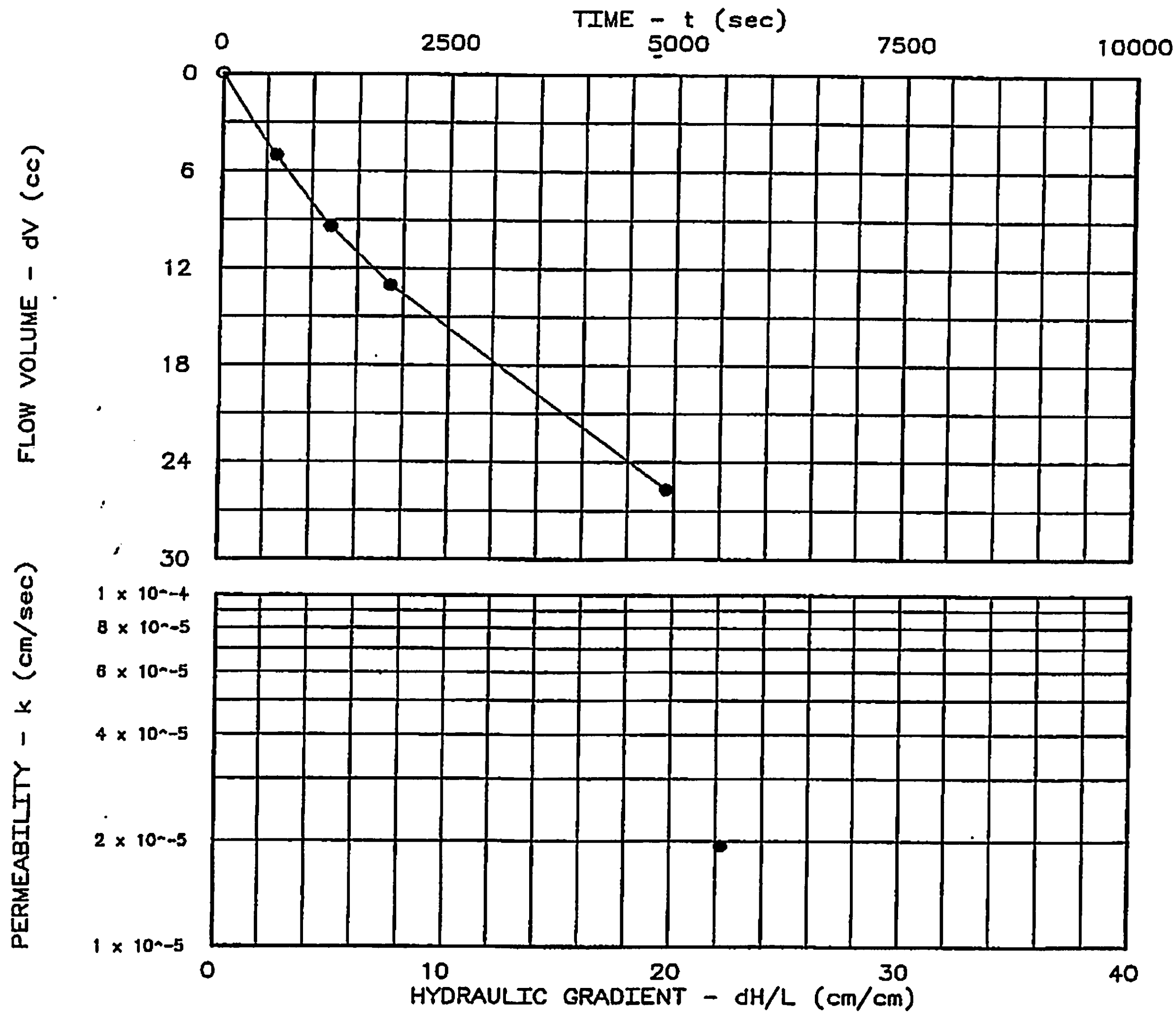
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 112.4
Moisture Before Test (%): 19.3
Moisture After Test (%): 17.9
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 85.0
BACK PRESSURE(psi): 82.0
VACUUM PRESSURE(psi): 79.8
Diff. Head (psi): 2.2
Flow Rate (cc/sec): 4.60 x 10^-3
Perm. (cm/sec): 1.94 x 10^-5

SAMPLE DATA:

Sample Identification: GB-12, T-1, 16.5'-18.5'
Visual Description: DARK GRAY SILTY SAND WITH TRACE ORGANICS
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

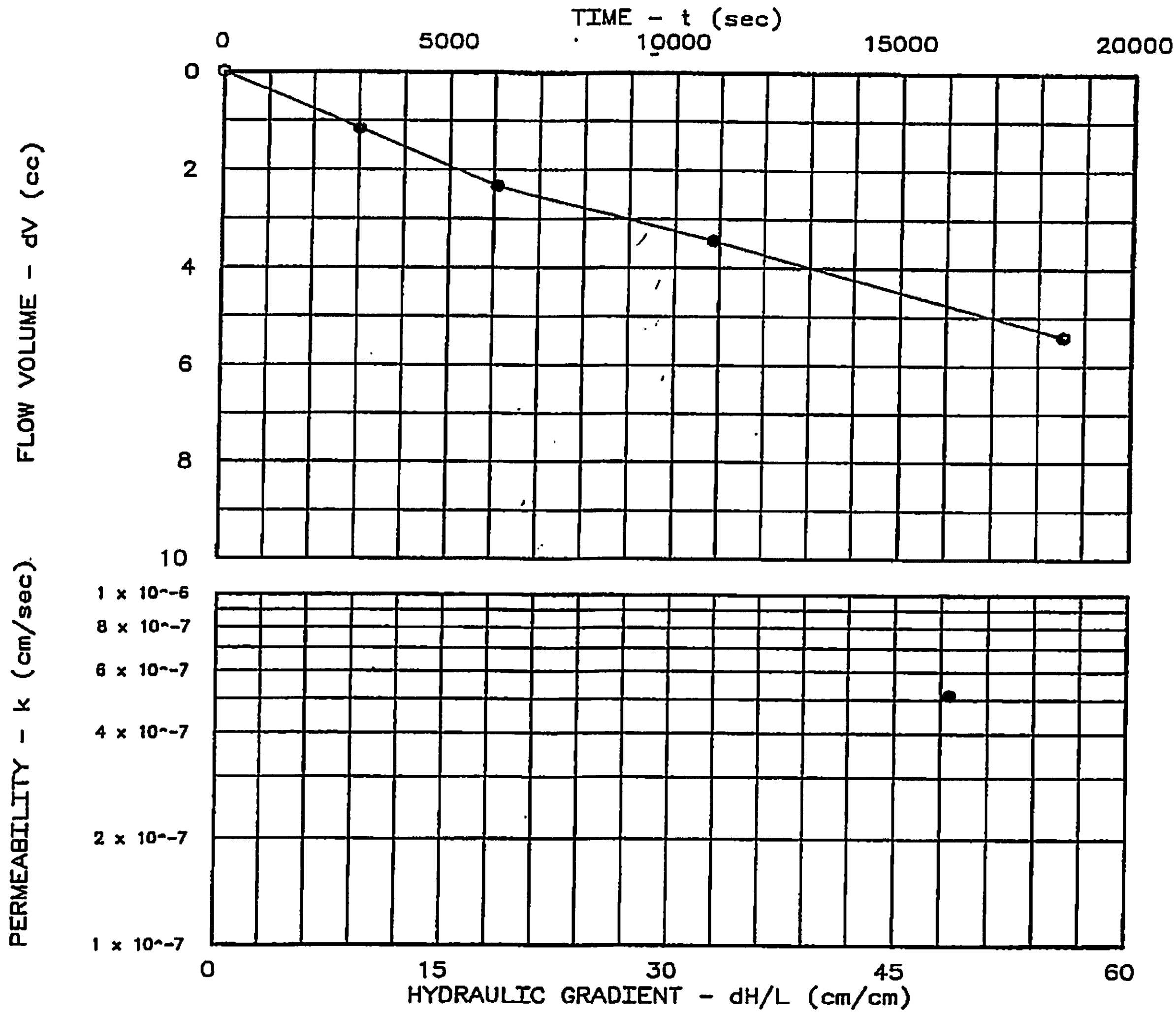
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 117.8
Moisture Before Test (%): 15.8
Moisture After Test (%): 15.5
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 85.0
VACUUM PRESSURE(psi): 80.1
Diff. Head (psi): 4.9
Flow Rate (cc/sec): 2.66 x 10^-4
Perm. (cm/sec): 5.14 x 10^-7

SAMPLE DATA:

Sample Identification: GB-14, T-1, 17.0'-18.5'
Visual Description: LT.GRAY W/TRACE YELLOW SANDY LEAN CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

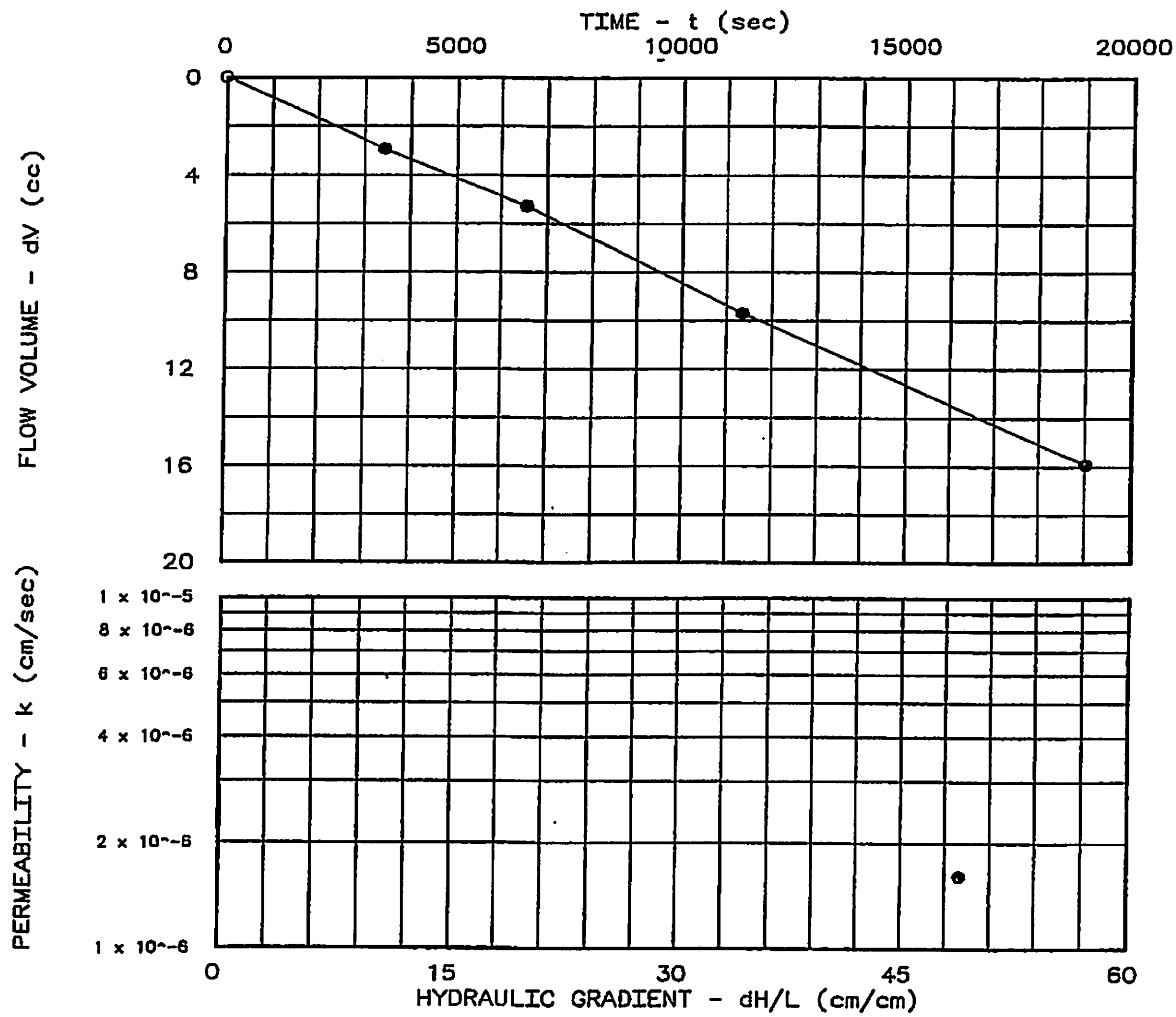
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 107.3
Moisture Before Test (%): 18.6
Moisture After Test (%): 20.1
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 85.0
VACUUM PRESSURE(psi): 80.0
Diff. Head (psi): 5.0
Flow Rate (cc/sec): 8.41 x 10^-4
Perm. (cm/sec): 1.61 x 10^-6

SAMPLE DATA:

Sample Identification: GB-14, T-2, 4.0'-6.0'
Visual Description: YELLOW AND LT.GRAY SANDY LEAN CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head

PERMEABILITY TEST REPORT

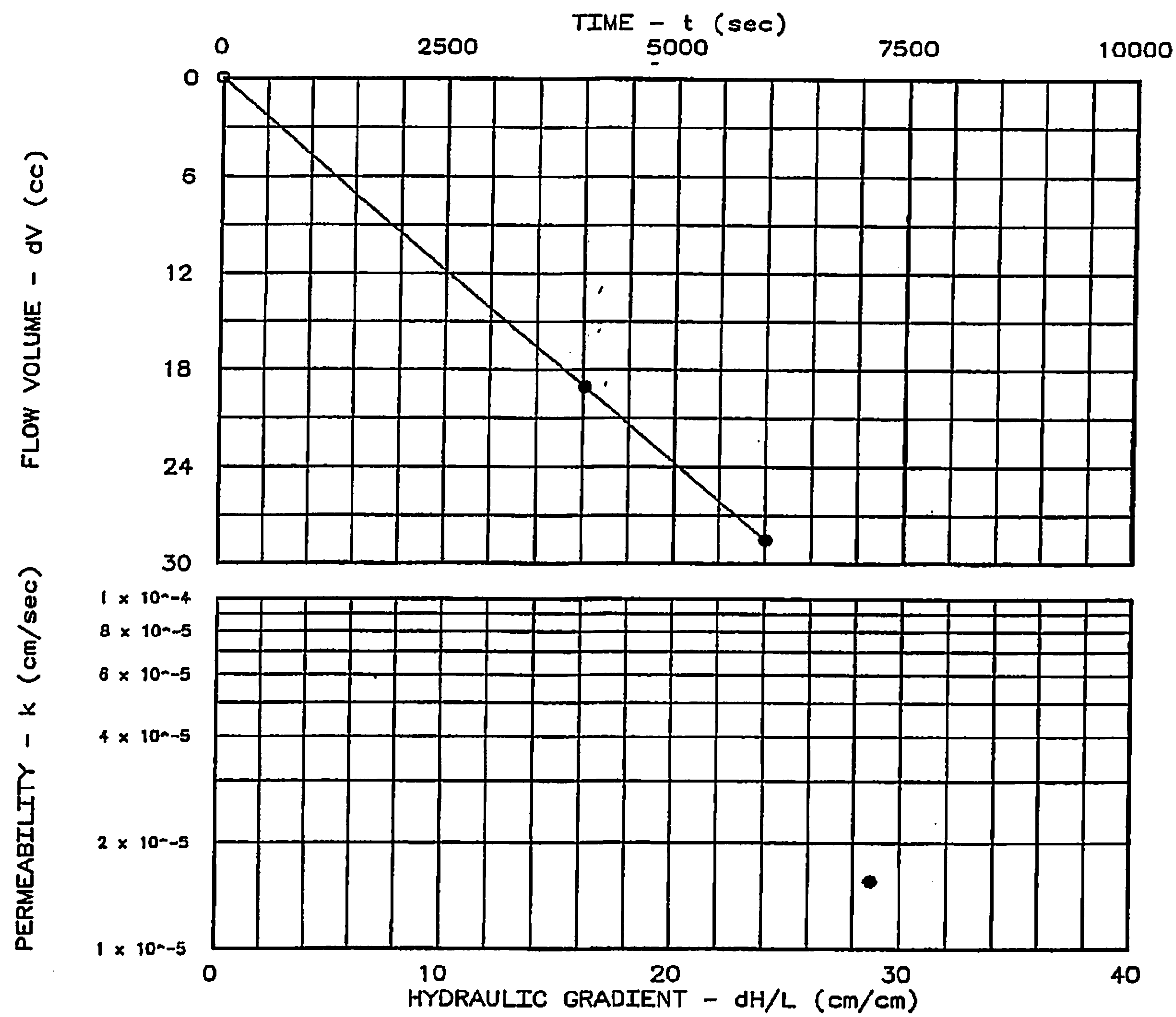
TEST DATA:

Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 110.5
Moisture Before Test (%): 17.4
Moisture After Test (%): 18.4
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 83.0
VACUUM PRESSURE(psi): 80.1
Diff. Head (psi): 2.9
Flow Rate (cc/sec): 4.78 x 10^-3
Perm. (cm/sec): 1.56 x 10^-5

SAMPLE DATA:

Sample Identification: GB-16, T-2, 5.0'-7.0'
Visual Description: LT.GRAY W/TRACE BROWN AND YELLOW CLAYEY SAND
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



Project: CHASTANG LANDFILL SUBTITLE "D" Location: CHASTANG, ALABAMA Date: 03-30-1999	Project No.: 98-392 File No.: 1 Lab No.: 1
PERMEABILITY TEST REPORT **GEOTECHNICAL ENGINEERING-TESTING, INC.**	Tested by: RGP Checked by: HO Test: CH - Constant head

PERMEABILITY TEST REPORT

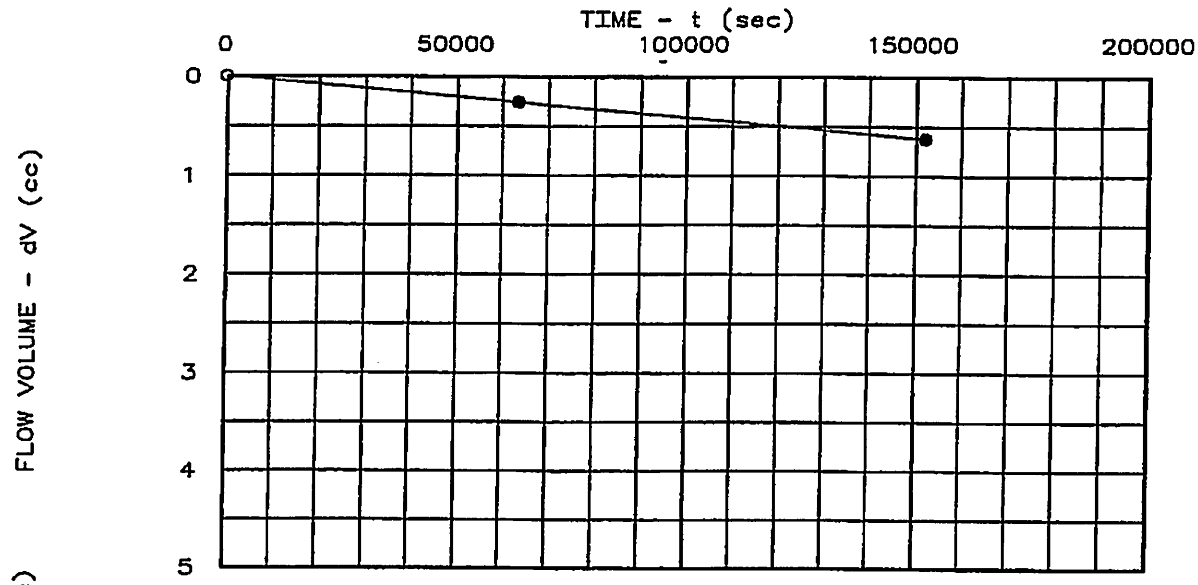
TEST DATA:

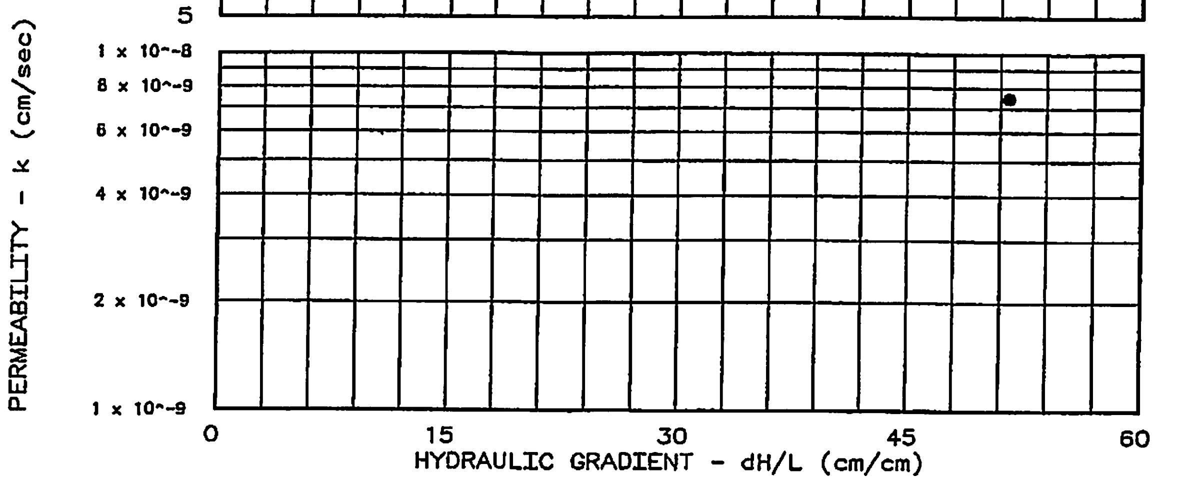
Specimen Height (cm): 7.11
Specimen Diameter (cm): 3.56
Dry Unit Weight (pcf): 110.3
Moisture Before Test (%): 19.6
Moisture After Test (%): 20.8
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 88.0
BACK PRESSURE(psi): 85.0
VACUUM PRESSURE(psi): 79.8
Diff. Head (psi): 5.2
Flow Rate (cc/sec): 4.11 x 10^-6
Perm. (cm/sec): 7.47 x 10^-9

SAMPLE DATA:

Sample Identification: GB-17, T-1, 18.0'-20.0'
Visual Description: LT.GRAY AND YELLOW W/ TRACE LT.RED FAT CLAY
Remarks: SAMPLE TRIMMED TO 1.4"D BY 2.8"L.
Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: SHELBY TUBE



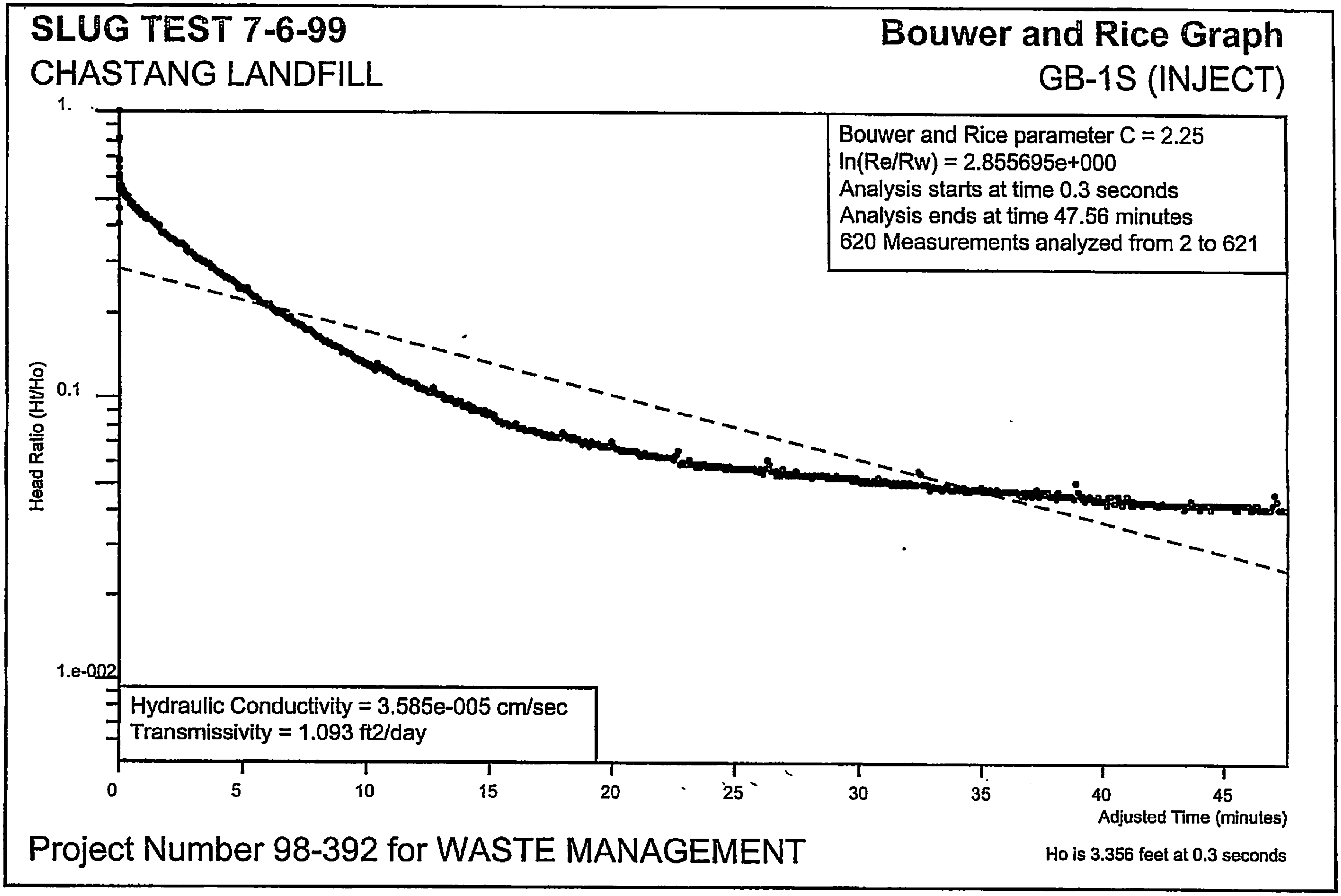


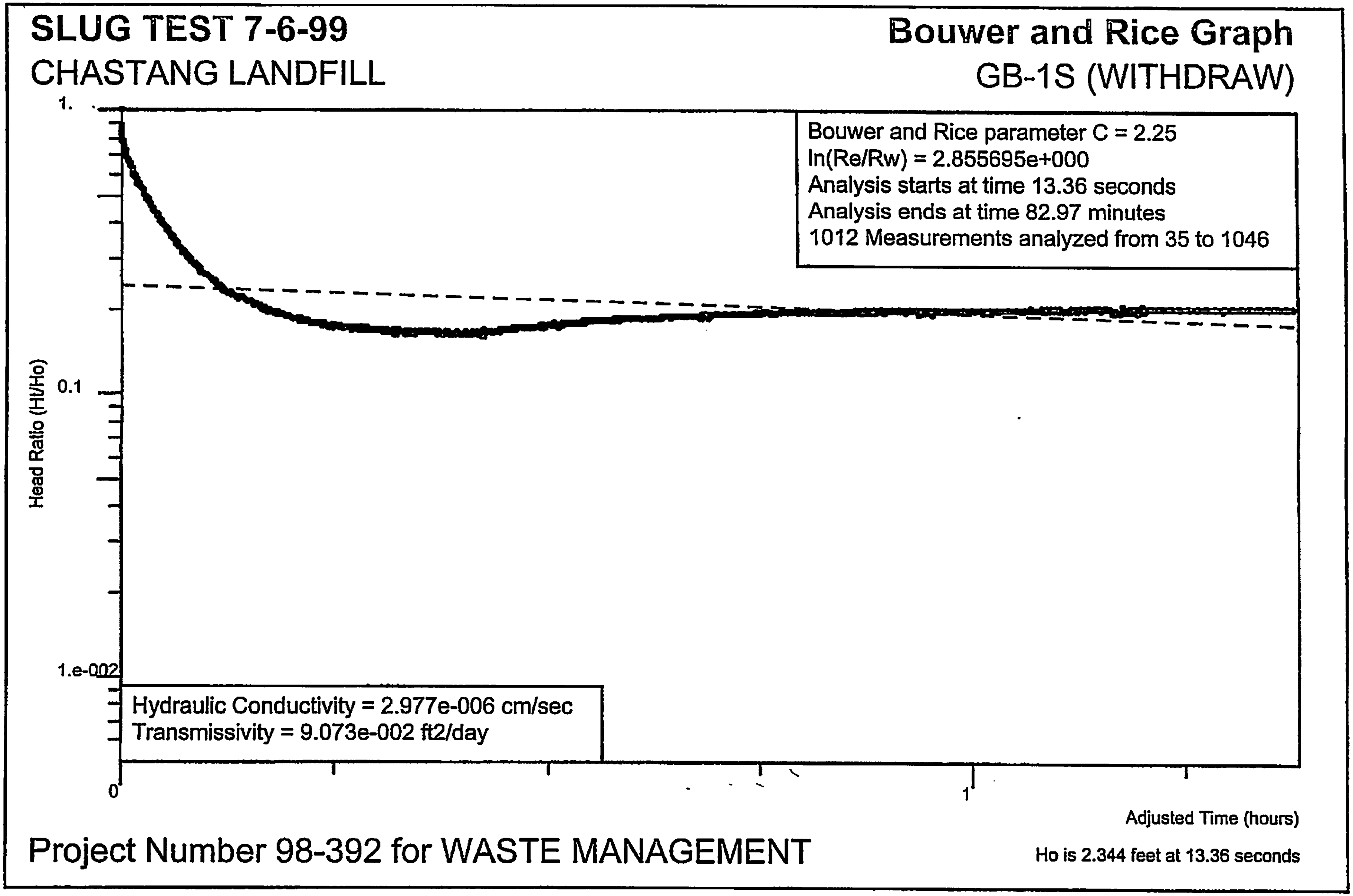
Project: CHASTANG LANDFILL SUBTITLE "D"
Location: CHASTANG, ALABAMA
Date: 03-30-1999

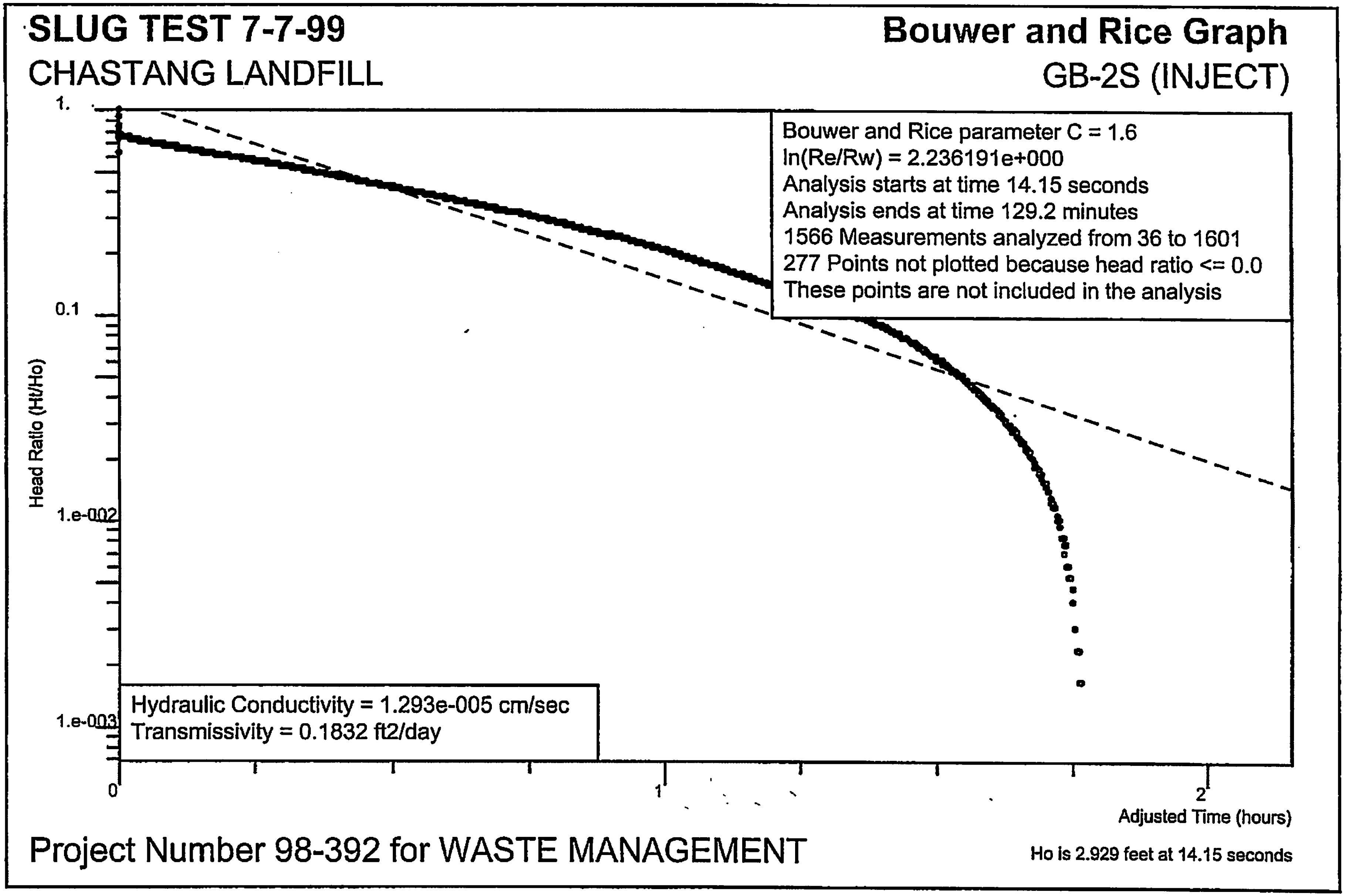
PERMEABILITY TEST REPORT

GEOTECHNICAL ENGINEERING-TESTING, INC.

Project No.: 98-392
File No.: 1
Lab No.: 1
Tested by: RGP
Checked by: HO
Test: CH - Constant head


SLUG TEST 7-6-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-1S (INJECT)
Bouwer and Rice parameter C = 2.25
ln(Re/Rw) = 2.855695e+000
Analysis starts at time 0.3 seconds
Analysis ends at time 47.56 minutes
620 Measurements analyzed from 2 to 621
Hydraulic Conductivity = 3.585e-005 cm/sec
Transmissivity = 1.093 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
40
45
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 3.356 feet at 0.3 seconds


SLUG TEST 7-6-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-1S (WITHDRAW)
Bouwer and Rice parameter C = 2.25
ln(Re/Rw) = 2.855695e+000
Analysis starts at time 13.36 seconds
Analysis ends at time 82.97 minutes
1012 Measurements analyzed from 35 to 1046
Hydraulic Conductivity = 2.977e-006 cm/sec
Transmissivity = 9.073e-002 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
1
Adjusted Time (hours)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 2.344 feet at 13.36 seconds

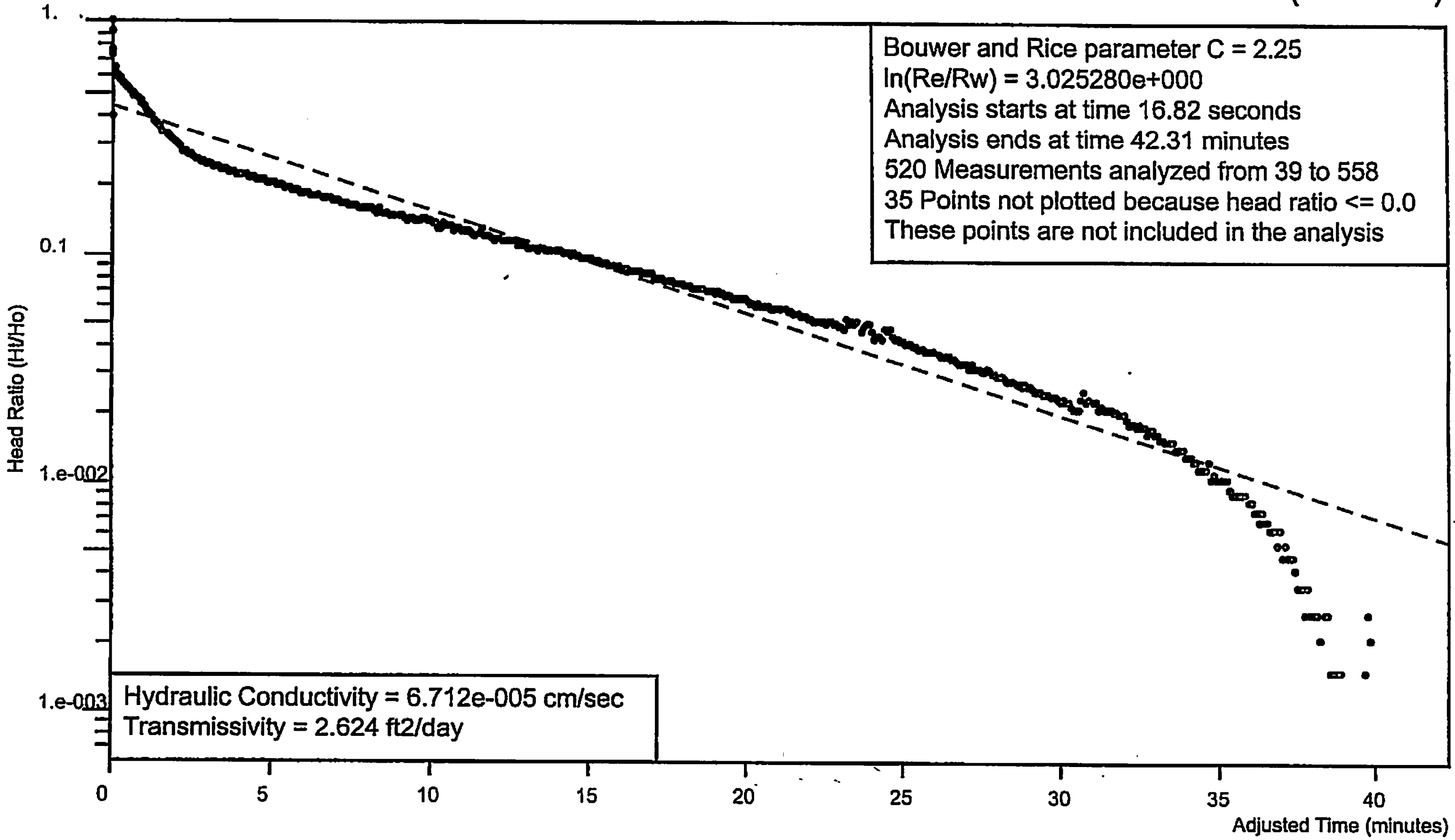

SLUG TEST 7-7-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-2S (INJECT)
Bouwer and Rice parameter C = 1.6
ln(Re/Rw) = 2.236191e+000
Analysis starts at time 14.15 seconds
Analysis ends at time 129.2 minutes
1566 Measurements analyzed from 36 to 1601
277 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
1.e-003
Hydraulic Conductivity = 1.293e-005 cm/sec
Transmissivity = 0.1832 ft2/day
0
1
2
Adjusted Time (hours)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 2.929 feet at 14.15 seconds

SLUG TEST 7-7-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-3S (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

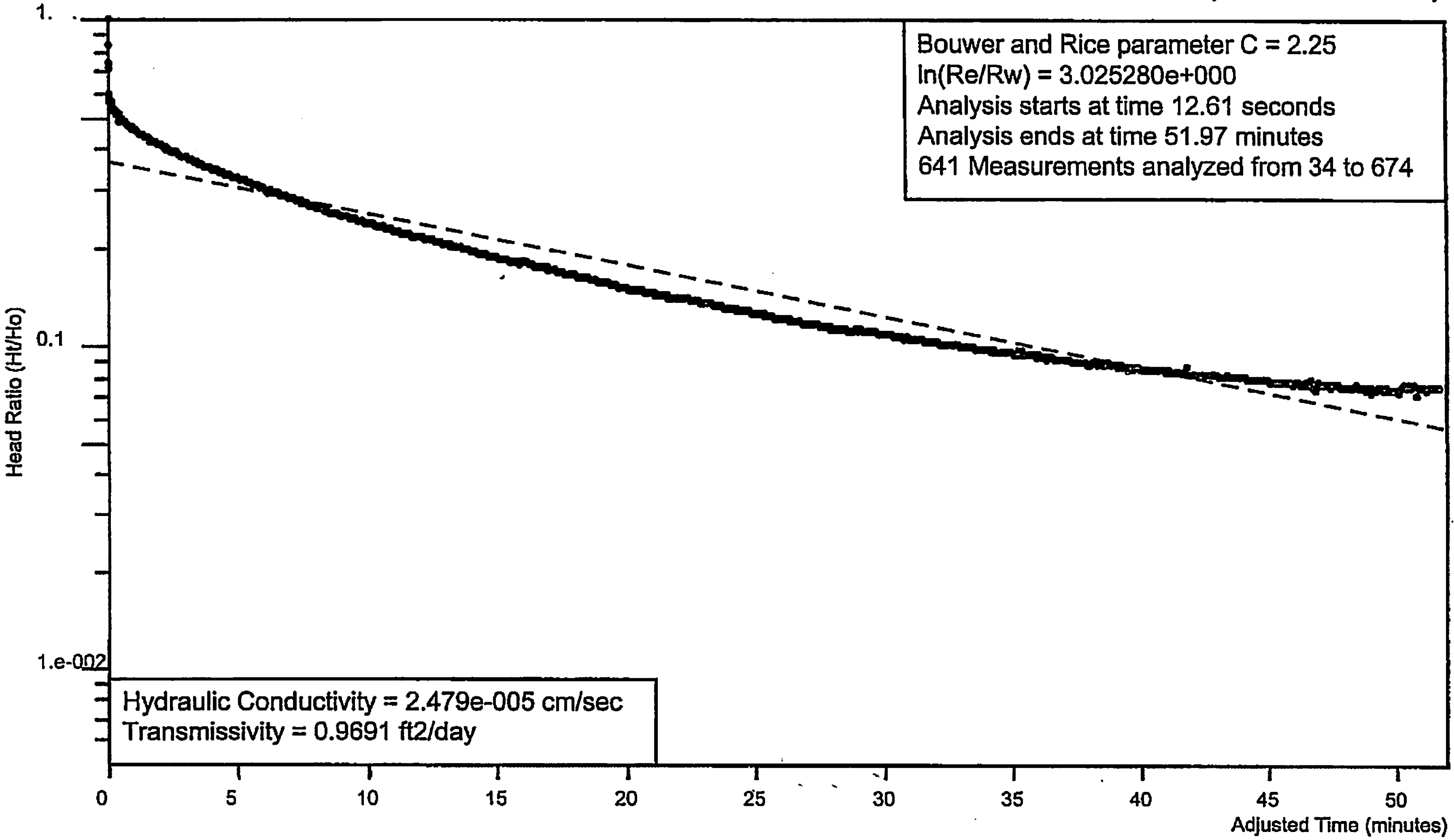
Ho is 3.352 feet at 16.82 seconds

SLUG TEST 7-7-99

CHASTANG LANDFILL

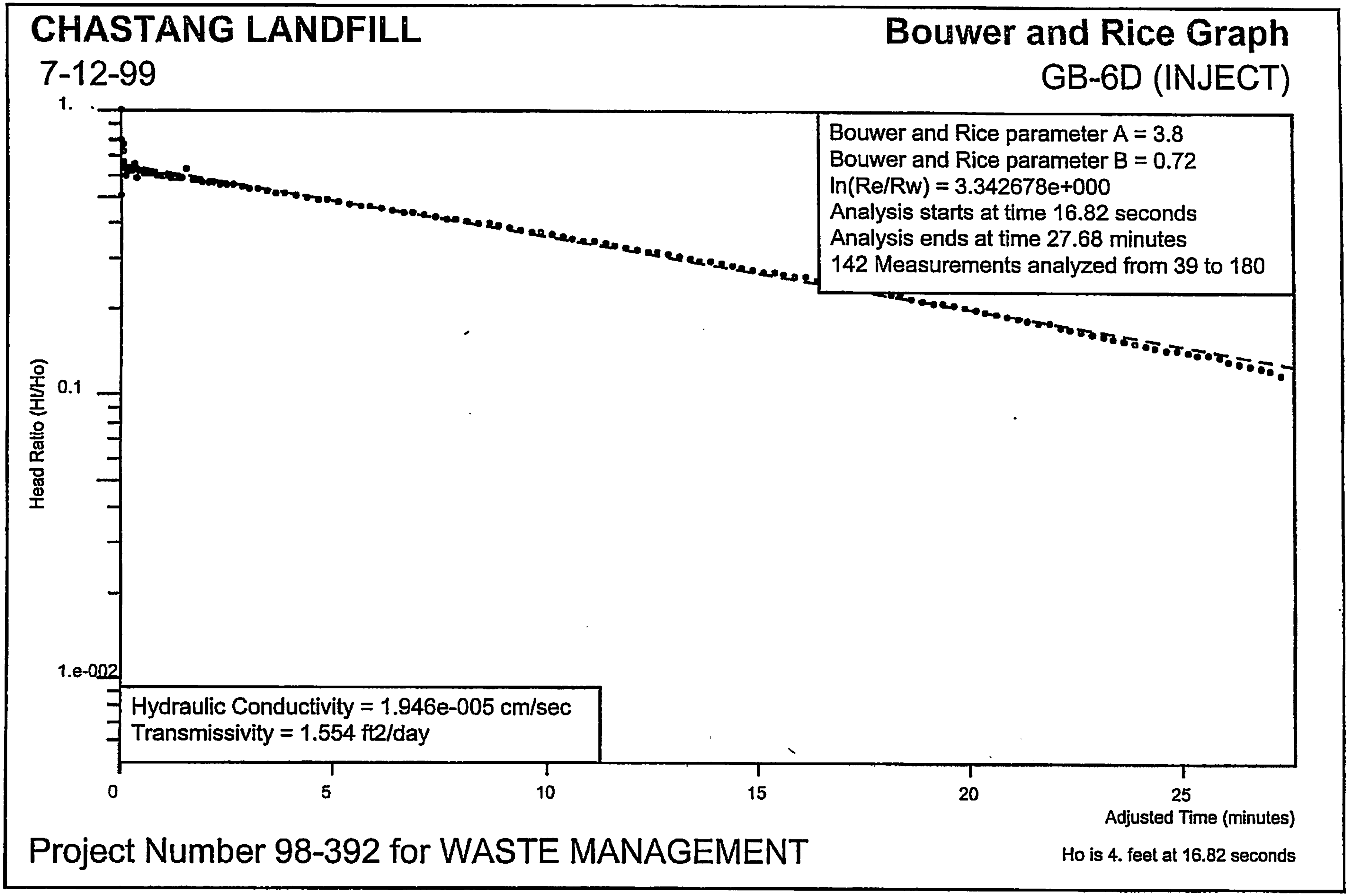
Bouwer and Rice Graph

GB-3S (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

Ho is 3.645 feet at 12.61 seconds

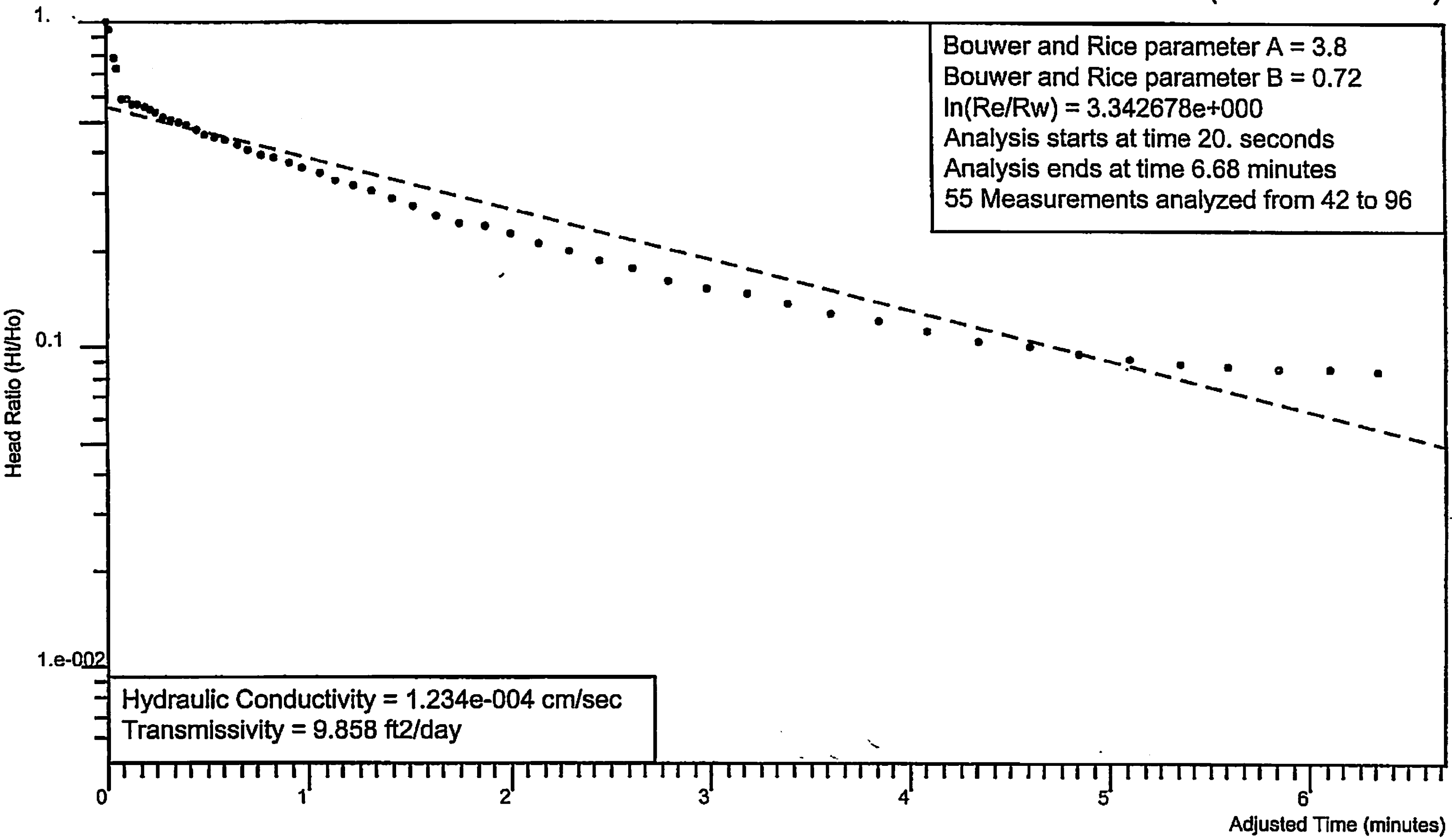

CHASTANG LANDFILL
7-12-99
Bouwer and Rice Graph
GB-6D (INJECT)
Bouwer and Rice parameter A = 3.8
Bouwer and Rice parameter B = 0.72
ln(Re/Rw) = 3.342678e+000
Analysis starts at time 16.82 seconds
Analysis ends at time 27.68 minutes
142 Measurements analyzed from 39 to 180
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 1.946e-005 cm/sec
Transmissivity = 1.554 ft2/day
0
5
10
15
20
25
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 4. feet at 16.82 seconds

SLUG TEST 7-12-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-6D (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

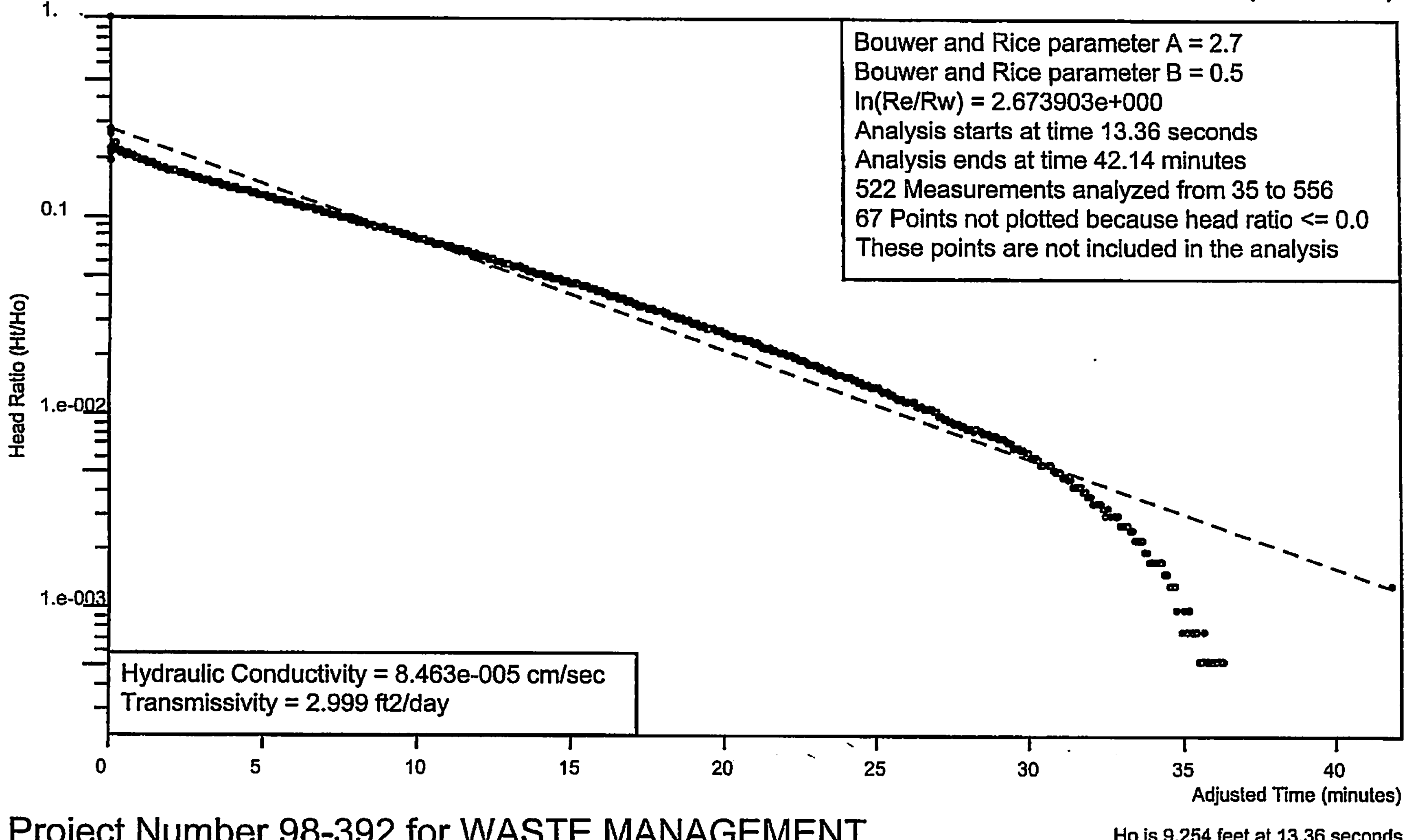
Ho is 2.607 feet at 20. seconds

SLUG TEST 7-6-99

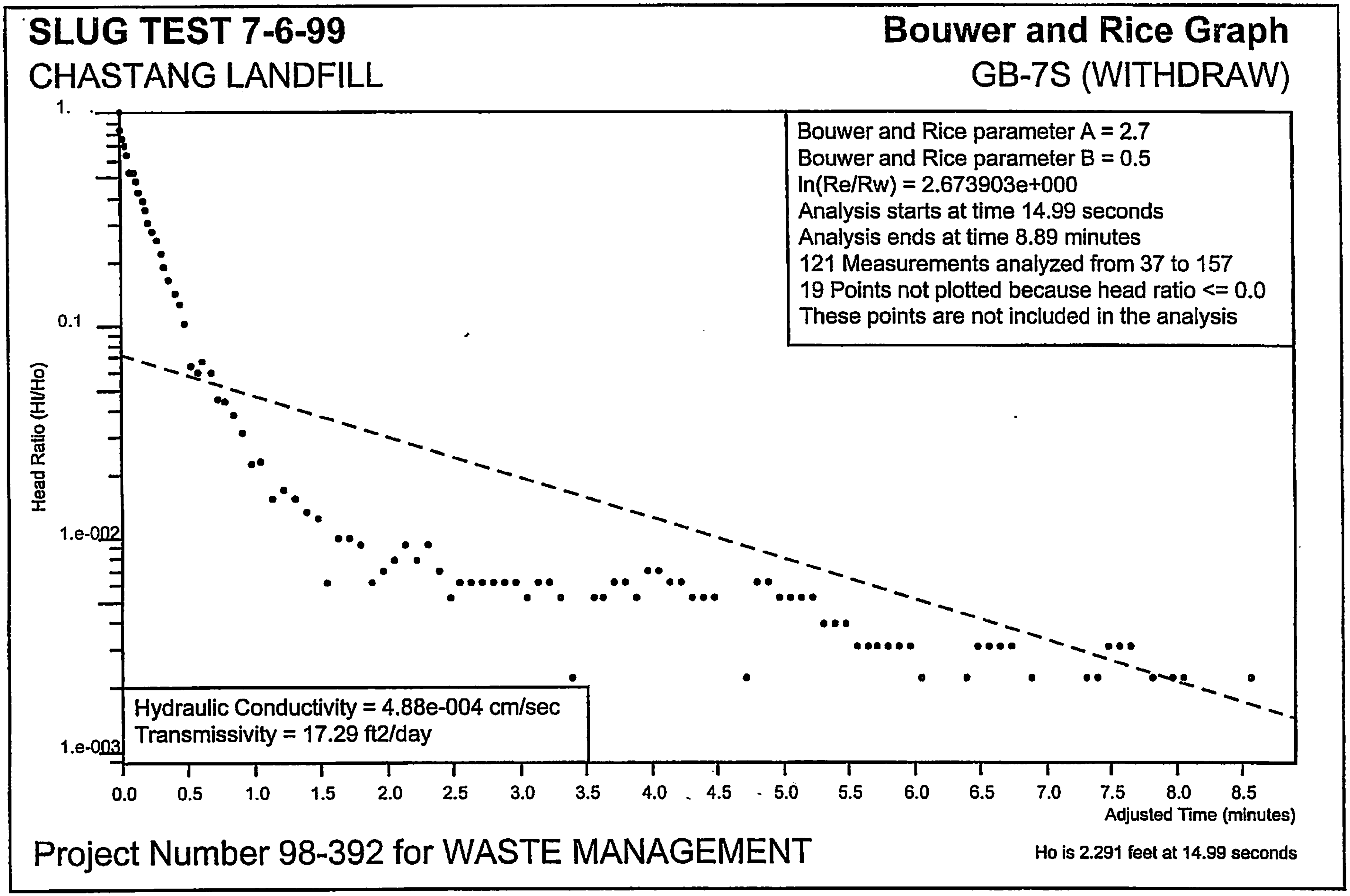
CHASTANG LANDFILL

Bouwer and Rice Graph

GB-7S (INJECT)

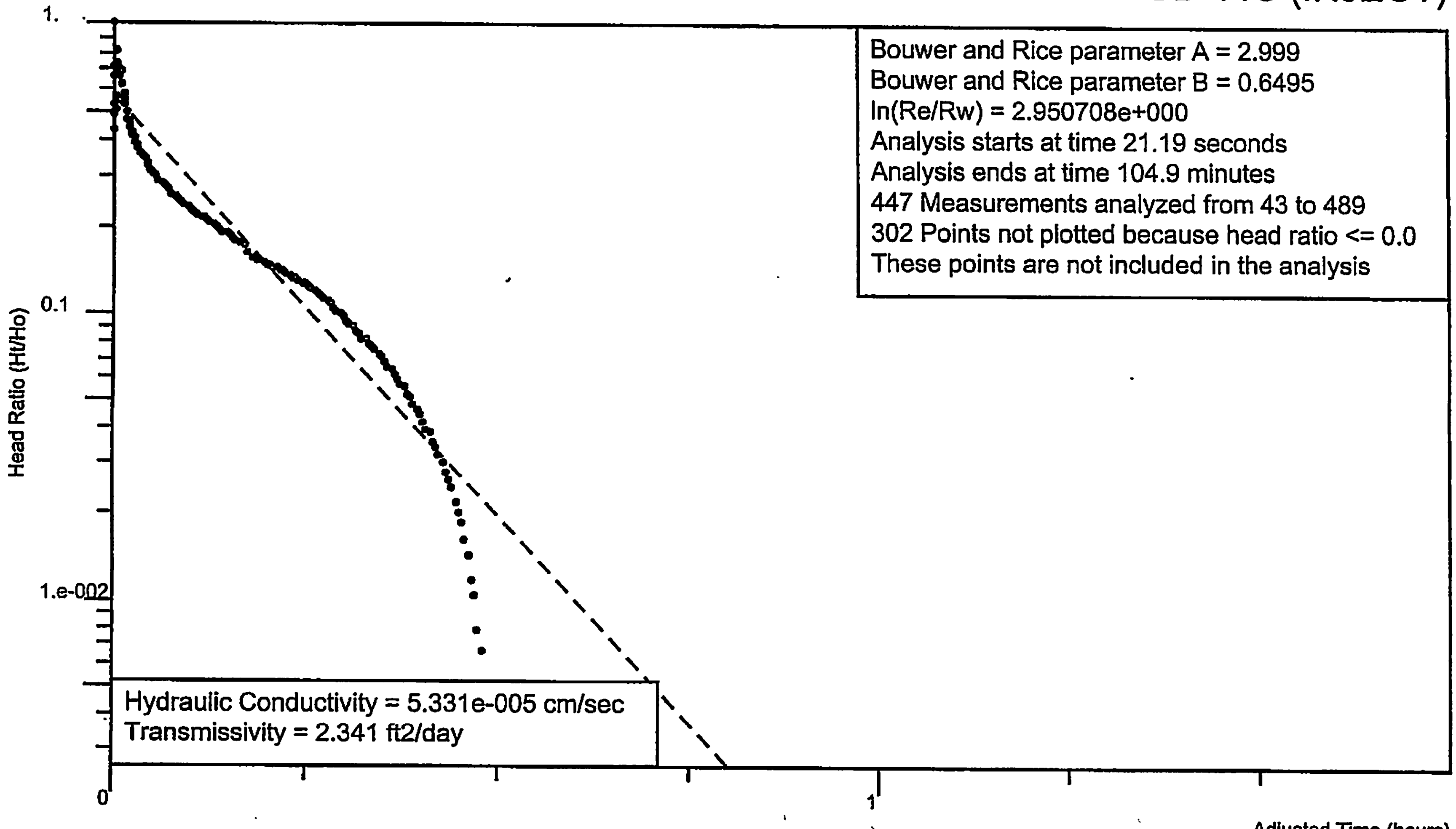


Project Number 98-392 for WASTE MANAGEMENT


SLUG TEST 7-6-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-7S (WITHDRAW)
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.673903e+000
Analysis starts at time 14.99 seconds
Analysis ends at time 8.89 minutes
121 Measurements analyzed from 37 to 157
19 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.88e-004 cm/sec
Transmissivity = 17.29 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
1.e-003
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 2.291 feet at 14.99 seconds

SLUG TEST 7-12-99
CHASTANG LANDFILL

Bouwer and Rice Graph
GB-11S (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

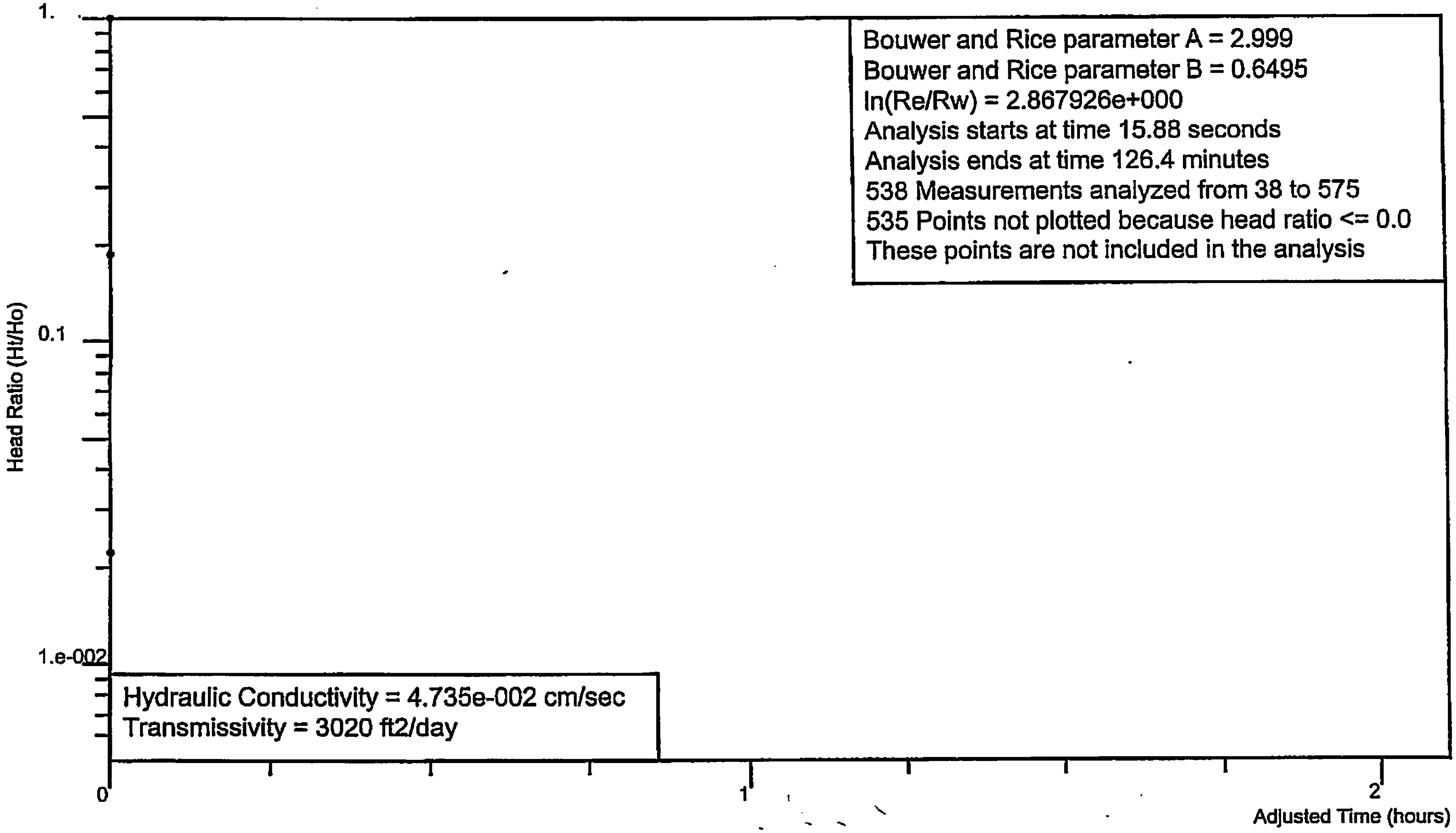
Ho is 2.72 feet at 21.19 seconds

SLUG TEST 7-12-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-11S (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

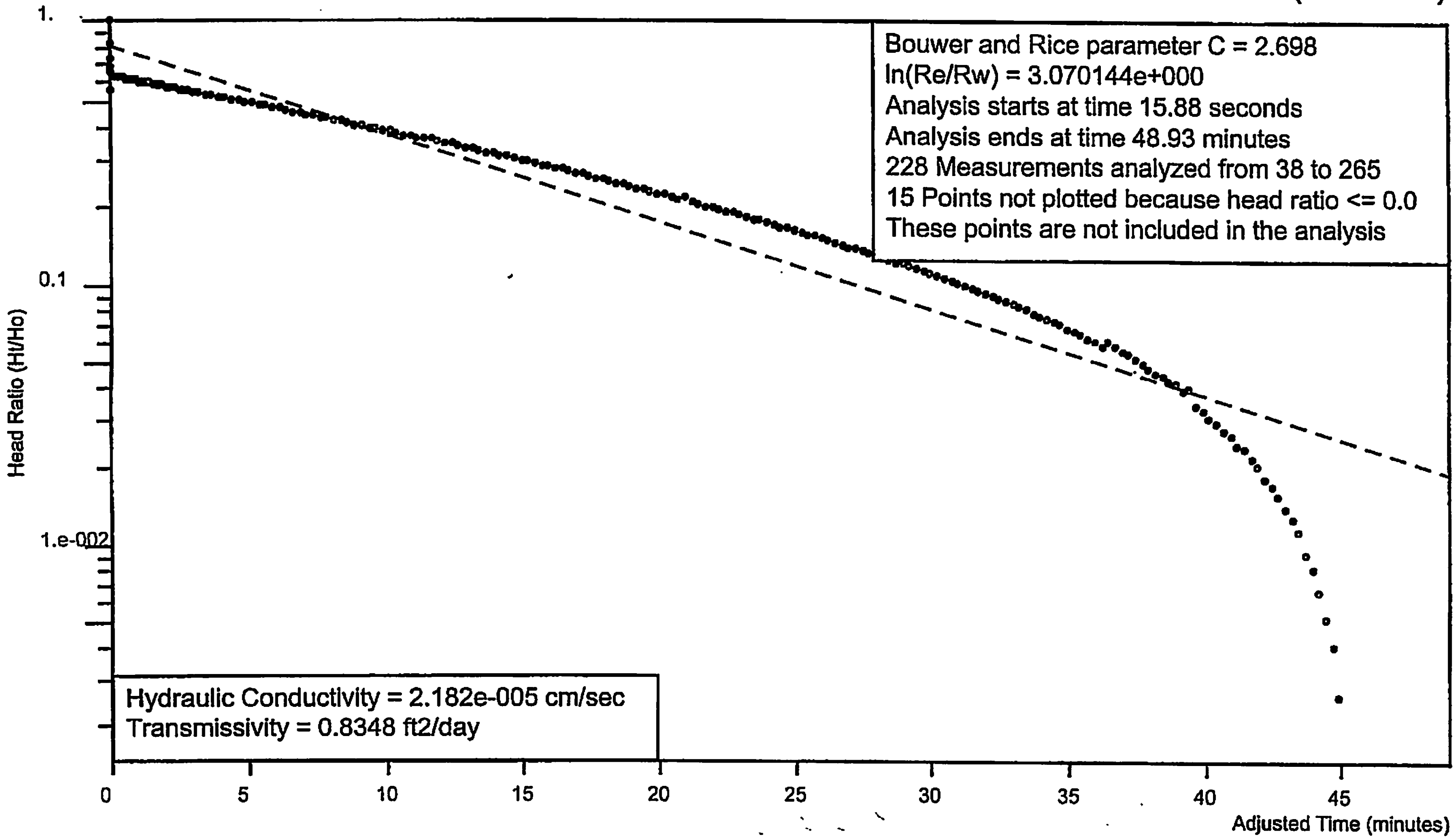
Ho is 1.366 feet at 15.88 seconds

SLUG TEST 7-9-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-14S (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

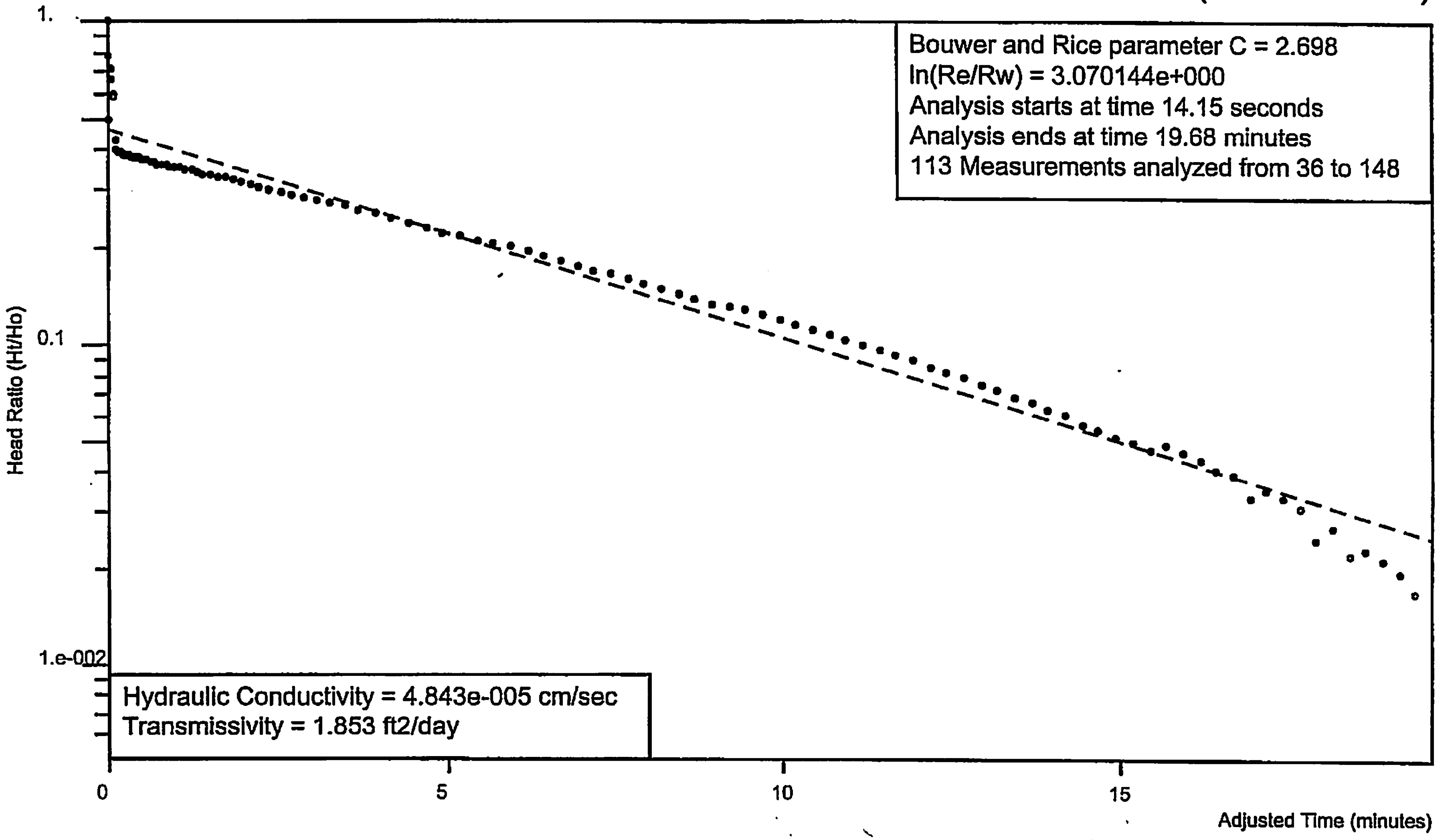
Ho is 3.418 feet at 15.88 seconds

SLUG TEST 7-9-99

CHASTANG LANDFILL

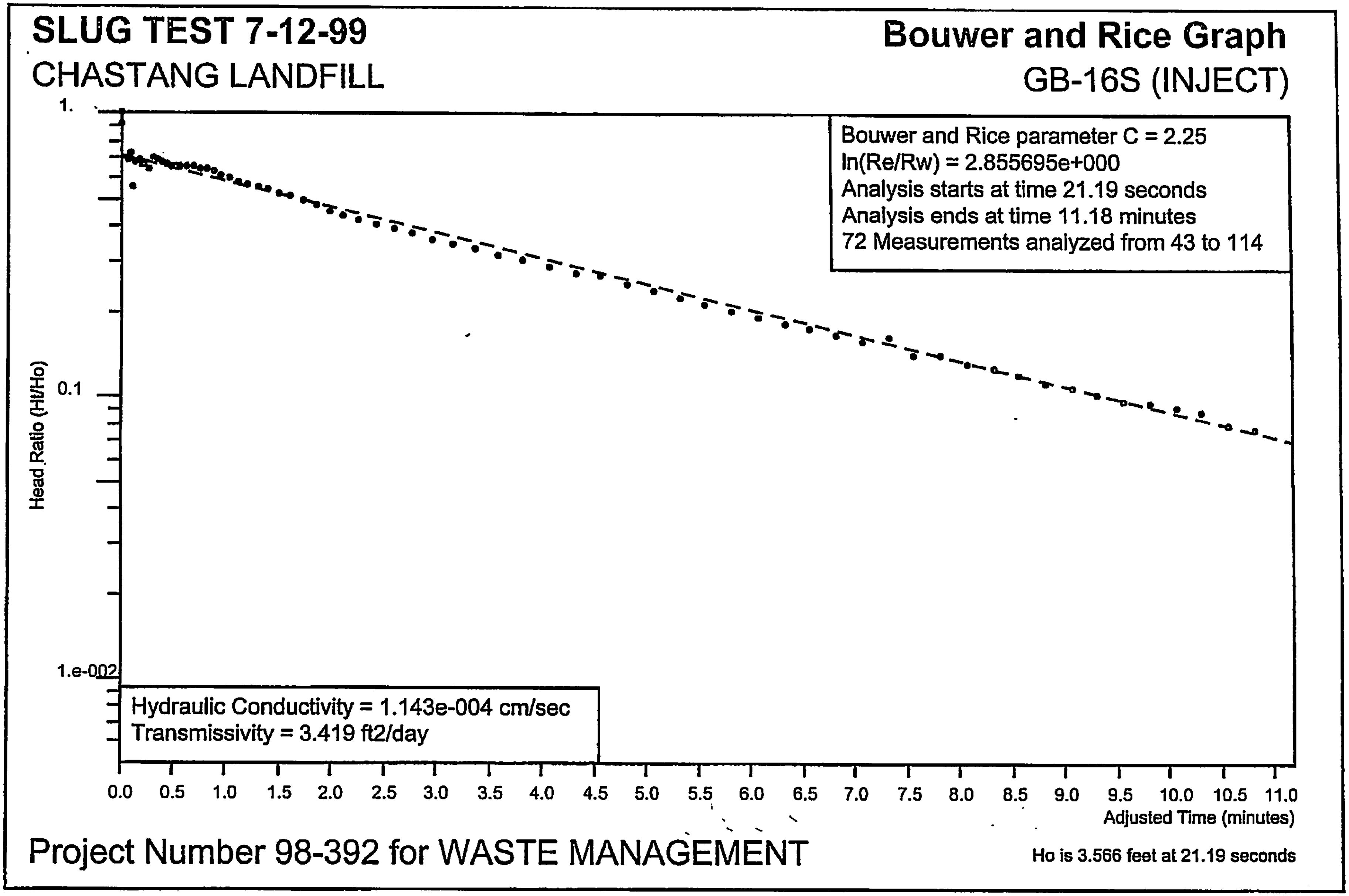
Bouwer and Rice Graph

GB-14S (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

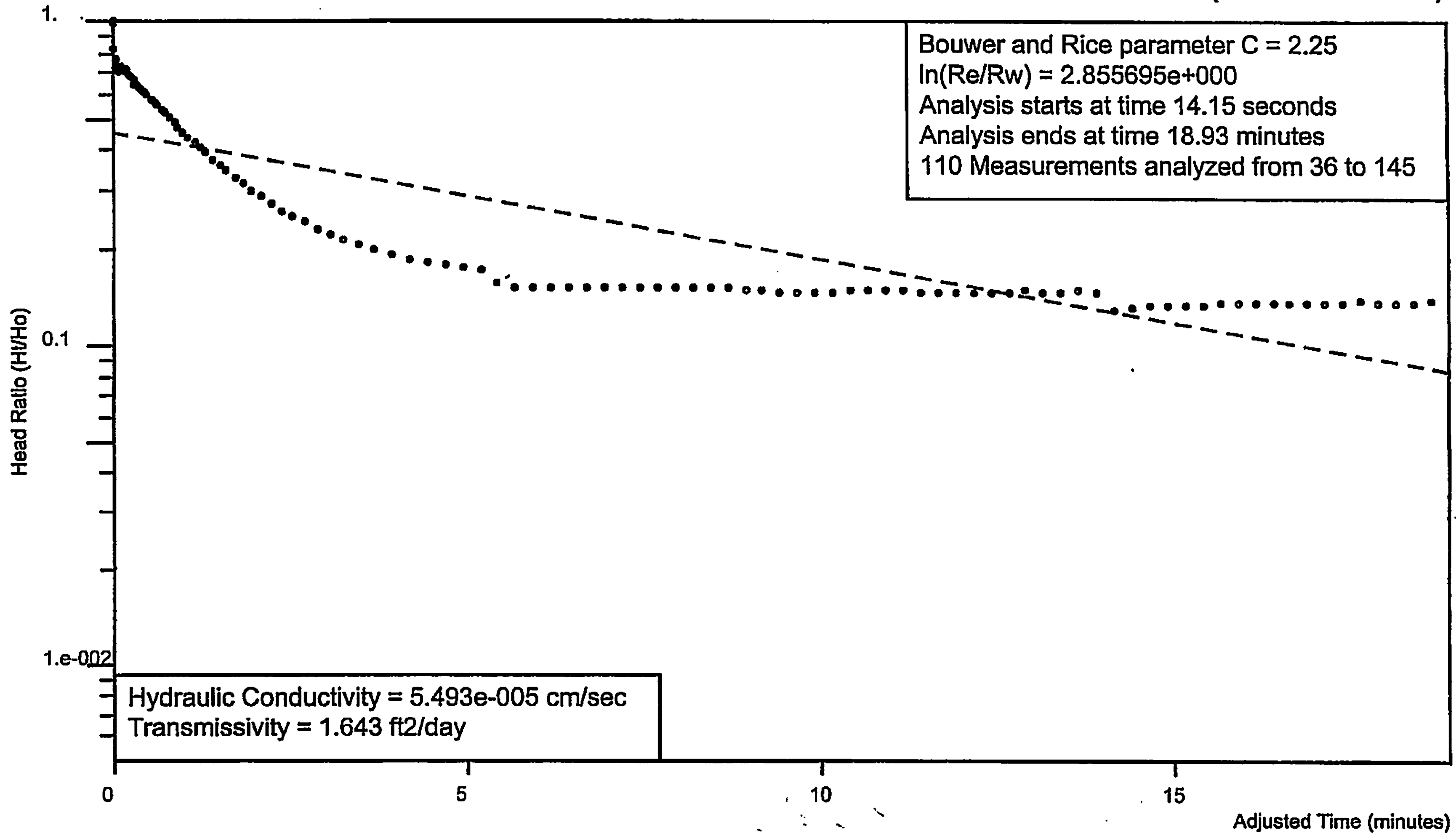
Ho is 4.004 feet at 14.15 seconds



SLUG TEST 7-12-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-16S (INJECT)
Bouwer and Rice parameter C = 2.25
ln(Re/Rw) = 2.855695e+000
Analysis starts at time 21.19 seconds
Analysis ends at time 11.18 minutes
72 Measurements analyzed from 43 to 114
Hydraulic Conductivity = 1.143e-004 cm/sec
Transmissivity = 3.419 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 3.566 feet at 21.19 seconds

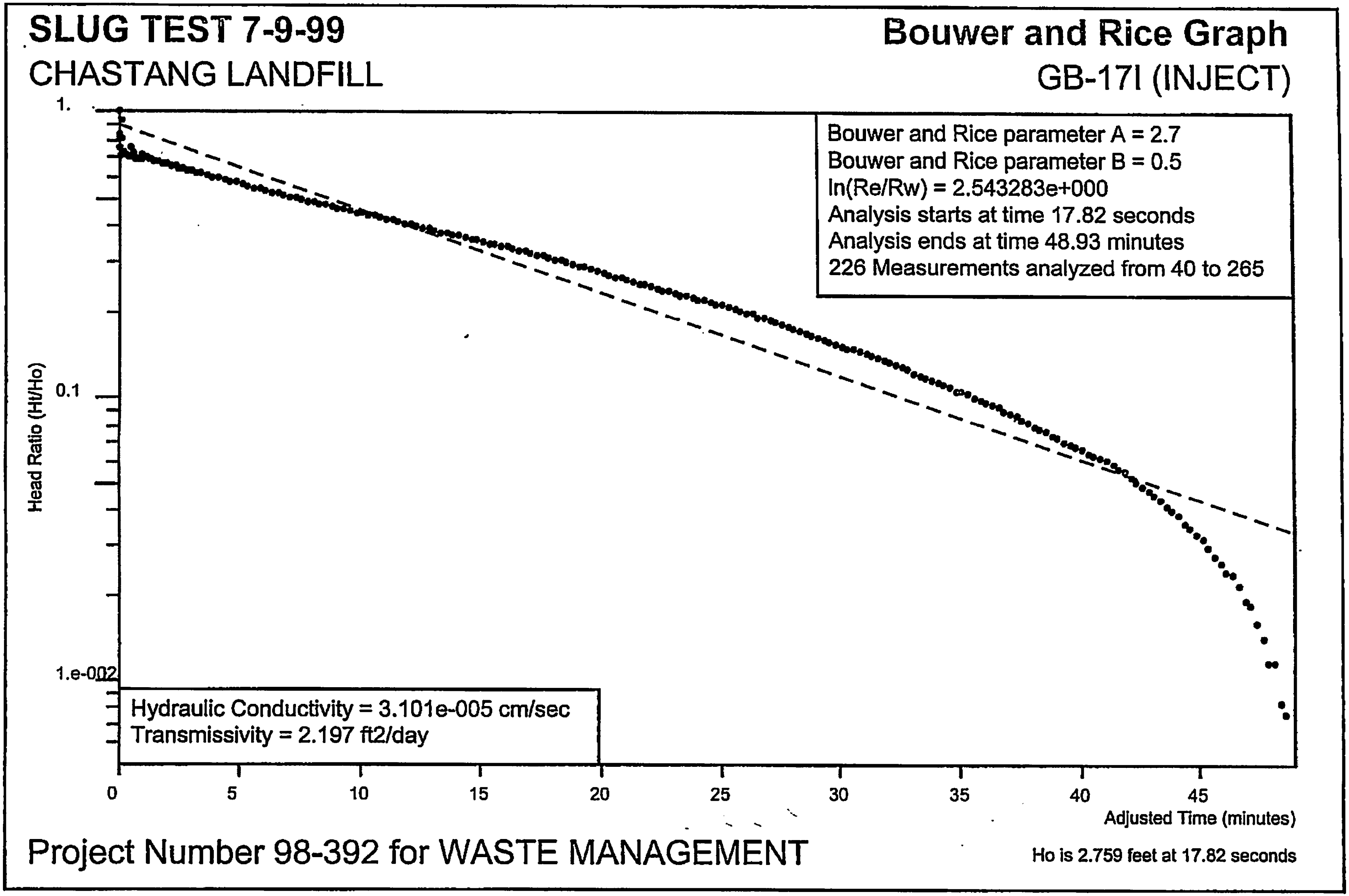
SLUG TEST 7-12-99
CHASTANG LANDFILL

Bouwer and Rice Graph
GB-16S (WITHDRAW)

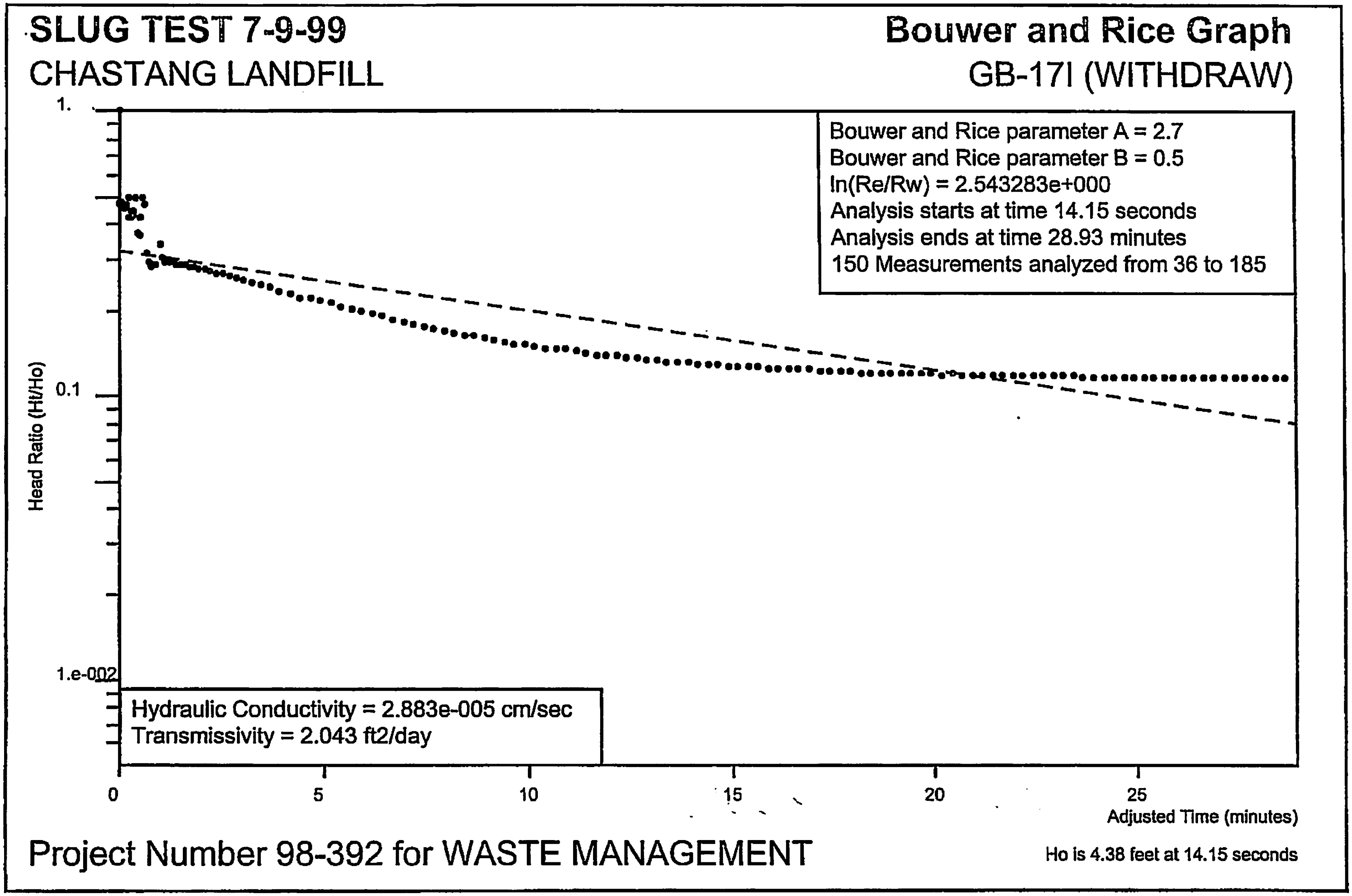


Project Number 98-392 for WASTE MANAGEMENT

Ho is 2.201 feet at 14.15 seconds



SLUG TEST 7-9-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-17I (INJECT)
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.543283e+000
Analysis starts at time 17.82 seconds
Analysis ends at time 48.93 minutes
226 Measurements analyzed from 40 to 265
Hydraulic Conductivity = 3.101e-005 cm/sec
Transmissivity = 2.197 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
40
45
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 2.759 feet at 17.82 seconds

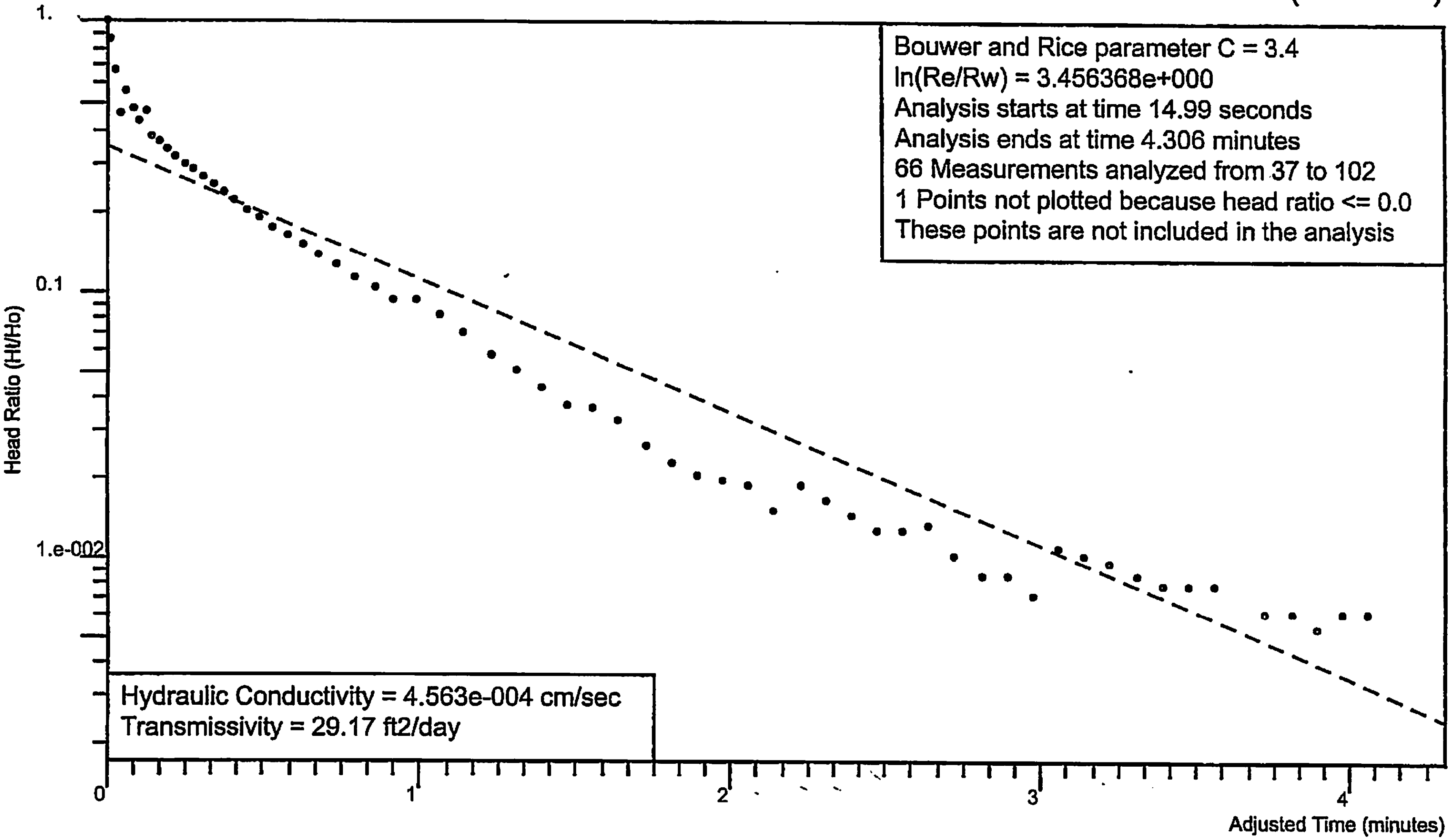

SLUG TEST 7-9-99
CHASTANG LANDFILL
Bouwer and Rice Graph
GB-17I (WITHDRAW)
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.543283e+000
Analysis starts at time 14.15 seconds
Analysis ends at time 28.93 minutes
150 Measurements analyzed from 36 to 185
1.
0.1
1.e-002
Head Ratio (Ht/Ho)
Hydraulic Conductivity = 2.883e-005 cm/sec
Transmissivity = 2.043 ft2/day
0
5
10
15
20
25
Adjusted Time (minutes)
Project Number 98-392 for WASTE MANAGEMENT
Ho is 4.38 feet at 14.15 seconds

SLUG TEST 7-6-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-18S (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

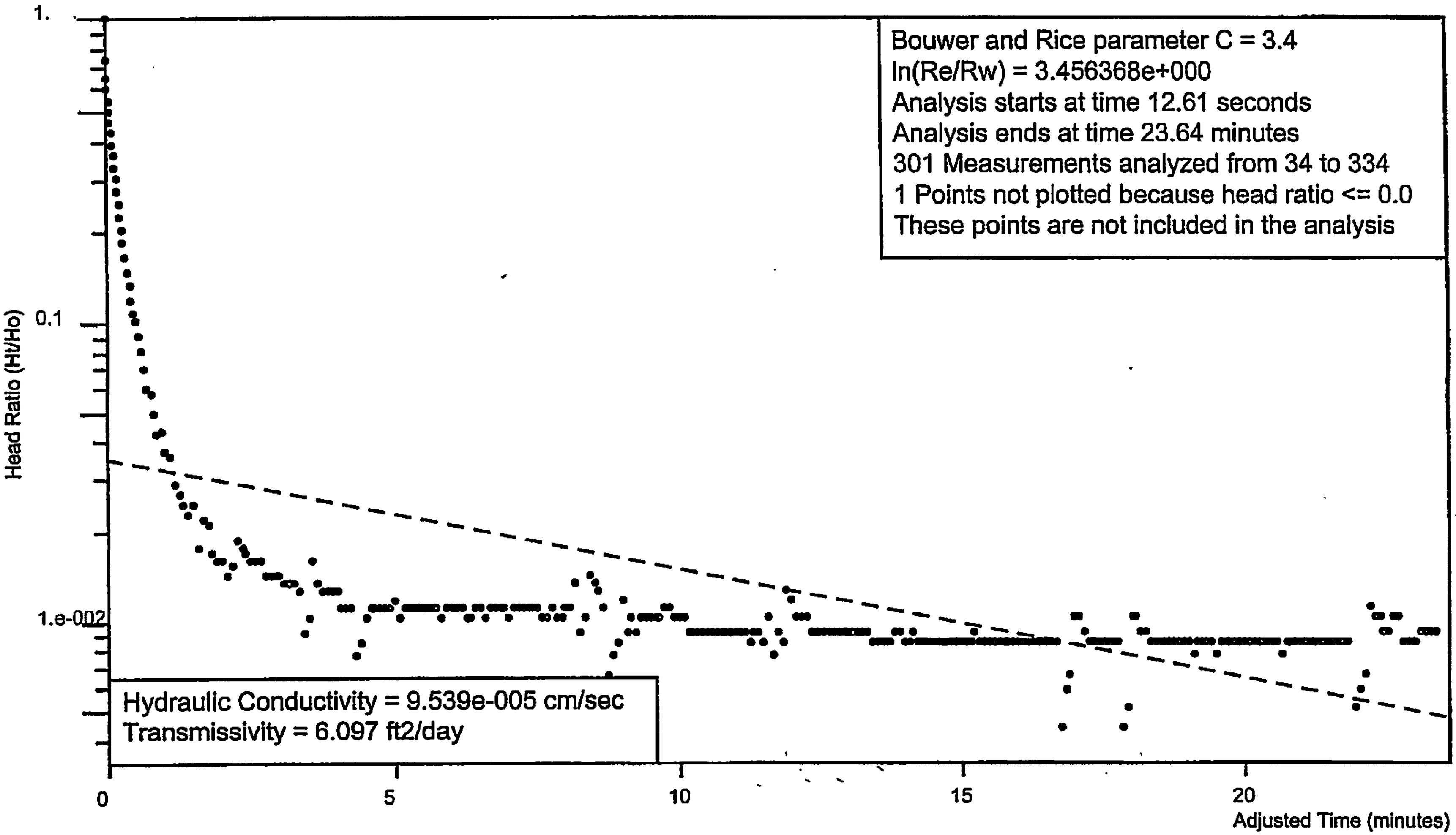
Ho is 2.941 feet at 14.99 seconds

SLUG TEST 7-6-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-18S (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

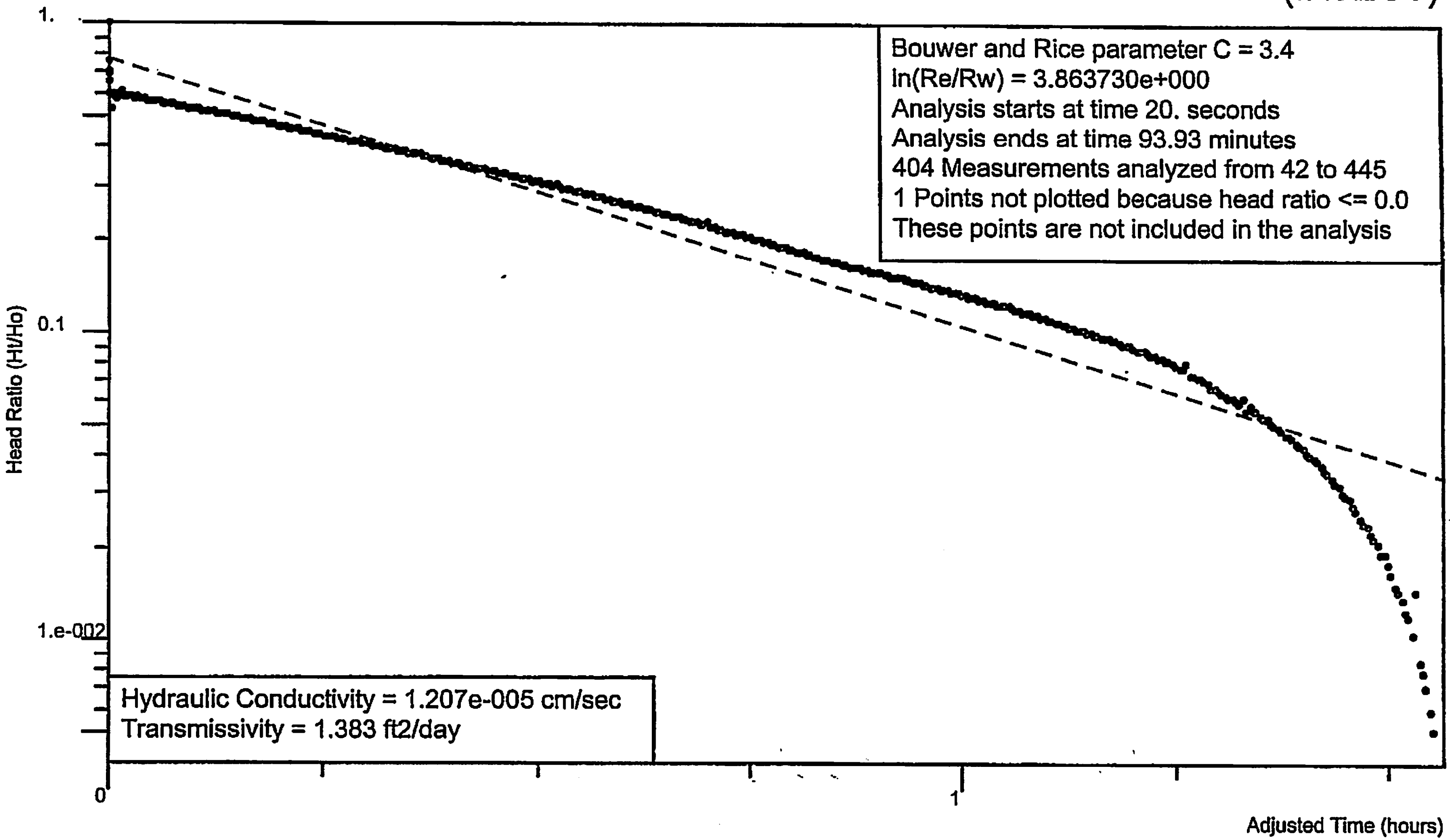
Ho is 2.708 feet at 12.61 seconds

SLUG TEST 7-9-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-19D (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

Ho is 3.525 feet at 20. seconds

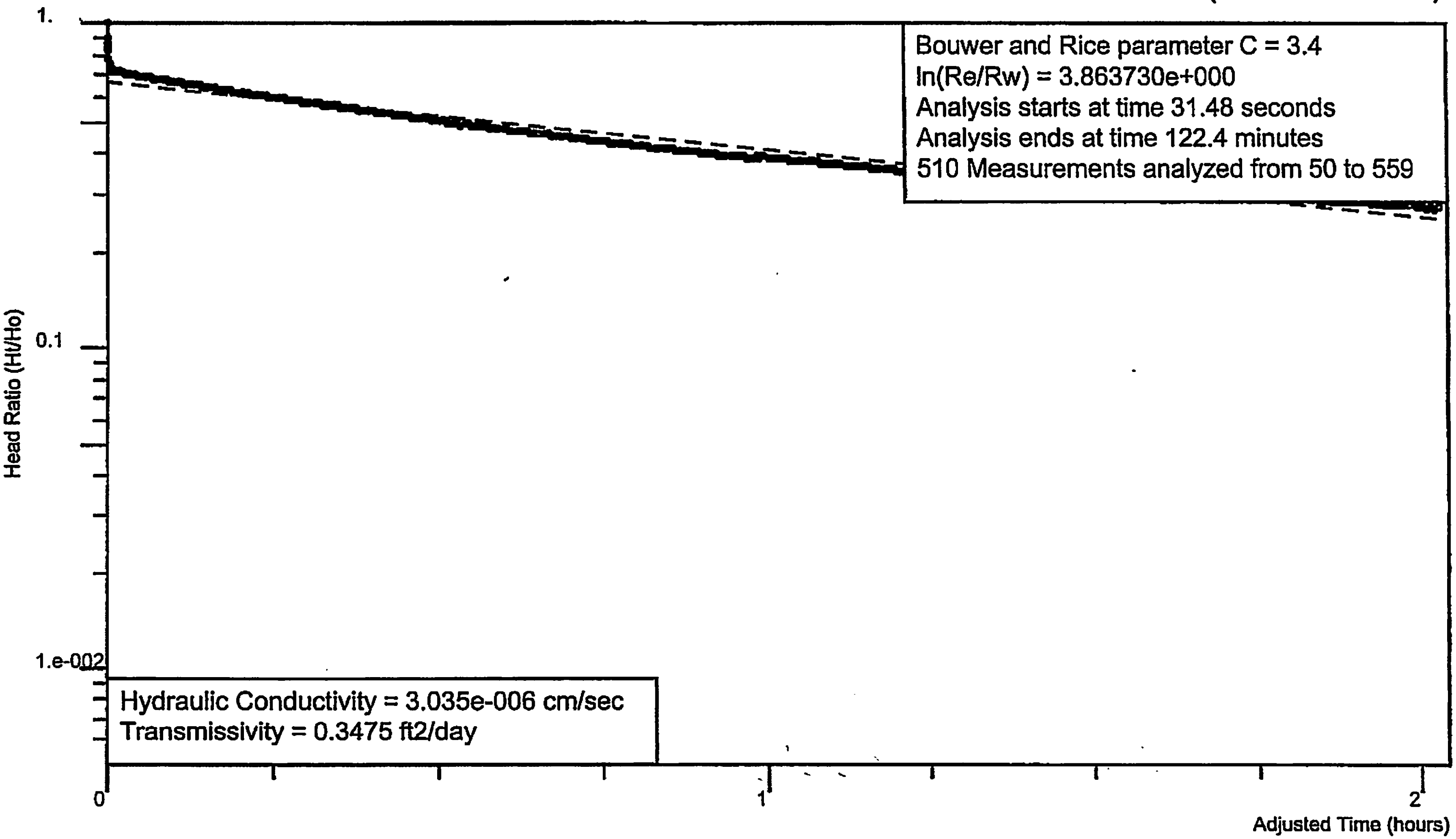
GEOTECHNICAL ENGINEERING TESTING, INC

SLUG TEST 7-9-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-19D (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

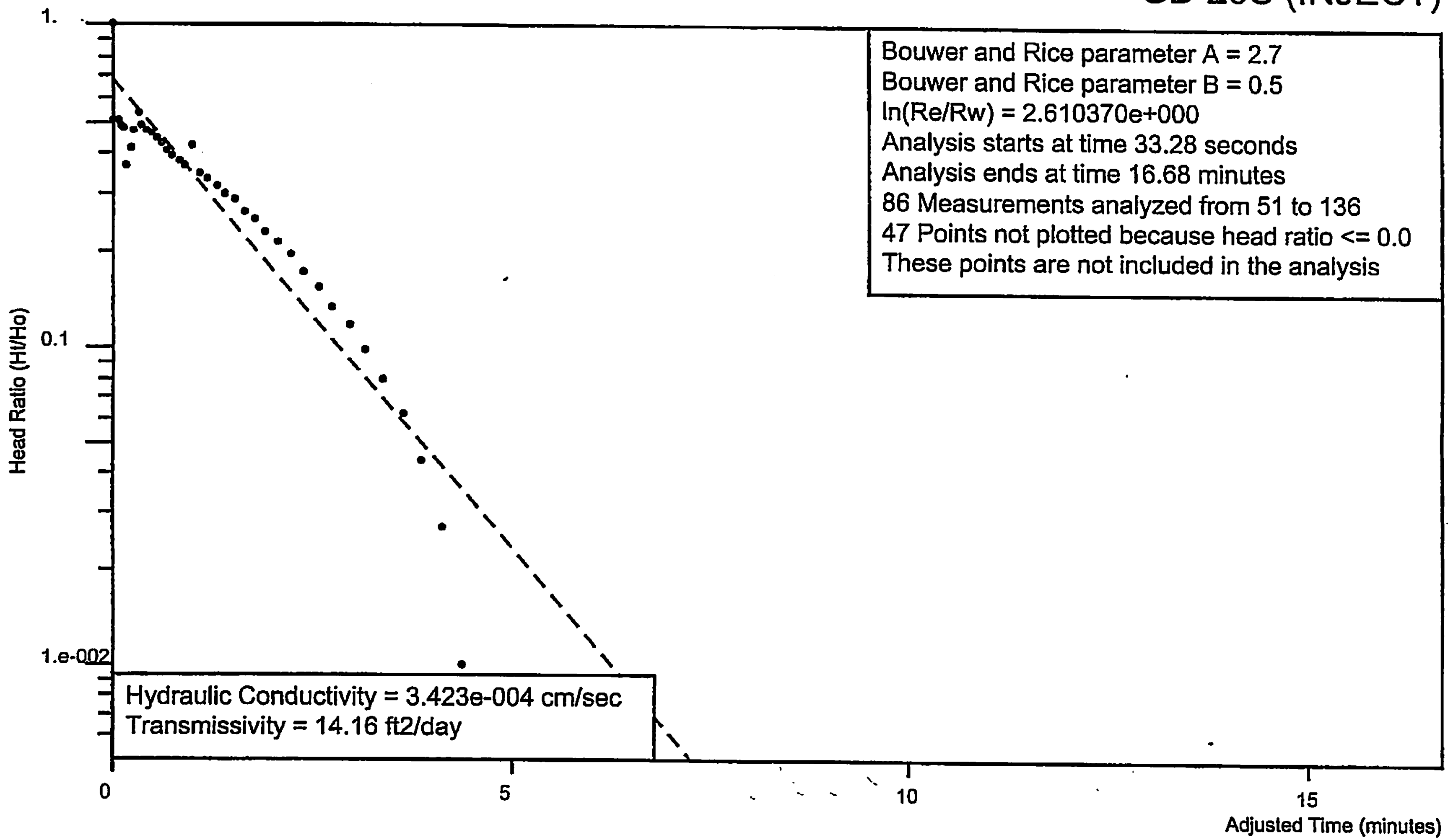
Ho is 2.777 feet at 31.48 seconds

SLUG TEST 7-13-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-20S (INJECT)



Project Number 98-392 for WASTE MANAGEMENT

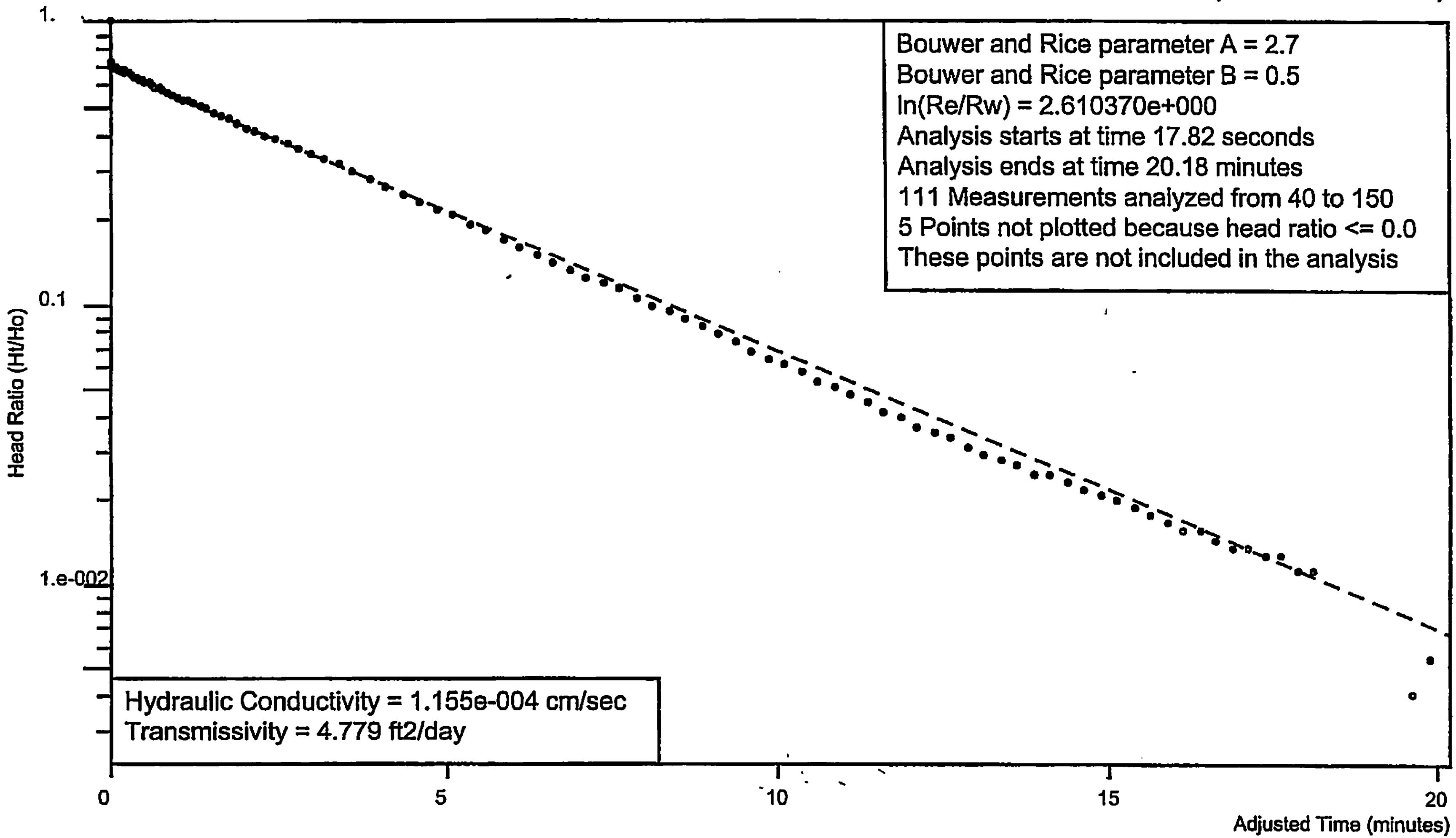
Ho is 1.79 feet at 33.28 seconds

SLUG TEST 7-13-99

CHASTANG LANDFILL

Bouwer and Rice Graph

GB-20S (WITHDRAW)



Project Number 98-392 for WASTE MANAGEMENT

Ho is 2.205 feet at 17.82 seconds

GEOTECHNICAL ENGINEERING TESTING, INC.

CHASTANG LANDFILL													
Well Number		GROUNDWATER ELEVATIONS (MSL) JANUARY - JULY											
		1/4	1/12	1/18	1/26	2/3	2/10	2/24	3/11	3/25	4/14	6/3	7/21
GB-1	S	94.5	94.3	94.0	94.1	94.4	94.0	93.3	94.0	93.5	93.5	92.6	94.1
GB-1	I	92.7	92.7	92.6	92.5	92.6	92.9	92.2	92.4	92.2	92.1	92.0	92.4
GB-1	D	68.5	68.5	68.4	68.3	68.3	68.3	68.3	67.9	68.0	67.9	66.7	67.0
GB-2	S	84.9	85.2	85.0	85.1	85.0	84.8	84.4	84.6	84.5	84.2	83.7	84.1
GB-2	D	75.4	73.4	73.0	72.8	72.9	72.8	71.4	72.4	72.8	72.2	70.5	71.1
GB-3	S	86.2	86.0	85.5	86.0	85.9	85.4	84.8	86.1	84.7	85.3	83.3	83.6
GB-3	D	54.1	54.3	54.2	54.1	54.3	54.1	53.9	54.0	54.2	53.8	52.6	52.7
GB-4	S	76.9	76.7	76.5	76.8	76.8	76.5	NM	77.1	76.6	76.5	NM	NM
GB-4	D	73.0	73.2	72.9	73.2	73.4	73.1	NM	73.2	72.5	72.6	NM	NM
GB-5	S	81.3	81.4	80.0	81.4	80.9	79.9	78.4	82.4	81.1	78.2	76.8	80.5
GB-5	D	72.6	73.1	73.1	73.1	73.3	73.1	71.5	73.1	72.8	72.5	71.0	72.0
GB-6	S	73.3	73.1	72.5	73.1	73.1	72.4	71.6	73.4	71.6	72.0	69.7	73.1
GB-7	S	72.4	72.4	71.8	72.4	72.3	71.7	70.8	73.0	71.2	71.2	69.5	71.0
GB-7	D	69.8	70.3	70.3	70.4	70.7	70.5	69.8	70.3	70.2	69.8	67.9	69.0
GB-8	D	70.1	70.4	70.4	70.4	68.6	70.4	70.2	70.4	70.6	70.0	69.3	69.4
GB-9	S	69.9	69.5	69.1	69.5	69.3	69.0	68.6	69.9	68.6	69.0	66.7	67.0
GB-9	D	68.1	68.1	67.7	68.0	67.9	67.7	67.4	68.2	67.2	67.6	66.0	67.3
GB-10	S	68.0	67.9	67.7	67.8	67.7	67.6	67.4	67.9	67.0	67.8	66.8	67.4
GB-10	D	48.5	48.4	48.4	48.5	48.5	48.5	48.4	49.1	48.7	48.5	48.4	48.5
GB-11	S	69.8	70.1	70.0	70.1	70.1	70.1	69.8	70.0	70.1	69.8	69.0	69.2
GB-11	D	67.3	67.6	67.4	67.5	67.5	67.3	66.9	67.5	67.1	67.0	65.8	66.6
GB-12	S	71.2	71.2	70.5	68.5	71.1	70.4	69.4	71.9	71.3	69.4	65.0	67.8
GB-12	D	66.3	66.5	66.2	66.6	66.4	66.1	65.8	66.6	68.3	65.8	64.3	66.7
GB-13	S	65.6	65.2	65.1	65.2	65.1	65.1	65.0	65.3	64.9	65.0	64.7	64.8
GB-13	D	64.4	64.3	64.1	64.2	64.4	64.1	64.0	63.3	63.7	64.0	63.3	63.5
GB-14	S	66.7	66.6	66.3	66.5	66.5	66.2	65.9	66.6	65.7	66.2	65.1	66.0
GB-14	D	44.0	44.2	44.2	44.2	44.3	44.3	44.1	44.1	44.5	44.1	43.9	43.4
GB-15	S	66.9	66.6	66.3	66.5	66.6	66.1	65.6	66.7	65.4	66.0	64.3	65.5
GB-15	D	62.6	63.1	63.0	63.2	63.3	62.9	62.6	63.2	62.5	62.8	61.3	62.4
GB-16	S	63.0	62.7	62.2	62.6	62.3	62.0	59.7	62.8	61.5	61.8	60.4	61.6
GB-16	D	42.0	42.1	42.1	42.2	42.2	42.3	42.1	42.1	42.5	42.0	41.6	41.4
GB-17	S	88.1	89.2	89.0	89.6	89.5	89.0	88.1	89.0	88.7	87.7	87.4	87.3
GB-17	I	67.4	68.0	67.8	67.9	68.0	68.0	67.5	67.8	68.2	67.5	NM	66.2
GB-17	D	65.0	65.4	65.2	65.2	65.4	65.3	64.9	65.2	65.6	64.8	64.0	63.8
GB-18	S	59.3	59.2	58.9	59.1	59.0	58.6	58.1	59.1	58.4	58.1	57.0	58.1
GB-18	D	41.6	41.7	41.7	41.6	41.7	41.7	41.8	41.2	41.4	41.3	40.1	40.1
GB-19	S	88.3	90.7	89.2	89.8	89.8	89.2	87.8	89.0	90.3	89.3	84.6	84.8
GB-19	D	64.9	63.1	62.9	62.5	62.9	62.8	62.4	62.6	63.2	62.4	61.6	61.0
GB-20	S	54.1	53.9	53.7	53.9	53.9	53.7	53.2	54.0	53.1	53.6	52.3	53.6
GB-20	D	49.0	49.1	49.1	49.2	49.3	49.2	48.9	48.9	51.3	48.9	51.6	50.6
		PREVIOUS BORINGS											
P-2	S	67.9	67.8	67.6	67.8	67.7	67.5	67.3	68.0	67.1	67.4	66.8	67.4
P-2	D	44.2	44.3	44.2	44.2	44.3	44.2	44.0	44.0	44.3	43.9	43.1	42.9
P-5		NM	77.3	77.2	77.2	77.2	77.1	76.9	77.5	77.1	76.9	75.7	76.4
P-6	S	94.0	94.0	93.9	93.9	93.7	93.9	93.7	94.1	93.6	93.8	93.5	93.9
P-6	D	74.6	74.7	74.8	74.7	74.8	74.8	74.6	74.5	74.5	74.6	71.9	73.5
P-10	S	NM	NM	81.1	81.1	81.2	81.2	81.1	81.1	81.0	81.1	80.2	80.9
P-10	D	NM	NM	74.8	74.8	74.9	74.8	74.3	74.7	74.4	74.3	73.0	74.1
P-11	S	NM	NM	83.8	83.8	83.9	83.8	83.6	83.7	NM	83.8	NM	83.3
P-11	D	NM	NM	80.9	80.9	81.0	80.8	80.6	81.4	NM	80.5	NM	80.5
P-14		NM	68.7	68.9	69.0	NM	NM	NM	NM	NM	68.9	NM	66.1

ATTACHMENT H

SSAB Refractory Brick as ADC Approval

WM Mobile Bay Environmental Center, Inc.
Chastang Landfill
17045 Highway 43
Mount Vernon, AL 36560

November 22, 2024

Mr. Blake Holden
Alabama Department of Environmental Management
Land Division - Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

Re: Chastang Sanitary Landfill
Request for Use of Refractory Brick
as Alternate Daily Cover
ADEM Permit No. 49-05

Dear Mr. Holden:

Pursuant to our November 18, 2024 phone conversation, WMMBECI/Chastang Landfill is including this request for approval to use refractory brick from SSAB as Alternate Daily Cover (ADC) with our Response to the Department's 10/31/2024 Solid Waste Permit Renewal Application Comments Letter. This material is approved for disposal at Chastang Landfill and has already been approved for use as base material for interior roads and the tipper pad at the Turkey Trot Landfill in Washington County (variance to Permit 65-05). Additionally, a similar refractory material from Outokumpu is already approved for use as ADC at Chastang Landfill. The material meets all the regulatory requirements for ADC identified in ADEM Admin Code 335-13-4-21 and 335-13-4-.22(1)(a)1. Information in support of this request is enclosed.

Should you have any questions or require additional information, you may contact me at 813-786-6807.

Respectfully,

Michele H. Lersch

Michele Lersch
Environmental Protection Manager
Waste Management – Gulf Coast Area

Encl.

Cc: File (City of Mobile-SWDA)
Jeff Breedlove, Promus Engineering

LANCE R. LEFLEUR
DIRECTOR

ADEM

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

KAY IVEY
GOVERNOR

11/18/2024

Delivered Via Email to Joe Burkel

RE: Waste Certification
Used Refractory Brick

The Alabama Department of Environmental Management has reviewed your waste certification received on 3/31/2023 and has assigned a Certification Number for this waste as shown below.

Waste Profile #: VA0913	SSAB Alabama Inc
Certification #: SW-053125-E013	12400 Hwy 43 N
Expiration Date of Certification: 5/31/2025	Axis, AL

In your certification you requested one or more landfills be approved to receive your waste. Based on our review of the waste and the landfills requested, the waste is approved for disposal in the following landfills:

Axis Industrial Landfill-Lined cell	49-21
Turkey Trot Landfill	65-05
Chastang Landfill	49-05

You should provide this approval letter to the landfill(s) listed above and contact the landfill to determine any special handling requirements for this waste prior to delivery to the landfill. According to ADEM regulations, the landfill may not receive this waste unless it has received a waste certification approval. For waste generated on a routine basis (not a one-time occurrence), another written certification for this waste stream should be submitted to ADEM prior to the expiration date listed above or at any time the process producing the waste changes. Each submittal should include a completed Solid Waste Profile Sheet, any supporting documentation including current analytical, and the appropriate fee. Current analytical consists of analysis performed within the past six months.

If at any time before the expiration date of this certification, new analysis of the waste is performed, the new results will supersede any prior analysis from the time the samples are taken. If the new analysis indicates the waste is still non-hazardous, the waste may continue to be disposed of at the landfill listed above until the expiration date of this certification. If the new analysis indicates the waste is hazardous, this certification is revoked. Each time new analysis is performed on the waste, copies of the analytical results should be provided to ADEM and the landfill until this certification expires. The generator should not dispose of the waste prior to the receipt and review of the sampling results. Furthermore, this approval letter does not exempt SSAB Alabama Inc from complying with all applicable requirements of the ADEM Administrative Code. If you have any questions concerning this approval or the approval process, please contact Ms Cala Obenauf at 334-271-7824.

Sincerely,

Sonja B Favors

Sonja B Favors, Chief
Industrial Hazardous Waste Branch
Land Division

SBF/cjo

MICRO-METHODS
LABORATORY, INC.

6500 Sunplex Drive
Ocean Springs, MS 39564
228.875.6420 Phone
228.875.6423 Fax

March 30, 2023

Tony Cooper

Work Order # : 2303386

Purchase Order #: AL-109494

SSAB Alabama Inc.
12400 Hwy 43 North
Axis, AL 36505

RE: Used Refractory Brick

Enclosed are Micro-Methods Laboratory, Inc. results of analyses performed on samples received 03/22/2023 15:12. If you have any questions concerning this report, please feel free to contact the office.

Sincerely

Mitch Spicer

Lab Director
Micro-Methods Laboratory, Inc.

NELAP ACCREDITED LABORATORY

DISCLAIMER

The results only relate to the items or the sample and/or samples received by the laboratory. This report shall not be reproduced except in full without the approval of the laboratory. All NELAP certified test methods performed meet the requirements of NELAC 2009 Standards. Any variances and/or deviations specific to this analytical report are referenced in the lab report using qualifiers and detailed explanations found in the case narrative.

MICRO METHODS

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SSAB Alabama Inc.
12400 Hwy 43 North
Axis AL, 36505

Project: Used Refractory Brick
Project Number: [none]
Project Manager: Tony Cooper

Reported:
03/30/2023 08:02

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date/Time Sampled	Sampled by	Date/Time Received
VA0913	2303386-01	Solid	03/21/2023 12:30	*Brian Austin*	03/22/2023 15:12

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SSAB Alabama Inc.
12400 Hwy 43 North
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Project: Used Refractory Brick
Project Number: [none]
Project Manager: Tony Cooper

Reported:
03/30/2023 08:02

Sample Receipt Conditions

Date/Time Received: 3/22/2023 3:12:00PM

Shipped by: Lab Pick-up

Received by: Sarah E. Tomek

Submitted by: Malcolm H Burton

Date/Time Logged: 3/22/2023 3:42:00PM

Logged by: Sarah E. Tomek

Cooler ID: #1299

Receipt Temperature: -1.3 °C

Cooler Custody Seals Present	No
Containers Intact	Yes
COC/Labels Agree	Yes
Labels Complete	Yes
COC Complete	Yes
Volatile Vial Headspace >6mm	No
Field Sheet/Instructions Included	No
Samples Rejected/Documented in Log	No
Temp Taken From Temp Blank	No
Temp Taken From Sample Container	Yes
Temp Taken From Cooler	No
COC meets acceptance criteria	Yes

Received on Ice but Not Frozen	Yes
No Ice, Short Trip	No
Obvious Contamination	No
Rush to meet HT	No
Received within HT	Yes
Proper Containers for Analysis	Yes
Correct Preservation	Yes
Adequate Sample for Analysis	Yes
Sample Custody Seals Present	No
Samples Missing from COC/Cooler	No

MICRO METHODS

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	Reported: 03/30/2023 08:02

CASE NARRATIVE SUMMARY

All reported results are within Micro-Methods Laboratory, Inc.defined laboratory quality control objectives unless detailed in narrative summary or identified as qualifications. NOTE: All results listed on this report are calculated on a wet weight basis (as received by the laboratory) unless otherwise noted in the analysis qualification sections.

Summary Comments: *No Summary Comments*

Total Metals-SW 6010D

Qualification:

EV-01 Matrix interference present in sample. Results reported are estimated values.

Analyte & Samples(s) Qualified:

Lead 220.353 [Axial]

2303386-01[VA0913], 3C24007-MS1, 3C24007-PS1

M1 MS/MSD Recovery limit exceeded.

Analyte & Samples(s) Qualified:

Lead 220.353 [Axial]

3C24007-PS1

M2 MS/MSD Recovery below acceptable limit.

Analyte & Samples(s) Qualified:

Lead 220.353 [Axial]

3C24007-MS1

QM-12 The spike recovery was outside acceptance limits for the MS and/or MSD. Post Spike and/or Serial Dilution required.

Analyte & Samples(s) Qualified:

Cadmium 228.802 [Axial]

3C24007-MS1

Mercury Total-SW 7471B

Qualification:

M2 MS/MSD Recovery below acceptable limit.

Analyte & Samples(s) Qualified:

Mercury

3C28035-MS1

M8 Target recovery is outside of established control limits due to matrix interference.

Analyte & Samples(s) Qualified:

Mercury

3C28035-MS1

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	Reported: 03/30/2023 08:02

VA0913

2303366-01 (Solid)

Analyte	Result	MRL	Units	Dil	Batch	Analyst	Date Time Prepared	Date Time Analyzed	Method	Notes
Metals by EPA 6000 Series Methods ICP-AES										
Barium 455.403 [Radial]	225	2.49	mg/kg dry wt.	1.0	3C24007	CLV	03/24/2023 09:30	03/27/2023 11:00	SW 6010D	
Cadmium 228.802 [Axial]	1.43	0.498	"	"	"	CLV	"	"	"	
Chromium 283.563 [Axial]	1320	2.49	"	5.0	"	CLV	"	03/27/2023 11:23	"	
Copper 324.754 [Axial]	114	0.498	"	1.0	"	CLV	"	03/27/2023 11:00	"	
Lead 220.353 [Axial]	54.1	2.49	"	"	"	CLV	"	"	"	SV-01
Manganese 257.610 [Axial]	29900	125	"	50.0	"	CLV	"	03/27/2023 12:28	"	
Nickel 231.604 [Axial]	100	2.49	"	1.0	"	CLV	"	03/27/2023 11:00	"	
Zinc 213.856 [Axial]	2890	12.5	"	5.0	"	CLV	"	03/27/2023 11:23	"	
Mercury by EPA 7000 Series Methods CVAAS										
Mercury	ND	0.0332	mg/kg dry wt.	1.0	3C28035	GWG	03/28/2023 12:00	03/29/2023 14:02	SW 7471B	
TCLP Metals by EPA Method 1311/6010D										
Arsenic 193.759 [Axial]	ND	0.100	mg/L	1.0	3C27029	CLV	03/27/2023 08:45	03/28/2023 12:07	SW 6010D	
Barium 455.403 [Radial]	ND	0.500	"	"	"	CLV	"	"	"	
Cadmium 228.802 [Axial]	ND	0.100	"	"	"	CLV	"	"	"	
Chromium 283.563 [Axial]	ND	0.100	"	"	"	CLV	"	"	"	
Lead 220.353 [Axial]	ND	0.250	"	5.0	"	CLV	"	03/28/2023 12:27	"	
Selenium 196.090 [Axial]	ND	0.100	"	1.0	"	CLV	"	03/28/2023 12:07	"	
Silver 328.068 [Axial]	ND	0.100	"	"	"	CLV	"	"	"	
TCLP Mercury by EPA Method 1311/7470A										
Mercury	ND	0.015	mg/L	1.0	3C28036	GWG	03/28/2023 11:30	03/29/2023 10:59	SW 7470A	

MICRO METHODS

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	Reported: 03/30/2023 08:02

Metals by EPA 6000 Series Methods ICP-AES - Quality Control

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3C24007 - EPA 3050B DCN 1017 Rev 10							*Prepared: 03/24/202 Analyzed: 03/27/202*			
Blank (3C24007-BLK1)										
Barium 455.403 [Radial]	ND	2.50	mg/kg dry wt.							
Cadmium 228.802 [Axial]	ND	0.500	"							
Chromium 283.563 [Axial]	ND	0.500	"							
Copper 324.754 [Axial]	ND	0.500	"							
Lead 220.353 [Axial]	ND	2.50	"							
Manganese 257.610 [Axial]	ND	2.50	"							
Nickel 231.604 [Axial]	ND	2.50	"							
Zinc 213.856 [Axial]	ND	2.50	"							
LCS (3C24007-BS1)										
Barium 455.403 [Radial]	10.3	2.50	mg/kg dry wt.	10.0		103	80-120			
Cadmium 228.802 [Axial]	9.16	0.500	"	10.0		91.6	80-120			
Chromium 283.563 [Axial]	10.1	0.500	"	10.0		101	80-120			
Copper 324.754 [Axial]	10.2	0.500	"	10.0		102	80-120			
Lead 220.353 [Axial]	10.8	2.50	"	10.0		108	80-120			
Manganese 257.610 [Axial]	10.1	2.50	"	10.0		101	80-120			
Nickel 231.604 [Axial]	9.74	2.50	"	10.0		97.4	80-120			
Zinc 213.856 [Axial]	9.16	2.50	"	10.0		91.6	80-120			
LCS Dup (3C24007-BSD1)										
Barium 455.403 [Radial]	10.5	2.50	mg/kg dry wt.	10.0		105	80-120	2.08	20	
Cadmium 228.802 [Axial]	9.31	0.500	"	10.0		93.1	80-120	1.60	20	
Chromium 283.563 [Axial]	10.2	0.500	"	10.0		102	80-120	1.24	20	
Copper 324.754 [Axial]	10.4	0.500	"	10.0		104	80-120	1.96	20	
Lead 220.353 [Axial]	10.8	2.50	"	10.0		108	80-120	0.415	20	
Manganese 257.610 [Axial]	10.2	2.50	"	10.0		102	80-120	1.47	20	
Nickel 231.604 [Axial]	9.90	2.50	"	10.0		99.0	80-120	1.62	20	
Zinc 213.856 [Axial]	9.27	2.50	"	10.0		92.7	80-120	1.15	20	

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SSAB Alabama Inc.
12400 Hwy 43 North
Axis AL, 36505

Project: Used Refractory Brick
Project Number: [none]
Project Manager: Tony Cooper

Reported:
03/30/2023 08:02

Metals by EPA 6000 Series Methods ICP-AES - Quality Control

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3C24007 - EPA 3050B DCN 1017 Rev 10						*Prepared: 03/24/202 Analyzed: 03/27/202*				
Duplicate (3C24007-DUP1)	**Source: 2303386-01**									
Barium 455.403 [Radial]	217	2.49	mg/kg dry wt.		225			3.32	20	
Cadmium 228.802 [Axial]	1.18	0.498	"		1.43			19.2	20	
Chromium 283.563 [Axial]	1220	2.49	"		1320			8.61	20	
Copper 324.754 [Axial]	105	0.498	"		114			7.45	20	
Lead 220.353 [Axial]	53.3	2.49	"		54.1			1.63	20	
Manganese 257.610 [Axial]	31700	124	"		29900			5.90	20	
Nickel 231.604 [Axial]	103	2.49	"		100			2.94	20	
Zinc 213.856 [Axial]	2560	12.4	"		2890			12.2	20	
Matrix Spike (3C24007-MS1)	**Source: 2303386-01**									
Cadmium 228.802 [Axial]	6.31	0.498	mg/kg dry wt.	9.96	1.43	49.1	75-125			QM-12
Lead 220.353 [Axial]	50.6	2.49	"	9.96	54.1	NR	75-125			EV-01, M2
Post Spike (3C24007-PS1)	**Source: 2303386-01**									
Cadmium 228.802 [Axial]	42.7	2.49	mg/kg dry wt.	49.8	1.43	82.8	75-125			
Lead 220.353 [Axial]	125	12.5	"	49.8	54.1	142	75-125			EV-01, M1

MICRO METHODS

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	Reported: 03/30/2023 08:02

Mercury by EPA 7000 Series Methods CVAAS - Quality Control

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3C28035 - EPA 7471B DCN 1017 Rev 10						*Prepared: 03/28/202 Analyzed: 03/29/202*				
Blank (3C28035-BLK1)										
Mercury	ND	0.0200	mg/kg dry wt.							
LCS (3C28035-BS1)										
Mercury	0.106	0.0200	mg/kg dry wt.	0.100		106	80-120			
LCS Dup (3C28035-BSD1)										
Mercury	0.108	0.0200	mg/kg dry wt.	0.100		108	80-120	2.15	20	
Duplicate (3C28035-DUP1)	**Source: 2303386-01**									
Mercury	ND	0.0332	mg/kg dry wt.		ND				20	
Matrix Spike (3C28035-MS1)	**Source: 2303386-01**									
Mercury	0.0243	0.0333	mg/kg dry wt.	0.167	ND	14.6	80-120			M2, M8

MICRO METHODS

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	**Reported:** 03/30/2023 08:02

TCLP Metals by EPA Method 1311/6010D - Quality Control

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3C27029 - EPA 3010A DCN 1017 Rev 10						*Prepared: 03/27/202 Analyzed: 03/28/202*				
Blank (3C27029-BLK1)										
Arsenic 193.759 [Axial]	ND	0.100	mg/L							
Barium 455.403 [Radial]	ND	0.500	"							
Cadmium 228.802 [Axial]	ND	0.100	"							
Chromium 283.563 [Axial]	ND	0.100	"							
Lead 220.353 [Axial]	ND	0.100	"							
Selenium 196.090 [Axial]	ND	0.100	"							
Silver 328.068 [Axial]	ND	0.100	"							
LCS (3C27029-BS1)										
Arsenic 193.759 [Axial]	0.202	0.100	mg/L	0.200		101	80-120			
Barium 455.403 [Radial]	0.214	0.500	"	0.200		107	80-120			
Cadmium 228.802 [Axial]	0.203	0.100	"	0.200		101	80-120			
Chromium 283.563 [Axial]	0.222	0.100	"	0.200		111	80-120			
Lead 220.353 [Axial]	0.219	0.100	"	0.200		110	80-120			
Selenium 196.090 [Axial]	0.201	0.100	"	0.200		100	80-120			
Silver 328.068 [Axial]	0.108	0.100	"	0.100		108	80-120			
LCS Dup (3C27029-BSD1)										
Arsenic 193.759 [Axial]	0.185	0.100	mg/L	0.200		92.7	80-120	8.72	20	
Barium 455.403 [Radial]	0.201	0.500	"	0.200		101	80-120	6.03	20	
Cadmium 228.802 [Axial]	0.186	0.100	"	0.200		93.2	80-120	8.53	20	
Chromium 283.563 [Axial]	0.202	0.100	"	0.200		101	80-120	9.18	20	
Lead 220.353 [Axial]	0.201	0.100	"	0.200		100	80-120	8.79	20	
Selenium 196.090 [Axial]	0.186	0.100	"	0.200		93.2	80-120	7.50	20	
Silver 328.068 [Axial]	0.100	0.100	"	0.100		100	80-120	7.61	20	
Matrix Spike (3C27029-MS1)	**Source: 2303386-01**									
Arsenic 193.759 [Axial]	0.178	0.100	mg/L	0.200	ND	88.9	75-125			
Barium 455.403 [Radial]	0.208	0.500	"	0.200	0.028	90.1	75-125			
Cadmium 228.802 [Axial]	0.163	0.100	"	0.200	ND	81.3	75-125			
Chromium 283.563 [Axial]	0.161	0.100	"	0.200	ND	80.4	75-125			
Lead 220.353 [Axial]	0.197	0.250	"	0.200	0.022	87.3	75-125			
Selenium 196.090 [Axial]	0.181	0.100	"	0.200	ND	90.4	75-125			
Silver 328.068 [Axial]	0.100	0.100	"	0.100	0.015	84.8	75-125			

MICRO METHODS

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SSAB Alabama Inc.	Project: Used Refractory Brick	
12400 Hwy 43 North	Project Number: [none]	Reported:
Axis AL, 36505	Project Manager: Tony Cooper	03/30/2023 08:02

TCLP Mercury by EPA Method 1311/7470A - Quality Control

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3C28036 - EPA 7470A DCN 1017 Rev 10						*Prepared: 03/28/202 Analyzed: 03/29/202*				
Blank (3C28036-BLK1)										
Mercury	ND	0.015	mg/L							
LCS (3C28036-BS1)										
Mercury	0.020	0.015	mg/L	0.0200		99.0	85-115			
LCS Dup (3C28036-BSD1)										
Mercury	0.020	0.015	mg/L	0.0200		101	85-115	2.00	20	
Matrix Spike (3C28036-MS1)	**Source: 2303343-01**									
Mercury	0.022	0.015	mg/L	0.0200	ND	108	75-125			
Matrix Spike (3C28036-MS2)	**Source: 2303344-01**									
Mercury	0.021	0.015	mg/L	0.0200	ND	104	75-125			

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Certified Analyses Included in this Report

Analyte	Certification Code
Total Metals in Solid	
Aluminum 394.401 [Radial]	C01,C02
Aluminum 396.152 [Radial]	C01,C02
Antimony 206.833 [Axial]	C01,C02
Arsenic 193.759 [Axial]	C01,C02
Barium 455.403 [Radial]	C01,C02
Barium 493.409 [Radial]	C01,C02
Beryllium 313.042 [Axial]	C01,C02
Boron 249.773 [Radial]	C01,C02
Cadmium 228.802 [Axial]	C01,C02
Calcium 315.887 [Radial]	C01,C02
Chromium 283.563 [Axial]	C01,C02
Cobalt 228.616 [Axial]	C01,C02
Copper 324.754 [Axial]	C01,C02
Iron 259.940 [Axial]	C01,C02
Iron 259.940 [Radial]	C01,C02
Lead 220.353 [Axial]	C01,C02
Magnesium 285.213 [Radial]	C01,C02
Manganese 257.610 [Axial]	C01,C02
Molybdenum 202.030 [Axial]	C01,C02
Nickel 231.604 [Axial]	C01,C02
Potassium 766.490 [Radial]	C01,C02
Selenium 196.090 [Axial]	C01,C02
Silver 328.068 [Axial]	C01,C02
Sodium 589.592 [Axial]	C01,C02
Sodium 589.592 [Radial]	C01,C02
Strontium 346.446 [Radial]	C01,C02
Strontium 421.552 [Radial]	C01,C02
Thallium 190.856 [Axial]	C01,C02
Vanadium 309.311 [Axial]	C01,C02
Zinc 213.858 [Axial]	C01,C02
Mercury Total in Solid	
Mercury	C01,C02

****Only compounds included in this list are associated with accredited analyses****

MICRO METHODS

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SSAB Alabama Inc. 12400 Hwy 43 North Axis AL, 36505	Project: Used Refractory Brick Project Number: [none] Project Manager: Tony Cooper	Reported: 03/30/2023 08:02

Laboratory Accreditations/Certifications

Code	Description	Number	Expires
C01	*LA Environmental Lab Accreditation Program*	*01960*	*06/30/2023*
C02	*The NELAC Institute (NELAP)*	*TNI01397*	*06/30/2023*
C03	*Ms Dept of Health (Drinking Water Microbiology)*	*MS00021*	*12/31/2023*
C04	*Ms Dept of Health (Drinking Water Chemistry)*	*MS00021*	*12/31/2023*
C05	*Ms DEQ Lead Firm Certification*	*PBF-00000028*	*03/31/2024*
C06	*MsDEQ Asbestos Inspector : C.D. Bingham*	*ABI-00001348*	*02/09/2024*
C07	*MsDEQ Air Monitor : C.D. Bingham*	*AM-011572*	*02/10/2024*
C08	*MsDEQ Asbestos Inspector: C. W. Meins*	*ABI-00001821*	*09/09/2022*
C09	*MsDEQ Air Monitor : C.W. Meins*	*AM-011189*	*02/10/2024*
C14	*MsDEQ Lead Paint Inspector : C.D. Bingham*	*PBI-00003690*	*02/07/2024*
C15	*MsDEQ Lead Paint Inspector : C.W. Meins*	*PBI-00001740*	*02/07/2024*

Report Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the minimum reporting limit
NR	Not Reported
RPD	Relative Percent Difference
ICV	Initial Calibration Verification
CCV	Continuing Calibration Verification Standard
SSV	Secondary Source Verification Standard
LCS	Lab Control Spike - Lab matrix prepared with known concentration of analyte/s of interest analyzed by method.
MS	Matrix Spike - Sample prepared with known concentration of analyte/s of interest analyzed by method.
MSD	Matrix Spike Duplicate - Duplicate sample prepared with known concentration of analyte/s of interest analyzed by method.
MRL	Minimum Reporting Limit
%REC	Percentage Recovery of known concentration added to matrix
Batch	Group of samples prepared for analysis not to exceed 20 samples.
Matrix	Material containing analyte/s of interest
Surrogate	Analyte added to sample to determine extraction efficiency of method.

MICRO-METHODS LABORATORY, INC.
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www.micromethodslab.com

Chain of Custody Record

Lab ID# MS00021
LELAP ID # 01960
TNI ID # TNI01397

M-M Lab WO #: 2303386

Company Name: SSAB Alabama, Inc.	Project Manager: Brian Austin
Address: 12400 Hwy 43, North	Purchase Order #: AL-109494
City: Axis State: AL Zip: 36505	Email Address: brian.austin@ssab.com
Phone: 251-662-4400	Sampler Name Printed: Brian Austin
Fax: N/A	Sampler Name Signed: [signature]

Turn Around Time & Reporting
Our normal turn around time is 10 working days

X Normal
__ Next Day*
__ 2nd Day*
__ Other* ______

*All rush order requests must be prior approved.

__ Phone
__ Mail
__ Fax
__ Email

QC Level: Level 1 ☐ Level 2 ☐ Level 3 ☐

Project Name: Used Refractory Brick
Project #:

List Analyses Requested

Sample Identification	Sampling Date/Time	Matrix Code	# of Containers	Grab (G) or Composite (C)	TCLP Metals	Total Metals*	Field Test	Field Test	Field Test	Field Test
VA0913	3/21/23 @ 12:30	S	1	C	X	X				

Matrix: W = Water, DW = Drinking Water, S = Solid, SO = Soil, SE = Sediment, L = Liquid, A = Air, O = Oil, SL = Sludge

Preservation: 1=H2SO4, 2=H3PO4, 3=NaOH, 4=ZnC4H10O6, 5=ZnC4H10O6 & NaOH, 6=HNO3, 7=Na2S2O3, 8=HCl, 9=NaHSO4

Received on Ice (Y) / N Thermometer# 5 Cooler # 1204 Receipt Temp Corrected(°C) -1.3°C
Date & Time ______ By: ______ Sample X Blank ____ Cooler ____

All Temps are Corrected Values

	Printed Name	Signature	Company	Date	Time
Relinquished by	Brian Austin	[signature]	SSAB	3/22/23	10 AM
Received by	Malcolm Burton	[signature]	MXM	3/22/23	11:30
Relinquished by	Malcolm Burton	[signature]	MXM	3/22/23	15:10
Received by	Silvana Torrez	[signature]	MM	3/22/23	1512
Relinquished by					
Received by					

Notes:
* Barium, Cadmium, Chromium
Copper, Lead, Manganese,
Mercury, Nickel, Zinc

DCN# F316 Rev.#5

Physical Address: 6500 Sunplex Drive, Ocean Springs MS 39564

Issued 8/15/2022 SCH

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Issue Date: 1-16-2012	TCLP Regulatory Limit Sheet Metals, Volatiles, Semi Volatiles Pesticides, Herbicides	DCN: F031 Date Revised: 1-16-2012 Revision 5

Micro-Methods Laboratory, Inc.

TCLP REGULATORY LIMITS

TCLP Metals:	mg/l
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0
Volatile Target Compounds:	
Benzene	0.5
Carbon Tetrachloride	0.5
Chlorobenzene	100.0
Chloroform	6.0
1,2 dichloroethane	0.5
1,1 Dichloroethene	0.7
Methyl Ethyl Ketone (2-Butanone)	200.0
Tetrachloroethene	0.7
Trichloroethene	0.5
Vinyl Chloride	0.2
Semi Volatile Target Compounds:	
1,4 Dichlorobenzene	7.5
2,4 Dinitrotoluene	0.13
2,4,5 Trichlorophenol	400.0
2,4,6 Trichlorophenol	2.0
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3.0
Nitrobenzene	2.0
Pentachlorophenol	100.0
Pyridine	5.0
m-Cresol	200.0
o-Cresol	200.0
p-Cresol	200.0
Pesticide Target Compounds:	
Chlordane	0.03
Endrin	0.02
Heptachlor	0.008
Heptachlor epoxide	0.008
Lindane	0.4
Methoxychlor	10.0
Toxaphene	0.5
Herbicide Target Compounds:	
2,4 D	10.0
2,4,5-TP Silvex	1.0
Inorganic	
Flash Point	>140°F
Cyanide	<250 mg/kg
Sulfide	500 mg/kg
pH	2.00 – 12.5 SU

TCLP – Toxicity Characteristics Leachate Procedure, SW 846, Sec. 1311