Pre Design Report

1048163

PREDESIGN REPORT

BLOSENSKI LANDFILL
CHESTER COUNTY, PENNSYLVANIA

APPENDIX 1-1

SCOPE OF SERVICES

FOR

BLOSENSKI LANDFILL SUPERFUND SITE

CHESTER COUNTY, PENNSYLVANIA

APPENDIX "A"

12 FEBRUARY 1988

1. Project Description. The Contractor shall conduct all necessary travel, professional analysis, and perform all work required to prepare Pre-Design Documents used for the design of the cleanup of Blosenski Landfill Superfund Site located in West Caln Township, Chester County, Pennsylvania.

2. Details of Performance. Pre-Design activities include treatability test, bench scale test, fracture trace analysis, geophysical survey, surface soil and sediment sampling, monitoring well installation and sampling, residential well sampling and pump test to provide additional data for design of an extraction/treatment system, RCRA CAP and drum removal The following pre-design documents will be submitted to the Contracting Officer for approval as a draft, and with suggested revisions, will stand as the final documents:

Site Survey

Treatability Testing Proposal

Treatability Testing Report

Pre-Design Engineering Report

Drum Disposal Area Investigation Report

Monitoring Well Installation Plan

Pump Test Plan

A-E Quality Control Plan (A-E QCP)

A-E Laboratory Quality Management Plan (A-E LQMP)

A-E Quality Control Summary Report (A-E QCSR)

A-E Daily Quality Control Reports (A-E DQCR)

A-E Safety, Health, and Emergency Response Plan (A-E SHERP)

a. Pre-Design and related activities for Pre-Design activities.

(1) Treatability Testing Report.

(2) Site Survey.

(3) Installation of monitoring wells, conducting pump test and sampling and analysis of wells (new and existing).

(4) Estimate of construction cost for cost of drum removal and implementation of other ROD activities and value engineering report.

(5) Interview key personnel who operated the site and/or lived near site for prior activities.

(6) Surface soil samples.

(7) Geophysicial Survey (locate drums on site and locare off-site fracture zones).

(8) Survey of incinerators available.

(9) Abandon old wells

(10) Fracture trace analysis.

(11) Surface water and sediment sampling

3. Project Engineer. The Contractor shall assign a member or employee who will be known as the Project Engineer or Project Manager. This individual will oversee the correlation of the entire project pre-design, administer all instructions from this office, and answer or obtain answers to all questions from this office during and after the pre-design work.

4. General.

a. Travel. The Contractor shall perform the following travel as part of the contract requirements, and the cost thereof shall be included with the contract cost.

(1) Responsible representatives of the Contractor firm from the appropriate disciplines shall attend conferences and/or make the following listed trips:

(a) To inspect the site of work, in early stages of pre-design, to verify existing conditions.

(b) To attend a Progress Review Meeting in the Syracuse, NY area on the pre-design activities.

(c) To attend a review conference in the Omaha, NE area on the Pre-Design Engineering Report.

(d) To attend meeting in Omaha for discussion of Chemical lity Assurance with Omaha District chemist.

(e) To attend meeting in EPA Region III office with enforcement personnel.

(f) All travel required to obtain field data necessary for pre-design documents.

(2) Additional trips (required by the Contracting Officer Representative) to attend review conferences or provide on-site technical assistance during design, or during construction, shall be paid for at the rate shown in Article 1.

b. Review of Progress and Technical Adequacy.

(1) At appropriate times, representatives of the Contracting Officer may review the progress and technical adequacy of the work. Such review shall not relieve the Contractor from performing all contract requirements, except as may be waived by written instruction.

(2) Progress Charts. Upon receipt of Notice-to-Proceed, the Contractor shall prepare a progress chart (preferably a bar chart) to show the proposed schedule for completion of pre-design. The progress chart shall be prepared in reproducible form and submitted for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment. Progress charts must be revised to reflect modifications and other approved changes in scheduling.

(3) Progress Reports. The Contractor shall submit progress reports with each request for payment. The progress reports shall indicate pre-design work performed, pre-design costs, and problems incurred during the payment period.

c. Conference Notes and Confirmation Notices.

(1) Conference Notes. The Contractor shall be responsible for taking notes and preparing the reports for all conferences. Conference notes shall be prepared in typed form and the original furnished this office (within five days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

(a) The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

(b) Written comments presented by attendees shall be attached to each report with the conference action noted. Conference actions shall be "A" for an Approved comment, "D" for a Disapproved comment, "W" for a comment that has been Withdrawn, and "E" for a comment that has an Exception noted.

(2) Confirmation Notices. The Contractor shall be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the Contractor and/or his presentatives on matters relative to this contract and the work,

irrespective of whom the other participants may have been. These records, entitled "Confirmation Notices," shall be numbered sequentially and shall fully identify participating personnel, subject discussed, and any conclusions reached. The Contractor shall forward to the Contracting Officer or his representative as soon as possible (not more than ten work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices shall be made by the Government.

d. Federal, State and Local Environmental Protection Criteria and Environmental Permits. The Contractor shall be responsible for ensuring that the project is in full compliance with all applicable Federal, state and local environmental laws and regulations, including but not limited to: National Environmental Policy Act (NEPA), Clean Water and Clean Air Acts, Endangered Species Act, Resource Conservation and Recovery ACT (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA), i.e., perfund, etc. The Contractor shall prepare and include in the Pre-Design Engineering Report a chapter entitled: "Federal, State and Local Environmental Protection Criteria and Environmental Permits." This chapter shall summarize the project requirements regarding compliance with the aforementioned environmental laws and regulations. Additionally, the Pre-Design Engineering Report shall include the following:

(1) The Permitting Authority(ies)

(2) Construction/Operating Permits Required

(3) Time required by the permitting agency(ies) to process the application(s) and issue the permits.

(4) Fee schedule including filing/application fees, emissions fees, certification testing, etc.

(5) Monitoring and/or compliance testing requirements.

(6) Actual agency regulations governing applications, exemptions, iances, etc.

Should permits be required, the Contractor shall obtain all required application forms, complete all technical sections and provide the partially completed forms to the Omaha District. The Contractor shall prepare all supporting material required for the applications including emission surveys, diagrams, pollutant load calculations, etc.

The Contractor shall promptly notify the Omaha District of any major discrepancies existing between these instructions and the pollution abatement criteria and any unusually long lead time permits.

Copies of all correspondence from permitting agencies which either details permit requirements or indicates that no permits are necessary shall be furnished to the Omaha District by the Contractor.

e. Mailing Documents. Documents shall be mailed to all reviewers via a rrier service that will provide overnight service, such as Express Mail. A document Submittal List which contains the reviewers and their addresses will be furnished by the Omaha District.

f. Drawings. Blank sheets of paper or mylar will be furnished the Contractor by the Omaha District in sufficient quantity for all drawings.

5. Document Submittal List. Furnished separately.

SUPPLEMENT TO APPENDIX A

BLOSENSKI LANDFILL SUPERFUND SITE
CHESTER COUNTY, PENNSYLVANIA

SUPPLEMENT TO APPENDIX "A"

12 FEBRUARY 1988

The following data and criteria are furnished the Contractor for guidance in pre-design. Deviation from the criteria will be permitted only when actual field conditioned require such a change or other factors. Proposed deviation with justification shall be submitted to the Contracting Officer for approval.

Record of Decision, Remedial Alternative Selection, Superfund Record of Decision, Blosenski Landfill, PA, dated September 1986
Remedial Investigation Report - Draft Feasibility Study Report (Vol 1 and 2), Blosenski Landfill Site, Pa, dated February 1986
Remedial Investigation-Feasibility Study Blosenski Landfill Site, Chester County, PA, dated February 1986
EM 385-1-1, U.S. Army Corps of Engineers, Safety and Health Requirements Manual
Document Submittal and Distribution List
Technical Manuals for Architect-Engineer design Guidance, Master Checklist
Architect-Engineer (A-E) Instruction Manual, dated June 1983
A-E Guidance for Developing A-E Quality Management Procedures for Site Investigative Activities
Sample Handling Protocol for Low, Medium and High Concentration Samples Hazardous Waste (10-86)
Appendix "B" to ER 1110-1-263, Guide for Site-Specific Quality Management Plan (SSQMP)
ENG Form 4288, Submittal Register

Technical Manuals

TM 5-820-2	Drainage and Erosion Control-Subsurface
TM 5-830-2	Drainage Facilities for Airfield Pavements
TM 5-813-5	Sources and General Considerations
TM 5-813-5	Water Distribution Systems
TM 5-814-1	Sanitary and Industrial Wastewater Collection-Gravity Sewers and Appurtenances
TM 5-814-2	Sanitary and Industrial Wastewater Collection-Pumping Station and Force Mains
TM 5-814-3	Domestic Wastewater Treatment
TM 5-814-6	Industrial Wastes
TM 5-809-1	Load Assumptions for Buildings
TM 5-809-3	Masonry Structural Design for Building
TM 5-809-10	Seismic Design for Buildings
EM 1110-1-1804	Geotechnical Investigations

1. Survey.

(1) General. The Contractor shall perform all topographic and boundary surveys for this project.

(2) Topographic Survey. Produce a topographic site map of the project area from aerial photography. The map scale shall be 1"=30'. Show a 2' contour interval. Increase the line weight and label each with contour. Locate all above and below ground features that would effect a grading plan. The term "features" is intended to include, but not limited to, the following:

Utilities (Both above and below ground)
Buildings/Structures (Show finished floor elev)
Streets, Roads or Drives, Fences, Ditches,
Streams, Storage Tanks
Drill Holes or Sample Sites

Discoloration of the soil or rock should be identified by color and dimension. Groups of trees or piles of debris may be called out as an area by delineating the limits, height and description of the content. Show all breaks-in-grade as well as flow-line elevation of the ditches. Show invert elevations of all utilities.

(a) Horizontal and Vertical Control. Use the same photogrammetric control as the 1"=200' Site Plan shown in the Remedial Investigation by NUS. If a good closure cannot be achieved, then use the most convenient monuments. If no monuments are recovered, then establish a minimum of two durable monuments on the same coordinate system as the site plan. Strategically locate any new monuments near the site so as to be used for but not destroyed by new construction. Provide a detailed sketch, including coordinates for each control monument used or set.

(b) Accuracy. The finished map shall meet the horizontal and vertical accuracy criteria as called out in the National Standards of Map Accuracy. Measure hardened surfaces to the nearest 0.01' of all ground shots to the nearest 0.1'. Features requiring precision unattainable by 1"=30' mapping photography should be field measured.

(c) Limits and Scale. The limits of the survey are as shown on Exhibit 1. (Approximately 15 acres.) Survey and map the area at 1"=30'.

(d) Drafting. Plot the site map in ink on a standard Corps of Engineers mylar sheet. Use a lettering size that will be legible when reduced to half-size.

(3) Boundary Survey. Provide a boundary survey for the Blosenski Land-Fill parcel. Perpetuate each corner with a durable monument. Each monument cap shall have a logical designation as well as the surveyor's identity.

The boundary survey shall be accomplished by a surveyor who is registered in the State of Pennsylvania. The surveyor shall comply with all local, County and State statutes and laws. The boundary plat shall be drafted and filed with the proper authorities in Chester County as well as the State, if applicable. Provide the Corps a copy of the recording documents.

(4) New Vicinity Map. Provide photogrammetric mapping and ground control for the area shown in Exhibit 1.

(A) Mapping Requirements. Produce this Vicinity Map using an analytical stereo plotter. The map scale shall be 1"=200'. Show a 10 contour interval. Increase the line weight and label each fifth contour. Show all above ground features. The term "features" is intended to include but not be limited to:

Utilities.
Buildings/Structures.
Streets, Roads or Drives, Fences,
Ditches, Streams, Storage Tanks,
Drill Holes and Sample Sites.
Groups of Trees.

(B) Map Accuracy. The vicinity map shall meet or exceed the National Standard of Map Accuracy.

(C) Aerial Photography.

1. The aerial photography to be taken under this contract shall be vertically exposed with a calibrated 6-inch focal length precision aerial mapping camera, equipped with a single high resolution, distortion-free type lens with appropriate haze filters. The camera-lens combination used on this project shall have been calibrated within the last 3 years by the USGS, and this report shall be furnished to the Government.

2. All aerial photography shall be accomplished with such equipment as to afford photographs meeting all precision requirements for ...rotriangulation and map compilation within the limits of the "C" factor of the plotting equipment to be employed, as stated by the Office of Management and Budget. The corps reserves the right to approve or disapprove the flight plan and panel layout prior to the flight.

3. All photography shall be accomplished when the sun is 30 degrees or higher above the horizon unless otherwise specified; when the atmosphere is sufficiently clear; and when no part of the terrain being photographed is obscured by clouds. No sun spots (reflections) shall be allowed. Any day containing two or more consecutive hours of such suitable conditions will be considered a "Suitable Day" for aerial photography.

4. Only fresh, fine-grained, high speed panchromatic aerial film shall be used. All negatives shall be sharp and clear and contain all highlight and shadow detail. They shall be free of any defects.

5. The Contractor shall mark on each negative required for minimum coverage, the name of the project, the assigned number of the negative, and the date of exposure.

6. All negatives shall be delivered to the Contracting Officer in rolls on winding spools within cans with each can labeled to show the name and address of the Contracting Agency, the name of the project, the aerial numbers of the first and last numbered negative of each strip, the date, the scale, complete camera data including model, serial number, calibrated focal length of the lens in millimeters, internal coordinates of the camera, the contract number, last calibration and usage since that

calibration, and the name and address of the Contractor who accomplished the photography. Plane "N" number and pilot and camera operator name shall be included also.

7. One (1) contact print of all photos required shall be made on medium weight RC paper with semi-matte finish and shall be delivered flat, trimmed on all sides, as flush with the image as possible, and still retain the fiducial marks. Unless otherwise specified print size shall be 9-inch x 9-inch. They shall be sharp, clear, and shall contain all highlight and shadow detail.

8. Upon successful completion of all photography, the Contractor shall prepare and deliver a final index map. The photo-index map shall be both a photographic reproduction on medium weight paper with semi-matt finish and a mylar print of a stapled assembly of contact prints of all numbered photographs. The index map shall bear a brief title consisting of "Aerial Photography Index, Project Name, Contracting Agency, and scale." The index map shall also bear a note including information as to the Contract number, the Contractor's name, the month and year the exposures were made, and the approximate negative scale.

(D) Survey Control. Use the same datum as the mapping of the landfill. Either photo identifiable points or panel points may be used for ground control. All monitoring wells and sample sites shall be plotted on the vicinity map, therefore they should be paneled or coordinates traversed in with ground surveys.

(E) Drafting. Plot the site map with ink on mylar. Use lettering that will be legible when half-sized.

(5) Flight Mission.

(A) The negative scale for the site map shall not exceed 1"=1500 (1:18000). The negative scale for the topographic survey shall not exceed 1"-200' (1:2400).

(B) Photograph the area called out in Exhibit 1 with black and white film. The negative scale shall be 1"=200' (1:2400). Conform to the same specifications as 4-C aerial photography for mapping.

(C) Produce two oblique photographs with the black and white film. Each oblique shall cover all the area in Exhibit B.

(6) Completion of Work. Completion of work shall include acceptable performance and delivery of the following items:

a. All original field notes.

b. Copy of all computations.

c. Original mylars and one half-size print each.

d. Sketch description and photograph of each control point set.

e. Mylar copy of the boundary plat.

f. Copy of the recording documents for the boundary survey.

g. Aerial film. (2 cans)

h. Contact prints.

i. Photo index negatives of each film type and two prints each.

j. Camera calibration sheet.

2. Cost Estimate and Value Engineering Report.

a. Cost Estimates. The Contractor shall prepare a preliminary cost estimate for the anticipated design for the remedial cleanup. Information obtained during the pre-design activities shall be used in the cost estimate. The cost estimate shall include the RCRA cap construction cost and the treatment plant construction cost along with estimated annual operation and maintenance cost. Identify major construction, operations and maintenance costs. Provide for approval the methodology that will be used in developing the cost estimate. The cost estimate shall be included in the Pre-Design Engineering Report.

b. Value Engineering Report. This report would be performed near the conclusion of the pre-design activities and would present a series of cost benefit assessments to both enable identification of the most advantageous design and contractor's concepts for remediation. In addition, it would examine the proposed project for aspects which may warrant a formal value engineering study during design. Topics of consideration will include utilization of option capping materials, relative costs of "over designed" caps versus costs saved from maximum reduction in leachate generation, relative advantages and cost for leachate treatment alternatives, etc. The Value Engineering Report shall be included in the Pre-Design Engineering Report.

3. Treatability Testing Study. The Contractor shall perform treatability testing to determine design parameters for the groundwater treatment system. The Contractor shall provide a proposal called "Treatability Testing Proposal", with a complete description, of the bench and on-site pilot treatment requirements. The proposal shall include a cost summary with a breakdown of tasks and man-hour estimates. The cost summary shall include a list of all rented and purchased equipment and a list of analyses to be preformed with associated costs.

a. A written report entitled "Treatability Testing Report" shall be submitted which presents the original proposal, test data, procedures used, assumptions, recommendations and conclusions drawn from the testing. The methodology and details of the work shall be determined by the Contractor and shall be in accordance with generally-accepted practice and regulatory agency requirements. All wastes from the sampling and testing shall be disposed of in accordance with regulatory agency requirements. The Contractor shall review and use information supplied in the Final Remedial Investigation,

Feasibility Study Report and Record of Decision for Blosenski Landfill Site prepared by NUS Corporation. The Treatability Testing Study shall include (but not limited to) the following:

(1) Determine the anticipated effluent discharge regulatory standards for the proposed ground water treatment plant, dependent water quality standards (both EPA and State), acceptable risk and/or best available control technology, and the level of treatment required for the groundwater treatment system surface discharge into the unnamed tributary of Indian Spring Run adjacent to site.

(2) The A-E shall review and use information supplied in the Final Feasibility Study Report prepared by NUS Corporation and any other monitoring well sampling in determining which monitoring well(s) which represents the most representative influent to the proposed groundwater treatment facility. This representative monitoring well(s) shall be used as the influent sample for all the treatability testing.

(3) Perform laboratory bench scale testing for the metals precipitation process for the removal of inorganic contaminants. Provide a technical evaluation of the precipitation process which includes as a minimum the following items:

(a) Determine all feed chemicals and dosage rates.

(b) Evaluate and report the required settling times, sludge production rate, efficiencies and ultimate effluent qualities.

(c) Perform any tests necessary for design of sludge watering and ultimate disposal.

(d) A neutralization system for pH adjustment.

(4) Perform laboratory bench scale testing using a filtration system for pretreatment prior to the air stripping system. The influent for this testing shall from the effluent of the bench scale metals precipitation testing. Filtration shall be examined to determine if it is applicable or required as a pretreatment step prior to the air stripping or granular activated carbon absorption system. Provide a technical evaluation of the process which should include a minimum of the following:

(a) Determine optimum sized filter media and their respective depths.

(b) Determine the most appropriate filtration rate and terminal headloss.

(c) Determine the expected length of the filter run and backwash criteria.

(d) Pressure versus gravity.

(e) Declining rate versus fixed.

(f) Provide analysis of filter effluent, and expected sludge

quality and quantity.

(5) Perform on-site and/or off-site air stripping pilot study wit the representative influent, to be determined by Contractor. Provide a technical evaluation of the air stripping process, for volatile organic removal, which includes as a minimum the followfollowing items:

(a) Determine if noxious off-gases from air stripper need to be treated. Provide necessary design data and method for treatment.

(b) Evaluate and select critical organic compounds (low Henry's constant) for design of air stripping unit.

(c) Evaluate and test different air-to-water ratios.

(d) Evaluate or confirm the mass transfer efficiency of a selected packing and verify mathematical model predictions.

(e) Identify and discuss any potential plugging or fouling problems associated with the air stripping unit.

(6) Perform off-site laboratory treatability testing of the granular activated carbon (GAC) process for removal of volatile and refractory organics. The influent for this process shall be a representative sample of the effluent from the air stripping process. Provide a technical evaluation of the pilot GAC system for final design which includes as a minimum the following items:

(a) absorption isotherms shall be determined utilizing tota .ganic carbon (TOC) and the more critical organic compounds, that are know t be existing at the site. The Contractor shall evaluate and select which organic compounds should be analyzed during the testing.

(b) Types of carbon.

(c) Carbon column contact time and depth for desired water quality.

(d) Pretreatment requirements.

(e) Carbon usage in terms of pounds of organic material removed per pound of carbon.

(f) Breakthrough characteristics.

(g) Potential deleterious effects.

(h) Headloss characteristics.

(i) Select at least two types of activated carbon that are acceptable and available from more than one supplier.

(7) The Contractor shall determine an appropriate method of sludge disposal meeting regulatory agency requirements. Using the metal precipitated generated by the bench testing the Contractor shall as a minimum determine the

following:

(a) Sludge dewaterability, chemical addition and system design.

(b) Final sludge disposal plan.

(8) Discuss the need for a chronic aquatic bioassays to determine whether the treated groundwater can be surface discharged and consequently define any additional level of treatment required, if any, to meet discharge requirements.

b. Deviations from the Record of Decision (i.e., treatment scheme, feed chemicals, precipitation process, etc.) shall be submitted to the Corps of Engineers for EPA approval prior to making any final design changes. The Contractor shall recommend the final pretreatment scheme, with appropriate design parameters necessary to complete final design.

c. The Contractor shall develop costs for the final treatment process including chemical and sludge disposal cost.

d. Analytical Protocol. Depending on the treatability testing program that is proposed, a variety of analytical methods will be required to monitor multi-media samples. Tables 5a and 5b represent projected analyses and sample numbers that may be needed. Table 5b is for estimating purposes only. The projected analytical program is capable of monitoring treatment system influent characteristics, air stripper influent and effluent characteristics and metals precipitation influent and effluent characteristics. Note that quality assurance samples are not required for all monitoring activities.

4. Chemical Quality Management. (Applicable to all activities where samples are obtained and analyzed for chemical characterization.) An extremely important aspect of this project is the generation of chemical data. A quality management approach must be established assuring that the contractors collect, analyze, and document chemical data that are scientifically and legally defensible.

a. SUBMITTALS:

1. Development of A-E Quality Control Plan (A-E QCP).

(a) The Contractor shall develop an effective working plan for chemical data quality control.

(b) An A-E QCP will include the information outlined in the enclosed A-E Guidance for Developing A-E Quality Management Procedures for Site Investigative Activities.

(c) As part of the A-E QCP, the Contractor shall develop a Sampling Plan to address protocols for gathering all samples in all media of interest. The Sampling Plan will contain a statement of sampling objectives, specification of equipment, analyses of interest, sample types, sample location and frequency, and schedule. Use of field screening techniques to preliminary characterize samples and limit fixed laboratory analysis should be considered.

2. Development of A-E Laboratory Quality Management Plan (A-E LQMP).

(a) As the initial step in the lab validation procedure the Contractor shall submit a Laboratory Quality Management Plan. (See Section 4(b)(1).

(b) Specific guidance for development of this plan is presented in the enclosed A-E Guidance for Developing A-E Quality Management Procedures for Site Investigative Activities.

3. Development of A-E Daily Quality Control Reports (A-E DQCR).

(a) The Contractor will provide Daily Quality Control Reports (DQCR) to the Contracting Officer.

(b) Specific guidance for development of these reports is presented in the enclosed A-E Guidance for Developing A-E Quality Management Procedures for Site Investigative Activities.

4. Development of A-E Quality Control Summary Report (A-E QCSR).

(a) The Contractor shall develop this report and submit it at the conclusion of the Pre-Design Project.

(b) Specific guidance for the development of this report is presented in the enclosed A-E Guidance for Developing A-E Quality Management Procedures for Site Investigative Activities.

GENERAL PROTOCOLS

1. Laboratory Validation All quantitative and qualitative chemical analysis shall be performed by a laboratory (or laboratories) which have been validated by the U.S. Army Corps of Engineers. This validation, at a minimum, will involve submittal of an off-the-shelf Laboratory Quality Management Plan. See Section 4(a)(2). This plan shall be submitted immediately after the Notice-proceed is given. Additionally, performance of audit samples and a laboratory inspection by a U.S. Army Corps of Engineers representative may be required. Audit samples will be matrix and analyte specific, and will be supplied by the U.S. Army Corps of Engineers. The contract laboratory shall be reimbursed for the successful analysis (i.e. resulting in validation) of all audit samples.

If the ongoing laboratory validation of the contractor's lab for environmental analyses for another corps project is successful, the submittal of the Lab Quality Management Plan and an additional laboratory inspection specifically for this project will be waived. However, any analytical procedures specified as part of this project which differ from the other Corps project will require analysis of additional analytic specific audit samples.

2. Decontamination Protocol. Decontamination protocol shall be proposed by the Contractor for all field activities in the A-E Quality Control Plan. These procedures shall insure that there is no cross-contamination of multi-media samples which would result in the compromise of the final analytical results. In general, procedures should include cleaning (e.g.

steam cleaning) of the drilling equipment between boreholes and critical cleaning of all sampling devices between sampling events. This critical cleaning shall include a series of cleaning procedures to remove all contaminant classes potentially encountered at the site. Generation of decontamination liquids (i.e. water and organic rinses) should be kept to a minimum since these liquids shall be disposed of in an environmentally sound manner.

3. QA/QC Samples. In general, for each matrix sampled, one field duplicate and one field split shall be taken for each ten (10) field samples and sent to the contract lab and the Quality Assurance Lab respectively. In general, for each matris, two field blanks shall be taken for each ten (10) field samples and one sent to the contract lab and one sent to the Q.A. Lab. Trip blanks shall be sent for sample shipments containing samples for volatile analysis. See Tables 1-5 for specific QA/QC sample requirements.

4. Sample Packaging, Chain-of-Custody, and Shipping. The U.S. Army Corps of Engineers guidance document entitled "Sample Handling Protocol for Low, Medium, and High Concentration Samples of hazardous Waste (dated 10/1986)" will be followed explicitly in regard to sampling packaging, chain-of-custody, and sample shipping. Also, see Tables 6 and 7 attached to this Scope of Service for specific project sample bottles, preservation, and holding times. All sample bottles and coolers for contract laboratory analyses shall be supplied by the Contractor. Purchase of pre-cleaned bottles with documented QC is urged. All sample bottles and coolers for Quality Assurance Laboratory Analysis shall be supplied by the QA Lab. The project manager must be notified at lease one week prior to going into the field with a proper shipping address so that shipment of QA bottles will be timely.

5. Quality Assurance Laboratory. The Quality Assurance (QA) laboratory for this project will be the Missouri River Division Lab. The QA Lab will be notified of the beginning of sampling activities approximately one week prior to the arrival of the first QA sample shipment. Saturday sample arrival will be cleared with the QA Lab in advance. The QA sample shipping address is:

Commander
U.S. Army Engineer Division, Missouri River
ATTN: MRDED-L (Dr. Joe Solsky)
420 South 18th Street
Omaha, NE 68102-2586

Phone (402) 221-3211

6. Matrix Spikes. Laboratory matrix spike analysis shall be run on at least one in twenty (20) samples for all parameters where none is required in the requested methodology. Methods with specific requirements for surrogate spikes, matrix spikes, lab blanks and internal QC shall be followed explicitly.

7. Data Reporting and Data Validation. Contract lab data reports shall include at least parameter concentrations when above detection limits, compound specific method detection limits, daily lab blanks "hits," surrogate spike results, and matrix spike results. Contract lab data validation shall be performed by the Contractor. A plan for this activity shall be included in the A-E QCP.

8. QA/QC Problem Notification. When QA/QC problems are encountered either in the field or in the laboratory, the U.S. Army Corps of Engineers shall be contacted by phone within 48 hours, or sooner. The problem and associated corrective action shall be reported.

9. QA/QC Definitions.

(a) Quality Control Samples. Samples analyzed by the contract lab to insure data quality. They include duplicates and field blanks (i.e. sampler rinsates and trip blanks).

(b) Quality Assurance Samples. Samples analyzed by the designated Corps of Engineers lab to serve as a check on preservation and packaging, to insure contract lab data quality, and to generate additional data points to aid in site characterization.

(c) Field Duplicate. Samples analyzed by the contract lab which are generated in the field from a mixed sample (i.e. field duplicate and field sample are generated from a homogenized media) for non-volatile analysis. Field duplicates and field samples for volatile analysis are generated at the same time in close proximity to one another but from a non-mixed media.

(d) Sampler Rinsate. A laboratory grade water sample that has been poured over a cleaned sampling device (e.g. bailer, split spoon, etc.) and properly preserved for the appropriate analysis. The purpose of this sample is to assess the decontamination effort and the potential for cross-contamination of samples.

(e) Trip Blank. A laboratory grade water sample that is filled (no head space) in the field in a clean area. The sample accompanies all field samples for volatiles analysis (water and soil) to the lab and is stored with the field samples prior to analysis. The purpose of this sample is to assess contamination of volatiles samples during shipment and storage.

(f) Background Sample. A sample analyzed to assess "naturally" occurring levels of certain contaminants, especially metals and PNA's.

(g) Matrix Spike. A field sample spiked with method "list" compounds to assess sample preparation, sample analysis, and overall method accuracy.

10. Potentially Hazardous Materials.

(a) Drill cuttings. All soil drill cuttings and rock core generated from off-site drilling activities shall be transported to the site. These materials shall be assumed non-hazardous and spread on the ground at the site.

(b) Liquids. All potentially hazardous liquids (i.e. decontamination water, drilling fluid, and well development water) shall be drummed initially with decontamination water being segregated from other liquids. Drummed liquids shall then be screened using a field reconnaissance method and determined hazardous or non-hazardous. Non-hazardous liquids shall be dumped on-site while hazardous liquids shall be treated along with pump

test water. The A-E shall propose a detailed field screening plan as part of the AEQCP.

c. A-E Safety, Health and Emergency Response Plan (A-E SHERP).

a. General. The Contractor shall review the supplied project information and develop a site-specific Safety, Health, and Emergency Response Plan (SHERP) which shall establish in detail the protocols necessary to protect on-site personnel, the public, and the environment from potential physical, chemical, and/or biological hazards associated with the activities required by this scope of services. The Contractor shall avoid providing material which is of a general nature and not specifically related to this project. Information readily available in standard texts should be repeated only to the extent necessary to make the plan required by this project self-sufficient. The Contractor shall provide a draft SHERP to the Corps of Engineers for review and comment. Any comments shall be addressed and the results incorporated into a final plan and resubmitted to the Corps for approval prior to the commencement of any on-site activity.

b. A-E SHERP Requirements.

(1) The A-E SHERP shall comply with the following regulations and reflect the guidance given in applicable regulations and publications:

(a) OSHA standards 29 CFR 1910 and 1926, specifically 29 CFR 1910.120 (the Interim Final Rule dated 12-19-86) "Hazardous Waste Operations and Emergency Response."

(b) FAR Clause 52.236-13, Accident Prevention.

(c) Corps of Engineers Safety and Health Requirements Manual, EM385-1-1, revised October 1987.

(d) NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," October 1985.

(e) Other relevant regulations.

(2) The A-E SHERP shall address the following components as a minimum:

(a) Staff organization, responsibilities, authorities and qualifications of key personnel and alternates responsible for health and safety.

(b) Safety and health hazard assessment and risk analysis for each site task and operation.

(c) Accident Prevention in accordance with Em 385-1-1, paragraph 01.A and appendix Y.

(d) General and site-specific training of personnel.

(e) Frequency and content of medical surveillance.

(f) Site control measures including site map, work zones, communication, security and site access.

(g) Standard operating safety procedures, engineering controls and work practices.

(h) Personal protective equipment specific to each of the site tasks and operations being conducted. Include types/materials, respiratory protection program and site-specific action levels to dictate upgrades/downgrades.

(i) Personnel hygiene and decontamination facilities and procedures.

(j) Equipment decontamination facilities and procedures.

(k) Frequency and types of personnel and environmental monitoring including instrumentation, calibration, sampling techniques and analytical methods.

(l) Heat/cold stress monitoring.

(m) On-site emergency equipment and first aid requirements.

(n) Emergency response plan and contingency procedures.

(o) Logs, reports, and recordkeeping related to implementation of the SHERP.

(3) Examples of Guidance. The following are examples of available guidance which can be used (latest editions should be used):

(a) NIOSH (National Institute of Occupational Safety and Health), Manual of Analytical Methods, 3rd Edition, Volumes I and II, February 1984.

(b) TLV's - Threshold Limit Values and Biological Exposure Indices for 1987-88, ACGIH (American Conference of Governmental Industrial Hygienists).

(c) ANSI Z88.2-1980, (American National Standards Institute), American National Standards Practices for Respiratory Protection, March 11, 1981.

(d) Interim Standard Air Monitoring Guide for Hazardous Waste Sites, Toxic Waste and Environmental Section, Missouri River Division, U.S. Army Corps of Engineers, June 1984.

(e) NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

6. Fracture Trace Analysis Review. The 1985 EPIC fracture trace analysis shall be reviewed to confirm the interpretation of the lineaments identified in the report. A copy of the report and the photography utilized in the analysis will be provided to the Contractor by the COE. The Contractor shall

also examine the aerial photos obtained for topographic mapping under this contract to confirm or enhance the interpretations made using the formerly existing photography. All lineaments identified in the EPIC report and any newly identified lineaments shall be located on the 1"=200' vicinity map generated under this contract. A discussion of those lineaments which may affect contaminant migration in the vicinity of the Blosenski site, including possible interpretations, shall be included in the Pre-Design Engineering Report.

7. Surface Geophysical Surveys.

a. Off-Site Electrical Resistivity Survey. Electrical resistivity profiling shall be performed to further delineate possible fracture zones identified by the fracture trace analysis as potentially affecting the Blosenski site. Electrode configurations and spacings shall be appropriate for locating these fluid-filled bedrock fracture zones. Electrical resistivity profiling shall also be performed in areas of known ground-water contamination to aid in determining related contaminant migration pathways. Results shall be presented as horizontal profiles or contour maps of apparent resistivity. Profile lines shall be surveyed and accurately located on the site maps.

b. On-Site Magnetometer and Electromagnetic Survey. Surface geophysical surveys shall be performed on the landfill to aid in locating concentrations of buried drums.

(1) Magnetometer Survey. A magnetometer survey of the landfill surface shall be performed. Metal debris on the ground surface may affect magnetometer readings. The presence of metal debris near a magnetometer station shall be noted at the time of the survey and possible interference considered in the interpretation of the data. Either total field or gradient measurements may be taken. If total field measurements are taken, daily readings shall be taken at a fixed reference base station located off site in an area free of magnetic anomalies. Care will be taken to minimize noise from clothing and personal effects such as steel-toed boots, respirators, etc. Station measurements or continuous measurement methods may be used. Survey lines and stations shall be spaced closely enough to allow a contour map of magnetic field intensity to be constructed on the site plan. No attempt shall be made to estimate the quantity or depth or drums from the magnetometer data. The Contractor shall include in their proposal (Drum Disposal Area Investigation Report) a brief description of the equipment and methods to be used, including survey line locations and station spacings.

(2) Electromagnetics Survey. An electromagnetics (EM) survey of the landfill shall be conducted to be used in conjunction with the magnetometer data and surface soil sampling results to locate concentrations of buried drums. The instrument used shall have a response depth of approximately 30 feet. Station readings shall be taken at sufficiently close spacings to allow large concentrations of drums to be detected. The Contractor shall include in their proposal a brief description of the equipment and methods to be used, as well as station spacings and any other pertinent information.

(3) Drum Disposal Area Investigation Report. The Contractor shall present the results of each of the surface geophysical surveys in the form of

isopleth maps of magnetic field intensity and conductivity. In addition, profiles or other means may also be used to further illustrate the results. The Contractor shall attempt to correlate the results of the magnetometer and EM surveys, as well as results of on-site soil gas analysis, to locate areas of the landfill which may contain large concentrations of buried drums. Possible areas shall be shown on a site plan and shall be rated as to the degree of confidence of their identification as drum disposal areas. The three areas where drums were found in test pit excavations performed during the Remedial Investigation should be used as control locations where drums are known to be buried. These three areas should receive the highest confidence rating as probable drum disposal areas. The Contractor shall also provide a written discussion of the field methods and equipment, correlation methods, and the basis for the rating of each possible drum disposal area. This information shall all be compiled in a Drum Disposal Area Investigation Report which shall be completed as soon as possible after completion of the necessary field activities.

8. Surface Soil Sampling. A soil gas study shall be performed in the filled area of the site as another tool to help determine whether residual volatile product (and possibly drums) are still present in the landfill. The study shall be conducted only under proper conditions (no recent rain events). The technical approach shall involve pounding temporary steel shallow point well samplers (preceded by drive points) which are open ended at the bottom. The well points shall be inserted a distance of 3-5 feet and then withdrawn one-half foot to allow for soil gas development. Any annular space that develops shall be sealed off by tamping soil around the well point. Soil gas shall be allowed to develop for 12 - 24 hours before the probe is sampled using a peristaltic pump. Each probe will be sampled using both a PID and FID type instrument with steady state and peak instrument readings being recorded for both instruments. The instruments shall be calibrated and zeroed periodically as instructed by the manufacturer with an ombient air blank (drawn through a cleaned probe) also being analyzed periodically. When probes are removed the holes shall be backfilled with powdered bentonite. The contractor shall accurately locate sampling points and produce isopleth maps as part of the final report. The A-E shall submit a detailed plan for the soil gas study as part of the AEQCP.

The sample grid shall coincide and be on even multiple of the grid that will be used for the geophysical surveys. For estimating purposes the soil gas survey will be assumed to consist of approximately 125 sampling points.

9. Sediment Sampling. In the sampling plan of the AEQCP, the Contractor shall propose five sediment/surface water (if water is flowing) sampling points along the course of the unnamed tributary of Indian Spring Run. At least one of these sampling points shall be upgradient of the Blosenski Landfill Site to assess possible upstream sources of contamination. The surface water samples shall be taken prior to the sediment samples to limit generation of particles that could effect the surface water sample results. For both sediment and surface water sampling, sampling activities shall proceed from the furthest down stream point sequentially in an up stream direction. The Contractor shall propose specific sampling procedures for obtaining these samples. (See Tables 2 and 3)

All sediment samples shall be analyzed for Volatile Organics by EPA Method 8240, BNA Extractable Organics by EPA Method 3540 or 3550/8250 or 8270, and

Pesticides/PCB's by EPA Method 3540 or 3550/8080. All quality control procedures and control limits are detailed in the respective methods. All sediment samples shall be analyzed for Priority Pollutant Metals using EPA Method 3050/6010 for Antimony, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Thallium, and Zinc, and EPA Methods 3050/7060 or 7061 for Arsenic, EPA Method 7471 for Mercury, EPA Method 7760 for Silver, and EPA Method 3050/7740 or 7741 for Selenium. See Section 4e for quality control requirements in addition to those stated in the method. All analytical results shall be reported on a dry weight basis.

All surface water samples shall be analyzed for Volatile Organics by EPA Method 8240, BNA Extractable Organics by EPA Method 3510 or 3520/8250 or 8270, and Pesticides/PCB's by EPA Method 3510 or 3520/8080. All quality control procedures and control limits are detailed in the respective methods. All surface water samples shall also be analyzed for total Priority Pollutant Metals using EPA Method 3010/6010 for Antimony, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Thallium, and Zinc, and EPA Method 7060 or 7061 for Arsenic; EPA Method 7470 for Mercury, EPA Method 7760 for Silver, and EPA Method 7740 or 7741 for Selenium. See Section 4e for quality control requirements in addition to those stated in the method. Some ICP analyses may need to be changed to Graphite Furnace to meet or exceed MCL's. Detection limits for all organic and inorganic analysis will meet or exceed MCL's.

10. Monitoring Wells.

a. Well Locations. Fifteen (15) new ground-water monitoring wells shall be installed to define contaminant migration pathways and the limits of ground-water contaminants in the bedrock aquifer. Approximate well locations and their intended functions are listed below.

(1) Three (3) wells shall be installed between the south site boundary and Kings Highway to determine the effects of residential well pumping on ground-water levels, determine the presence of a ground-water divide in the area, and determine the extent and migration pathways for ground-water contamination.

(2) Three (3) wells shall be installed along Kings Highway to investigate contaminant migration to residential wells in the vicinity of Kings Highway and Cambridge Road.

(3) One (1) well shall be installed to replace MW6-1 which appears to have been vandalized.

(4) Four (4) wells shall be installed to the northeast of the site to investigate contaminant migration pathways in the direction of residential wells along Cambridge Road.

(5) Four (4) wells shall be installed to the north and northwest to define the limits of ground-water contamination and define the influence of the intermittent stream on contaminant migration.

Exact well locations and the number of wells in each area will be determined based on the results of the fracture trace analysis and off-site electrical resistivity survey. However, the total number of wells will remain the same.

b. Monitoring Well Installation Plan. Prior to initiation of monitoring well installation activities, the Contractor shall submit to the Contracting Officer for approval a Monitoring Well Installation Plan which, with suggested revisions, will stand as the Monitoring Well Installation Plan for the project. This plan shall include a description of the equipment and procedures that will be used to install the monitoring wells and to obtain necessary soil and rock samples. At a minimum, this plan shall describe the drilling equipment and methods, well development procedures, soil and rock sampling equipment and methods, precautions for preventing cross contamination of aquifers, and shall identify the responsibilities of all personnel involved. Within 10 working days after the completion of the fracture trace analysis and the off-site geophysical survey the Contractor shall submit, for approval, proposed monitoring well locations. The locations shall be shown on the 1"=200' vicinity map. This monitoring well location plan shall, after approval, be included as an attachment to the previously approved Monitoring Well Installation Plan.

c. General Requirements. The Contractor shall provide a qualified geologist who shall be on site for all monitoring well drilling, installation, development, and testing operations. Recommended practices for the construction of such wells are set forth in "Manual of Water Well Construction Practices," USEPA Publ. EPA 570/9-75/001. Additional design recommendations are given in "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities," USEPA Publ. No. EPA 530/SW-611," and "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document," USEPA, September 1986. Any state or local certification requirements shall be met. The Contractor shall be responsible for obtaining any well drilling permits required by state or local authorities and for complying with state or local regulations concerning submission of well logs and samples.

d. Drilling Methods.

(1) The drilling method(s) is optional. Drilling fluids shall be restricted to clean water and filtered air. Water to be used for drilling purposes shall be from a source which has been tested and proven to be free of contaminants prior to initiation of drilling activities. Air used for drilling fluid shall be filtered to remove compressor oil. The filter shall be operated and maintained in full accordance with manufacturer's recommendations.

(2) Minimum 4" I.D. casing shall be set through the overburden and 1 to 2 feet into bedrock and cemented into place using the grout mixture specified in paragraph 10.k, Bentonite Seal and Grout. Further drilling into bedrock will not be permitted until casing is grouted into place. Grout shall be tremied into place around the casing from the bottom to the top or the grout may be placed in the open hole prior to inserting the casing. The casing shall be centered in the hole to ensure a complete grout seal.

e. Protection of Water Yielding Zones. The use of contaminating additives (gels, barite, etc.) in drilling fluids is not permitted. Grease or oil on drill rod joints is not permitted. Dispersing agents (such as phosphates) or acids shall not be used in well installation or development. There shall be no attempt made to chemically disinfect the well. The Contractor drill rig or rigs, drill tools, and associated equipment shall be cleaned with live steam prior to commencement of drilling at each well

location. It is expressly understood that toxic and/or contaminating substances shall not be used during any part of the drilling, well installation or well development process. All drilling methods shall prohibit the introduction of contaminants from one water bearing stratum to another via the well bore.

f. Soil Samples. Down hole soil samples shall be obtained at a minimum of every 5 feet in the overburden to provide an accurate log of subsurface materials. Drill cuttings shall not be substituted for down hole samples. Down hole samples shall confirm adequacy of logging from drill cuttings. These samples are not for chemical analysis and do not have to be saved. Proposedsampling methods shall be included in the Monitoring Well Installation Plan.

g. Rock Core. Continuous rock core shall be taken in the bedrock portion of all monitoring well borings to a depth of 175 feet below ground. Core shall be N series or larger in diameter. Double or triple-tube core barrels shall be used for all rock coring. Coring methods and equipment shall maximize core recovery and minimize drilling induced damage to the core. Excessive core loss or damage which occurs as a result of the Contractor's negligence or improper practice will be grounds for non-acceptance of the well by the Contracting Officer. All core shall be carefully logged in accordance with paragraph 10.m. and photographed in color. Included in each photo shall be the project name, date, hole number, and core depth. Top and bottom of the core shall also be clearly indicated in the photo. Two sets of prints shall be submitted along with the field logs within 10 days of completion of the well. Detailed logging requirements are given in paragraph 10.m. Well Construction Logs.

h. Down-Hole Geophysical Logging. Down-hole geophysical logs shall be run on the bedrock portion of all monitoring well borings after development of the well boring in accordance with paragraph 10.n. and a subsequent waiting period of 3-4 days. As a minimum, caliper, temperature, and spontaneous potential logs shall be run. Temperature logs shall be run first in each boring. An interpretation of the logs from each boring will be performed to attempt to detect water-producing fractures in the bedrock. This interpretation shall be used along with fracturing observed in the core to determine the depth of placement of the monitoring well screens. The geophysical logs and interpretations shall be included as an appendix to the engineering report.

i. Well Riser and Screen. To prevent collapse or silting in of the monitoring wells, well screen and riser shall be suspended in the boring a shown in the attached drawing. For estimating purposes, the well depths, screen lengths, and riser lengths shall be as shown in the drawing. The screens shall be located to monitor water bearing fractures or zones as indicated by observation of the rock core and interpretation of the down-hole geophysical logs. Well riser shall consist of new, threaded flush joint 304 grade stainless Steel Schedule 5 pipe with a minimum 2-inch nominal diameter. Riser shall conform to ASTM Standards A312-84c and A778. The well screen shall be constructed of the same size and strength 304 Stainless Steel as the riser. The screen shall be factory constructed "continuous wrap" design with a slot width of 0.010 inches. Riser and Screen shall be joined by threaded, flush joint couplings to form watertight unions. All joints shall be dry threaded without the use of lubricating oils or grease.

2 Drilling and sampling equipment.

3 Depth of each change of stratum. (Note that sufficient samples shall be taken to identify changes in lithology and character.)

4 Thickness of each stratum.

5 A description and identification of the material of which each stratum is composed according to the United Soil Classification System. Rock classification terminology shall follow EM 1110-1-1804, Appendix B.

6 Depth interval from which each sample was taken. Include blow count whenever a sample is driven.

7 Nominal hole diameter and depth at which hole diameter (bit sizes) changes.

8 Depth at which ground water is first encountered while drilling and fluid levels at the beginning and end of each shift.

9 Total depth of boring.

10 Depth or location of any loss of drill water circulation, loss of tools or equipment.

11 Depth of any core loss zones.

12 Percent core recovery for each coring run.

13 Drilling date or dates, the name of the driller and geologist logging the hole.

14 Coordinates and elevation.

Descriptions of rock core shall include items such as rock type, bedding or foliation, degree of weathering, fracturing, hardness, and other pertinent information. Fracture descriptions shall include, as a minimum, dip angle, aperture, alteration, and spacing. Drilling-induced fractures shall be indicated as such.

(2) A Well Installation Diagram shall be constructed for each monitoring well at the time of installation which shall include, but not be limited to, the following:

1 Reference elevation for all depth measurements.

2 Drilling and sampling equipment.

3 Major stratigraphic units.

4 Total depth of complete well.

5 Development methods and records.

6 Nominal hole diameters.

7 Depth and type of well casing.

8 Description (to include length, location, diameter, slot sizes, material, and manufacturer) of well screen(s).

9 Static water level upon completion of the well and after development.

Copies of the field boring logs and Well Installation Diagrams shall be included in the draft Engineering Report and final drafted Well and Installation Diagrams shall be submitted in the final Engineering Report. The logs shall be prepared by a qualified geologist present during all drilling operations. The original and one copy of each field boring log and well installation diagram shall be submitted to the Contracting Officer not later than ten calendar days after the well is completed. The well will not be accepted by the Contracting Officer until the logs are received and approved.

n. Well Development. After each well boring has been drilled, but prior to geophysical logging or installation of the screen and riser, the contractor shall direct a program for the development of the well by pumping, without the use of acids, dispersing agents or explosives. Development shall continue for a period of four hours (minimum) and until ground water removed from the well is clear and free of sand. At least as much water as was introduced during drilling shall be removed from the well. No water or other liquid may be introduced into the well during development. All development equipment shall be suitable decontaminated before use in the well as referenced in paragraph 4(b)(2). After final development of the well, the Contractor shall collect approximately one liter of water from the well in a clear glass jar, label and photograph it with a 35mm color photo, and submit the photo as part of the well log. The photograph shall be a suitably back-lit close-up which shows the clarity of the water. All water from well development shall be contained and transported to the site. The water shall then be treated by the GAC units used to treat the pump test water and released to the unnamed tributary of Indian Spring Run.

o. Ground Water Samples for Chemical Analyses. The Contractor shall include in the QCP all methods and equipment to be utilized. Each of the newly installed ground water monitoring wells shall be sampled for chemical analyses once. Prior to sampling, the water level in each well shall be measured using a decontaminated sounder or tape. This information, used with the information available on well construction, shall be used to calculate well water volume. Then the well shall be pumped or bailed with clean equipment to remove a quantity of water equal to at least five times the submerged volume of the casing. If the well does not recharge fast enough to permit removing five casing volumes, the well shall be pumped or bailed dry and sampled as soon as sufficient recharge has occurred. Ground water samples shall be analyzed as specified in the following paragraph. (See Table -)

All groundwater samples shall be analyzed for Volatile Organics by EPA Method 8240, BNA Extractable Organics by EPA Method 3510 or 3520 / 8250 or 8270, and Pesticides / PCB's by EPA Method 3510 or 3520 / 8080. All quality control procedures and control limits are detailed in the respective methods. The

Volatile Organic and BNA Extractable Organic Analysis shall also include a CLP-type peak search routine to tentatively identify and quantify non-l[redacted] peaks. All groundwater samples shall also be analyzed for total Prio[redacted] Pollutant Metals using EPA Method 3010 / 6010 for Antimony, Berylli[redacted] Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Nickel, Potassium, Sodium, Thallium, and Zinc and EPA Method 7060 or 7061 for Arsenic, EPA Method 7470 for Mercury, EPA Method 7760 for Silver, and EPA Method 7740 or 7741 for Selenium. All groundwater samples shall also be analyzed for dissolved metals using EPA Method 3005/6010 for all metals except Arsenic, Mercury, and Selenium for which the same methods as those listed for total metals shall be used. See Section 4e for quality control requirements in addition to those stated in the method. Some ICP analyses may need to be changed to Graphite Furnace analyses to meet or exceed MCLs. Additional general water quality parameters shall be analyzed using methods from the latest edition of EPA 600/4-79-020 (See Tables 4 and 7). Detection limits for all organic and inorganic will meet or exceed MCLs.

p. Contractor Responsibility for Monitoring Wells. It is the responsibility of the Contractor to properly plan, design, install, develop, and test monitoring wells so that they are suitable to produce representative ground water samples in sufficient quantity and quality for geochemical testing. The Contractor shall ensure that the intentions of this Scope of Services and best construction practices are carried out. If the Contractor, due to his inadequate design or construction, installs monitoring wells that are not functional or not in accordance with specifications, the Contracting Officer will disapprove the well and direct the Contractor to repair or replace it at the Contracting Officer's discretion. This work shall be done at no additional cost to the Government. If a monitoring well is disapprov[redacted] by the Contracting Officer or is abandoned by the Contractor for any reas[redacted] the hole shall be backfilled with neat cement grout from bottom to top by Contractor at no additional cost to the Government.

q. Response Test. After each well has been completed, a response test shall be conducted. The initial static water level shall be measured and recorded. Both falling head and rising head test shall then be run in each well. The water level in the well shall be raised by introducing a bailer or stainless steel slug into the well. After the falling head test is completed and the well has stabilized, the rising head test shall be run by removing the bailer or slug from the well and recording the water level response. Formation permeability shall be estimated from the slug test data using recognized standard methods. The response test results shall be submitted to the Contracting Officer's representative along with the boring logs and well installation diagrams and shall also be included in the Engineering Report.

r. Continuous Water Level Recorders. Continuous water level recording devices shall be installed in 3 monitoring wells in areas which may be affected by pumping of nearby residential wells. These wells shall be identified at the time monitoring well locations are proposed. The device shall consist of a down-hole pressure transducer and a data recording unit. The unit shall measure and record the ground-water level in the well at 1 hour intervals for a period of one month. This data shall be used to determine the effects of residential well pumping on local ground-water flow.

s. Site Restoration. The site of each monitoring well shall be left in as near its original condition as is possible. Tire tracks and ruts shall be

graded smooth. Areas of damaged vegetation shall be reseeded. The Contractor shall, at all times, keep each well site free of trash and debris generated by the Contractor's activities.

11. Aquifer Pump Test. A pump test shall be conducted to determine the hydrologic characteristics of the bedrock aquifer. In order to conduct the pump test, a test well and two observation wells shall be installed. The actual location of the test well and observation wells shall be proposed by the Contractor based on the results of the other site characterization activities . The test well shall be installed in accordance with proper well design and construction standards. The observation well shall be designed to accurately measure the varying water levels during the pump test. The Contractor shall submit the proposed design and construction methods to the Omaha District CE for approval prior to the start of work. Details concerning the installation of the wells and performance of the pump test are specified in the following paragraphs:

a. General Requirements. The Contractor shall provide a qualified hydrogeologist who shall be on site for all drilling, installation, development, and testing operations. Any state or local certification requirements shall be met. The Contractor shall be responsible for obtaining any well drilling permits required by state or local authorities and for complying with state or local regulations.

b. Test Well. A test well capable of efficiently producing approximately ten to forty gallons per minute shall be installed. The estimated depth of the well is 120 feet. The drilling method is optional, however, the method selected shall minimize damage to the water bearing formation due to the drilling. Sufficient soil and rock samples shall be taken to accurately log the subsurface materials determined. The well shall be designed by the Contractor. The well material is optional. The well screen shall be the continuous slot type. The screen length shall be determined by the Contractor, based on conditions encountered during drilling. For estimating purposes, assume a 30-foot long screen. The well shall be sufficiently aligned and plumb to permit installation of the pumping equipment. A 3/4" to 1" PVC pipe shall be installed outside the well casing and screen to permit water level measurements immediately adjacent to the well. A suitable method to get accurate water level measurements inside the well shall also be provided. The annular space around the casing above the screen shall be sealed to prevent migration of water along the casing. The well shall be developed sufficiently to produce a sand-free, efficient well. A drill log and well installation diagram similar in magnitude as specified for the monitoring wells shall be prepared. Upon completion of the pump test and analysis, the well shall be abandoned by backfilling with cement grout from the bottom up. Any casing/screen that can be removed remains the Contractor's material.

c. Observation Well. The observation wells shall consist of any suitable device that will permit accurate water level measurements throughout the pump test and recovery period. The minimum diameter shall be two inches and the average depth is estimated to be 120 feet.

d. Pump Test. The pump test shall be performed for 48 hours with a minimum eight-hour recovery test. The Contractor shall determine the optimum pumping rate. In addition to monitoring the test well and the two observation

wells, the Contractor shall monitor any existing monitoring wells that will aid in the hydrologic analysis. It is estimated that approximately t[redacted] existing monitoring wells will be monitored throughout the test. The Contractor shall submit for review and approval a Pump Test Plan. The plan shall include as a minimum: the location and design of the test well and observation wells; installation and development methods; the number and location of the existing monitoring wells that will be monitored; drawdown measurement intervals; method(s) for measuring drawdown; anticipated pumping rate; and any other pertinent data. Water produced during the pump test shall be discharged to the intermittent stream located to the north of the site after proper treatment. The Contractor is responsible for obtaining permission from the state for surface discharge of the pump test water. The Contractor shall supply the state with information on the proposed treatment methods, influent and effluent stream characteristics, discharge rate, length and date of the test, and all other information required to obtain state approval.

e. Analysis and Presentation of Data. All pump test data (both drawdown and recovery) shall be analyzed to the extent possible using established techniques. Hydraulic conductivity, storage coefficients and specific capacity computed from the analyses shall be presented for all observation wells and the pumping well in the Engineering Report. The report shall also describe the test procedure, qualitatively discuss the reliability of all values, derived from the test, and shall estimate a hydraulic conductivity and storage coefficient value representative of the aquifer suitable for future design purposes. Copies of field notes from the pump test (including all water level measurements), the reduced drawdown versus time v and graphical plots of the data for all wells monitored during the test and the pumping well shall be included as an appendix to the report.

12. Residential Well Monitoring Program. Limited area-wide residential well monitoring was performed as part of the RI and post - RI activities. A similar program is to be expanded and carried on as part of this Scope f Work. It will be assumed that a total of 35 residential wells shall be sampled once as part of this SOW. The Contractor is responsible for submitting a sampling plan for this activity as part of the A-E QCP. This proposed plan shall specify residential wells in the area that the Contractor feels should be sampled to compliment data that will be obtained from analysis of new monitoring well groundwater samples. The overall objective of the sampling and analysis program will be to fully delineate the extent and magnitude of ground water contamination resulting from landfilling activities at the Blosenski Site. To accomplish the sampling plan the Contractor may need to conduct a survey within the neighborhood to document condition and character of the area residential wells.

An attempt shall be made to sample each well prior to any water treatment devices. This may involve simply sampling at the tap. A sampling protocol shall be proposed as part of the A-E QCP. A field log shall be kept of the specific activities that were involved with sampling each residential well. Ease of sampling should be kept in mind when considering certain wells for inclusion in this monitoring program. Residential well samples shall be analyzed for the same parameters as monitoring wells samples except that only total metals shall be analyzed for (not total and dissolved as for monitoring well samples). See Section 10(o).

13. Monitoring Well Abandonment. Five (5) existing monitoring wells which have been damaged shall be abandoned. The depth of each well shall be measured if possible. The well shall then be filled with grout which is placed from the bottom of the well using a tremie pipe. The grout mix shall be as specified in paragraph 10.k. Bentonite Seal and Grout. The surface protective casing and any surrounding protective posts shall be removed. The well casing shall be removed to a depth of at least 2-3 feet below ground. The top of the well shall then be covered with soil to original grade. A record shall be kept of the materials removed from the well and the amount of grout used. All materials removed from the well shall be steam cleaned and removed from the site.

14. Availability of Incinerators. The Contractor shall investigate the availability of incinerators, that are in full compliance with EPA requirements, that could be used by a remedial action contractor for disposal of waste. The survey shall include as a minimum: Company name/contact, haul distance from site, acceptable wastes, capacity (current and projected) and any additional comments. This information shall be in table form and inserted in the pre design Engineering Report.

15. Interview of Personnel. The Contractor shall conduct an interview of key site personnel who operated or lived by the site. This interview is to obtain information about the history and operation of the site. The Contractor shall meet with EPA Region III enforcement personnel to review files and compile a list of people to interview. Questions to be asked and the names of people to interview shall be proposed to COE Project Manager in a letter prior to interview. The interviews that are conducted shall be documented, recorded, and included in the Pre-Design Engineering Report.

PREDESIGN REPORT

BLOSENSKI LANDFILL
CHESTER COUNTY, PENNSYLVANIA

APPENDIX 4-1

Chris Young

TS-PIC-84137
April 1985

Biosenski Landfill
Fracture Trace/Lineament Analysis
Chester County, Pennsylvania

by
L. Mike Fauss, Imagery Analyst
The Bionetics Corporation
Warrenton, Virginia 22186

Contract No. 68-03-3161

Project Officer
Richard G. Park
Environmental Photographic Interpretation Center
Environmental Monitoring Systems Laboratory
Warrenton, Virginia 22186, FTS 557-3110

ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89114

NOTICE

This document has not been peer and administratively reviewed within EPA and is for internal Agency use and distribution only.

ABSTRACT

The following report presents a fracture trace/lineament analysis of the Blosenski Landfill in West Caln Township, Chester County, Pennsylvania. The analysis was undertaken to support ongoing remedial investigation and feasibility study of this Superfund site.

Historical aerial photography was used to enhance fracture trace detection in agricultural fields. Sixty-two fracture trace features were identified on historical aerial photography between 1965 and 1984. Two major fracture trace trends were inferred from a rose diagram plot of the 62 fracture traces. One trend had an approximate orientation of N70E, while the other had an approximate east-west orientation.

The majority of the east-west fracture traces occurred in the northern half of the study area, while the majority of the N70E fracture traces were seen in the south. The results suggest the possibility of two fracture systems in the area.

The Environmental Protection Agency's (EPA) Environmental Photographic Interpretation Center in Warrenton, Virginia, a field station of the Environmental Monitoring Systems Laboratory in Las Vegas, Nevada, performed this study at the request of EPA Region 3. This analysis covers the period between 1965 and 1984 and was completed in April 1985.

CONTENTS

FIGURES

INTRODUCTION

This report presents a fracture trace/lineament analysis of Blosenski Landfill in West Caln Township, Chester County, Pennsylvania. The analysis was undertaken to support an ongoing remedial investigation and feasibility study of this Superfund site.

Figure 1 depicts the site location, keyed to a U.S. Geological Survey (USGS) 1:24,000 scale topographic quadrangle map. Site boundaries or areas used in the analysis were determined by observations made from the aerial photography and do not denote legal property lines or ownership.

Fracture traces are linear features that can be identified on aerial photography as differences in vegetation growth or lushness, soil tonal variations, discontinuities in rock outcrops, and topographic features like straight stream segments and shallow grooves in the land surface. The linear feature must be natural, excluding those natural features such as outcrop patterns of tilted beds, lineations, foliation and stratigraphic contacts.

Aerial photography of the Blosenski Landfill was obtained to represent the period from 1965 to 1984.[1] Historical black and white photography for the years 1965, 1969, and 1980; color photography for 1983; and color infrared photography for 1984 were used for this analysis.

Historical aerial photography was used to identify a greater number of fracture trace features. Many of the fracture traces were identified as soil tonal variations in agricultural fields. The use of historical aerial photography allowed the analyst to examine a greater number of fields existing in a tilled state, thereby allowing direct observation of the soil tonal variations. The fracture trace features were identified on historical and recent aerial photography and compiled onto an overlay of a recent photo of the Blosenski Landfill site area (Figure 2). A second historical photo was included to show fracture trace features in a field adjacent to the site.

The Environmental Protection Agency's (EPA) Environmental Photographic Interpretation Center in Warrenton, Virginia, a field station of the Environmental Monitoring Systems Laboratory in Las Vegas, Nevada, performed this analysis at the request of EPA Region 3. Work was completed in April 1985.

[1] A listing of all maps and photography used in this report can be found in the References section.

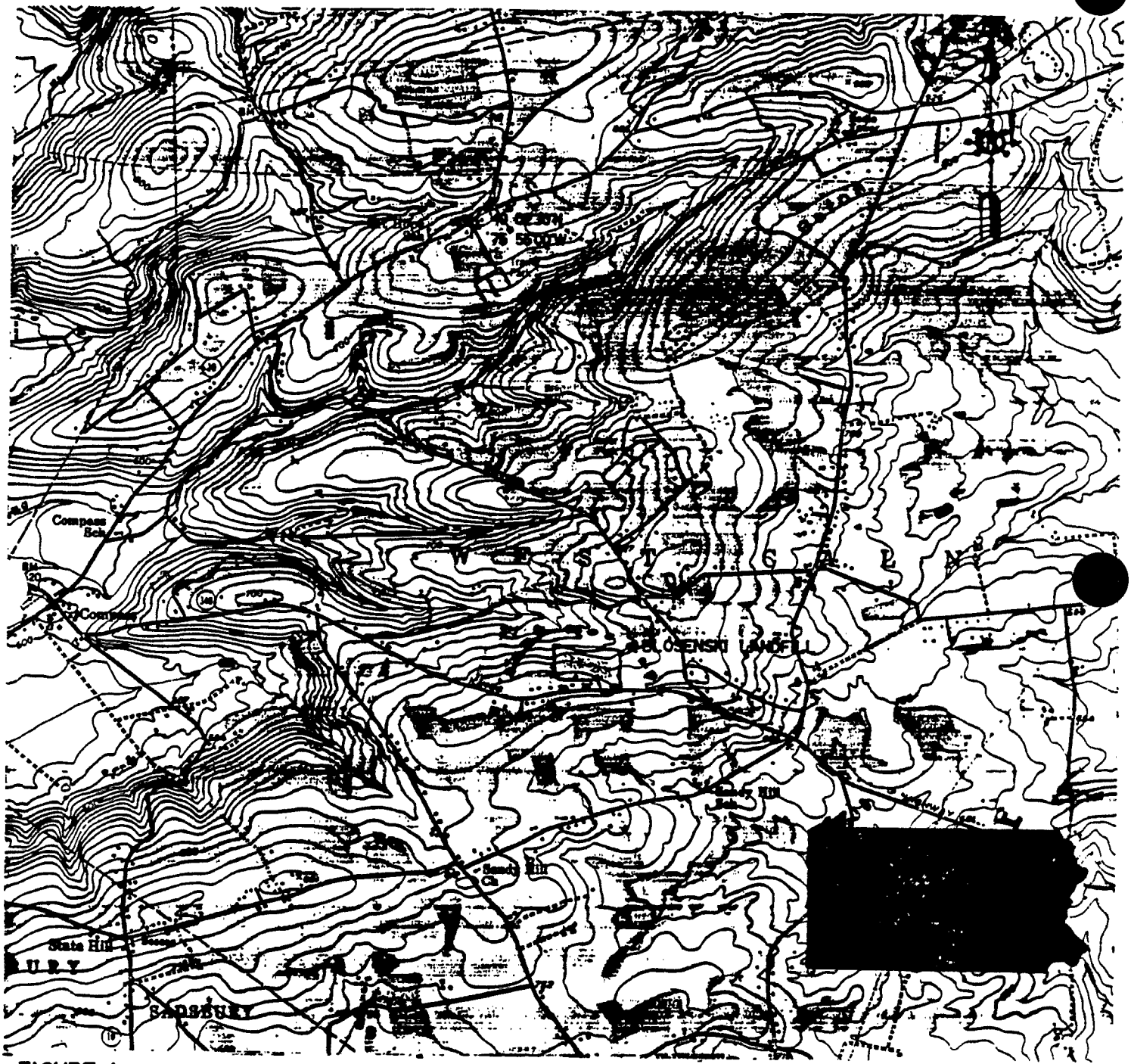


FIGURE 1
BLOSENSKI LANDFILL — LOCATION MAP
HONEY BROOK, PA. QUAD — SCALE 1: 24,000

METHODOLOGY

A search of government and commercial aerial photographic sources was undertaken to obtain the best quality photography available of the site spanning the desired time frame. A listing of all maps and photography used for this report can be found in the References section.

The analysis was performed by stereoscopically viewing pairs of transparencies, backlit on a standard Richards light table. By observing the site three-dimensionally, at various light intensities, and at various magnifications, the analyst could search for desired features expressed on the land surface.

Prints were made from the most recent photography to cover the Blosenski Landfill site area. Prints were also made from one year of historical black and white photography to cover the Blosenski Landfill site. The findings were annotated on overlays to these prints, and full descriptions are provided in the accompanying text.

It should be noted that site boundaries or areas used in this analysis were determined by observations made from the aerial photography and do not denote legal property lines or ownership.

In this report, a distinction is made between probable and possible identifications. Probable is used when a limited number of discernible signatures allows the analyst to be reasonably sure of a particular identification. Possible is used when few signatures are discernible, and the analyst can only infer an identification.

FRACTURE TRACE/LINEAMENT ANALYSIS

BLOSENSKI LANDFILL SITE AREA (Figure 2)

This 1984 color infrared photo represents an approximate 9.2-square kilometer (3.6-square mile) area surrounding the Blosenski Landfill. Sixty-two fracture traces were identified from the analysis of historical aerial photography and compiled onto the one overlay for the 1984 photography.

The approximate position of the annotated fault was transferred from a geologic map of the Honeybrook Quadrangle by Bascom and Stose (1938).[1]

[1]Bascom, F., and Stose, G.W., 1938, Geology and mineral resources of the Honeybrook and Phoenixville quadrangles, Pennsylvania, U.S. Geological Survey Bulletin 891, 145 p. Compiled by A.A. Socolow, 1978, in: Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania, Pennsylvania Bureau of Topographic and Geologic Survey, 1981.

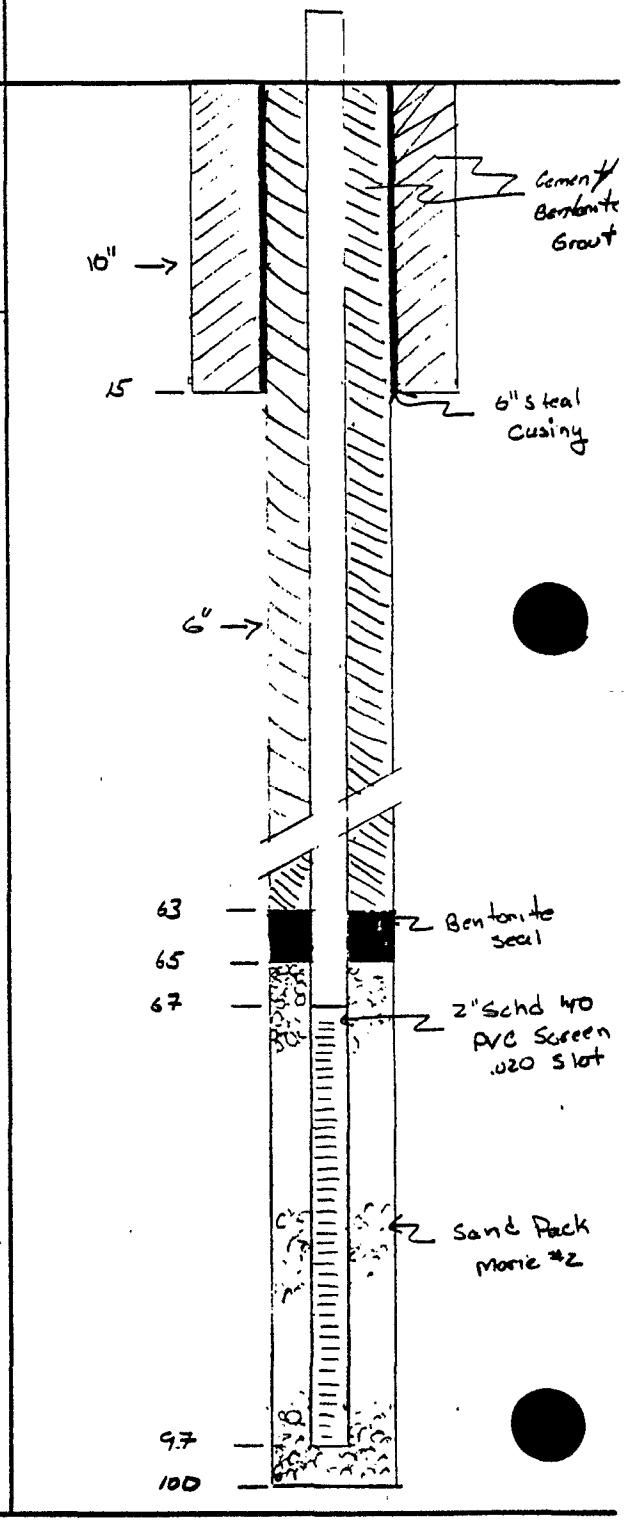
PREDESIGN REPORT

BLOSENSKI LANDFILL
CHESTER COUNTY, PENNSYLVANIA

APPENDIX 4-2

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: OB "1 SHEET 1 OF
PROJECT LOCATION: BLOSBURG LANDFILL CLIENT: U.S ARMY CORPS OF ENGINEERS FILE NO.: 3277.001	DRILLING INFORMATION METHOD: AIR- PERCUSSION DRILLING CO.: MORETRENCH FOREMAN: ED MOORE OBG GEOLOGIST: R GORA	WELL LOCATION: DATE STARTED: DATE FINISHED: GROUND WATER ELEVATION:

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
-0-	Fill material; sand/silt lt. brown some rock fragements		
10	Quartzose Schist - Grey		



COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: OB #1 SHEET 1 OF ___
PROJECT LOCATION: Blosensk. Landfill CLIENT: USCOE FILE NO.: 3277-021	DRILLING INFORMATION METHOD: Air Percussion DRILLING CO.: Morefrench America FOREMAN: Ed Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: DATE STARTED: DATE FINISHED: GROUND WATER ELEVATION:

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Fill material lt. brown sand	10" Air Percussion	4.6 7.5		
2 - 4					
4 - 6	Sand - fine, Brown, slight paint odor present - dry grey paint		6.7 7.6		
6 - 8					
8 - 10					
10 - 12	Same as above - no odor		6.8.5 7.6		
12 - 14		Drilled to 15 feet			
14 - 16	Grey quartzose - schist	to set casing			
16 - 18					
18 - 20					
20 - 22					
22 - 24					
24 - 26					
26 - 28					
28 - 30					
30 - 32					
32 - 34					
34 - 36					
36 - 38					
38 - 40					
40 - 42					
42 - 44					
44 - 46					
46 - 48					
48 - 50					
50 - 52					
52 - 54					
54 - 56					
56 - 58					
58 - 60					

COMMENTS:

AR000246

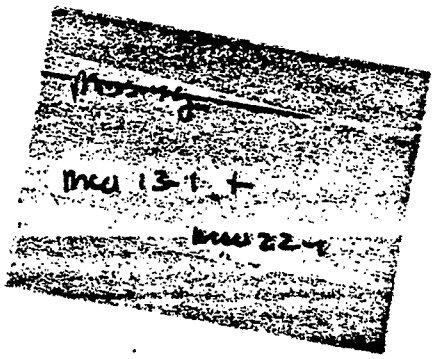
O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
IENT: _____	METHOD: _____	DATE STARTED: _____
	DRILLING CO.: _____	DATE FINISHED: _____
FILE NO.: _____	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION		BORING DIAGRAM
			DRILLING RATE	LITHOLOGY LOG	
60 - 62	Grey quartzose schist				
62 - 64					
64 - 66					
66 - 68					
68 - 70					
70 - 72					
72 - 74					
74 - 76					
76 - 78					
78 - 80					
80 - 82					
2 - 84					
84 - 86					
86 - 88					
88 - 90					
90 - 92					
92 - 94					
94 - 96					
96 - 98					
98 - 100					
100 - 102					
102 - 104					
104 - 106					
106 - 108					
108 - 110					
110 - 112					
112 - 114					
114 - 116					
6 - 118					
118 - 120					

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 26-1 SHEET 1 OF ___
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S. Army Corps of Engineers	METHOD: Air Percussion	DATE STARTED: 5/14/90
FILE NO.: 3277.001	DRILLING CO.: Moore trench America	DATE FINISHED: 7/16/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 38.52
	OBG GEOLOGIST: D. Gori	

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
- 0 -	Crushed stones, dk. brown organic soils, roots, leaves		8" Steel casing
- 2 -	Sand / silt, lt. brown to grey, to Sand, lt grey. (sm)		Cement/ Bentonite grout
39	Quartzose Schist brown - grey		4" SCHD 80 PVC Riser
			136 Bentonite seal 138
			145 Sand Pack morie #1
			4" SCHD 80 PVC Screen .010
			165
			170 Bentonite Seal 172



COMMENTS: Hole reamed w/ 8" air hammer to depth of 172'

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw26-1 SHEET 1 OF 3
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S. COE	METHOD: Air Percussion	DATE STARTED: 5-14-90
FILE NO.: 3277.001	DRILLING CO.: MES	DATE FINISHED: 7-16-90
	FOREMAN: Ed. Moore	GROUND WATER ELEVATION: 38.52
	OBG GEOLOGIST: P. Gor.	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Crushed stones, organic soils - dk. brn roots leaves				
2 - 4					
4 - 6	Sand/Silt - lt. brown to lt. grey, fine to med (SM)		8.14 17.22		
6 - 8					
8 - 10	Sand/Silt - lt. grey, fine-med (SM)		12.9 9.11		
10 - 12					
12 - 14					
14 - 16	Sand - lt. grey, fine-med, saprolitic modeled appearance (SM)		9.66 30.42		
16 - 18					
18 - 20					
20 - 22	Sand - same as above (SM)		10.30 40.50		
22 - 24					
24 - 26	Sand - same as above, weathered bedrock grey/brown, saprolitic	(SM)	30-5 5/3"		
26 - 28					
28 - 30					
30 - 32	weathered bedrock, lt. brown-tan sand, fine	(SM)	5 5/3"		
32 - 34					
34 - 36	Quartzose Schist		5 5/0"		
36 - 38	grey/brown-grey, schistocity	Bedrock encountered Drill 3'			
38 - 40	oriented ~45° angle, mod-	socket			
40 - 42	highly weathered.				
42 - 44		Highly fractured (45.6-46.6)	ft/min		
44 - 46		Fractures ~45° angle	2.0		
46 - 48		mod. Fractured ~45°	2.0		
48 - 50		Fracture 48.2'	2.0		
50 - 52	Highly weathered (50 10"-51')		2.75		
52 - 54	No recovery 52-55'		8		
54 - 56		Slightly Fractured ~45°	3		
56 - 58		Fracture 58.6'	2.5		
58 - 60			2.75		

COMMENTS: Surface casing set at 39.0', Air hammer (12") set casing
NQ core barrel used for coring (OD. ~3", ID ~1.9")
Dashed line - reamed hole, MW placement
~ - Fm. Line

AR000249

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW26-1 SHEET 2 OF 3
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
	DRILLING CO.:	DATE FINISHED:
FILE NO.:	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Quartzose Schist - grey	Mod. Fractured ~45°	3.25		
62 - 64	Schistocity ~ 45° angle	Fracture 60:	4.0		
64 - 66	mod. weathered	Intensely fractured (61-63')	3.0		
66 - 68	Highly weathered zone	Slightly Fractured	3.5		
68 - 70	Fe* staining 68'8"	Fracture 66'10" 68'8"	4.0		
70 - 72		Highly Fractured (69'6" - 70'10")	5.0		
72 - 74		Fracture 72'10"	4.0		
74 - 76		moderately Fractured	3.75		
76 - 78		Fracture (77.2)	4.5		
78 - 80		Fracture (78.4)	4.25		
80 - 82	Fe* staining	Highly Fractured (80 - 83)	6.25		
82 - 84			3.25		
84 - 86		Highly Fractured	5.0		
86 - 88			5.5		
88 - 90	Highly weathered (88-90)		7.5		
90 - 92			6.5		
92 - 94		moderately Fractured ~45°	3.75		
94 - 96		Fracture (96.9)	3.75		
96 - 98		97.6	4.0		
98 - 100		98.3	4.5		
100 - 102		Highly Fractured (100-101)	5.5		
102 - 104		Slightly Fract. 103	3.25		
104 - 106			3.75		
106 - 108		Fracture 106.5	6.0		
108 - 110	Quartzite - grey	Intensely Fract. (107 - 114.5)	16.0		
110 - 112	mod weathered		16.0		
112 - 114	Quartzose Schist - grey		5.0		
114 - 116	schistocity oriented ~45°		4.0		
116 - 118	mod. weathered	Highly Fractured	4.5		
118 - 120		(115 - 125)	3.5		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC. | WELL CONSTRUCTION LOG | WELL NO.: MW26-1 SHEET 3 OF 3

PROJECT LOCATION: _____
CLIENT: _____
FILE NO.: _____

DRILLING INFORMATION
METHOD: _____
DRILLING CO.: _____
FOREMAN: _____
OBG GEOLOGIST: _____

WELL LOCATION: _____
DATE STARTED: _____
DATE FINISHED: _____
GROUND WATER ELEVATION: _____

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzose Schist - grey	Highly Fractured	4.0		
122 - 124	schistocity oriented ~ 45°	Fe* staining along Fracture	2.75		
124 - 126	sl. weathered	horizontal, 45°	4.0		
126 - 128			3.5		
128 - 130			5.5		
130 - 132			3.25		
132 - 134			7.0		
134 - 136	Quartzose Schist grey - lt. grey	Highly Fractured	4.5		
136 - 138	schistocity ~ 45°	horizontal ± 45°	3.5		
138 - 140	mod weathered		2.75		
140 - 142	Fe* along Fractures		3.75		
142 - 144			5.25		
144 - 146			3.5		
146 - 148			2.75		
148 - 150			3.0		
150 - 152			3.0		
152 - 154			3.0		
154 - 156			1.75		
156 - 158			1.75		
158 - 160			1.5		
160 - 162			1.25		
162 - 164			1.5		
164 - 166	Sandstone (Quartzose) Schist	Intensely Fractured	1.5		
166 - 168	grey - brown - possibly highly	cannot identify fracture	1.5		
168 - 170	weathered quartzose schist	orientations	3.25		
170 - 172	schistocity ~ 45°		2.75		
172 - 174	highly weathered		2		
174 - 176			3		
176 - 178					
178 - 180					

COMMENTS:

AR000251

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6-5-90 - 6-6-90

BORING NO.: MW 26-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	45	55	120	100	3.45 ft/min	Return: Brownish to reddish brown
2	55	65	96	80	3.0 ft/min	Return: Brownish
3	65	75	114	95	5.0 ft/min	Return: Brownish
4	75	85	120	100%	5.1 ft/min	Return: Brownish

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	45	55	Sandstone Schist - moderately hard, brown-grey, moderate-highly weathered Fractures ~45° highly fractured
	53	55	soft decomposed sediment
			Fe* staining along fractures
2	55	65	Sandstone Schist - grey mod hard mod-highly weathered, mod fract. schistocity ~45° Fractures ~45°
	55	61	highly weathered, mod hard
	61	64	mod weathered, mod hard
3	65	75	Sandstone schist, grey, mod hard, mod weathered, slightly-mod fractured. Fractures horizontal + ~45° Fe* staining fract.
	72	75	Less weathered zone
4	75	85	Sandstone Schist - mod grey, mod hard, mod weathered, mod-highly fractured w/ Fe* staining horizontal Fractures + ~45°

AR000252

CORE LOG

PROJECT: Blosensk: Landfill mw Installation

DATE: 6-5-90 6-6 1990

BORING NO.: mw 26-1 CORE SIZE: WQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	85	95	120	100	4.9 ft/m	Return: Brownish
6	95	105	120	100	3.95 ft/min	Return: Brownish
7	105	115	96	80	10.0 ft/min	Return: Brownish
8	115	125	120	100	3.75 ft/min	Return: Brownish no return 118-120
					ft/m	

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	85	95	Sandstone Schist - ~~med~~ grey, mod. hard, highly fractured, mod. weathered schistocity oriented ~45°
6	95	105	Sandstone Schist - grey, mod hard, mod. weathered, mod-highly fractured Fractures horizontal + ~45° schistocity ~45°
			Fe# staining along fractures 99'8" - 101'9"
7	105	115	Sandstone schist - grey, mod. hard, mod weathered, mod-highly fract.
	109	113	Quartzite - grey, ~~med~~ Fe# staining along fractures
	113	115	Sandstone Schist
8	115	125	Sandstone Schist - lt grey, mod hard, mod weathered, Fe# staining along bedding planes + fractures highly fractured
			Fracture ~45° and 05° from horizontal.

AR000253

CORE LOG

PROJECT: Blosenski Landfill mw Installation

DATE: 6-5 to 6-6 1990

BORING NO.: mw 26-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	125	135	120	100	5.1 ft/min	Return: lt. brown no return 133-135
10	135	145	120	100	3.7 ft/min	Return: brownish-cloudy no return 136-139
11	145	155	120	100	2.65 ft/min	Return: lt. brown
12	155	165	108	90	1.5 ft/min	Return: lt. brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	125	134	Sandstone Schist - lt. grey, mod. hard, sl. fractured, mod - highly fractured Fe+ staining present on fracture surfaces
	134	135	Quartzite - hard lt. grey reddish tint ~~highly~~ mod
			fractured mod weathered. Fe+ staining along fractures
10	135	145	Sandstone Schist - lt. grey. grey. mod hard, mod weathered highly fractured Fractures ~45° & horizontal
			Fe+ staining present along fracture surfaces
11	145	155	Sandstone Schist - lt grey to off white, mod hard, mod weathered. mod - highly fractured. Schistocity ~ 45° angle. Fractures ~45° & horizontal, Fe+ staining along fracture surfaces.
12	155	165	Sandstone Schist - grey. soft, mod hard, mod - highly weathered.
			Fractures horizontal & 45°. Schistocity ~ 45°

AR000254

CORE LOG

PROJECT: Blosenski Landfill mw Installation

DATE: 6-5 to 6-6 1990

BORING NO.: mw 26-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	165.	175	48	40	235 ft/hr	Return: dk. brown

DESCRIPTION OF ROCK TYPE

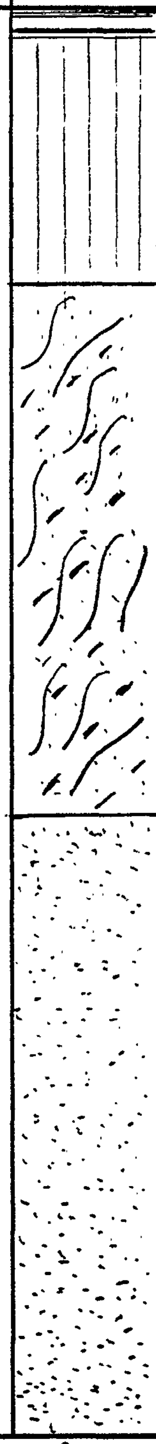
RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	165	175	Sandstone Schist. grey/brown decomposed so
			Quarte frugement present on end of core.

AR000255

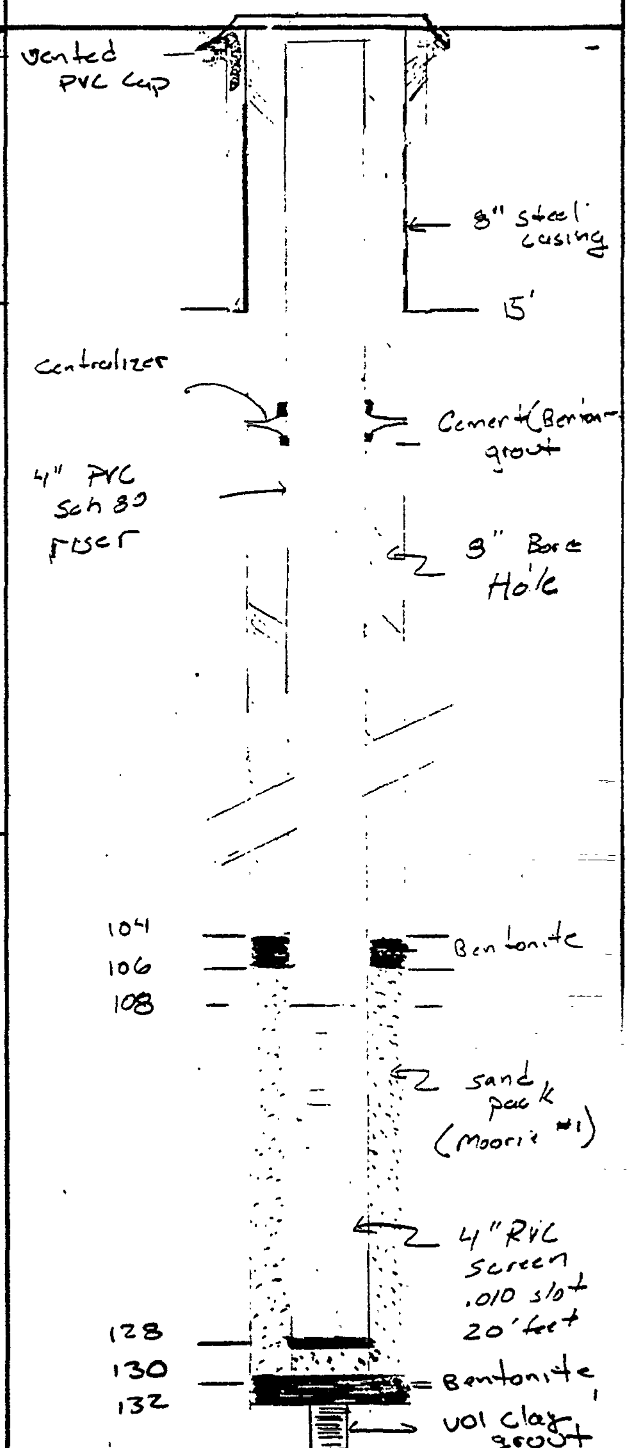
O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW25-1 SHEET 1 OF 1
PROJECT LOCATION: Blosenski Landfill	**DRILLING INFORMATION**	WELL LOCATION:
CLIENT: U.S. Army Corps of Engineers	METHOD: Air Hammer	DATE STARTED: 12/12/89
FILE NO.: 3277.001.221	DRILLING CO.: Moretrench America	DATE FINISHED: 3/15/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 45.50
	OBG GEOLOGIST: P. Gori	

DEPTH	LITHOLOGY
0	Fill material Residual soils (sand/silt) SM weathered Sandstone Shist
15'	Sandstone schist
~~100~~ 99'	Quartzite

SYMBOL



WELL DIAGRAM



COMMENTS: Centralizers placed every 20' after first 50' from the bottom
Hole reamed using 8" air hammer to de

AR000256

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw 25-1 SHEET 1 OF 3
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: US Army Corp of Engineers	METHOD: Air Percussion	DATE STARTED: 12/12/89
FILE NO.: 3277.001.221	DRILLING CO.: Moore Trench America	DATE FINISHED: 3/15/90
	FOREMAN: Brad / Ed Moore	GROUND WATER 45.50
	OBG GEOLOGIST: P. Cori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Humus, woods + roots	Air precussion used			12'
2 - 4		(nominal - 12" bit)			
5 - 7	Sand/silt (SM) lt grey - off white, fine-med. dry				
7 - 8					
8 - 10					
10 - 12	Competent rock		80/4		
12 - 15	Competent rock → Sandstone/	↓	min/ft		
15 - 16	schist; grey / brown	Begin rock coring.	3.5		3'
16 - 18	quartz veins present	NQ core barrel, O.D.	3.5		
18 - 20	schistocity ~45°	~3", I.D. ~1.9"	3.0		
20 - 22	mod weathered	mod. - highly fractured	3.0		
22 - 24		↓	3.0		
24 - 26		↓	4.5		
26 - 28		Fracture Zone 27-28	5.0		
28 - 30		Fracture 30'	3.8		
30 - 32		↓	3.3		
32 - 34		↓	3.0		
34 - 36	Sandstone - Schist - grey - brown	mod. - highly fractured	4.5		
36 - 38	highly weathered	clay material present	3.8		
38 - 40	schistocity ~45°	on fractures	3.0		
40 - 42		Fracture 33', 37'	3.0		3'
42 - 44		↓	1.5		
44 - 46	Sandstone Schist →	Intensely Fractured	1.8		
46 - 48	brown - reddish brown		2.3		
48 - 50	highly weathered		2.0		
50 - 52	schistocity ~45°		2.5		
52 - 54			3.5		
54 - 56	Sandstone Schist →		3.3		
56 - 58	grey / brown → grey		3.0		
58 - 60	Pyrite present	↓	3.0		

COMMENTS: Dashed line - reamed hole for mw placement
Surface casing set at 15.0'. Air hammer (12") set casing
NQ core barrel used for coring (OD ~3", ID ~1.9")

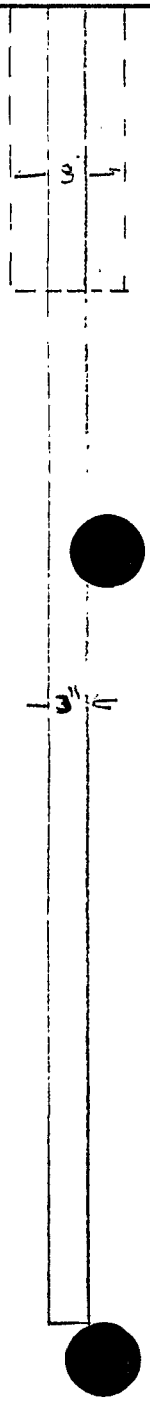
O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw25-1 SHEET 2 OF 3
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
FILE NO.:	DRILLING CO.:	DATE FINISHED:
	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE min/ft	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Sandstone Schist →	Intensely Fractured	4.0		
62 - 64	grey / brown	60-61	3.8		
64 - 66	schistocity ~ 45° angle	Slightly Fractured	3.5		
66 - 68	slt. weathered	Fracture 63'	4.3		
68 - 70			4.8		
70 - 72			4.8		
72 - 74			3.3		
74 - 76			3.5		
76 - 78			3.8		
78 - 80			3.8		
80 - 82		Fracture 82'	3.3		3"
82 - 84			3.8		
84 - 86			3.3		
86 - 88			3.8		
88 - 90			3.5		
90 - 92			3.8		
92 - 94			4.3		
94 - 96			4.0		
96 - 98	Quartzite → reddish brown	Highly Fractured	3.0		
98 - 100	grading to pink		4.3		8"
100 - 102	slightly weathered		4.5		
102 - 104			4.8		
104 - 106			6.0		
106 - 108		Clay material present along fract. 108'4"-108'9"	4.25		
108 - 110			8.5		
110 - 112		Core Jam. Tripped out	36.0		
112 - 114		Changed bit.	4.80		
114 - 116		Intensely Fractured	3.5		
116 - 118			6.0		
118 - 120			5.5		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw25-1 SHEET 3 OF 3
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
FILE NO.:	DRILLING CO.:	DATE FINISHED:
	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzite → reddish brown → pink	Intensely Fractured	5.5		
122 - 124	highly weathered	↓	3.5		
124 - 126	Quartzite → grey	Intensely Fractured	4.5		
126 - 128	sl. weathered		4.0		
128 - 130			7.8		
130 - 132			5.0		
132 - 134			7.5		
134 - 136			6.5		
136 - 138			5.0		
138 - 140			5.0		
140 - 142			5.0		
142 - 144			5.0		
144 - 146			5.5		
146 - 148			6.0		
148 - 150			6.0		
150 - 152			6.0		
152 - 154			6.0		
154 - 156			6.0		
156 - 158			6.0		
158 - 160			6.0		
160 - 162			6.0		
162 - 164	↓	↓	6.0		
164 - 166	Quartzite / Quartzitic	Highly Fractured	3.9		
166 - 168	schist → lt. tan	↓	3.9		
168 - 170	grading to grey	Intensely Fractured	3.9		
170 - 172	highly weathered		3.9		
172 - 174	↓		3.9		
174 - 176		↓	3.9		
176 - 178					
178 - 180					



COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/1 - 2/7 1990

BORING NO.: mw 25-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double tube core line

RUN NO.	DEPTH (Ft.) FROM	DEPTH (Ft.) TO	RECOVERY IN.	RECOVERY %	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	15	25	114	95.0	3.15 mn/ft	Return Water: Grey-brown
2	25	35	120	100.0	3.9 mn/ft	Return Water: Grey-brown
3	35	45	96	80.0	3.05 mn/ft	Return Water: lt brown/rust-brown/dk brown
4	45	55	81	67.5	2.7 mn/ft	Return Water. lt brown-dk brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	DEPTH (Ft.) TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	15	25	Sandstone Schist → grey-brown, moderately hard, non-continous thinly laminated bedding, moderately weathered moderately-highly fractured. Fractures along planes of schistosity (~45°) Fe* staining along fracture surfaces.
2	25	28'6"	Same as above
	28'6"	29'6"	Quartzite → off white-rose, moderately hard, moderately weathered medium bedded highly fractured
	29'6"	35	Sandstone schist → grey, moderately hard, slightly-moderately weathered non-continous thinly laminated bedding, mod.-highly fractured Fract 45° ∠
3	35	45	Sandstone Schist → grey-brown, soft moderately hard, slightly-highly weathered, non-continous thinly laminated bedding highly fractured. Fractures along planes of schistosity (~45°) Fe* staining and clay products present on fractured surfaces.
4	45	50'7"	Sandstone Schist → brown-reddish brown, soft-moderately hard highly weathered thinly laminated bedding highly-intensely fractured. Fe* staining along fracture surfaces.
	50'7"	55	As above: highly weathered-decomposed intensely fractured v. soft

AR000260

CORE LOG

PROJECT: BLOSENOSKI LANDFILL MW INSTALLATION

DATE: 2/1-2/7 1990

BORING NO.: MW 25-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	55	65	120	100.0	3.9 mn/ft	Return Water: brown-grey
6	65	75	120	100.0	4.05 mn/ft	Return Water: Grey-milky white
7	75	85	120	100.0	3.55 mn/ft	Return Water: Grey-lt. brown
8	85	95	120	100.0	3.75 mn/ft	Return Water: Grey lt brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	55	65	Sandstone Schist → moderately hard-hard, moderately weathered thinly laminated bedding, moderately fractured.
			(grey-grey/brown) Fractures on ~45° angle to horizontal. Fe staining present on fracture surfaces. Pyrite present.
6	65	75	Sandstone Schist → grey, moderately hard, slightly weathered thinly laminated bedding, moderately fractured
			Fractures on 45° angle. Fe staining present along fracture surfaces. Quartz veins present.
7	75	85	Sandstone Schist → Same as above
8	85	95	Sandstone Schist → same as above

AR000261

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/1-2/7 1990

BORING NO.: MW 25-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 41 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	95	105	120	1000	4.2 mn/ft	Return Water: 95-100' → Grey-lt brown 100-105' → milky white
10	105	115	120	1000	2.8 mn/ft	Return Water: milky white/lt brown. Core Jam @ 112' Tripped out Change core bit
11	115	125	120	1000	4.9 mn/ft	Return Water: milky white- grey brown
12	125	135	120	100.0	6.0 mn/ft	Return Water: lt brown- milky white

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	95	99'6"	Sandstone Schist → grey, moderately hard, moderately weathered, thinly laminated bedding highly fractured. Fractures along ~45° with Fe# staining along exposed surfaces.
	99'6"	105'	Quartzite → reddish brown moderately hard, slightly weathered, moderately fractured. Fe# staining & clay material present on fracture surfaces
10	105	115'	Quartzite → pink, very hard slightly weathered, massive bedding, highly fractured. Fractures horizontal +45° angle. Fe# staining & clay material present along fracture surfaces (108'4"-108'9")
11	115	118	Quartzite → pink, very hard, slightly weathered, massive bedding intensely fractured. Fractures horizontal, & 45° angle Fe# staining present on fracture surfaces.
	118	125	Quartzite → red to grey, hard-very hard, slightly weathered, massive bedding, intensely fractured. Fe# staining on fract surfaces
12	125	135	Quartzite → grey, very hard, slightly weathered, massive bedding intensely fractured. Fractures along ~45° angle. Fe# staining along fracture surfaces.

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/1 - 2/7 1990

BORING NO.: MW 25-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	135	145	114	95.0	5 mn/ft	Return Water: lt. grey - milky white
14	145	155	120	1000	6 mn/ft	Return Water: lt. grey - milky white
15	155	165	120	1000	6mn/ft	Return Water: lt. grey - milky white
16	165	175	120	1000	3.9 mn/ft	Return Water: lt. grey milky white

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	135	145	Quartzite → grey, very hard, slightly weathered, massive bedding, intensely fractured. Fractures along ~ 45° angle. Fe# staining along fracture surfaces
14	145	155	Quartzite → grey very hard, moderately weathered, thin bedding intensely fractured. Fractures ~ 45° angle. Fe# staining present along fracture zones. slight schistose nature to rock
15	155	165	Quartzite → grey, very hard, slightly weathered, some schistosity no continous bedding, intensely fractured. Fe# staining & clay material present on fracture surfaces Fractures predominantly 45° angle.
16	165	168	Quartzite → lt tan, soft, highly weathered, massive bedding highly fractured. Fractures predominantly along 45° angle. Fe# staining along fracture surfaces.
	168	175	Quartzite → Grey - lt grey, soft, highly weathered, massive bedding intensely fractured. Fractures predominantly along 45° angle. Fe# staining & clay products noted on fracture surfaces.

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 24-1 SHEET 1 OF 1
PROJECT LOCATION: Blosenski Landfill CLIENT: U.S. Army Corps of Engineers ILE NO.:	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: MES FOREMAN: Ed Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: DATE STARTED: 5/9/90 DATE FINISHED: 8/22/90 GROUND WATER ELEVATION: 46.95

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
4	Crushed Stone, dk. brown organic soil roots, leaves Sand - lt. brown - grey fine grained (SM)		8" Steal Casing Cement/ Bentonite grout
50	Quartzose Schist Lt. grey		48' 4" Schd 80 PVC Riser 68 Bentonite seal 70 75 4" Schd 80 PVC Screen .010 Sand pack Morie #1 95 98 Bentonite seal 101'

COMMENTS: Centralizers placed every 20' after the first 50' from the bottom. Hole reamed using 8" air hammer to depth of 101'.

AR000264

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 24-1 SHEET 1 OF
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: US COE	METHOD: Air Percussion	DATE STARTED: 5/9/90
FILE NO.: 82772001	DRILLING CO.: MES	DATE FINISHED: 8/22/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 476.2
	OBG GEOLOGIST: P. Geri	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Crushed Stones, organic soils, dk. brown roots, leaves				
2 - 4					
4 - 6	Sand - lt. brown, fine, fine grained, quartz frag present, modeled appearence, dry SM		6.0 10.13		
6 - 8					
8 - 10					
10 - 12	Sand - lt grey - lt brown, fine grained, mica flakes present, modeled appearence dry SM		13.8 12.12		
12 - 14					
14 - 16	Sand/S.lt - lt grey, fine grained (saphrolitic) mica flake present, quartz seams dry SM		0.10 26.23		
16 - 18					
18 - 20					
20 - 22	Sand/S.lt - lt brown (saphrolitic) fine grained	mica flakes present dry SM	10.12 33 50/3		← 12" →
22 - 24					
24 - 26	Sand/Silt - lt brown fine grained (saphrolitic) some quartz	bedding present frag present dry SM	50/0/3		
26 - 28					
28 - 30					
30 - 32	Sand/Silt - lt brown - w/ dk brown bands lt grey (saphrolitic) becoming hard Bedding present SM		29. 50/5		
32 - 34					
34 - 36	Same as above -	SM	49. 50/2		
36 - 38					
38 - 40					
40 - 42	Sand/S.lt - lt brown - lt grey fine grained (saphrolitic) mottling much more apparent		50. 50/5		
42 - 44					
44 - 46	NO Recovery		50/0		
46 - 48					
48 - 50					
50 - 52	Quartzose Schist → lt grey -	Intensely Fractured			
52 - 54	grey, mod - highly weathered	Fractures rand. orient.			
54 - 56	schistocity ~45°		16.0		← 3 →
56 - 58		highly weathered (56-58)	13.0		
58 - 60			15.5		← 8 →

COMMENTS: Surface casing set at 480'. Air Percussion Hammer (12") set casing
NQ core barrel used for coring (OD ~ 3.0" ID ~ 1.9")
Dashed Line reamed hole for mw Placement
~ - Fracture

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Quartzose Schist → lt. grey-grey	Intensely Fractured	8.25		
62 - 64	sl. weathered, schistocity	randomly oriented	11.75		
64 - 66	~45°	Mod Fractured - horizontal	2.75		
66 - 68		Fracture 67'	3.5		
68 - 70		Fracture 69'	4.25		
70 - 72			4.75		
72 - 74		Fracture 72.3 72.5	4.5		
74 - 76		Highly Fract (74.75.3)	5.25		
76 - 78		Fracture 76.5'	3.5		
78 - 80	Fe+ staining along fractures	Fracture 79.0'	4.5		
80 - 82		Fracture 81.4'	4.0		
82 - 84		Fracture 82.4'	4.75		
84 - 86			5.5		
86 - 88		Highly Fractured ~45°	4.75		5
88 - 90		(86.9 - 89.5)	6.5		
90 - 92		Fracture 91.0'	4.75		
92 - 94	Quartzose Schist → grey	sl. Fract. (92.4)	5.5		
94 - 96	sl. weathered schistocity		2.5		
96 - 98	~45°	Highly Fract (95.8 - 96.2)	4.5		
98 - 100	sl. Fe+ staining along fract.	Fract. 99.8'	4.75		
100 - 102		Fract. 102.0'	4.25		
102 - 104			4.0		
104 - 106	Quartzose Schist → grey	mod fract. (105 - 106) vertical	4.0		
106 - 108	unweathered schistocity	Fract (107 - 108) vertical	6.25		3
108 - 110	~45°		3.5		
110 - 112		Highly Fractured (110.8 - 111.5)	3.25		
112 - 114		Fracture 112.5'	4.0		
114 - 116		sl. fractured	4.0		
116 - 118			5.0		
118 - 120			5.0		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzose Schist → grey	Sl. Fractured	4.25		
122 - 124	unweathered, schistocity ~45°	Fracture (120 - 124) vertical	4.5		
124 - 126			4.5		
126 - 128			4.5		
128 - 130		Highly Fractured (128.10 - 13)	6.5		
130 - 132			4.5		
132 - 134			5.0		
134 - 136		Fracture 136'	5.0		
136 - 138			3.5		
138 - 140			3.5		
140 - 142		Fracture 140.7'	3.75		
142 - 144			3.75		
144 - 146			7.5		
146 - 148		Fracture 146.2'	5.5		→ 3 ←
148 - 150		mod Fractured	5.0		
150 - 152		Fracture 150.3', 151.1', 151.9'	4.5		
152 - 154		Fracture 152.2'	4.5		
154 - 156		Fracture 154.6'	6.5		
156 - 158		Fracture 157.5'	6.5		
158 - 160			5.0		
160 - 162		Fracture 160.2'	4.5		
162 - 164			6.0		
164 - 166		Fracture 165	4.5		
166 - 168			4.5		
168 - 170			5.0		
170 - 172			4.0		
172 - 174		Fracture 173.3'	4.25		
174 - 176			4.0		
176 - 178					
178 - 180					

COMMENTS:

AR000267

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 5/31 - 6/4 1990

BORING NO.: MW 24-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 3 TYPE BARREL: Double Barrel Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	54	64	120	1000	141 mn/ft	Core Jam 55, 57, 59' Tripped out. Return Water: grey - milky
2	64	74	120	1000	385 mn/ft	Return Water: grey - cloudy
3	74	84	120	100.0	4.4 mn/ft	Core Jam @ 79' Tripped out Return water: greyish
4	84	94	120	100.0	4.55 mn/ft	Core Jam @ 89 + 90' Tripped out Return Water: greyish

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	54	64	Quartzose Schist (micaceous) lt. grey, mod. hard, mod - highly weathered, thinly laminated bedding, intensely fractured
			Quartz veining, present. Highly weathered zones 56-58' + 60-61.5'
			Schistocity ~45°
2	64	74	Quartzose Schist - grey, mod. hard, slightly weathered, thinly laminated bedding, mod. fractured
			Slight Fe++ staining along fractures Quartz veining present 71-73 feet.
3	74	84	Quartzose Schist - same as before, Quartz veining
			74.5 - 75.5' + 82 - 83.5'.
4	84	94	Quartzose Schist - grey, mod hard, slightly weathered w/ highly weathered zones, thinly laminated
			bedding, mod - highly fractured (~45°). Quartz veining 84 - 87 feet.
			Fracture zones 86'10" - 87'8" 89'6" - 89'6"

AR000268

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 5/31 - 6/4 1990

BORING NO.: mw 24-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 3 TYPE BARREL: Double Barrel Wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	94	104	120	1000	4.7 mn/ft	Core Jam @ 103' - Tripped out Return Water: grey
6	104	114	120	1000	4.0 mn/ft	Return Water: Grey
7	114	124	120	1000	4.8 mn/ft	Return Water: Grey
8	124	134	120	1000	5.4 mn/ft	Return Water: Grey => Lost return 128'.

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	94	104	Quartzose Schist - grey, moderately hard, slightly weathered thinly laminated bedding, slightly fractured,
6	104	114	Quartzose Schist - grey, mod hard, unweathered, thinly laminated bedding, slightly - mod fractured. ~~Fract~~ + (45°-60°) fracture zone
			105-106, 107-108, 110-112.
7	114	124	Quartzose Schist - grey, mod hard, unweathered, thinly laminated bedding, slightly fractured
			Vertical fract. (120-124)
8	124	134	Quartzose Schist - grey, mod hard, unweathered, thinly laminated bedding slightly fractured ≈ 45°

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 5/31 - 6/4 1990

BORING NO.: MW 24-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 3 TYPE BARREL: Double Barrel Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	134	145	120	100.0	3.9 mn/ft.	No Return
10	144	154	120	100.0	5.5 mn/ft	No Return
11	154	164	120	100.0	5.8 mn/ft	No Return
12	164	175	132	100.0	3.68 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	134	144	Quartzose Schist - same as before
10	144	154	Quartzose Schist - same as before
11	154	164	Quartzose Schist - same as before, Quartz
			veining
12	164	175	Quartzose Schist - same as before mod. hard

AR000270

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: mw 23-1 SHEET 1 OF 1
PROJECT LOCATION: Biosenski Landfill CLIENT: U.S. Army Corp of Engineers FILE NO.: 3277.001.221	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moretrench America FOREMAN: Ed Moore OBG GEOLOGIST: D. Gori	WELL LOCATION: DATE STARTED: 11/20/89 DATE FINISHED: 3/9/90 GROUND WATER ELEVATION: 50

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
2'	Organ soil, roots, crushed stones Sand, (weathered rock) SM		vented PVC cap; 6" Protective casing; 8" steel casing; cement Bentonite grout
47	Quartzose - Schist grey / brown - grey		4" PVC sched 80 Riser; 84' Bentonite; 86' Sand Pack Morie #1; 4" PVC sched 80 screen .010 Slot (5 feet); 103' 105' 107' Bentonite void clay grout

COMMENTS: Centralizers placed every 20' after first 50' from the bottom.
Hole reamed using 8" air hammer to depth of 107'

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 23-1 SHEET 1 OF ___
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD: Air Percussion	DATE STARTED: 11/20/89
FILE NO.:	DRILLING CO.: MES	DATE FINISHED: 3/9/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 50.28
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Humus crushed stone, leaves, roots				
2 - 4					
4 - 6	Sand - lt. grey - off white, fine-med, dry, grit, pebbles SM		13.30 21.16		
6 - 8					
8 - 10					
10 - 12	sand - grey-brown, fine-med. dry, saphrolitic SM		9.8 11.14		
12 - 14					
14 - 16	Same as above thin bleach seams present (3") bottom		18.19 22.23		
16 - 18	SM				
18 - 20					
20 - 22	Sand - lt. brown - reddish brown	fine-med. dry SM	9.12 15.15		
22 - 24					
24 - 26	Sand - lt brown / brown - grey, fine-med dry saphrolitic SM		8.14 20.29		12
26 - 28					
28 - 30					
30 - 32	Sand - brown-grey, fine-med. dry saphrolitic SM		23.25 28.30		
32 - 34					
34 - 36	Sand - lt brown - fine-med. dry saphrolitic, bedding more evident SM		14.19 30.31		
36 - 38					
38 - 40					
40 - 42	Sand - lt brown, fine-med, dry	saphrolitic SM	38/100.5		
42 - 44					
44 - 46	No Recovery Competent Rock		100/1		
46 - 48	Sandstone Schist → grey - brown	Highly Fractured (48-49)	5		
48 - 50	sl. - mod weathered	Fractures ~45°	5.0		
50 - 52	schistocity ~ 45°	→ Fracture 50'	6.0		3
52 - 54		→ Highly fractured (52-53)	5.0		
54 - 56	Fe# staining evident on fractures	→ Fracture 56.5'	5.0		
56 - 58			4.0		8
58 - 60		Fracture 60'	4.5		

COMMENTS: Surface Casing set at 375'
NQ core barrel used for coring (3" OD, 1.9" ID)
Dashed Lines - reamed hole for mw placement
t/ - Fractures

AR000272

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Sandstone Schist → lt grey	Highly Fracture (60.8-61.3)	3.5		
62 - 64	mod. weathered	Mod Fractured ~45°	3.0		
64 - 66	schistocity ~45°	Fracture 64.6'	3.0		
66 - 68	↓		3.0		
68 - 70	Fe* staining present along	Fracture 69.8'	4.0		
70 - 72	fractures	Fracture 71.9'	4.0		
72 - 74	↓	Highly Fractured 72.6-73 (73.6-74.8)	4.3		
74 - 76	↓		4.0		
76 - 78	Sandstone Schist → lt grey	sl. Fractured ~45°	4.0		
78 - 80	sl. weathered	Fracture 80'	4.0		
80 - 82	schistocity ~45°	Fracture 81.1	4.0		
82 - 84	↓	Fracture 83.3	4.0		
84 - 86	↓		4.0		
86 - 88	↓	Fracture 86.5	4.0		
88 - 90	Fe* staining present	Fracture 89.3'	4.5		
90 - 92	along fracture surfaces	Fracture 91.2'	4.5		
92 - 94	↓	Fracture 93.3'	4.5		
94 - 96	↓	Fracture 95.6'	4.5		← 6 →
96 - 98	↓		4.5		
98 - 100	↓	Fracture 98.0'	4.5		
100 - 102	↓		4.5		
102 - 104	Highly weathered	Highly Fractured (102.9-102.3)	4.5		
104 - 106	↓		4.5		
106 - 108	↓	MOD. FRACTURED ~45°	4.5		
108 - 110	↓	Highly Fract. (108.2-109)	4.0		
110 - 112	↓	Fracture 110.6', 111.6'	4.0		
112 - 114	↓	Highly fract (112.6-113)	4.0		← 3 →
114 - 116	↓	Fracture 115.6'	4.0		
116 - 118	↓	Fracture (117-118) vertical	4.0		
118 - 120	↓	Fracture 119.7	4.0		

COMMENTS:

AR000273

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Sandstone Schist → grey	Sl. fractured ~45°	4.0		
122 - 124	Slightly unweathered	Fract. 123.3'	4.0		
124 - 126	schistocity ~45°		4.0		
126 - 128	Fe* staining along fract	Fract. 126.6	4.0		
128 - 130		Fract. 129.7	4.0		
130 - 132			4.0		
132 - 134			4.0		
134 - 136			4.0		
136 - 138		Fracture 136.5'	4.0		
138 - 140		mod. Fractured	4.0		
140 - 142	Fe* staining along	Fracture 140.2', 141.3'	18.5		
142 - 144	fractures	Fracture 143.6	6.3		
144 - 146		Highly Fractured (144 - 145.1')	6.0		
146 - 148		Fracture 146.4 - 147 (vertical)	6.5		
148 - 150		Highly Fract. (148 - 149)	7.0		
150 - 152		Fracture 151.	7.0		
152 - 154		Fracture 152.8	7.0		
154 - 156			7.0		
156 - 158	Sandstone Schist → grey	mod. fractured ~45° (157.3)	7.0		
158 - 160	schistocity ~45°		7.0		
160 - 162	unweathered	Fracture 161.2'	6.0		
162 - 164		Fracture 162.7, 163.6	6.0		
164 - 166			6.0		
166 - 168		Fracture 166.7	9.0		
168 - 170		Fracture 168.9	9.0		
170 - 172			6.0		
172 - 174			7.0		
174 - 176			9.0		
176 - 178					
178 - 180					

→ 3

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 11/25 - 11/30 1990

BORING NO.: MW 23-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	48	58	120	100.0	5.0 mn/ft	Return Water: milky white - greyish brown Lost return ~ 52'
2	58	68	117	97.5	3.41 mn/ft	No Return
3	68	78	120	100.0	4.05 mn/ft	No Return
4	78	88	120	100.0	4.0 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	48	58	Sandstone Schist → grey - brown, moderately hard, slightly - moderately weathered non-continous thinly laminated bedding, moderately fractured. Fractures on 45° (along planes of schistosity) Fe++ staining on fracture surfaces.
2	58	68	Same as above
3	68	78	Same as above
4	78	88	Sandstone Schist → grey, moderately hard, moderately weathered non-continous thinly laminated bedding, moderately fractured. Fractures along 45° angle (planes of schistosity) Fe++ staining on fractured surfaces.

CORE LOG

PROJECT: BIOSENOSKI LANDFILL MW INSTALLATION

DATE: 1/25- 1/30 1990

BORING NO.: MW 23-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	88	98	115	958	45 mn/ft	No Return
6	98	108	120	100.0	45 mn/ft	No Return
7	108	118	120	100.0	40 mn/ft	No Return
8	118	128	120	100.0	40 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	88	98	Sandstone Schist → grey- brown, moderately hard, moderately weathered, non- continous thinly laminated bedding, moderately fractured. Fractures on ~45° angle (Planes of schistosity) Fe^{++} staining along fracture surfaces.
6	98	108	Same as above
7	108	118	Sandstone Schist → Grey- brown, moderately hard, moderately weathered, non-continous thinly laminated bedding, moderately fractured. Fractures horizontal + on 45° angle (planes of schistosity) Fe^{++} staining on fracture surfaces.
8	118	128	Sandstone Schist → grey, moderately hard, slightly weathered non-continous thinly laminated bedding, moderately fractured. Fractures on ~45° angle Fe^{++} staining on fracture surfaces. Pyrite crystals present.

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 1/25 - 1/30 1990

BORING NO.: mw 23-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	128	138	120	100.0	40 mn/ft	No Return
10	138	147	108	100.0	8.4 mn/ft	No Return Core Jam 140'1" Tripped bbl
11	147	156	108	100.0	7.0 mn/ft	No Return
12	156	166	120	100.0	6.55 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	128	138	Sandstone Schist → grey, moderately hard, slightly weathered, non-continous thinly laminated bedding, slightly fractured. Slight Fe stanining on fracture surfaces of Fractures on ~ 45° angle. Pyrite crystals present
10	138	147	Same as above
11	147	156	Same as above
12	156	166	Sandstone Schist → grey, moderately hard, unweathered, non-continous thinly laminated bedding, slightly fractured. Fractures on ~ 45° angle. Pyrite present

AR000277

CORE LOG

PROJECT: BLOSENSKI LAND FILL MW INSTALLATION

DATE: 1/25 - 1/30 1990

BORING NO.: MW 23-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	166	176	120	100.0	8.3 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	166	176	Sandstone Shist -> grey, moderately hard, unweathered non-continous thinly laminated bedding. un fractured. Fracture on ~ 45° angle

AR000278

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 21-1 SHEET 1 OF ___
PROJECT LOCATION: ROSEWSKI LANDFILL CLIENT: U.S. Army Corps of Engineers ILE NO.: 3277.001.221	DRILLING INFORMATION METHOD: Air Percussion/mud Rotary DRILLING CO.: Morse Trench America FOREMAN: Ed Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: ___ DATE STARTED: 5/22/90 DATE FINISHED: 7/10/90 GROUND WATER ELEVATION: 73.6

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
9	Silt/Sand, tan-reddish brown, med grained (SM)		6" Protective Casing; 8" steel Casing
38	No Recovery		Cement Bentonite Grout; 4" Sch 80 PVC Riser
98	Sandstone		112 Bentonite; 114; 122 Gravel Pack (Moorie #1); 4" Sch 80 PVC Screen .010 slot; 142; 144; 146 Bentonite

COMMENTS: Centralizers placed every 20' after first 50' from the bottom. Hole reamed using 8" rotary bit, w/ mud produced during drilling from hole., to a depth of 146'.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW21-1 SHEET 1 OF 3
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: USCOE	METHOD: Air Percusson/Mud Rotary	DATE STARTED: 5/22/90
JOB NO.: 3277-021	DRILLING CO.: MES	DATE FINISHED: 9/14/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 7369
	OBG GEOLOGIST: P. Gorr.	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2		12" O.D. air hammer			
2 - 4					
4 - 6	Silt/fine sand tan w/ black m. sand. Trace brown rock fragments. Trace organics, leaves (dry)		6.12 · 11.10		
6 - 8	(SM)				
8 - 10					← 12' →
10 - 12	Silt/fine sand tan modeled, weathered rock structure ~45° (red, tan, yellow)	(dry)	12.18 · 25.30		
12 - 14	(SM)				
14 - 16	Silt/fine sand olive, orange. dry decomposed rock bedding planes visible		12.24 · 32.30		
16 - 18	(SM)				
18 - 20					
20 - 22	Silt/Sand - red, tan, brown, decomposed rock (dry)		18.15 · 28.30		
22 - 24	(SM)				
24 - 26	Silt/sand. red, pink structure, dry decomposed rock some yellow modeling		15.27 43.60		
26 - 28	(SM)				
28 - 30					
30 - 32	Silt/sand - pink, red, dry decomposed rock (SM)		35.63 · 74.90		
32 - 34					
34 - 36	Silt/sand - red, brown dry, decomposed rock	(SM)	38.75 · 100/5.5		
36 - 38	No Recovery		4"/min		
38 - 40		Begin rock coring	3.5		
40 - 42		NQ core barrel O.D	3.0		
42 - 44		~3" I.D. ~1.9"	3.0		
44 - 46			2.75		
46 - 48			2.0		→ 5 ←
48 - 50			2.0		
50 - 52			1.75		
52 - 54			2.5		← 8 →
54 - 56			2.5		
56 - 58			2.5		
58 - 60			2.25		

COMMENTS: Surface Casing set at 38.0' Air percussion hammer (~12") set casing
NQ core barrel used for coring (OD ~3" ID ~1.9")
Dashed lines - reamed hole for well placement

AR000280

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw 21-1 SHEET 2 OF 3
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
ILE NO.:	DRILLING CO.:	DATE FINISHED:
	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62			2.0		8"
62 - 64			2.0		
64 - 66			2.0		
66 - 68			3.0		
68 - 70			2.25		
70 - 72			2.0		
72 - 74			2.0		
74 - 76			2.5		
76 - 78			2.0		
78 - 80			2.5		
80 - 82			2.5		
82 - 84			2.0		
84 - 86			2.0		
86 - 88			2.25		
88 - 90			3.25		
90 - 92			3.25		3"
92 - 94			2.5		
94 - 96			2.5		
96 - 98			2.5		
98 - 100	Sandstone brown		2.5		
100 - 102	extremely weathered		2.5		
102 - 104			2.0		
104 - 106			1.25		
106 - 108			1.5		
108 - 110	Sandstone. lt brown soft	Intensely Fractured	2.0		
110 - 112	highly weathered		2.75		
112 - 114			2.0		
114 - 116			1.75		
116 - 118			2.25		
118 - 120	No Recovery		2.0		

COMMENTS: ⌇ - Fractures

AR000281

BLOSENSKI LANDFILL (Figure 3)

This 1965 black and white photo shows the Blosenski Landfill site and the immediate area that surrounds it. This large scale photo was included to show fracture traces that occur near the site. Fracture traces are seen to the east and south of the site.

FINDINGS

A survey of available geologic information places the Blosenski Landfill site in a Precambrian quartzite identified as the Chickies Quartzite. The site is located between two faults that strike approximately east/west. The southern fault was covered by the photo area (Figure 2). No evidence of this fault was seen; however, the position of the fault, as mapped by Bascom and Stose (1938),[1] was included on Figure 2.

An orientation measurement was taken for each of the 62 fracture traces, and the results were plotted on a rose diagram (Figure 4). The rose diagram is used in this case to graphically represent the orientation and number of fracture trace occurrences. General trends of fracture systems were inferred from the rose diagram.

Two major trends were inferred from the rose diagram. One trend had an approximate orientation of N70E, while the other had an approximate east-west orientation. The majority of the east-west fracture traces occurred in the northern half of the study area, while the majority of the N70E fracture traces were seen in the south. The findings suggest that there may be two fracture systems in the area.

The longest linear feature can be seen near the southern boundary of the site (Figure 2). This is a topographic linear feature whose form suggests a possible fault. Positive identification of this feature as a fault can only be determined by field inspection.

[1] Bascom, F., and Stose, G.W., 1938, Geology and mineral resources of the Honeybrook and Phoenixville quadrangles, Pennsylvania, U.S. Geological Survey Bulletin 891, 145 p. Compiled by A.A. Socolow, 1978, in: Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania, Pennsylvania Bureau of Topographic and Geologic Survey, 1981.

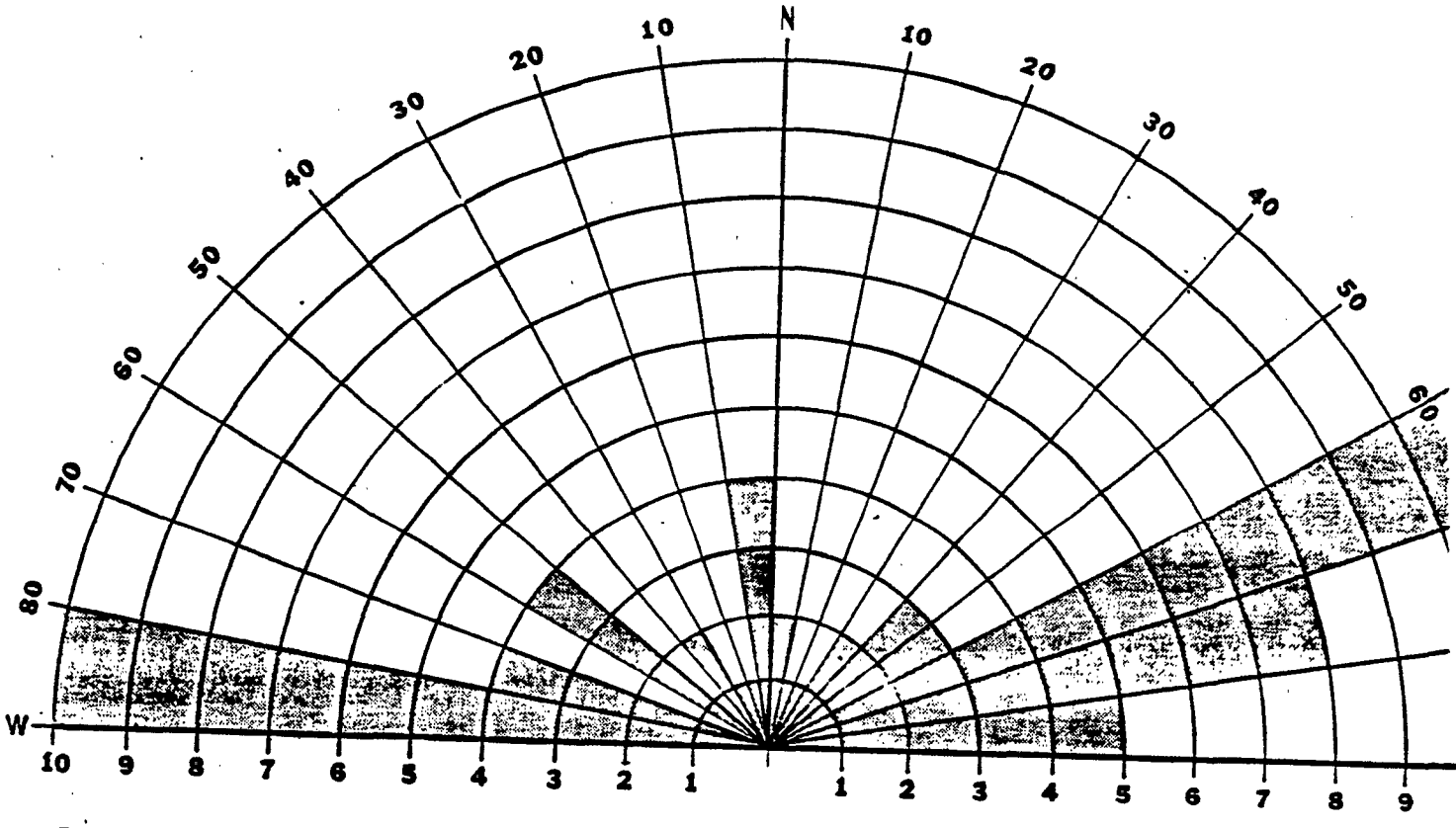


FIGURE 4

ROSE DIAGRAM SHOWING SIXTY-TWO FRACTURE TRACES IDENTIFIED FROM HISTORICAL AERIAL PHOTGRAPHY

REFERENCES

AERIAL PHOTOGRAPHY

Date	Agency	Mission Code	Frame #	Orig. Scale	EPIC Frame #
May 14, 1965	TXAERO[1]	--	1557,1558	1:24,000	7672,7673
April 24, 1969	USGS[2]	YCFE	34,35,41, 42,43	1:24,000	8040-8043, 7812
May 5, 1980	ASCS[3]	42029	65-67	1:26,000	7890-7892
June 2, 1983	EPIC[4]	83-051	28,29	1:6,700	28,29
July 12, 1984	USFS[5]	84-078	576-578	1:32,000 AT NADIR	576-578

[1]Aero Service, Incorporated, Houston, Texas

[2]U.S. Geological Survey, U.S. Department of Interior

[3]Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture

[4]Environmental Photographic Interpretation Center, U.S. Environmental Protection Agency

[5]U.S. Forest Service, U.S. Department of Agriculture

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: mw 16-1 SHEET 1 OF 1
PROJECT LOCATION: BLOSENSKI LANDFILL CLIENT: U.S. Army Corps of Engineers FILE NO.: 3277.001.	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moore Trench America FOREMAN: Ed Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: DATE STARTED: 5/15/90 DATE FINISHED: 8/7/90 GROUND WATER ELEVATION: 40.95

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
2	Topsoil, roots		8" steel Casing
	Silt and sands, lt. brown-lt. grey v. fine grained (sm)		
62	Sandstone		62 — Cement Bentonite Grout
105	Quartzose Schist		4" Schd 80 PVC Riser
			120 — Bentonite
			122
			125 — Gravel Pack (Moorie #1)
			4" Schd 80 PVC Screen .010 Slot
			145
			147 — Bentonite
			150

COMMENTS: Centralizers placed every 20' after first 50' from the bottom
Hole reamed using a 8" air hammer to depth of 150'

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 16-1 SHEET 1 OF 4
PROJECT LOCATION: BLOSENSKI LANDFILL CLIENT: U.S. Army Corps of Engineers FILE NO.: 3277.001	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moretrench American FOREMAN: Ed Moore OBG GEOLOGIST: P. Gosi	WELL LOCATION: DATE STARTED: 5/15/90 DATE FINISHED: 8/7/90 GROUND WATER ELEVATION:

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Topsoil, roots	Air - Percussion hammer			
2 - 4		(12" nominal bit)			
4 - 6	Silt - lt brown/ lt grey, clayey, dry. micas flakes present		6.6 · 9.10		
6 - 8	(Sm)				
8 - 10					
10 - 12	silt. lt brown/ lt grey bedding planes sandstone fragment, dry (Sm)		9.9 · 12.20		12"
12 - 14					
14 - 16	Same as above last 8" changes to reddish brown, dry	(Sm)	8.N · 30.37		
16 - 18					
18 - 20					
20 - 22	Sand - lt brown, silty, v. fine remnant rock structure present	(Sm)	20.40 43.5%4		
22 - 24					
24 - 26	Same as above	(Sm)	20.45 · 50/3		
26 - 28					
28 - 30					
30 - 32	Decomposed bedrock, (resembles mica sandstone schist) (saprolite) lt grey dry	(Sm)	45. 50/4		
32 - 34					
34 - 36	Same as above med. grey dry	(Sm)	22. 50/4		
36 - 38					
38 - 40					
40 - 42	Same as above - lt brown	water present on spoon (Sm)	50/4		
42 - 44					
44 - 46	Same as above - dk grey	v. weathered bedrock (wet)	50/4		
46 - 48	(Sm)				
48 - 50					
50 - 52	dk. grey / rust brown (wet) weathered	bedrock (decomposed)	39/4		
52 - 54	(Sm)				
54 - 56	Same as above (Sm)		50/3		
56 - 58					
58 - 60					

COMMENTS: Surface casing set at 65.0'.
NQ core barrel used for coring (OD ~ 3" . I.D. ~ 1⅞")
Dashed lines - reamed hole for mw Placement
⏚ - Fracture

AR000287

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw 16-1 SHEET 2 OF ___
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
FILE NO.:	DRILLING CO.:	DATE FINISHED:
	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	No Recovery		5½		
62 - 64	Sandstone → lt. brown	Intensely fractured	1.5		
64 - 66	highly weathered	Fractures ~45°, horizontal	1.5		
66 - 68			3.0		
68 - 70			3.5		
70 - 72			6.0		
72 - 74			2.25		3
74 - 76		Highly Fractured	1.5		
76 - 78		Fractures ~45°, horizontal	2.5		
78 - 80			2.25		
80 - 82		Intensely fracture (81-81.9)	3.0		
82 - 84		Highly fractured	2.25		
84 - 86		Fractures ~45° horizontal	2.5		
86 - 88			2.25		
88 - 90			3.5		
90 - 92			2.5		
92 - 94			2.25		
94 - 96		Felt staining colony	2.75		8
96 - 98		fractures	3.25		
98 - 100			2.75		
100 - 102	Quartzose Schist → lt. grey	Highly fractured	3.0		
102 - 104	schistocity ~ 45°	Fractures ~45°, horizontal	2.0		
104 - 106	mod. highly weathered	Mod. Fractured	2.25		
106 - 108		Fracture 105.5 107.3	2.25		
108 - 110		Fracture 108.5 109	3.0		
110 - 112		Fracture 110.5	2.0		
112 - 114	Quartzose Schist → brown	Mod. Fractured ~45°	2.0		
114 - 116	highly weathered	Fract 112.2 113.3 114.2	2.0		
116 - 118	Quartzose Schist → lt grey	Highly fractured	2.0		
118 - 120	brown highly weathered		2.0		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzose Schist. lt. grey- lt.	Intensely fract (120.5 - 121.3)	2.0		
122 - 124	brown highly weathered	Fract rand orient. Fracture 122.5 (horizontal)	2.5		
124 - 126	schistocity ~45°	Highly fractured	3.0		
126 - 128	Fe" staining along fract.	Fractures ~45° horizontal	2.0		
128 - 130	surfaces.	Intensely fractured, decomposed	3.0		
130 - 132		(129.5 - 130.4)	3.0		
132 - 134			3.0		
134 - 136	Quartzose Schist → grey -	Intensely fractured (133.3 - 135)	2.5		
136 - 138	brown schistocity ~	randomly oriented	2.5		
138 - 140	45° sl-mod weathered	Highly fractured	2.5		8
140 - 142		Fractures horizontal	2.25		
142 - 144	Fe" staining along fract.		2.0		
144 - 146	Quartzose Schist	Intensely fractured	2.25		
146 - 148	grey - sl-mod weathered	fract. randomly oriented	2.5		
148 - 150	schistocity ~ 45°		2.5		
150 - 152			2.5		
152 - 154		sl. fractured	2.0		
154 - 156			3.25		
156 - 158			2.5		
158 - 160		Fracture 158.5 ~45°	3.0		
160 - 162	Highly weathered →	Intensely Fract (160-161)	2.75		3
162 - 164		Highly fract. (163.5-165)	4.0		
164 - 166		Intensely fract (166 - 168.8)	2.25		
166 - 168		Highly fractured	1.5		
168 - 170		fractures ~45°	1.75		
170 - 172			2.0		
172 - 174			2.0		
174 - 176			1.5		
176 - 178					
178 - 180					

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/7- 6/8 1990

BORING NO.: MW 16-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 2 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	65	75	78	65.0	40 mm/ft	Return Water: lt brown/tan - reddish brown
2	75	85	120	100.0	245 mm/ft	Return Water: lt. brown
3	85	95	120	100.0	2.6 mm/ft	Return Water: Brown
4	95	105	120	100.0	40 mm/ft	Return Water: Brown- grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	65	75	Sandstone → lt. grey- brown, soft- mod. hard, highly weathered, intensely fractured. Fractures horizontal
2	75	85	Sandstone → lt. grey- brown, soft- mod hard, highly weathered, highly fractured, Fractures horizontal + ~45°
			Fe^{++} staining evident in weathered [redacted] zones
3	85	95	Sandstone → same as above
4	95	100	Sandstone → lt. grey- med grey, soft, slightly weathered
	100	105	Quartzose Schist → highly fractured, some Fe^{++} staining.

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/7- 6/8 1990

BORING NO.: mw16-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 3 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	105	115	120	1000	225 mm/ft	Return Water: Grey- brown
6	115	125	108	90.0	2.5 mm/ft	Return Water: Brown
7	125	135	108	90.0	30 mm/ft	Return Water: Brown
8	135	145	114	95.0	34 mm/ft	Return Water: Brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	105	115	Quartzose Schist → grey- brown, soft, slr highly weathered, mod- highly fractured, Schistocity ~ 45° Fractures horizontal, vertical, ~45°. Fe# staining along fracture surfaces
6	115	125	Quartzose Schist → lt grey, soft- mod. hard, mod weathered, highly fractured, Fe# staining present fracture surfaces Fract. 45° horizontal. Fractures parallel to schistocity
7	125	135	Quartzose Schist → grey/ brown, soft- mod. hard, mod- highly weathered, mod- highly fractured, Schistocity ~45° Fe# staining present fracture surfaces - Fract 45° to horizontal
8	135	145	Quartzose Schist → grey- brown, soft- mod hard, sl.- mod weathered, mod fractured, Fractures near horizontal Schistocity ~ horizontal to 45°.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/7- 6/8 1990

BORING NO.: MW 16-1 CORE SIZE: HQ 1.9"

PAGE 3 OF 3 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	145	155	120	1000	2.6 mn/ft.	Return Water: Brown- Grey
10	155	165	120	1000	3.2 mn/ft	Return Water: brownish grey Core Jam @ 164' Tripped out
11	165	175	120	100.0	3.8 mn/ft	Return Water: Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	145	155	Quartzose Schist → grey, soft, sl.-mod weathered, V. intensely fractured, schistocity ~ 45°.
10	155	165	Quartzose Schist → grey, soft- mod hard, sl-mod weathered sl.-mod fractured, schistocity ~ 45°. Fractures are parallel to schistocity.
11	165	175	Quartzose Schist → grey, soft-mod hard, sl.-mod weathered, mod- highly fractured. schistocity ~ 45°. Fractures parallel to schistocity.

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 15-1 SHEET 1 OF 1
PROJECT LOCATION: BLOSENSKI LANDFILL CLIENT: U.S. Army Corps of Engineers FILE NO.: 8277.001	DRILLING INFORMATION METHOD: Air Hammer/Mud Rotary DRILLING CO.: Moorestrench America FOREMAN: Ed Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: DATE STARTED: 5/23/90 DATE FINISHED: 8/2/90 GROUND WATER ELEVATION: 3

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
			6" Protect Casing
2	Organic soils, roots, & grass		
	Sand, wh.-tr - lt grey coarse (SW)		8" steel Casing
15'	Sandstone		15' — Cement Bentonit Grout
55	Quartzose Schist		4" Schd 80 RVC Risco
			62 — Bentonite
			65 — Gravel Pack (Moorie #1
			70 —
			4" Schd 80 PVC Screen .010 Slot
			90 —
			92 — Bentonite
			95 — Sand
			102 —

COMMENTS: Centralizers placed every 20' after first 50' from the bottom Hole reamed using 8" air hammer to depths of 102! mud rotary (using AquaGold seal as mud) used to keep hole open for well construction.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 15-1 SHEET 1 OF 3
PROJECT LOCATION: Biosensk. Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S COE	METHOD: Air Hammer/Mud Rotary	DATE STARTED: 5/23/90
FILE NO.: 3277-001	DRILLING CO.: MES	DATE FINISHED: 8/2/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 33.95
	OBG GEOLOGIST: P. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Organic soil, roots				
2 - 4					
4 - 6	Sand - coarse - white-grey dry	"broken rock" SW	20.43 100/4		
6 - 8					12
8 - 10					
10 - 12	Rock fragments quartzite		9.50/3"		
12 - 14					
14 - 16	Bedrock encountered 15' - Rock frag		50/1"		
16 - 18	Sandstone → grey	Highly fractured			
18 - 20	highly weathered	Fract. ~45°, horizontal	2.5		
20 - 22		Fe° staining along fract	4.0		
22 - 24			3.75		
24 - 26			2.5		
26 - 28			2.0		8
28 - 30			2.0		
30 - 32			4.5		
32 - 34			2.5		
34 - 36		Intensely Fractured	2.5		
36 - 38		fract' randomly orient.	1.5		
38 - 40			1.5		
40 - 42			1.75		
42 - 44			2.25		3
44 - 46			2.5		
46 - 48			1.5		
48 - 50			3.0		
50 - 52			3.5		
52 - 54	Quartzose Schist → grey	Intensely fractured	4.0		
54 - 56	highly weathered	fractures randomly orient.	3.5		
56 - 58	decomposed	Fe° staining along fract	1.5		
58 - 60			1.5		

COMMENTS: Surface casing set at 18.0' Air Percussion hammer (12)" used to set casing
NQ core barrel used for coring (OD ~3, ID ~1.9")
Dashed lines - reamed hole for mw placement
~ - Fractures

AR000294

O'BRIEN & GERE ENGINEERS, INC. | WELL CONSTRUCTION LOG | WELL NO.: _____ SHEET 2 OF ___

PROJECT LOCATION: _____
CLIENT: _____
FILE NO.: _____

DRILLING INFORMATION
METHOD: _____
DRILLING CO.: _____
FOREMAN: _____
OBG GEOLOGIST: _____

WELL LOCATION: _____
DATE STARTED: _____
DATE FINISHED: _____
GROUND WATER ELEVATION: _____

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BOR DIAGR
60 - 62	Quartzose Schist → grey	Highly fractured	2.5		
62 - 64	mod. highly weathered	fractures ~45°	2.75		
64 - 66	schistocity ~45°		2.25		
66 - 68			3.25		
68 - 70			2.25		
70 - 72	highly weathered →	Intensely fractured	3.5		
72 - 74		fract. rand orient.	2.75		
74 - 76	Quartzose Schist - brown	Intensely fractured	2.25		
76 - 78	highly weathered-	fract. rand orient.	1.75		
78 - 80	schistocity ~45°	Fe* staining along fract.	2.5		8
80 - 82			1.75		
82 - 84			3.0		
84 - 86			3.75		
86 - 88			4.75		
88 - 90			2.5		
90 - 92			3.0		
92 - 94			3.0		
94 - 96	Quartzose Schist → grey	Highly fractured	4.0		
96 - 98	wt quartzite (pink) inter-	fractures ~45°	3.0		
98 - 100	spersed mod- highly	Fe* staining along	4.0		
100 - 102	weath. schistocity ~45°	fractures	4.25		
102 - 104			4.75		
104 - 106	Quartzite (106.5' 107.5)		5.0		3
106 - 108	Quartzose Schist - grey	mod. fractured	3.25		
108 - 110	mod weathered	Fractures ~45° - 109.2	3.25		
110 - 112	schistocity ~45°	Fracture 110.1, 111.2, 112.9	3.75		
112 - 114			2.75		
114 - 116	Fe* staining along fract.	Fracture 114.2	2.5		
116 - 118			2.5		
118 - 120		Fracture 119.8, 120.9	2.5		

COMMENTS:

AR000295

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzose Schist → grey	mod fractured	3.0		
122 - 124	Sl. weathered schistocity ~45°	→ Fractures ~45° (122.3)	4.0		
124 - 126	Tr. Fe" staining along fract.	→ Fracture (124.9)	3.0		
126 - 128		→ Fracture (127.5)	3.25		
128 - 130			3.75		
130 - 132		→ Fracture (130.3', 130.8')	4.5		
132 - 134		→ Fracture (132.6)	3.75		
134 - 136	Fe" staining along fract.	→ Highly Fract (134 - 135.5)	4.0		
136 - 138		Sl. fractured	4.5		
138 - 140		→ Fract (137.1) (horizontal)	4.5		
140 - 142			5.75		→ 3 ←
142 - 144			4.0		
144 - 146		Highly fractured (145.7-145)	3.5		
146 - 148		fractures randomly orient.	3.25		
148 - 150		Mod. Fractured	3.25		
150 - 152	Fe" staining along fract.	Fractures ~45° (149, 150)	3.75		
152 - 154		Fracture (154.5)	5.0		
154 - 156		↓	4.75		
156 - 158		Fracture (158.3) (horizontal)	4.0		
158 - 160		Fracture (160.2) "	4.25		
160 - 162		↓	4.0		
162 - 164		↓	3.5		
164 - 166	Highly weathered	Highly Fractured (165-166)	2.5		
166 - 168		Mod. fractured ~45°	4.75		
168 - 170		Fract. 169.3	5.75		
170 - 172		Fract. 170.5	5.25		
172 - 174			5.0		
174 - 176			4.5		
176 - 178					
178 - 180					

COMMENTS:

AR000296

CORE LOG

PROJECT: BLOSENSKI LAND FILL MW INSTALLATION

DATE: 6/11 - 6/13 1990

BORING NO.: MW 15-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Core Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	18	25	84	1000	3.4 mn/ft	Return Water: Lt. grey,
2	25	35	42	350	2.75 mn/ft	Return Water: lt. grey
3	35	45	84	700	1.8 mn/ft	Return Water: lt grey
4	45	55	60	500	2.8 mn/ft	Return Water: Lt grey - brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	18	25	Sandstone → grey, med hard, slightly weathered w/ some highly weathered zones, highly fractured (Fracture zones present @ 22')
2	25	35	Sandstone → grey, hard to moderately hard, mod - highly weathered, highly fractured (Fractures horizontal + ~ 45°)
3	35	45	Sandstone → lt. grey, med hard, mod - highly weathered intensely fractured, Bedding horizontal, fractures vert. + horizontal Fe++ staining along fractures
4	45	55	Sandstone → Grey, hard, mod to highly weathered mod - highly fractured. Fe+ staining along fractures. Fractures vertical + ~ 45°

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/11 - 6/13 1990

BORING NO.: MW 15-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	55	65	54	45.0	2.25 mn/ft	Return Water: Grey-brown. Core Jam @ 59' Tripped out
6	65	75	120	100.0	2.7 mn/ft	Return Water: Brown
7	75	85	96	80.0	2.3 mn/ft	Return Water: Brown
8	85	95	108	90.0	3.25 mn/ft	Return Water: Brown Core Jam @ 89' Tripped out

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	55	65	Quartzose Schist → lt. grey, med. hard, mod. - highly weathered
			mod. fractured. (vertical fractures) Schistocity
			Parallel to fractures Fe" staining present
6	65	75	Quartzose Schist → Grey, soft - v. hard, mod. - highly weathered
			Quarte veins present mod. fractured. Fe" staining along fractures horizontal
			to ~45° Schistocity present parallel to fractures.
7	75	85	Quartzose Schist → grey, med. hard, highly weathered
			solution cavities present intensely fractured. Schistocity parallel to fractures
			~45°. Fe" staining along fractures. Quarte veining present
8	85	95	Quartzose Schist → grey-brown, med hard - hard, mod
			weathered, intensely fractured. Schistocity 45° Fe"
			staining along fractures. Quarte veining + mineral solution voids present.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/11 - 6/13 19.0

BORING NO.: MW 15-1 CORE SIZE: WD 1.9"

PAGE 3 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	95	105	120	100.0	3.95 mn/ft	Return Water: Brown
10	105	115	120	100.0	3.1 mn/ft	Return Water: Grey
11	115	125	120	100.0	2.9 mn/ft	Return Water: Lt brown- Grey
12	125	135	120	100.0	3.7 mn/ft	Return Water: Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	95	105	Quartzose Schist → dk. grey, mod hard, mod. weathered, mod fractured
			Schistocity ~ 45°. Solution cavities present (102-105').
			Quartz veining present.
10	105	115	Quartzose Schist → dk. grey, mod hard, sl.-mod weathered,
			mod. fractured. Schistocity ~45°. Quartzite present
			(113-115) highly fractured, solution channels present. Fe+ staining along fractures.
11	115	125	Quartzose Schist → dk grey, mod hard, mod weathered
			mod fractured, Schistocity ~ 45°. Fe+ staining
			present along fracture surfaces.
12	125	135	Quartzose Schist → grey, mod hard, sl. weathered,
			mod fractured, Schistocity ~ 45°. Quartz veining
			present.

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW21-1 SHEET 3 OF 3
PROJECT LOCATION:	DRILLING INFORMATION	WELL LOCATION:
CLIENT:	METHOD:	DATE STARTED:
FILE NO.:	DRILLING CO.:	DATE FINISHED:
	FOREMAN:	GROUND WATER ELEVATION:
	OBG GEOLOGIST:	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	No Recovery		1.25		8'
122 - 124			2.0		
124 - 126			1.25		
126 - 128			1.5		
128 - 130	Sand - brown fine		2.0		
130 - 132	- v. fine w/ grey silt/clay		2.25		
132 - 134			2.75		
134 - 136			2.75		5'
136 - 138			2.25		
138 - 140			2.25		
140 - 142			4.25		
142 - 144			3.0		
144 - 146			4.0		
146 - 148			10.25		
148 - 150	Quartzose Schist	Highly fractured	4.5		
150 - 152	lt. grey - lt. brown		4.0		
152 - 154	schistocity near		4.0		
154 - 156	perpendicular to 45° angle	Slightly fractured	11.5		
156 - 158		Extensely Fractured	8.5		
158 - 160		(158 155)	35		
160 - 162		Fracture 160.5'	3.25		
162 - 164			4.0		
164 - 166		Fracture 163.5'	4.5		
166 - 168		Quartz veining	7.5		
168 - 170		Slightly fractured	6.0		
170 - 172		from Extensley fractured	5.75		
172 - 174		169 - 170'	6.75		
174 - 176			6.5		
176 - 178					
178 - 180					

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/28-7/2 1990

BORING NO.: MW 21-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double Tube, Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	158	168	113	94.8	4.05 mn/ft	Return Water: Brown
14	168	175	77	91.7	5.5 mn/ft	Return Water: lt grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	158	168	Quartzose Schist → grey - lt brown, mod. hard, slightly weathered, mod. fractured. Schistocity ~ 45° Quarte veining present.
14	168	175	Quartzose Schist → grey mod hard, unweathered slightly fractured. schistocity ~ 45° angle. Quarte veining present.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/28 - 7/C 1990

BORING NO.: MW 21-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	38	48	0	00	3.45 mn/ft	Return Water: Red/Brown
2	48	58	0	00	2.05 mn/ft	Return Water: Red/Brown
3	58	68	0	00	2.25 mn/ft	Return Water: ~~Brown~~ Red/Brown
4	68	-78	0	0.0	2.15 mn/ft	Return Water: Red/Brown (v. little)

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	38	48	No Recovery
2	48	58	No Recovery
3	58	68	No Recovery
4	68	78	No Recovery

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/28- 7/2 1990

BORING NO.: MW 21-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	78	88	0	0.0	2.25 mm/ft	Return Water: Red/Brown (v. little)
6	88	98	0	0.0	2.8 mm/ft	No Return
7	98	108	6	5.0	1.9 mm/ft	No Return
8	108	118	24	20.0	1.25 mm/ft	Return Water: brown/ tan

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	78	88	No Recovery
6	88	98	No Recovery
7	98	108	Sandstone - brown extremely weathered. decomposed
			bedding present.
8	108	118	sandstone - lt. brown - lt. grey, soft, highly weathered.
			intensely fractured

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/28- 7/2 1990

BORING NO.: MW 21-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	118	128	0	00	1.55 mn/ft	Return Water: Brown Racked out of hole to check bit
10	128	138	24	200	2.2 mn/ft	Return Water: Brown
11	138	148	36	300	4.75 mn/ft	Return Water Brown
12	148	158	114	95.0	6.5 mn/ft	Return Water: Brown - Core Jam 153' Tripped out then racked out.

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	118	128	No Recovery
10	128	138	Sand - brown fine to v. fine
			w/ grey silt/clay
11	138	148	Sandstone - lt brown - lt. grey, soft, highly
			weathered - decomposed.
			~ last 3" - highly weathered quartzite.
12	148	158	Quartzose Schist - lt grey - lt brown, soft - mod hard, mod-highly
			weathered, highly fractured. Schistocity
			near perpendicular to ~ 45° (154-158)
			(148-154)
			Fe+ staining present along fractures (Fractures ⊥ to schistocity)

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: mw 2c 1 SHEET 1 OF 1
PROJECT LOCATION: Bloserski Landfill CLIENT: U.S Army Corps of Engineers FILE NO.: 3277.001.221	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moretrench America FOREMAN: Ed Moore OBG GEOLOGIST: D. Gori	WELL LOCATION: DATE STARTED: 11/27/89 DATE FINISHED: 3/6/90 GROUND WATER ELEVATION:

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
			vented PVC cap. — 6" Protective steel casing
0-2	Organic soils, crushed stone leaves, roots		
2	Residual soil (sand/gravel, sands) (SM) weathered Quartzite		cement/Bentonite grout — 8" steel casing — centralizer
79'	Quartzite		4" PVC sched 80 R
			121 Bentonite 123 sand pack mosaic #1 4" PVC sched 80 screen .010 slot (20 feet) 145 Bottom well cap 147 Bentonite 150 sand/silt 152 vol cl gr

COMMENTS: Centralizers placed every 20' after first 50' from bottom
Hole reamed using 8" air hammer to depth of 152'.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 20-1 SHEET 1 OF 3
PROJECT LOCATION: Biosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S. Army Corps of Engineers	METHOD: Air Hammer	DATE STARTED: 11/27/89
FILE NO.: 3277.001.221	DRILLING CO.: Moore trench America	DATE FINISHED: 3/6/90
	FOREMAN: Brad Ed Moore	GROUND WATER 4.64'
	OBG GEOLOGIST: P. Geri	

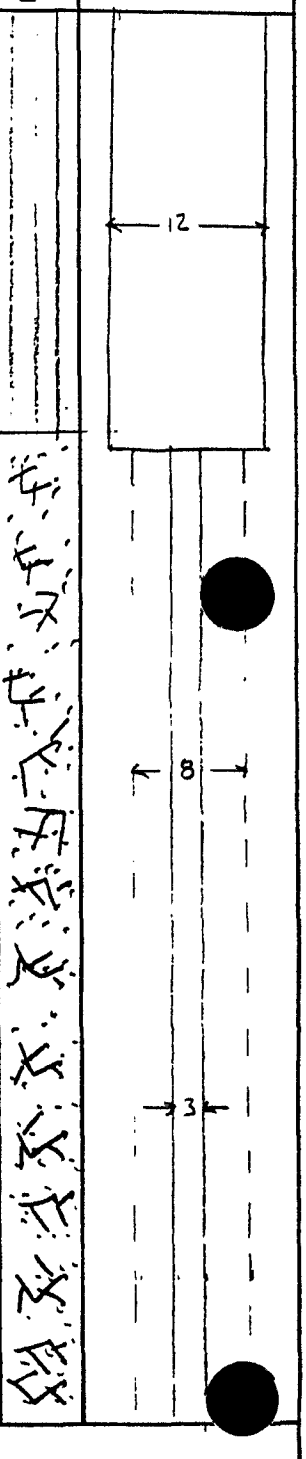
DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Humus, crushed stone	Air rotary drilling			
2 - 4		(nominal 13" bit)			
5 - 7	Sand/gravel (SP), lt brown-grey fine-med, dry, saprolitic		10.21 27.21		
7 - 8					
8 - 10					
10 - 12	Sand (SM), reddish brown, fine-med, dry, weathered qrtz saprolitic		8.9 13.22		
12 - 14					
15 - 17	Sand(SM) reddish brown-? brown, fine-med dry, weathered qrtz. saprolitic		40.60 75.30		
17 - 18					
18 - 20					
20 - 22	Sand(SM) reddish brown-brown, fine-med dry, wthrd qrtz. saprolitic moist	Water encountered during drilling.	18.25 35.38		13'
22 - 24					
25 - 27	Sand(SM), red, tan, grey, fine-med, moist saprolitic. (weathered quartzite)		14.41 67.41		
27 - 28					
28 - 30					
30 - 32	Same as above (SM), grey → reddish brown. saturated		32.21 46.100/4		
32 - 34					
35 - 37	Same as above (SM), reddish brown → grey saturated		43.61 57.100/4		
37 - 38					
38 - 40					
40 - 42	Same as above (SM) saturated		20.26 41.68		
42 - 44					
44 - 46					
47 - 49	Sand (SM), red, grey, lt brown, fine-med, saturated. saprolitic. Quartz vein 49'		21.31 67.72		
49 - 50					
51 - 53	Same as above (SM) no quartz vein		19.14 17.62		
53 - 54	No samples collected				
54 - 56					
56 - 58					
58 - 60					

COMMENTS: Could not collect split-spoon samples below 53 feet. Not enough rods.
Surface casing set at 79.6'. Air Percussion hammer (~13") set casing.

AR000306

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORI DIAGRAM
60 - 62	No samples				
62 - 64					
64 - 66					
66 - 68					
68 - 70					
70 - 72					
72 - 74					
74 - 76	Competent Rock				
76 - 78	Quartzite → milky white – light gry	Intensely Fractured			
78 - 80	w/ purple hue	Fract. horizon & vertical			
80 - 82	mod. weathered	Fe+ staining along fract.			
82 - 84	bedding massive				
84 - 86		Fractures @45° hor. & vert.			
86 - 88		Fractures contain silts			
88 - 90					
90 - 92					
92 - 94					
94 - 96					
96 - 98					
98 - 100					
100 - 102					
102 - 104					
104 - 106					
106 - 108					
108 - 110					
110 - 112					
112 - 114					
114 - 116					
116 - 118					
118 - 120					

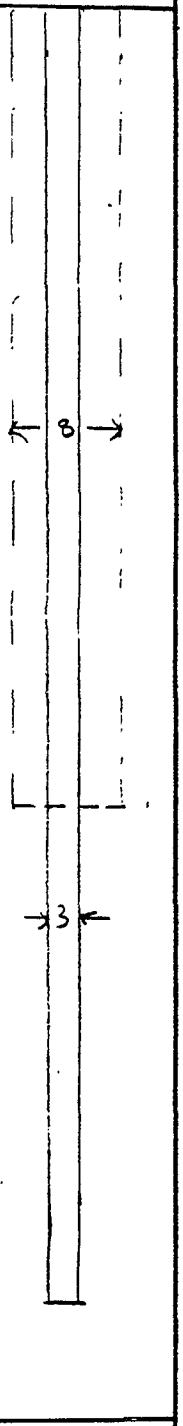


COMMENTS:

AR000307

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzite → lt grey w/	Highly fractured			
122 - 124	purple hue, mod -	- fractures horizontal & vertical			
124 - 126	weathered massive bedding	Fe" staining along fractures			
126 - 128	↓	↓			
128 - 130					
130 - 132					
132 - 134	↓	↓			
134 - 136	Quartzite → pink-purple	Highly Fractured			
136 - 138	mod weathered, massive bedding	- fractures horizontal & vertical			
138 - 140	slight schistocity evident	Fe" staining present on			
140 - 142	~45°	fracture surfaces			
142 - 144	↓	↓			
144 - 146	Quartzite → purple sl.	Highly fractured			
146 - 148	weathered, massive bedding	Fractures near horiz. &			
148 - 150	slight schistocity evident	vertical			
150 - 152	~45°	slight Fe" staining on fracture surfaces			
152 - 154	↓	↓			
154 - 156					
156 - 158					
158 - 160	↓	↓			
160 - 162	Quartzite → lt grey	Intensely fractured			
162 - 164	highly weathered	- fractures horiz. & vertical			
164 - 166	Quartzite - purple-reddish	Fe" staining present on			
166 - 168	slightly unweathered	fracture surfaces			
168 - 170	↓	↓			
170 - 172					
172 - 174					
174 - 176	↓	↓			
176 - 178					
178 - 180					



COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/13 - 2/16 1990

BORING NO.: MW 20-1 **CORE SIZE:** NQ 1.9"

PAGE 1 **OF** 3 **TYPE BARREL:** Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	DEPTH (Ft.) TO	RECOVERY IN.	RECOVERY %	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	75	85	92	76.7	365 mn/ft	Return Water: lt brown-tan. Core jam 78' Tripped out (Rock 78')
2	85	95	110	91.7	4.75 mn/ft	Return Water: lt tan Core Jam 89' Tripped out
3	95	105	108	90.0	3.9 mn/ft	Return Water: lt. tan Core Jam 103' Tripped out
4	105	115	108	90.0	5.35 mn/ft	Return Water: lt. tan- reddish brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	DEPTH (Ft.) TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	78	85	Quartzite / Quartzitic Sandstone, milky white → lt grey w/ purple tint, massive bedding, moderately hard, moderately weathered, highly fractured. Fractures on 45° angle & horizontal Fe# staining present on fracture surfaces
2	85	95	Same as above 10" core Loss 94'2"-95'
3	95	105	Same as above. Core Loss 95-96'
4	105	115	Quartzite, milky white - dr. purple/ lt. grey, moderately hard moderately weathered, intensely fractured.
			Fractures on 45° angle & horizontal. Fe# staining on fracture surfaces. Core Loss ~ 114-115'
			massive bedding.

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/13 - 2/16 1990

BORING NO.: mw 20-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 3 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	115	125	118	98.3	5.5 mn/ft	Return Water: lt. tan → milky white
6	125	135	92	76.7	4.5 mn/ft	Return Water: lt. braon → milky white
7	135	145	108	90.0	6.8 mn/ft	Return Water: lt. tan/milky white → reddish tan Core Jam 142' Tripped out
8	145	155	120	100.0	11.0 mn/ft	Return Water: milky white → lt. tan

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	115	125	Quartzite → milky white → dr. purple/lt grey, moderately hard moderately weathered, massive bedding, intensely fractured. Fractures on 45° angle & horizontal Fe^{++}
			staining present of fractured surfaces
6	125	135	Quartzite → lt. grey w/ purple tint, moderately hard, moderately weathered massive bedding. Highly fractured
			Fractures, horizontal, vertical & on 45° angle Fe^{++} staining on fracture surfaces Fractures contain
			weathered material (silt/sand) Core loss 132 6" → 134' 10".
7	135	145	Quartzite → Ank-purple, moderately hard, moderately weathered. massive bedding, highly fractured. Fractures
			horizontal, vertical & ~45° angle. Fe^{++} staining and weathered material (salt/sand) present on fracture surfaces
			Slight schistosity observed Core loss 144-145'
8	145	155	Quartzite → Purple, hard, slightly weathered massive bedding, highly fractured. Fractures horizontal,
			vertical & on ~45° angle. Fe^{++} staining and weathered material (silt/sand) present on fracture surfaces
			Slight shistosity observed.

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/13 - 2/16 1990

BORING NO.: MW 20-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 3 TYPE BARREL: Double tube, wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	155	165	120	1000	90 mn/ft	Return Water: lt. tan/milky white - reddish tan Core Jam 166' Tripped out. C.J. 161' Rasked out
10	165	175	118	98.3	14.4 mn/ft	Return Water: milky white Core Jam 169' tripped out.

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	155	165	Quartzite → Purple - reddish orange, very hard, slightly weathered massive bedding, highly fractured. Fractures horizontal, slight Fe+ staining on fracture surfaces.
10	165	175	Quartzite → Pink - lt grey, very hard, slightly weathered, massive bedding, moderate - highly fractured. Fractures horizontal, + vertical. Slight Fe+ staining on fracture surfaces. Slight schistosity observed. (173 1/2 - 175').

O'BRIEN & GERE

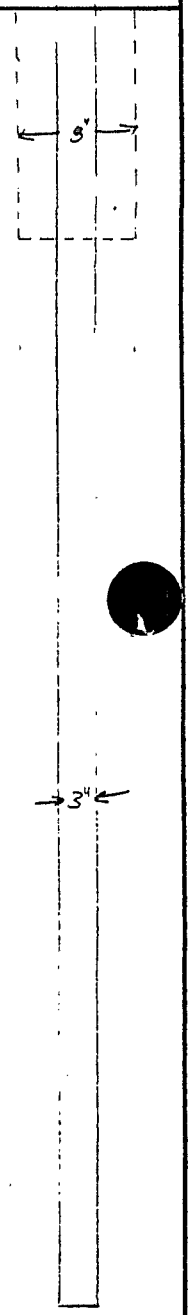
O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 19-1 SHEET 1 OF _
PROJECT LOCATION: BLOSENSKI LANDFILL CLIENT: U.S. Army Corps of Engineers FILE NO.: 3277.001.221	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moosetrench America FOREMAN: Ed Moore OBG GEOLOGIST: N. Gamester	WELL LOCATION: DATE STARTED: 5/19/90 DATE FINISHED: 7/26/90 GROUND WATER ELEVATION: 44.90

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
0	Organic soils, dk. brown. roots leaves		6" Protectiv Casing
4	Clayey silt - silty sands orangish brown. lt grey (ML) (SM)		8" stee Casin
33	Quartzose Schist Grey		33' Cement Bentoni Grout; 4" Schd PVC Ris
			146' Bentoni
			148'
			150' Gravel Pack (Moorie #1)
159	Quartzite grey		4" Schd PVC Scree .010 slo
			170'
			173' Bentoni
			175'

COMMENTS: Centralizers placed every 20' after first 50' from the bottor
Hole reamed using 8" air hammer to depth of 175'.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF 3
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzite lt. grey	Highly Fractured	8.5		
122 - 124	w/ purple hue	Fractures near horizontal	8.0		
124 - 126	slightly weathered	vertical, 45° angle	8.5		
126 - 128			9.5		
128 - 130			9.0		
130 - 132			11.0		
132 - 134			12.0		
134 - 136			12.5		
136 - 138			7.5		
138 - 140			4.3		
140 - 142	Quartzite → off white	Highly Fractured	4.5		
142 - 144	mod weathered		3.5		
144 - 146			3.0		
146 - 148		147' Core Jam Tripped out	5.3		
148 - 150			4.3		
150 - 152			3.3		
152 - 154		Core Jam 153'. Tripped out	3.5		
154 - 156	Quartzite - off white	Intensely fractured	3.5		
156 - 158	tan		3.5		
158 - 160	highly weathered decomposed		3.5		
160 - 162			3.5		
162 - 164		163'. Core Jam tripped	3.5		
164 - 166		out.	3.5		
166 - 168		Intensely fractured	3.5		
168 - 170			3.5		
170 - 172			3.5		
172 - 174			3.5		
174 - 176			3.5		
176 - 178					
178 - 180					



COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/7-2/13 1990

BORING NO.: MW 141-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: WIRE LINE

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	49	55	72	100.0	3.3 mn/ft	Return Water: lt. grey- white
2	55	65	120	100.0	4.1 mn/ft	Return Water: milky white
3	65	75	84	70.0	8.45 mn/ft	Return Water: milky white Core Jam @ 72'. Tripped, rods.
4	75	85	120	100.0	8.4 mn/ft	Return Water: milky white- lt grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	49	55	Quartzite → white / pink, moderately hard- hard, moderately weathered, massive bedding, highly fractured. Fractures on ~ 45° angle. Fe# staining present on fractured surfaces. Clay filling material also found on fracture surfaces.
2	55	65	Same as above
3	65	75	Same as above w/ more pink and red clay minerals
4	75	85	Quartzite → lt. grey- grey, hard- very hard, moderately weathered massive bedding, highly fractured. Fractures on ~ 45° and 60° angles. Fe# staining present on fracture surfaces clay products present in fracture openings.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENOSKI LANDFILL MW INSTALLATI

DATE: 2/7- 2/13 1990

BORING NO.: MW 14-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: WIRE LINE

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	85	95	120	1000		Return Water: lt. grey - white. Core Jam @ 92' Tripped out
6	95	105	120	100.0		Return Water: lt. grey - white. Packed out (checking b.t.)
7	105	115	114	95.0		Return Water: milky white Core Jam @ 109' Tripping out.
8	115	125	120	1000	7.0 mn/ft	Return: milky white

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	85	95	Quartzite → lt. grey - purple, hard - very hard, moderately weathered, massive bedding, highly fractured. Fractures on ~ 45° and 60° angles Fe# staining and clay products present on fracture surfaces.
6	95	105	Quartzite → lt. - dk grey w/ lt. purple tint, hard - very hard moderately weathered, massive bedding, highly fractured, Fractures more horizontal than pictures sections. Slight Fe# staining on fracture surfaces
7	105	115	Quartzite → lt. grey - med grey, very hard, slightly - moderately weathered, massive bedding, highly fractured Fractures near horizontal to 45° angle. Fe# staining and clayey material present on fractured surfaces.
8	115	116	Same as above → lt. grey - med grey w/ reddish hue
	116	125	Same as above → lt. grey - med grey w/ lt. purple hue

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 2/7 - 2/13 1990

BORING NO.: MW 141-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: WIRE LINE

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	125	135	120	1000	9.6 mn/ft	Return Water: Lost return
10	135	145	114	95.0	6.5 mn/ft	No Return
11	145	155	96	800	4.1 mn/ft	No Return. Core Jam 147. Tripped out. Core Jam 153' Tripped out
12	155	165	120	1000	3.5 mn/ft	No Return Core Jam 163' Tripped out

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	125	135	Quartzite → lt grey- med grey w/ lt purple hue, very hard, slightly weathered, massive bedding highly fractured. Fractures near horizontal, vertical, + 45° angle. Fe+ staining and clay material present on fracture surfaces.
10	135	141	Same as above
	141	145	Quartzite → milky- off white, hard, mod. weathered, massive bedding intensely fractured. Fractures on 45° angle + horizontal
			Fe+ staining + clay material present on fracture surfaces.
11	145	149	Same as above
	149	155	Quartzite → off white- lt grey, moderately hard, highly weathered massive bedding intensely fractured Fractures horizontal + vertical. Quartz vein present.
12	155	165	Quartzite → lt grey- tan, soft, highly weathered, bedding present (very thin appear to be schist like oriented ~ 45° angle. highly- intensely fractured. Fractures on ~ 45° angle clay material
			present on fractured surfaces.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSEWSKI LANDFILL - MW INSTALLATION

DATE: 2/7-2/13 1990

BORING NO.: MW 141-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: WIRE LINE

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	165	175	115	95.8	3.5 mn/ft	No Return

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	165	175	Quartzite → lt. grey - tan, soft, highly weathered, bedding present (very thin) appears to be schist like oriented ~ 45° angle, highly - intensely fractured. Fractures on ~ 45° angle & horizontal. Clay material present on fractured surfaces.

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: mw6-1 SHEET 1 OF 1
PROJECT LOCATION: Blosenski Landfill CLIENT: US Army Corp Engineers FILE NO.:	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: MES FOREMAN: Ed Moore OBG GEOLOGIST: F. Gori	WELL LOCATION: DATE STARTED: 8/23/90 DATE FINISHED: 8-27-90 GROUND WATER ELEVATION: 36.45

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
0	Organic material, topsoil Leaves, roots		6" Protective cap
2	Sand/Silt dk. brown - tan dry (SM)		Cement/Bentonite Grout 8" Steal casing
19			
21			Bentonite seal
22	Quartzose Schist lt. grey		
22			
25			4" Schd 80 PVC Screen .010
45			Sand pack Morie #1

COMMENTS: Hole reamed with 8" air hammer to depth of 45'.

AR000318

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 6-1 SHEET 1 OF 1
PROJECT LOCATION: Blossenski Landfill CLIENT: U.S. COE FILE NO.: 3277.001	DRILLING INFORMATION METHOD: Air Percussion DRILLING CO.: MES FOREMAN: Ed Moore OBG GEOLOGIST: Pete Gori	WELL LOCATION: DATE STARTED: 8/23/90 DATE FINISHED: 8/27/90 GROUND WATER ELEVATION: 36'

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORI DIAGRAM
G.L. - 2	Organic material, top soil, crushed				
2 - 4	stones, leaves, roots				
4 - 6	Sand/Silt - v. fine dk. brown, some organics present (leaves, roots) dry SM				
6 - 8					
8 - 10					
10 - 12	Sand/silt - orange brown v. fine - fine, dry SM				12
12 - 14					
14 - 16	Sand/silt - tan, fine - v. fine SM				
16 - 18					
18 - 20					
20 - 22	Rock flour (20-21) w/ rock	fragements (Quartzose Schist)			
22 - 24	Quartzose Schist - brown/white	not fractured	3.0		
24 - 26	& grey schistocity ~45°		3.0		
26 - 28	Fe" staining present →	Fracture (28.5)	2.25		
28 - 30	along fracture surfaces	highly fractured	1.75		8
30 - 32		↓	2.0		
32 - 34			2.75		
34 - 36	Quartzose Schist - grey	not. fractured	2.5		
36 - 38	schistocity ~45°		2.5		3
38 - 40	Fe" staining along fracture	Fracture (41.0')	3.5		
40 - 42	surfaces		3.0		
42 - 44			3.0		
44 - 46			3.0		
46 - 48					
48 - 50					
50 - 52					
52 - 54					
54 - 56					
56 - 58					
58 - 60					

COMMENTS: Surface casing set at 22.0'. ~12" air hammer used to set well.
NQ core barrel used for coring (OD ~ 3.8", ID ~ 1.9")
Dashed line - reamed hole - mw placement
X - Fracture

AR000319

CORE LOG

PROJECT: BLOSENSKI LANDFILL

DATE: 8/24/90

BORING NO.: MW 6-1 CORE SIZE: DQ 1.9"

PAGE 1 OF 1 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	22	25	24	66.7	30 mn/ft	Return Water : lt. brown - brown
2	25	35	84	70.0	2.45 mn/ft	Return Water: brown - dk brown 28-30 - reddish/orange brown
3	35	45	120	100.0	2.85 mn/ft	Return Water: lt. brown Leak Retaken

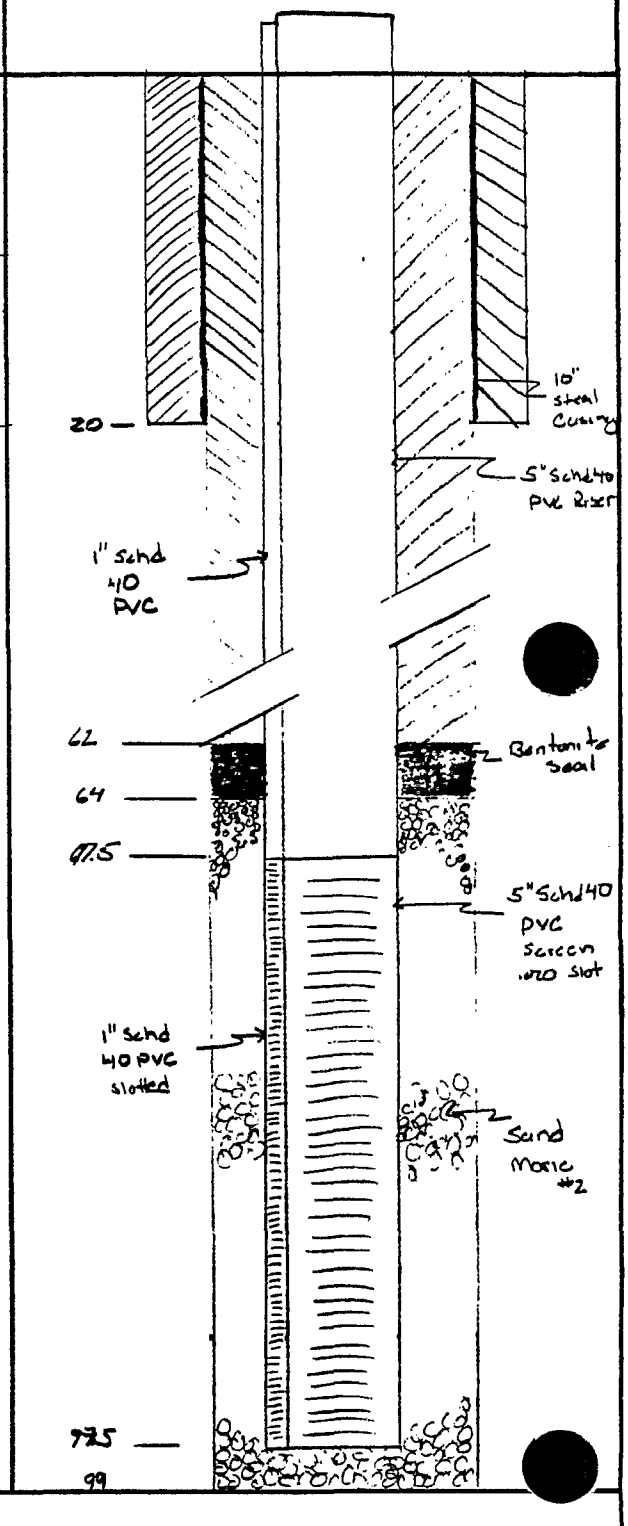
DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	22	25	Quartzose Schist - brown/white mod hard, highly weathered highly fractured Schistosity ~45° Fractures
			horizontal and along planes of schistosity
2	25	35	Quartzose Schist - brown-grey, mod hard, mod-highly weathered, mod-
			highly fractured several decomposed zones w/ Fe+ staining (28-30') (31-32')
			schistosity ~ 45° angle
3	35	45	Quartzose Schist - grey, mod hard, sl-mod weathered, mod
			fractured, Fe+ staining. Fractures ~45° schistosity
			~45° angle also.

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: Testwell SHEET 1 OF ___
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: US Army Corps of Engineers	METHOD: Air Percussion	DATE STARTED:
FILE NO.: 5279.001.221	DRILLING CO.: Mostrench America	DATE FINISHED:
	FOREMAN: Ed Moore	GROUND WATER ELEVATION:
	OBG GEOLOGIST: A Gori	

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
- 0 -	V. fine-sand & silt, brown, - some garbage, rubber tires.		
- 10' -	Quartzose Schist Grey		



COMMENTS:

AR000321

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: TEST WELL SHEET 1 OF
PROJECT LOCATION: Biosynski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: USCOE	METHOD: Air Percussion	DATE STARTED:
FILE NO.: 3277.001	DRILLING CO.: Moretrench America	DATE FINISHED:
	FOREMAN: Ed Moore	GROUND WATER ELEVATION:
	OBG GEOLOGIST: P. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Sand/Silt- v. fine, lt brown some schist fragements some 1¼" diam. rounded.	12" Air Percussion Hammer	~3 4.5		
2 - 4					
4 - 6	Sand. brown/grey - fine garbage present 5-5.5 (Rubber tires) schist fragements		9.14 19.3%		
6 - 8					
8 - 10					
10 - 12	No Recovery	Bedrock encountered. Drill	12.9%		
12 - 14		to 20 set casing.			
14 - 16	No Recovery		6%		
16 - 18					
18 - 20	Grey - quartzite / quartzose schist	10" Air Percussion Hammer used			
20 - 22					
22 - 24					
24 - 26					
26 - 28					
28 - 30					
30 - 32					
32 - 34					
34 - 36					
36 - 38					
38 - 40					
40 - 42					
42 - 44					
44 - 46					
46 - 48					
48 - 50					
50 - 52					
52 - 54					
54 - 56					
56 - 58					
58 - 60					

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION		BORING DIAGRAM
			DRILLING RATE	LITHOLOGY LOG	
60 - 62	Grey. Quartzite /				
62 - 64	Quartzose Schist				
64 - 66					
66 - 68					
68 - 70					
70 - 72					
72 - 74					
74 - 76					
76 - 78					
78 - 80					
80 - 82					
82 - 84					
84 - 86					
86 - 88					
88 - 90					
90 - 92					
92 - 94					
94 - 96					
96 - 98					
98 - 100					
100 - 102					
102 - 104					
104 - 106					
106 - 108					
108 - 110					
110 - 112					
112 - 114					
114 - 116					
116 - 118					
118 - 120					

COMMENTS:

AR000323

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: OB # 2 SHEET 1 OF
PROJECT LOCATION: BLOSINSKI LANDFILL CLIENT: U.S. ARMY CORPS OF ENGINEERS FILE NO.: 8277-001	DRILLING INFORMATION METHOD: AIR - PERCUSSION DRILLING CO.: MORETRENCH AMERICA FOREMAN: ED. MOORE OBG GEOLOGIST: P. GORAI	WELL LOCATION: DATE STARTED: DATE FINISHED: GROUND WATER ELEVATION:

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
12	Quartzose Schist Grey		10" 15 6" Steel Casing Cement/Bentonite Grout 2" Schd 40 PVC Riser 6" 62 65 68 Bentonite seal 2" Schd 40 PVC screen .020 slot Sand Pack Morie #2 980 99.6

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: OB #2 SHEET 1 OF ___
PROJECT LOCATION: Blossenk. Landfill CLIENT: USCOE FILE NO.: 3277.001	DRILLING INFORMATION METHOD: Air Percussion DRILLING CO.: Moretrench America FOREMAN: OBG GEOLOGIST:	WELL LOCATION: DATE STARTED: DATE FINISHED: GROUND WATER ELEVATION:

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Fill material / H brown sand/silt some rock fragments	10" Air Percussion	5.6 7.3		
2 - 4					
4 - 6	Could not collect sample due to rubber tire.				
6 - 8					
8 - 10	Bedrock - Grey quartz schist.				
10 - 12		Drilled to 15			
12 - 14		feet to set casing			
14 - 16					
16 - 18					
18 - 20					
20 - 22					
22 - 24					
24 - 26					
26 - 28					
28 - 30					
30 - 32					
32 - 34					
34 - 36					
36 - 38					
38 - 40					
40 - 42					
42 - 44					
44 - 46					
46 - 48					
48 - 50					
50 - 52					
52 - 54					
54 - 56					
56 - 58					
58 - 60					

COMMENTS:

AR000325

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
ILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION		BORING DIAGRAM
			DRILLING RATE	LITHOLOGY LOG	
60 - 62	Grey Quartzose Schist				
62 - 64					
64 - 66					
66 - 68					
68 - 70					
70 - 72					
72 - 74					
74 - 76					
76 - 78					
78 - 80					
80 - 82					
82 - 84					
84 - 86					
86 - 88					
88 - 90					
90 - 92					
92 - 94					
94 - 96					
96 - 98					
98 - 100					
100 - 102					
102 - 104					
104 - 106					
106 - 108					
108 - 110					
110 - 112					
112 - 114					
114 - 116					
116 - 118					
118 - 120					

COMMENTS:

PREDESIGN REPORT

BLOSENSKI LANDFILL
CHESTER COUNTY, PENNSYLVANIA

APPENDIX 4-3

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: mw19-1 SHEET 1 OF ___
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: US COE	METHOD: Air Percussion	DATE STARTED: 5/19/90
FILE NO.: 3277.001	DRILLING CO.: MES	DATE FINISHED: 7/26/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 44.90
	OBG GEOLOGIST: P. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2					
2 - 4					
4 - 6	Clay-silty- orange brown w/quartz frag.	ML	5.7 7.9		
6 - 8					
8 - 10					
10 - 12	Same as above		5.3 5.7		
12 - 14					
14 - 16	Silt/Sand - orange brown quartz frag present	SM	16.6 10.10		12'
16 - 18					
18 - 20					
20 - 22	Silt/Sand- lt. grey /w orange mottling v. weathered rock	(quartzite) SM	16.27 35.59		
22 - 24					
24 - 26					
26 - 28					
28 - 30					
30 - 32	Quartzose Schist- grey	Intensely Fractured	3.0		
32 - 34	schistocity ~45° mod weathered	Cannot identify fractures	4.25		
34 - 36		Intensely Fract (35-36) Highly weathered	2.5		
36 - 38		Mod Fractured	2.5		
38 - 40	Fe* staining present along	Intensely Fract (39.3-40) Decomposed	2.0		
40 - 42	fractures	Fracture 41.0'	2.5		
42 - 44		Fracture 43.8 44.0	2.5		8
44 - 46		Intens. Fractured (45-47)	2.25		
46 - 48	Fe* staining along	Highly Fract. (47-50)	2.5		
48 - 50	fractures	horizontal	2.0		
50 - 52		Mod Fractured (horizontal)	2.0		3
52 - 54		Fracture 52.0'	2.0		
54 - 56	Fe* staining along	Fracture 56.0'	2.0		
56 - 58	fractures	Fracture 58.	1.75		
58 - 60		Fracture 59.1	1.75		

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATIO

DATE: 6/13 - 6/15 1990

BORING NO.: MW 17-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	135	145	120	100.0	2.75 mm/ft	Return Water: None Core Jam @ 144 Tripped out
14	145	155	120	100.0	3.45 mm/ft	Return Water: None
15	155	165	120	100.0	4.75 mm/ft	Return Water: None
16	165	175	120	100.0	4.5 mm/ft	Return Water: None

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	135	145	Quartzose Schist → Grey, mod hard, mod - highly weathered
			sl. - mod fractured. Schistocity ~45°. Quartz
			veining, ↓ Fe staining present. solution cavities.
14	145	155	Quartzose Schist → Grey, mod. hard - hard, sl. weathered
			sl. fractured, Schistocity ~45°
15	155	158	Quartzose Schist → as above
	158	165	Quartzite → white + Pink, soft - hard, mod - highly weathered, highly fractured, Solution cavities present
16	165	175	Quartzite → off white - grey, hard, slightly weathered
			moderately fractured, Fe staining present along
			fractures.

AR000329

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Quartzose Schist → grey	Mod Fractured - horizontal	1.75		
62 - 64	schistocity ~45° mod	Fracture 61.3 62.4	1.75		
64 - 66	weathered	Vertical Fract. 63-64	2.0		
66 - 68		Mod Fract - Fract. 65.3, 67.9	3.0		
68 - 70	Decomposed (68.7 - 69.2)	Highly Fractured	2.0		
70 - 72	Decomposed →	Intensely Fractured (71-71.3)	2.0		
72 - 74		Fracture 73.5	2.0		— 8 —
74 - 76	Quartzose Schist → grey	Sl-mod fractured (horizontal)	1.75		
76 - 78	sl. weathered, schistocity	Fracture 77.3	2.25		
78 - 80	~45°	Highly Fractured (79 - 79.9)	2.0		
80 - 82		Fracture 80.6	2.0		
82 - 84			2.25		
84 - 86			2.5		
86 - 88		Fracture 87.3	3.0		
88 - 90		Fracture 90.0	3.5		
90 - 92	Fe* staining along fracture →	Fracture 91.6	2.75		
92 - 94			2.0		
94 - 96			2.5		
96 - 98		Fracture 98.0'	3.5		— 3 —
98 - 100		Fracture 99.5	3.0		
100 - 102	Fe* staining →	Fracture 102	2.25		
102 - 104		Fracture 103.8	2.75		
104 - 106	Quartzose Schist - grey	Highly Fractured	3.25		
106 - 108	mod weathered	106 - 106.3 Fe* staining	3.25		
108 - 110	schistocity ~45°		2.0		
110 - 112			2.75		
112 - 114	Highly weathered →	Intensely Fractured (112-113)	2.5		
114 - 116	Fe* staining →	Highly Fractured ~45° +	2.5		
116 - 118		horizontal	2.0		
118 - 120			2.25		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
120 - 122	Quartzose Schist → grey	mod Fractured ~45°	2.0		
122 - 124	schistocity ~45°, sl.	Fracture 120.4	2.5		
124 - 126	weathered	↓	3.0		
126 - 128	↓	Fracture 127.7	2.5		
128 - 130		↓	2.5		
130 - 132		↓	4.0		
132 - 134	Quartzose Schist - grey	sl. - mod fractured	2.5		
134 - 136	mod weathered	Fractures ~ 45°	3.5		← 8 →
136 - 138	schistocity ~45°	Fracture 136.1	2.5		
138 - 140	↓	↓	3.5		
140 - 142		Fracture 140.5	2.75		
142 - 144		↓	2.0		
144 - 146		Intensely Fractured	2.25		
146 - 148		fractures randomly orient	2.5		
148 - 150		Fe* staining along fract.	5.0		
150 - 152		↓	3.75		
152 - 154			1.5		
154 - 156			3.0		
156 - 158	↓	↓	5.0		→ 3 ←
158 - 160	Quartzite → grey	Highly fractured	4.5		
160 - 162	mod weathered	fractures ~45°, horizontal	4.5		
162 - 164	↓	↓	5.5		
164 - 166			6.5		
166 - 168			6.0		
168 - 170			4.0		
170 - 172			5.25		
172 - 174			4.25		
174 - 176	↓	↓	4.0		
176 - 178					
178 - 180					

COMMENTS:

AR000331

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/18 - 6/20 1990

BORING NO.: MW A-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	31	35	24	500	5.0 mn/ft	Return Water: Grey
2	35	45	120	1000	2.95 mn/ft	Return Water: Grey
3	45	55	120	1000	4.5 mn/ft	Return Water: Grey - H brown Core Jam @ 49 + 50' Tripped out
4	55	65	120	1000	2.3 mn/ft	

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	31	35	Quartzose Schist → Grey, mod. hard, mod. weathered, highly fractured. Schistocity ~ 45°
2	35	45	Quartzose Schist → Grey, soft- mod hard, moderately weathered, mod fractured. Schistocity ~ 45°
3	45	55	Quartzose Schist → Grey, soft- mod hard mod. weathered, sl. - ~~highly~~ mod ~~fractured~~ fractures Schistocity ~ 45°
4	55	65	Quartzose Schist → Grey, mod hard, mod weathered mod - highly fractured. Schistocity ~ 45°

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/18 - 6/20 1990

BORING NO.: MW 19-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	65	75	120	1000	23 mm/ft	Return Water: Brown
6	75	85	120	1000	2.95 mm/ft	Return Water: Grey
7	85	95	120	1000	3.25 mm/ft	Return Water: Grey / brown
8	95	105	120	1000	2.75 mm/ft	

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	65	75	Quartzose Schist → Grey, soft-mod hard, highly weathered, mod. fractured. Schistocity ~ 45°.
6	75	85	Quartzose Schist → Grey, hard, slightly weathered slightly weathered, slightly - mod fractured.
			Schistocity ~ 45°. Quartz veining present.
7	85	95	Quartzose Schist → Grey, hard, slightly weathered slightly fractured. Quartz veining present
			schistocity ~ 45°.
8	95	105	Quartzose Schist → Grey, mod hard - hard, slightly weathered, slightly fractured schistocity ~45°.
			Quartz veining present.

AR000233

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/18 - 6/20 1990

BORING NO.: MW 19-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: Double Tube wire line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	105	115	120	1000	2.75 mn/ft	Return Water: Brown
10	115	125	120	1000	2.05 mn/ft	Return Water: Braun (118) Grey (118-125)
11	125	135	120	1000	3.4 mn/ft	Return Water: Grey
12	135	145	120	100.0	3.1 mn/ft	Return Water: Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	105	115	Quartzose Schist → Grey, mod hard - hard, mod.
			weathered, mod. - highly fractured, Schistocity - 45°
			Quartz veining present Fe+ staining along fractures.
10	115	125	Quartzose Schist → Grey, mod hard, moderately
			weathered, moderately fractured. Quartz veining
			present. Schistocity ~ 45°.
11	125	135	Quartzose Schist → Grey, mod. hard, slightly
			weathered, mod - slightly fractured. Quartz
			veining present Schistocity ~ 45°.
12	135	145	Quartzose Schist → Grey, soft - mod hard, mod
			weathered. mod - slightly fractured
			Schistocity ~ 45°

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/18 - 6/20 1990

BORING NO.: mw 19-1 CORE SIZE: NQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.)		RECOVERY		DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
	FROM	TO	IN.	%		
13	145	155	120	100.0	3.05 mn/ft	Return Water: Brown (145-147) Grey (147-155)
14	155	165	120	100.0	3.8 mn/ft	Return Water: Brown/Grey (155-163) Grey (163-165)
15	165	175	120	100.0	5.2 mn/ft	Return Water: Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.)		DESCRIPTION (Color, Type, Weathering, Structure, etc.)
	FROM	TO	
13	145	155	Quartzose Schist → Grey soft - mod hard, mod-highly weathered, intensely fractured, Schistocity ~45° solution cavities present.
14	155	159	Quartzose schist - as above.
	159	165	Quartzite → Grey. hard, - mod hard, mod - highly ~~weathered~~ fractured mod. weathered.
15	165	175	Quartzite - Grey v. hard, mod. weathered, mod- highly fractured, solution cavities + pitting present. Quartzose schist lenses present. soft, mod weathered, highly fractured.

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 16-1 SHEET 1 OF 1
PROJECT LOCATION: Blosenski Landfill CLIENT: US Army Corps of Engineers FILE NO.:	DRILLING INFORMATION METHOD: Air Hammer / Mud Rotary DRILLING CO.: Moretrench American FOREMAN: Ed. Moore OBG GEOLOGIST: P. Gori	WELL LOCATION: DATE STARTED: 5/17/90 DATE FINISHED: 9/4/90 GROUND WATER ELEVATION: 5010

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
0	Organic soil, dk. brown - roots.		6" Protective cap
4	Silty sand, reddish-brown to grey fine-medium grained (SM)		Cement/ Bentonite grout 8" steal casing
39	Quartzose Schist lt. grey		39
90	Quartzite lt grey		4" schd 80 PVC Risers 95 Bentonite seal 97 100 Sand Pack Morie #1 4" Schd 80 PVC Screen .010 120 124

COMMENTS: Centralizers placed every 20' after first 50'. Reamed to 124' using 8" air hammer. Switched to mud rotary to keep hole open.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 18-1 SHEET 1 OF 3
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: USCOE	METHOD: Air Percussion/Mud Rotary	DATE STARTED: 5/17/90
FILE NO.: 3277.001	DRILLING CO.: MES	DATE FINISHED: 9/4/90
	FOREMAN: S.D. Moore	GROUND WATER ELEVATION: 50.4
	OBG GEOLOGIST: D. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Organic soil, dk brown roots				
2 - 4					
4 - 6	~~Silty~~ Silt reddish brown grading to tan (dry)	(sm)	7.5 · 5.7		
6 - 8					
8 - 10					
10 - 12	Silty Sand - tan - fine-med (dry)	(sm)	3.6 · 7.7		
12 - 14					
14 - 16	Silty Sand - reddish brown / lt grey (dry)	saprolitic (weathered bedrock)	5.5 · 6.9		12
16 - 18	(sm)				
18 - 20					
20 - 22	Silty Sand - tan - lt grey weathered (dry)	bedrock dry (saprolitic)	12.15 · 16.19		
22 - 24	(sm)				
24 - 26	Silty Sand - lt grey weathered	bedrock (saprolitic)	9.11 · 13.19		
26 - 28	(sm)				
28 - 30					
30 - 32	Silty Sand - lt grey weathered bedrock		10.22 · 27.35		
32 - 34	(sm)				
34 - 36	No Recovery	Drilled 3 foot socket	8%		
36 - 38	Sandstone	into bedrock	ft/min		
38 - 40	brown/white	Begin rock coring	3.25		
40 - 42	Quartzite present	NQ core barrel	2.75		
42 - 44	highly weathered	OD ~ 3" ID. ~ 1.9"	2.0		
44 - 46		Intensely fractured	1.5		
46 - 48			3.75		
48 - 50			3.0		3
50 - 52			1.75		
52 - 54			1.5		
54 - 56			2.5		8
56 - 58			2.5		
58 - 60			3.0		

COMMENTS: Surface casing set at 38.0'. Air percussin hammer (12) set casing
NQ core barrel used for coring (OD ~ 3", ID ~ 1.9")
Dashed lines - reamed hole for mw Placement
H - Fracture

AR000337

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Sandstone → brown	Intensely Fractured	3.75		
62 - 64	highly weathered	fract. rand. orient.	2.5		
64 - 66	Quartzose schist → grey	highly fractured	2.75		
66 - 68	highly weathered decomposed	fract rand. orient.	2.5		
68 - 70		↓	2.5		
70 - 72			2.0		
72 - 74			3.0		← 8 →
74 - 76	Sandstone → brown, mod	Intensely fractured	3.5		
76 - 78	weathered	fract. rand oriented	2.5		
78 - 80		↓	3.0		
80 - 82			4.5		
82 - 84		↓	6.5		
84 - 86	Quartzite → lt. brown	Intensely fractured	6.0		
86 - 88	mod weathered	Fe* staining along	5.75		
88 - 90		fractures, Fractures	8.0		
90 - 92		randomly oriented	4.5		
92 - 94		↓	6.0		
94 - 96	Quartzite → grey	Intensely Fractured	6.0		
96 - 98	mod weathered	- fractures randomly orient	6.0		
98 - 100		↓	5.5		
100 - 102			5.0		
102 - 104		↓	5.0		
104 - 106	Quartzite - grey	highly - Fractured	6.5		← 3 →
106 - 108	slightly weathered	Fractures ~45° & horizontal	7.5		
108 - 110		Fe* staining along	8.75		
110 - 112		fractures.	8.25		
112 - 114			6.25		
114 - 116		Intensely Fractured	8.75		
116 - 118		(115 - 116.5)	10.0		
118 - 120			12.0		

COMMENTS:

AR000338

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORIN DIAGRAM
120 - 122	Quartzite → grey, slightly weathered	Highly fractured	15.0		
122 - 124		Fractures ~45° & horizontal	25.5		
124 - 126		Fe" staining along fractures	6.5		
126 - 128		Intensely Fractured	7.5		
128 - 130		Fractures rand. orient, Fe"	6.0		
130 - 132		staining	6.5		
132 - 134		↓	16.0		
134 - 136		Highly Fractured ~45°	22.0		
136 - 138		Fe" staining along	18.0		
138 - 140		fractures.	12.5		
140 - 142			11.0		
142 - 144			12.0		
144 - 146			11.5		
146 - 148			16.0		
148 - 150			16.5		
150 - 152			12.0		
152 - 154			14.0		
154 - 156			24.5		
156 - 158		Highly Fractured	48.5		
158 - 160		Fractures randomly	26.5		
160 - 162		oriented	10.75		
162 - 164			9.5		
164 - 166			11.25		
166 - 168		Intensely Fractured	11.5		
168 - 170		Fractures randomly orient	13.0		
170 - 172		Highly Fractured	11.5		
172 - 174			13.0		
174 - 176			13.5		
176 - 178					
178 - 180					

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/20 - 6/27

BORING NO.: MW 18-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	37	45	6	6.25	3.13 mm/ft	Return Water: 37-43 - Grey 43-45 Lt brown
2	45	55	48	400	2.4 mm/ft	Return Water: Brown
3	55	65	72	600	3.0 mm/ft	Return Water: Brown
4	65	75	6	6.25	2.6 mm/ft	Return Water: Grey (65-71) Brown (71-75)

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	37	45	Sandstone → brown/white, soft, highly weathered - decomposed. Quartzite present.
2	45	55	Sandstone → brown/white, soft-hard, highly weathered intensely fractured.
3	55	65	Sandstone. as above w/ quartz veining
4	65	75	Quartzose Schist → grey, soft, decomposed, highly fractured. Quartz veining present @ 65-66'.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/20 - 6/27

BORING NO.: MW 18-1 CORE SIZE: 1.9" NQ

PAGE 2 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	75	85	120	1000	4.4 mm/ft	Return Water: Brown
6	85	95	120	1000	6.5 mm/ft	Return Water: Brown Core Jam @ 87, 89, 91 Tripped out
7	95	105	120	1000	5.4 mm/ft	Return Water: Lt brown / Grey
8	105	115	120	1000	7.75 mm/ft	Return Water: Lt brown / Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	75	85	Sandstone → brown, soft - hard, moderately weathered intensely fractured. Decomposed quartzose schist present quartz veining present.
6	85	95	Quartzite → lt. brown, hard, mod. weathered, intensely fractured, Fe^{+} staining. Some quartzose schist present decomposed, schistocity ~45°
7	95	105	Quartzite → Lt brown / Grey, hard, mod. weathered, mod-intensely fractured. Quartzose schist present in fracture zones.
8	105	115	Quartzite → Grey, hard, slightly weathered, mod fractured.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/20 - 6/27

BORING NO.: MW 18-1 CORE SIZE: 1.9" NQ

PAGE 3 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	115	125	120	100.0	13.75 mn/ft	Return Water: Lt. brown/grey Core Jam @ 119 ft Tripped out
10	125	135	120	100.0	9.6 mn/ft	Return Water: Grey
11	135	145	120	100.0	13.4 mn/ft	Return Water: Grey
12	145	155	120	100.0	15.2 mn/ft	Return Water: Grey/brown

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	115	125	Quartzite → Grey, hard, mod fractured, mod weathered.
10	125	135	Quartzite → Grey, hard, mod weathered.
			mod. intensely fractured, Fe^{+} staining along fractures
			Quartz veining evident
11	135	145	Quartzite → as above - mod fractured.
12	145	155	Quartzite → Grey, hard, mod. weathered, mod fractured, Fe^{+} staining present.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/20- 6/27

BORING NO.: MW 18-1 CORE SIZE: 1.9" NQ

PAGE 4 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	155	165	120	1000	22.05 mn/ft	Return Water: Grey / brown New Rig
14	165	175	120	1000	9.95 mn/ft	Return Water: Lt Grey / brown.

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	155	165	Quartzite → grey, hard, mod weathered, intensely fractured throughout. Fe" staining, pitting present.
14	165	175	Quartzite → Grey, hard, moderately weathered, intensely fractured.

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: mw 17-1 SHEET 1 OF 1
PROJECT LOCATION: BLOSENSKI LANDFILL CLIENT: U.S. Army Corps of Engineers FILE NO.: 3277.001.221	DRILLING INFORMATION METHOD: Air Hammer DRILLING CO.: Moore Trench America FOREMAN: Ed Moose OBG GEOLOGIST: D Gosi	WELL LOCATION: DATE STARTED: 5/17/90 DATE FINISHED: 7/20/90 GROUND WATER ELEVATION: 634

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
			6" Protecti Casing
	organic soils, roots.		
4	Sand / Silt, brown - lt brown medium grained (sm)		8" Stee Casing
20	Sandstone / Quartzite		20' Bemen Bentonit Grout
35	Quartzose schist		
			4" Schd 8 PVC Rise
			144' Bentonite
			146'
			150' Gravel fact (Moonic #1)
158'	Quartzite		4" Schd 8 PVC Scree .010 slot
			170'
			173' Bentonite
			175'

COMMENTS: Centralizers placed every 20' after first 50' from the bottom
Hole reamed using 8" air hammer to depth of 175'.

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW11-1 SHEET 1 OF
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: US COE	METHOD: Air Percussion	DATE STARTED: 5/17/90
FILE NO.: 5277.001	DRILLING CO.: MES	DATE FINISHED: 7/20/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION:
	OBG GEOLOGIST: P. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORI DIAGRAM
G.L. - 2	Organic soils, roots				
2 - 4					
4 - 6	Sand- brown med grained, w/quartzi dry weathered	rock (Schist) 6.9' SM	13.10 7.34		
6 - 8					
8 - 10					
10 - 12	Sand/Silt- lt brown fine-med. chloritic	bedding evident SM	9.5 10.17		
12 - 14					
14 - 16	No Recovery	Possibly competent rock	5%		
16 - 18	Drill cuttings changed from lt. brown- lt grey				
18 - 20					
20 - 22	No recovery		3%		
22 - 24	Sandstone/Quartzite → grey-	Intensely Fractured	After 25		
24 - 26	off white, highly weathered	fractured randomly orient.	3.25		
26 - 28	Fe" staining along		4.75		
28 - 30	fractures		4.75		
30 - 32			3.5		
32 - 34			6.75		
34 - 36	Quartzose Schist- grey	Highly Fractured	8.00		
36 - 38	schistocity ~45° highly	fractures ~45° horizontal	3.0		
38 - 40	weathered		2.0		
40 - 42	Fe" staining along		2.0		
42 - 44	fractures		3.25		
44 - 46			3.75		
46 - 48	Quartzose Schist - grey	Highly fractured	3.0		
48 - 50	schistocity ~45° mod.	Fract ~45° horizontal, highly weathered	3.5		
50 - 52	highly weathered	Mod Fractured (49.5)	2.0		
52 - 54		Fract. 51.0, 53.0 (Fe" staining)	2.0		
54 - 56		Fract 54.8, 55.4	3.5		
56 - 58		Highly fract. (56-57) highly weath	4.25		
58 - 60		Fract 59.5	3.75		

COMMENTS: Surface casing set at 20.0'. Air Percussion hammer (12") used to set casing
NQ core barrel used for coring (OD~3" ID~1.9")
Dashed Lines - reamed hole for MW placement
⌐ - Fractures

AR000345

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Quartzose Schist - grey	mod. Fractured ~45°	3.5		
62 - 64	schistocity ~45° mod.	Highly Fractured	2.0		
64 - 66	highly weathered	↓	2.5		
66 - 68	↓	↓	3.0		
68 - 70		mod Fractured	2.5		
70 - 72	Fe+ staining along	Fracture 70', 71.5	3.0		8
72 - 74	fractures	Fract. 73.3, 74.5	2.75		
74 - 76	Quartzose Schist - grey	Mod Fract - ~45° + horizontal	3.5		
76 - 78	schistocity ~45°	Fract. 76.9'	3.0		
78 - 80	sl. - unweathered	Fracture 78.4'	2.75		
80 - 82		Fracture 81.3'	2.25		
82 - 84		Fracture 83.0	2.75		
84 - 86		sl. Fractured ~45°	5.5		
86 - 88		Fracture 88.0	3.75		
88 - 90			3.0		
90 - 92		Fracture 92.9	1.75		
92 - 94			2.75		
94 - 96			2.5		
96 - 98		Fracture 97.0	3.25		3
98 - 100		Fracture 99.0	3.0		
100 - 102			2.5		
102 - 104			3.0		
104 - 106			3.75		
106 - 108		Fracture 106.2, 107	3.0		
108 - 110	highly weathered	Intensely Fractured (109.5-110.8)	3.0		
110 - 112		Highly Fractured	4.75		
112 - 114		Fracture ~45°	3.75		
114 - 116			3.0		
116 - 118			2.5		
118 - 120	↓	Fract. 117.7, 118.7, 120.	3.0		

COMMENTS:

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 3 OF ___
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORE DIAGRAM
120 - 122	Quartzose Schist → grey	Highly fractured	3.5		
122 - 124	schistosity ~45°	Fractures ~45°, horizontal	4.0		
124 - 126	sl. - unweathered	↓	4.0		
126 - 128		Highly weath, fractured	3.0		
128 - 130		(127.5 - 129.5)	2.75		
130 - 132		Highly fract 129.5 - 131.5	2.25		
132 - 134	Quartzose schist - brown	mod fractured	3.0		
134 - 136	highly weathered	Fractures ~45° 135.3	2.5		
136 - 138	schistosity ~ 45°	Fracture (137.0)	2.25		
138 - 140		↓	3.0		
140 - 142			2.75		
142 - 144		↓	3.0		
144 - 146	Quartzose schist - grey	Sl. fractured	3.0		
146 - 148	sl. weathered.	fractures ~46°	3.0		
148 - 150	schistosity ~45°	Fracture 145.1'	4.25		
150 - 152		Fracture 150.5	3.75		
152 - 154		↓	3.5		
154 - 156			3.5		
156 - 158		↓	3.75		
158 - 160	Quartzite → white	Highly fractured	5.0		
160 - 162	~ mod weathered	fractures ~45°	5.0		
162 - 164		↓	5.0		
164 - 166	Quartzite - off white - grey	Highly fractured	5.0		
166 - 168	sl. weathered	fractures ~45 + horizontal	5.0		
168 - 170	Fe* staining along	↓	5.0		
170 - 172	fractures		5.0		
172 - 174		↓	5.0		
174 - 176			5.0		
176 - 178					
178 - 180					

COMMENTS:

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/13 - 6/15 1990

BORING NO.: MW 17-1 CORE SIZE: NQ 1.9"

PAGE 1 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
1	20	25	54	90.0	33 mn/ft	Return Water: Brown
2	25	35	84	70.0	425 mn/ft	Return Water: brown-grey Core Jam 28' Tripped out
3	35	45	108	90.0	385 mn/ft	Return Water: Grey. Core Jam 36', 44', 45'. Lost Return @ 40'. Tripped out
4	45	55	120	100.0	365 mn/ft	Return Water: None

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
1	20	25	Sandstone → Grey + brown, mod hard - hard, intensely weathered fractured, intensely fractured, Fe" staining present
			Qtz veining present.
2	25	28	Quartzite → white, hard, highly weathered, highly fractured.
	28	35	Sandstone → Grey, mod hard - hard, highly weathered, highly
			fractured.
3	35	45	Quartzose Schist → Grey, mod hard - hard, highly weathered, mod.
			fractured, Schistosity ~ 45°. Fe" staining throughout section.
			Quartz present (35-36). white, hard, mod. weathered.
4	45	55	Quartzose Schist → Grey ~~mod~~ hard, moderately
			weathered, mod fractured, Fe" staining present
			throughout section. Schistosity ~ 45°.

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/13 - 6/15 1990

BORING NO.: MW 17-1 CORE SIZE: NQ 1.9"

PAGE 2 OF 4 TYPE BARREL: Double Tube wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
5	55	65	120	1000	3.8 mn/ft	Return Water: None
6	65	75	120	100.0	2.5 mn/ft	Return Water: None
7	75	85	120	100.0	3.45 mn/ft	Return Water: None
8	85	95	120	100.0	1.95 mn/ft	Return Water: None

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
5	55	65	Quartzose Schist → Grey, mod hard - hard, mod weathered mod fractured, schistocity ~ 45°. Fe # staining present along fracture surfaces.
6	65	75	Quartzose Schist → Grey, mod hard - hard, mod weathered, mod fractured, Fe # staining present along fractures. Schistocity ~ 45°
7	75	85	Quartzose Schist → Grey, hard, slightly weathered, sl. - mod fractured. Schistocity ~ 45°
8	85	95	Quartzose Schist → Grey, mod hard. hard, slightly weathered slightly fractured, schistocity ~ 45°

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/13 - 6/15

BORING NO.: MW 17-1 CORE SIZE: NQ 1.9"

PAGE 3 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
9	95	105	120	100.0	2.65 mm/ft	Return Water: None
10	105	115	120	100.0	36 mm/ft	Return Water: None
11	115	125	120	100.0	3.55 mm/ft	Return Water: None
12	125	135	120	100.0	2.85 mm/ft	Return Water: None

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
9	95	105	Quartzose Schist → Grey hard, unweathered, slightly fractured. Schistocity ~ 45°
10	105	115	Quartzose Schist → Grey, med hard - hard, s/ weathered moderately fractured, Schistocity ~ 45° Quartz veining present.
11	115	125	Quartzose Schist → as above.
12	125	135	Quartzose Schist → Grey soft - med. hard, med - intensely weathered, moderately fractured, Schistocity ~ 45° solution cavities + Fe# staining present (127 1/2 - 129 1/2) (131 1/2 - 133)

O'BRIEN & GERE

CORE LOG

PROJECT: BLOSENSKI LANDFILL MW INSTALLATION

DATE: 6/11 - 6/13 1990

BORING NO.: MW 15-1 CORE SIZE: WQ 1.9"

PAGE 4 OF 4 TYPE BARREL: Double Tube Wire Line

RUN NO.	DEPTH (Ft.) FROM	TO	RECOVERY IN.	%	DRILLING TIME	REMARKS (Water Level, Core Jam, etc.)
13	135	145	120	100.0	4.35 mn/ft	Return Water: Grey
14	145	155	120	100.0	3.9 mn/ft	Return Water: Grey
15	155	165	120	100.0	4.3 mn/ft	Return Water: Grey
16	165	175	120	100.0	4.6 mn/ft	Return Water: Grey

DESCRIPTION OF ROCK TYPE

RUN NO.	DEPTH (Ft.) FROM	TO	DESCRIPTION (Color, Type, Weathering, Structure, etc.)
13	135	145	Quartzose Schist → Grey, mod. hard, s/o weathered, s/-
			mod fractured (~ 45°) Schistocity ~45°.
14	145	155	Quartzose Schist → Grey. mod. hard, sl. weathered,
			mod- sl. fractured. schistocity ~45°. along fractures.
15	155	165	Quartzose Schist → Grey mod hard, sl. weathered
			sl. fractured. Schistocity ~45°.
16	165	175	Quartzose Schist → Grey. mod. hard, sl. weathered,
			sl fractured. Schistocity ~45° Fe staining
			present @ fracture (166').

O'BRIEN & GERE

O'BRIEN & GERE ENGINEERS, INC.	WELL INSTALLATION LOG	WELL NO.: MW 104-1 SHEET 1 OF 1
PROJECT LOCATION: Biosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S. Army Corps of Engineers	METHOD: Air Hammer	DATE STARTED: 12/7/90
FILE NO.: 3277.001.221	DRILLING CO.: Moretrench America	DATE FINISHED: 3/20/90
	FOREMAN: Ed Moore	GROUND WATER ELEVATION: 51.34
	OBG GEOLOGIST: D. Gori	

DEPTH	LITHOLOGY	SYMBOL	WELL DIAGRAM
0-2	Topsoil, leaves roots		vented PVC cap; 6" Protective casing
2	Residual soils (sands) SM weathered quartzite		8" steel casing; Cement Bentonite grout
47	→ Quartzite → wh.te/pink to ltgrey grey.		4" PVC Sched 80 Riser; 100' Bentonite; 103' Bentonite; Sand Pack Moorie #1; 4" PVC Sched 80 Screen .010 slot (20 feet); Bottom wall cap; 125' Bentonite; 131' w/ clay grout

COMMENTS: Centralizers placed every 20' after first 50' from bottom
Hole reamed using 8" air hammer to depth of 131'.

AR000352

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: MW 101-1 SHEET 1 OF 3
PROJECT LOCATION: Blosenski Landfill	DRILLING INFORMATION	WELL LOCATION:
CLIENT: U.S. Army Corps of Engineers	METHOD:	DATE STARTED: 12/7/89
FILE NO.: 3277001.221	DRILLING CO.: Moretrench America	DATE FINISHED: 3/20/90
	FOREMAN: Brad / Ed Moore	GROUND WATER 51.34
	OBG GEOLOGIST: P. Gori	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
G.L. - 2	Humus : leaves roots (residual)	Air rotary drilling			
2 - 4	soils				
5 - 7	Sand/Silt (SM), lt brown-tan, dry, fine-med. rnded. quartz frag. presents		20-30 / 7-36		
7 - 8					
8 - 10					
10 - 12	Sand Silt (SM) lt brown-grey, dry, fine-med. rnded v thin beds qtz frag present		8.16 / 24.29		
12 - 14					
15 - 17	Sand/Silt (SM) lt brown→grey, dry, fine-med, v. thin beds saprolitic		34.58 / 100/3"		13"
17 - 18					
18 - 20					
20 - 22	Sand/Silt (SM) lt brown-grey, dry, fine med v. thin beds, saprolitic		100/3"		
22 - 24					
25 - 27	Sand/Silt (SM) lt brown-grey, dry, fine-med. v. thin beds, saprolitic		100/3"		
27 - 28					
28 - 30					
30 - 32	Sand/Silt (SM) reddish brown, dry, fine med, saprolitic, qtz frag present		50/1"		
32 - 34					
35 - 37	No Recovery		50/1"		
37 - 38					
38 - 40					
40 - 42	weathered quartzite, grey		50/1"		
42 - 44					
45 - 47	Weathered quartzite, grey/lt brown Quartz frag present competent Rock		100/43"		
47 - 48		↓	mm/ft		
49 - 50	Quartzite → white / pink	Begin rock coring	2.0		
50 - 52	massive bedding		3.5		8"
52 - 54	med. weathered		4.0		
54 - 56	↓	Highly Fractured	3.3		
56 - 58		clay material present in	4.0		3"
58 - 60	↓	fractures	4.0		

COMMENTS:

Dashed line - reamed hole for mw Placement
Surface casing set at 48.0' Air Percussion Hammer (~13") set casing
NQ core barrel used for coring (O.D. ~3", I.D. ~1.9")
⌇ - Fractures.

AR000353

O'BRIEN & GERE ENGINEERS, INC.	WELL CONSTRUCTION LOG	WELL NO.: _____ SHEET 2 OF 3
PROJECT LOCATION: _____	DRILLING INFORMATION	WELL LOCATION: _____
CLIENT: _____	METHOD: _____	DATE STARTED: _____
FILE NO.: _____	DRILLING CO.: _____	DATE FINISHED: _____
	FOREMAN: _____	GROUND WATER ELEVATION: _____
	OBG GEOLOGIST: _____	

DEPTH	DESCRIPTION	REMARKS	FIELD INFORMATION: DRILLING RATE	FIELD INFORMATION: LITHOLOGY LOG	BORING DIAGRAM
60 - 62	Quartzite - white/pink	Highly Fractured	3.8		
62 - 64	mod. weathered		3.5		
64 - 66			6.0		
66 - 68			5.0		
68 - 70			8.8		
70 - 72			7.0		3"
72 - 74		Core Jam. Tripped out.	11.5		
74 - 76	Quartzite → lt. grey - grey w/	→ Highly Fractured	9.0		
76 - 78	purple tint	clay material present on	9.0		
78 - 80	mod. weathered	fractures	7.5		8"
80 - 82		Fractures between 45° + 90°	7.5		
82 - 84			8.0		
84 - 86			10.0		
86 - 88			8.0		
88 - 90			8.0		
90 - 92		Core Jam Tripped out	8.0		
92 - 94			8.0		
94 - 96			8.0		
96 - 98		Stopped coring. Racked	7.0		
98 - 100		out. checking bit	6.0		
100 - 102			7.5		
102 - 104			7.5		
104 - 106	Quartzite - lt. grey - grey/	Fractures near horizontal ~45°	8.0		
106 - 108	purple tint		8.0		
108 - 110	sl. - mod weathered	109'. Core Jam.	6.5		
110 - 112		Tripped out	6.5		
112 - 114			6.5		
114 - 116			5.5		
116 - 118			5.0		
118 - 120			5.5		

COMMENTS:

APPALACHIAN COAL SURVEYS

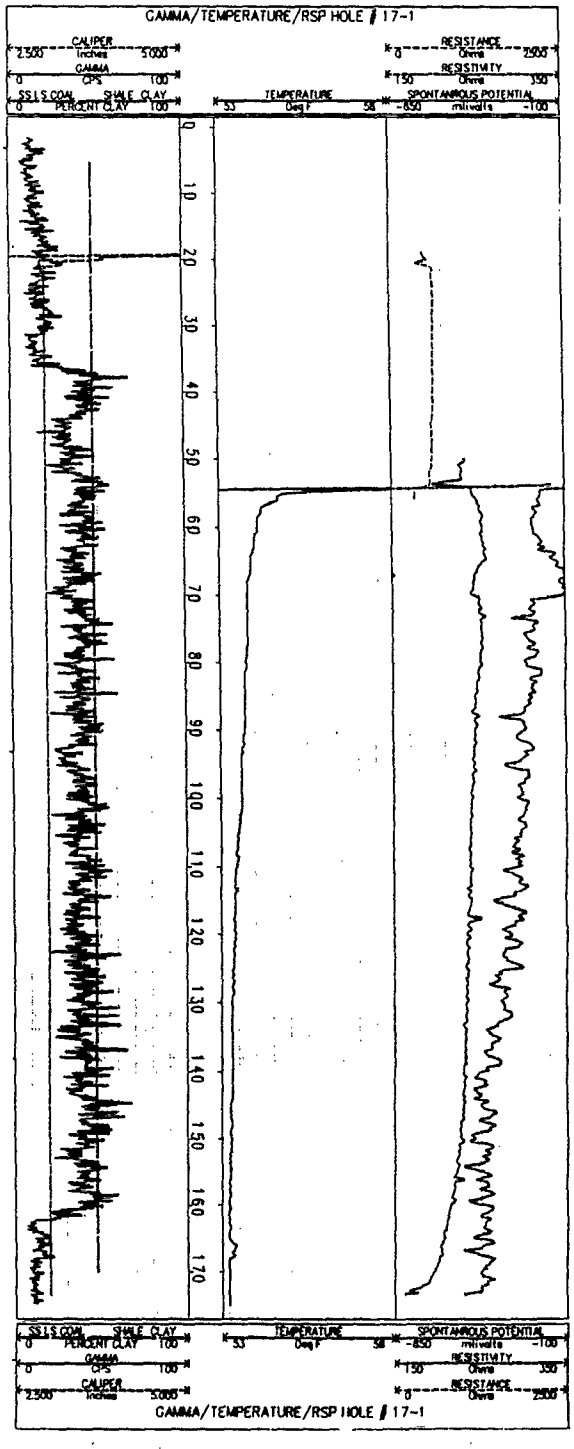
WELL NO: 17-1
LOG SUITE: GAMMA/TEMP/CAL/RSP

COMPANY: OBRIEN & GEERE ENGINEERS			LOCATION:
CLIENT REP: P. Gorl		OPERATOR: OBC	BLOSENSKI LANDFILL
DEPTH DRILLER: 175		COUNTY: Chester	
LOGGER: 175		STATE: PA	DRILLING CO:
ELEVATION:		DRILLING FLUID: Water	DRILLER:
BIT SIZE: 3		WATER LEVEL: 55	DATE LOGGED: July 5, 1990
CASING (FR. LOG): 20			
CASING DIAMETER: 8			

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	TEMPERATURE	56-175	5 Deg F		
2	GAMMA	2-175	100 CPS	2 Sec	Hot
3	CALIPER	20-175	1 in/in		
3	RESISTIVITY	20-175	100 Ohms		
3	S.P.	56-175	100 mV		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS: DATUM IS TOP OF CASING



APPALACHIAN COAL SURVEYS

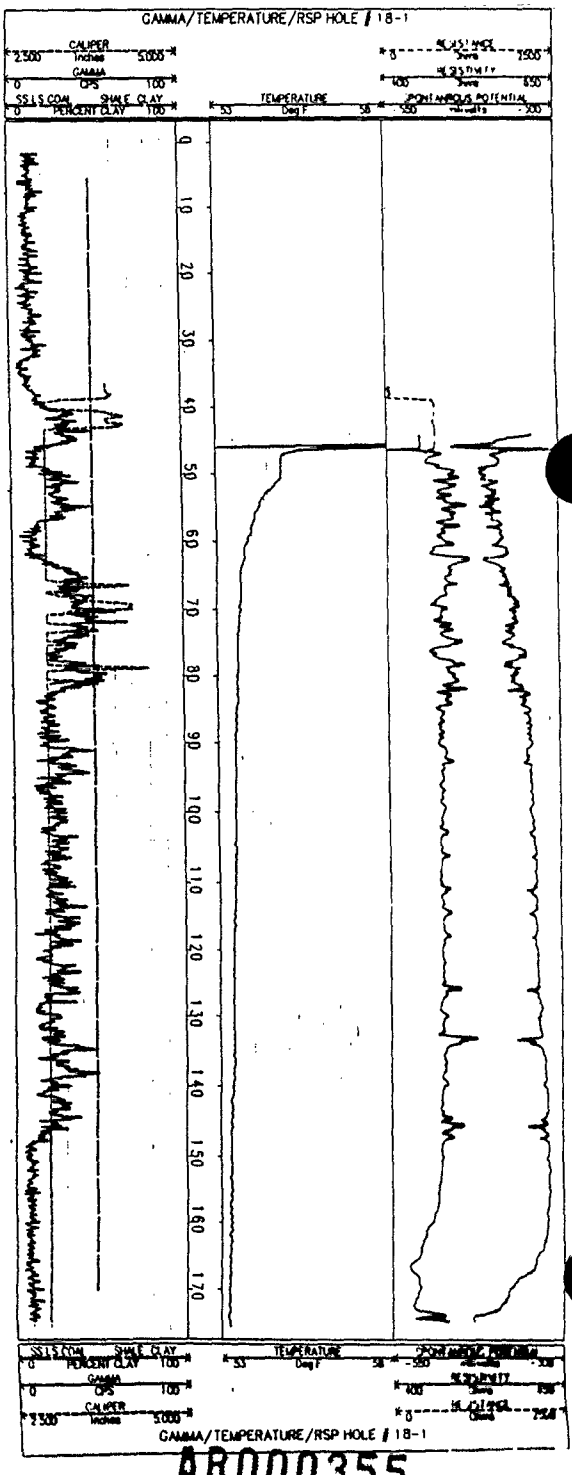
WELL NO: 18-1
LOG SUITE: GAMMA/TEMP/CAL/RSP

COMPANY: OBRIEN & GEERE ENGINEERS			LOCATION:
CLIENT REP: P. Gorl		OPERATOR: OBC	BLOSENSKI LANDFILL
DEPTH DRILLER: 175		COUNTY: Chester	
LOGGER: 175		STATE: PA	DRILLING CO:
ELEVATION:		DRILLING FLUID: Water	DRILLER:
BIT SIZE: 3		WATER LEVEL: 46	DATE LOGGED: July 5, 1990
CASING (FR. LOG): 39			
CASING DIAMETER: 4			

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	TEMPERATURE	46-175	5 Deg F		
2	GAMMA	2-175	100 CPS	2 Sec	Hot
3	CALIPER	39-173	1 in/in		
3	RESISTIVITY	39-175	100 Ohms		
3	S.P.	46-175	100 mV		

EXPANDED ZONES: SCALE: INCH = FOOT

COMMENTS: DATUM IS TOP OF CASING



APPALACHIAN COAL SURVEYS

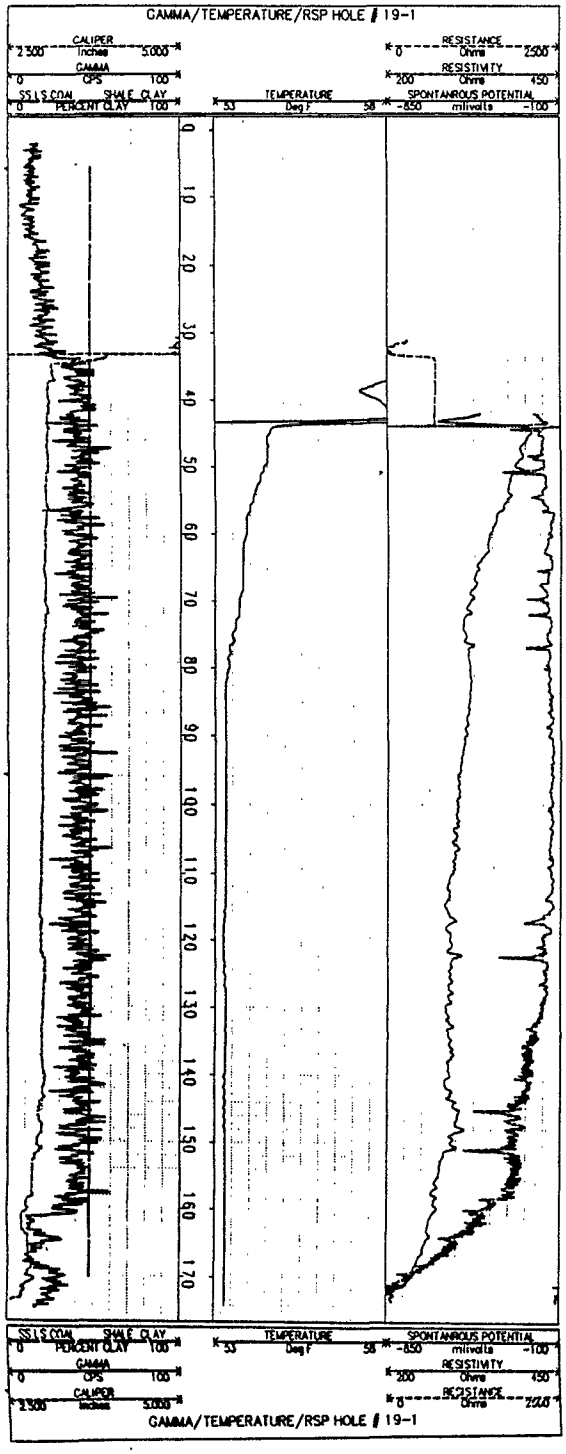
WELL NO: 19-1
LOG SUITE: GAMMA/TEMP/CAL/RSP

COMPANY: OBRIEN & GERE ENGINEERS		LOCATION:
CLIENT REP: P. Carl	OPERATOR: CBC	BLOSENSKI LANDFILL
	COUNTY: Chester	
DEPTH DRILLER: 175	STATE: PA	DRILLING CO:
LOGGER: 174		DRILLER:
ELEVATION:	DRILLING FLUID: Water	DATE LOGGED:
BIT SIZE: 3	WATER LEVEL: 43	July 5, 1990
CASING (FR. LOG): 33		
CASING DIAMETER: 8		

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	TEMPERATURE	43-174	5 Deg F		
2	GAMMA	2-174	100 CPS	2 Sec	Nat
3	CALIPER	33-174	1 in/in		
3	RESISTIVITY	33-174	100 Ohm		
3	SP	43-174	100 mV		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS: DATUM IS TOP OF CASING



APPALACHIAN COAL SURVEYS

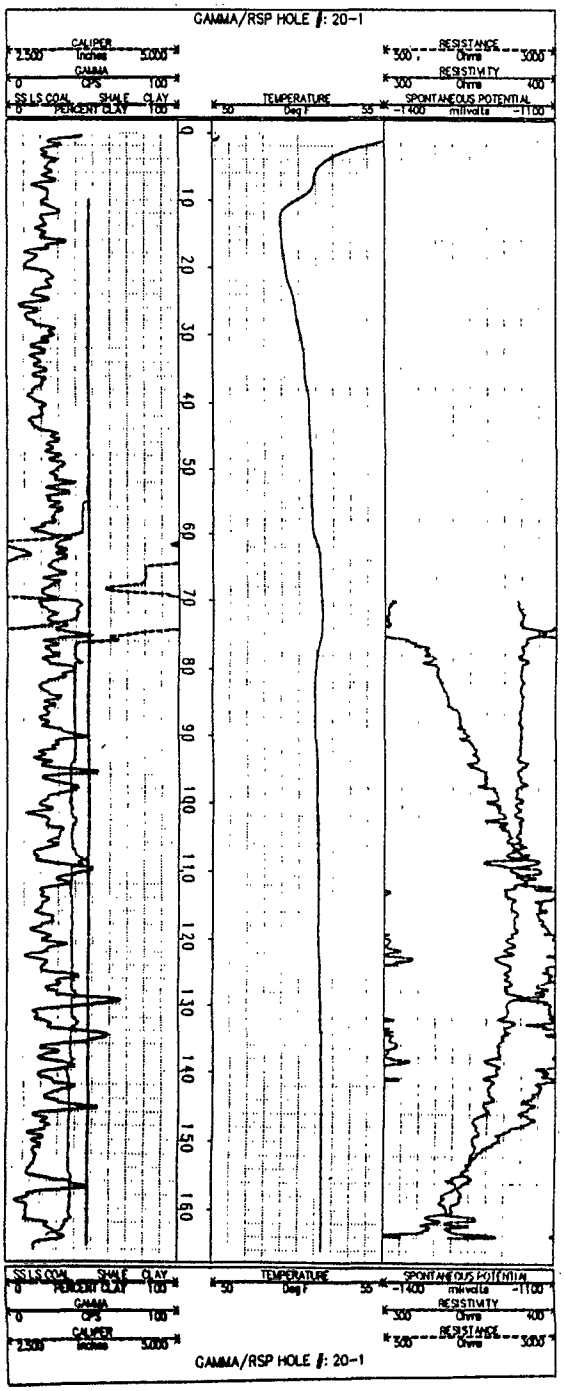
WELL NO: 20 - 1
LOG SUITE: LITHOLOGY

COMPANY: OBRIEN & GERE		LOCATION:
CLIENT REP: P. Carl	OPERATOR: CBC	BOLINSKI LANDFILL
	COUNTY: Lancaster	
DEPTH DRILLER: 175	STATE: PA	DRILLING CO:
LOGGER: 165		DRILLER:
ELEVATION:	DRILLING FLUID: WATER	DATE LOGGED:
BIT SIZE: 3	WATER LEVEL: 12	February 16, 1990
CASING (FR. LOG): 77		
CASING DIAMETER: 8		

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	CALIPER	77-165	1 in/in		
2	NAT. GAMMA	4-165	100 CPS	NATURAL	
2	SP	77-165	100 mV	2 SEC	
1	RESISTANCE	77-165	100 ohm		
	TEMPERATURE	12-165	5 deg F		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS:



AR000356

APPALACHIAN COAL SURVEYS

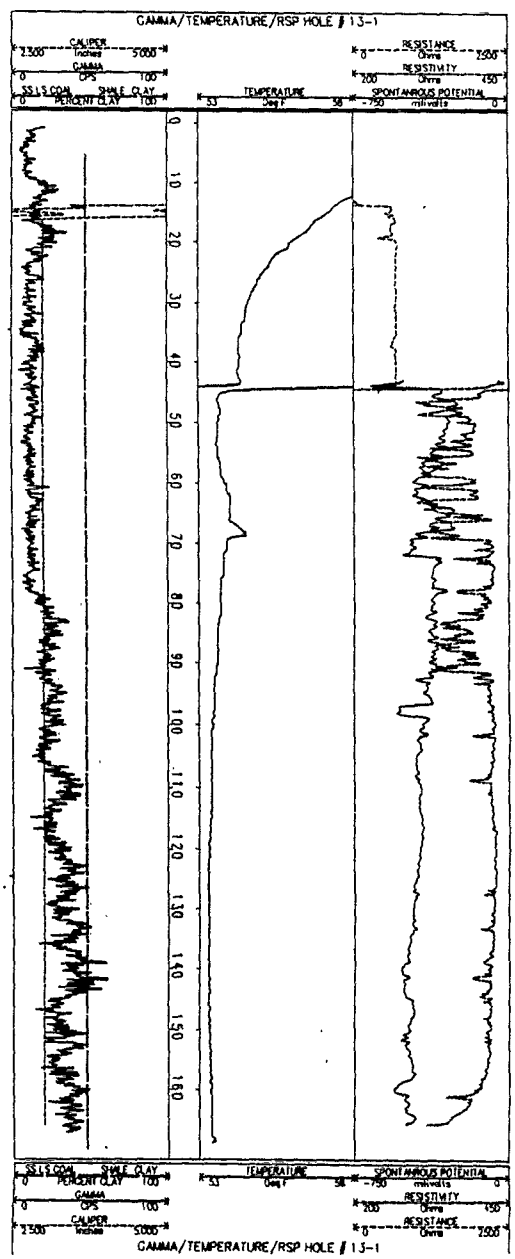
WELL NO: 13-1
LOG SUITE
GAMMA/TEMP/CAL/RSP

COMPANY: OBRIEN & GERE ENGINEERS			LOCATION:
CLIENT REP: P. Carl		OPERATOR: OBG	BOLENSKI LANDFILL
		COUNTY: Chester	
DEPTH DRILLER: 175		STATE: PA	DRILLING CO:
LOGGER: 167			DRILLER:
ELEVATION:		DRILLING FLUID: Water	DATE LOGGED:
BIT SIZE: 3		WATER LEVEL: 44	July 8, 1990
CASING (FR. LOG): 14			
CASING DIAMETER: 8			

RUN #	LOG	INTERVAL	RANGE	SOURCE SPACING
1	TEMPERATURE	44-167	5 Deg F	
2	GAMMA	2-167	100 CPS 2 Sec Inst.	
3	CALIPER	14-167	1 in/in	
3	RESISTIVITY	14-167	100 Ohm	
3	SP	44-167	100 mV	

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS: DATUM IS TOP OF CASING



APPALACHIAN COAL SURVEYS

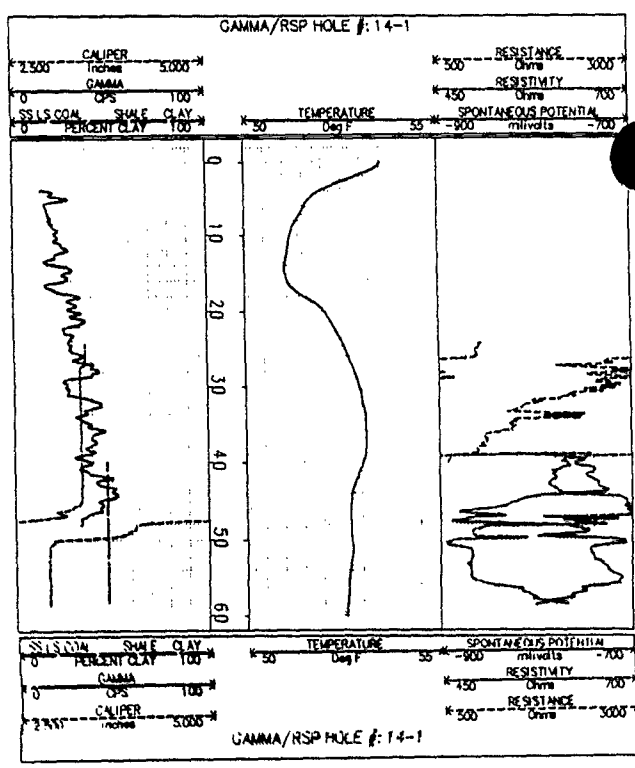
WELL No: 14-1
LOG SUITE
LITHOLOGY

COMPANY: OBRIEN & GERE			LOCATION:
CLIENT REP: P. Carl		OPERATOR: OBG	BOLINSKI LANDFILL
		COUNTY: Lancaster	
DEPTH DRILLER: 175		STATE: PA	DRILLING CO:
LOGGER: 58			DRILLER:
ELEVATION:		DRILLING FLUID: WATER	DATE LOGGED:
BIT SIZE: 3		WATER LEVEL: 36	February 16, 1990
CASING (FR. LOG): 47			
CASING DIAMETER: 8			

RUN #	LOG	INTERVAL	RANGE	SOURCE SPACING
1	CALIPER	47-58	1 in/in	
2	NAT. GAMMA	4-47	100 CPS	NATURAL
2	S.P.	47-58	100 mv 2 SEC	
1	RESISTANCE	47-58	100 ohm	
	TEMPERATURE	39-58	5 deg F	

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS: Borehole caved in at 58 feet in depth



AR000357

APPALACHIAN COAL SURVEYS

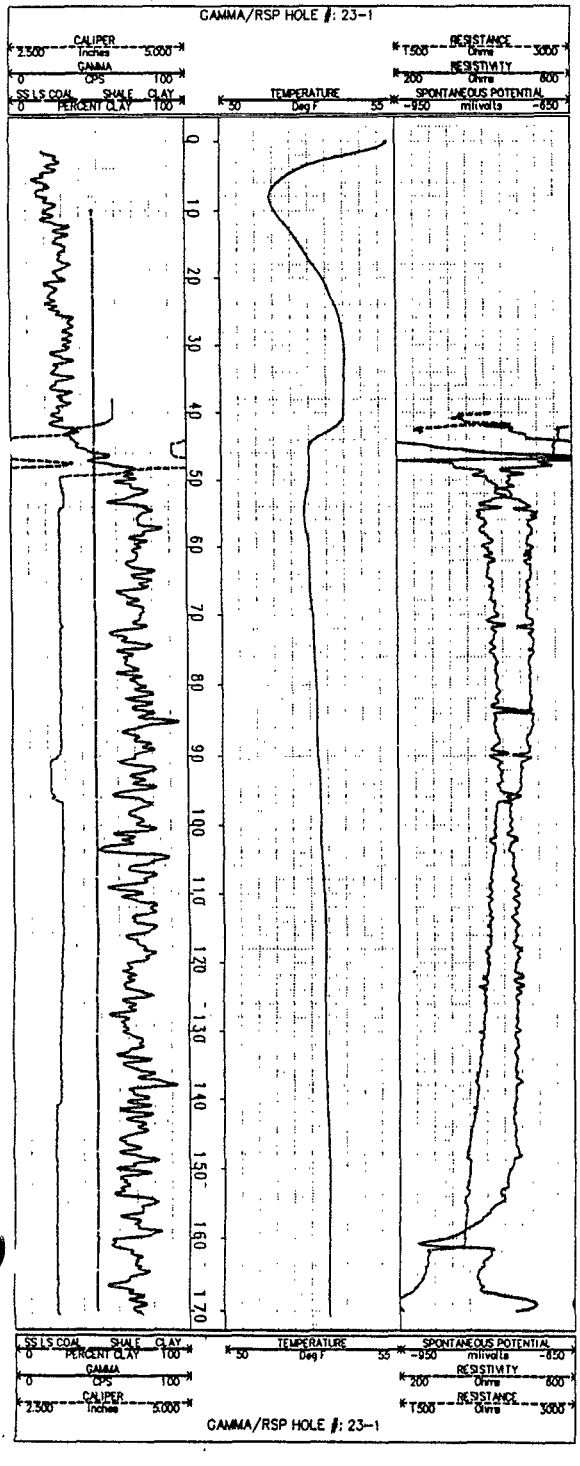
WELL No: 23 - 1
LOG SUITE: LITHOLOGY

COMPANY: OBRIEN & GERE		LOCATION:
CLIENT REP: M. Carl	OPERATOR: CBC	BOLINSKI LANDFILL
DEPTH DRILLER: 175	COUNTY: Lancaster	
LOGGER: 170	STATE: PA	DRILLING CO:
ELEVATION:	DRILLING FLUID: WATER	DRILLER:
BIT SIZE: 3	WATER LEVEL: 43	DATE LOGGED: February 16, 1990
CASING (FR. LOG): 42		
CASING DIAMETER: 6		

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	CALIPER	42-170	1 in/in		
2	NAT. GAMMA	4-170	100 CPS	NATURAL	
2	SP	43-170	100 mv	2 SEC	
1	RESISTANCE	43-170	100 ohm		
	TEMPERATURE	43-170	5 deg F		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS:



APPALACHIAN COAL SURVEYS

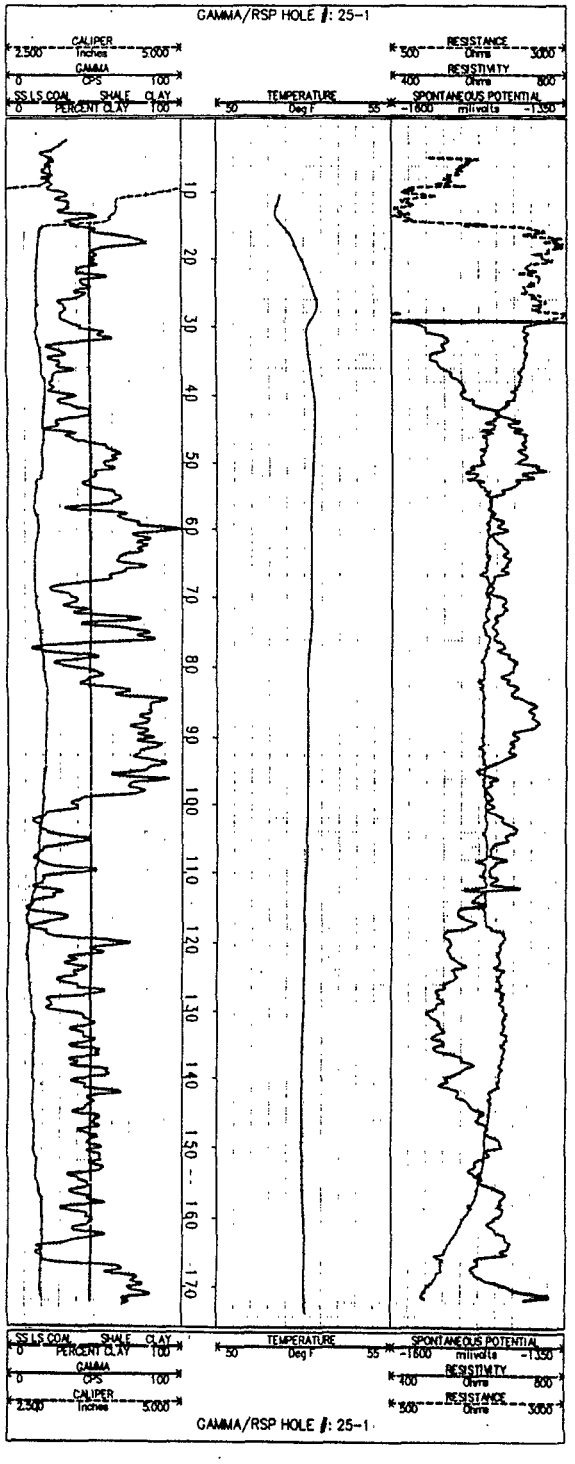
WELL No: 25 - 1
LOG SUITE: LITHOLOGY

COMPANY: OBRIEN & GERE		LOCATION:
CLIENT REP: P. Carl	OPERATOR: CBC	BOLINSKI LANDFILL
DEPTH DRILLER: 175	COUNTY: Lancaster	
LOGGER: 172	STATE: PA	DRILLING CO:
ELEVATION:	DRILLING FLUID: WATER	DRILLER:
BIT SIZE: 3	WATER LEVEL: 29	DATE LOGGED: February 16, 1990
CASING (FR. LOG): 10		
CASING DIAMETER: 6		

RUN #	LOG	INTERVAL	RANGE	SOURCE	SPACING
1	CALIPER	15-172	1 in/in		
2	NAT. GAMMA	4-172	100 CPS	NATURAL	
2	SP	29-172	100 mv	2 SEC	
1	RESISTANCE	15-172	100 ohm		
	TEMPERATURE	29-172	5 deg F		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS:



AR000358

APPALACHIAN COAL SURVEYS

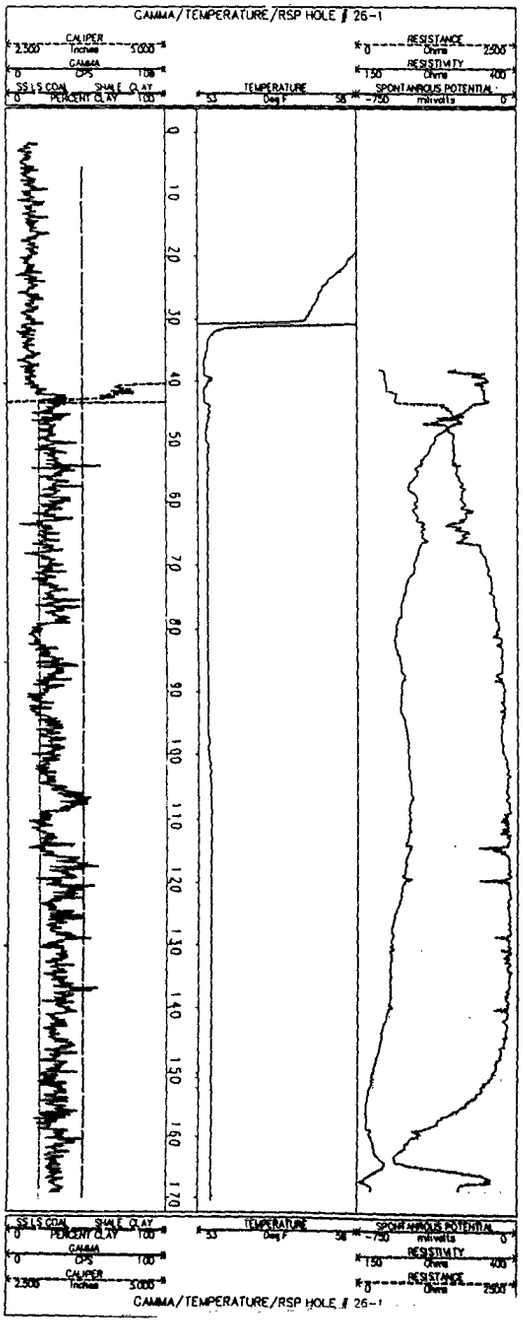
WELL NO: 26-1
LOG SUITE: GAMMA/TEMP/CAL/RSP

COMPANY: OBRIEN & GERE ENGINEERS			LOCATION:
CLIENT REP: P Carl		OPERATOR: GBC	BLOSENSKI LANDFILL
		COUNTY: Chester	
DEPTH DRILLED: 175		STATE: PA	DRILLING CO:
LOGGED: 170			DRILLER:
ELEVATION:		DRILLING FLUID: Water	DATE LOGGED:
BIT SIZE: 3		WATER LEVEL: 31	July 2, 1990
CASING (FT. LOG): 30			
CASING DIAMETER: 8			

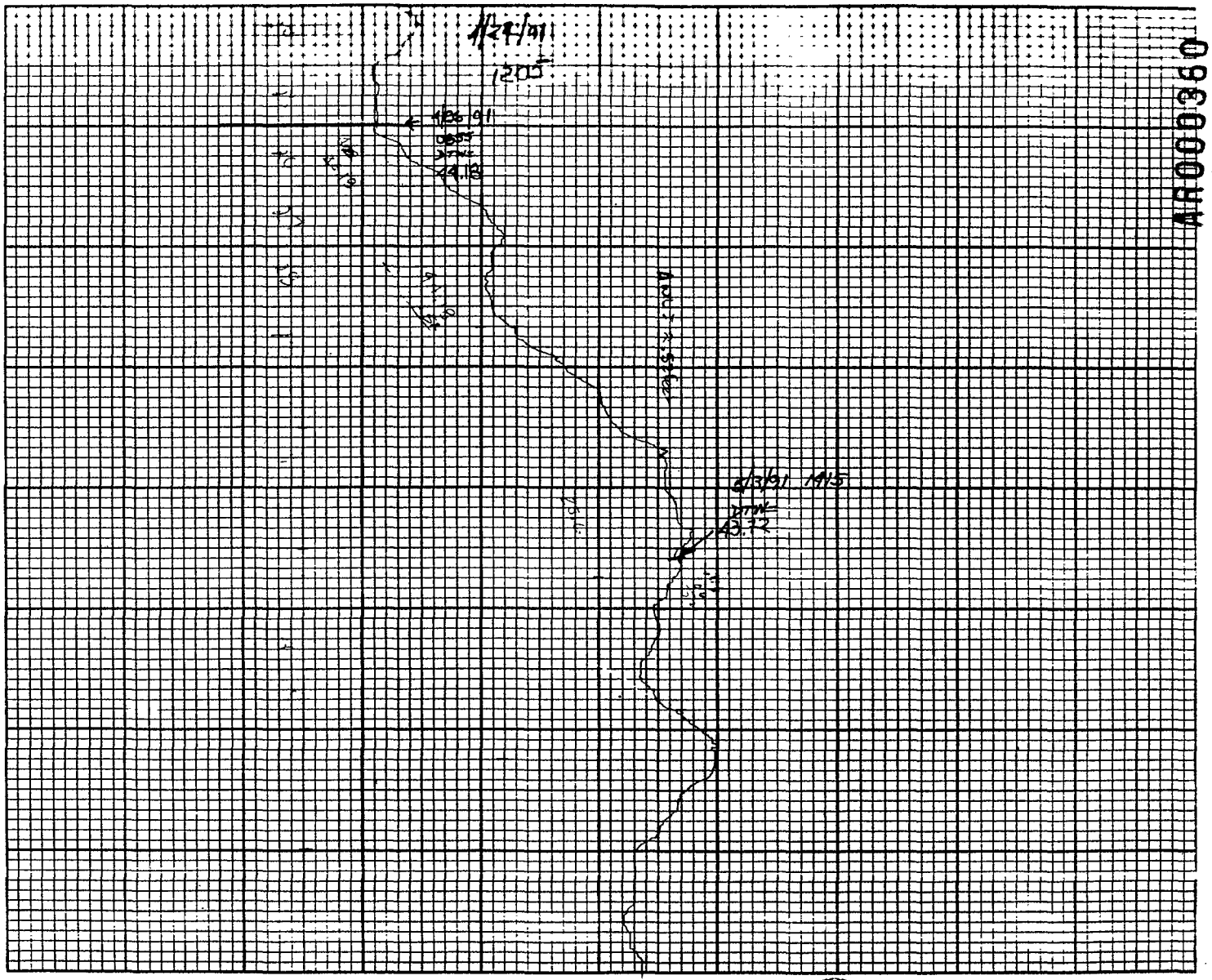
RUN #	LOG	INTERVAL	RANGE	SCALE	SPACING
1	TEMPERATURE	31-170	5 Deg F		
2	GAMMA	2-170	100 CPS	2 Sec	Mid
3	CALIPER	30-170	1 in/in		
3	RESISTIVITY	31-170	100 Ohm		
3	S.P.	31-170	100 mV		

EXPANDED ZONES: SCALE: 1 INCH = 1 FOOT

COMMENTS: DATUM IS TOP OF CASING



AR000359



Stevens Water Level Recorder — Type F

Chart F-1

AR000360

SE1000B
Environmental Logger
10/17 13:34

Unit# 00763 Test# 5

INPUT 1: Level (F) TOC

ence	35.16
factor	30.15
t	0.00

Step# 0 10/17 13:04

Elapsed Time	Value
0.0000	34.97
0.0033	35.01
0.0066	36.07
0.0099	36.55
0.0133	36.74
0.0166	34.15
0.0200	37.90
0.0233	36.88
0.0266	35.95
0.0300	36.19
0.0333	36.86
0.0500	36.67
0.0666	36.61
0.0833	36.55
0.1000	36.49
0.1166	36.44
0.1333	36.39
0.1500	36.35
0.1666	36.31
0.1833	36.25
0.2000	36.21
0.2166	36.16
0.2333	36.11
0.2500	36.09
0.2666	36.05
0.2833	36.00
0.3000	35.97
0.3166	35.94
0.3333	35.91
0.4167	35.78
0.5000	35.71
0.5833	35.71
0.6667	35.70
0.7500	35.69
0.8333	35.70
0.9167	35.70
1.0000	35.71
1.0833	35.72
1.1667	35.73
1.2500	35.74
1.3333	35.74
1.4166	35.75
.5000	35.75
5833	35.75
6667	35.75
.7500	35.76
1.8333	35.76
1.9167	35.76
2.0000	35.76
2.5000	35.75
3.0000	35.75
3.5000	35.74
4.0000	35.74
4.5000	35.73
5.0000	35.72
5.5000	35.71
6.0000	35.71
6.5000	35.70
7.0000	35.68
7.5000	35.68
8.0000	35.67
8.5000	35.66
9.0000	35.66
9.5000	35.65
10.0000	35.65
11.0000	35.64
12.0000	35.62
13.0000	35.62
14.0000	35.62
15.0000	35.60
16.0000	35.59
17.0000	35.58
18.0000	35.57
19.0000	35.57
20.0000	35.56
21.0000	35.56

END

Rising Head

Ready

SE1000B
Environmental Logger
10/17 13:30

Unit# 00763 Test# 4

INPUT 1: Level (F) TOC

Reference	35.16
Scale factor	30.15
Offset	0.00

Step# 0 10/17 12:44

Elapsed Time	Value
0.0000	35.17
0.0033	35.17
0.0066	35.16
0.0099	35.17
0.0133	35.17
0.0166	35.17
0.0200	35.17
0.0233	35.17
0.0266	30.23
0.0300	32.91
0.0333	31.41
0.0500	33.45
0.0666	32.81
0.0833	32.29
0.1000	32.85
0.1166	33.06
0.1333	33.22
0.1500	33.28
0.1666	33.13
0.1833	33.09
0.2000	33.08
0.2166	33.07
0.2333	33.05
0.2500	33.03
0.2666	33.03
0.2833	33.03
0.3000	33.02
0.3166	33.02
0.3333	33.02
0.4167	33.03
0.5000	33.07
0.5833	33.13
0.6667	33.19
0.7500	33.25
0.8333	33.30
0.9167	33.35
1.0000	33.40
1.0833	33.45
1.1667	33.50
1.2500	33.55
1.3333	33.58
1.4166	33.62
1.5000	33.66
1.5833	33.70
1.6667	33.73
1.7500	33.76
1.8333	33.80
1.9167	33.84
2.0000	33.87
2.5000	34.02
3.0000	34.15
3.5000	34.23
4.0000	34.30
4.5000	34.36
5.0000	34.40
5.5000	34.45
6.0000	34.49
6.5000	34.53
7.0000	34.56
7.5000	34.59
8.0000	34.62
8.5000	34.65
9.0000	34.67
9.5000	34.69
10.0000	34.71
11.0000	34.76
12.0000	34.78
13.0000	34.82
14.0000	34.85
15.0000	34.88
16.0000	34.90
17.0000	34.92
18.0000	34.94
19.0000	34.96

END

Falling Head

mw 6-1

Ready

SE1000B
Environmental Logger
10/15 13:50

Unit# 00763 Test# 3

INPUT 1: Level (F) TOC

Reference	52.95
Scale factor	30.15
Offset	0.00

Step# 0 10/15 13:36

Elapsed Time	Value
slug in 0.0000	53.83
0.0033	58.33
0.0066	57.44
0.0099	54.00
0.0133	57.52
0.0166	57.21
0.0200	57.52
0.0233	56.90
0.0266	58.37
0.0300	58.75
slug out 0.0333	59.10
0.0500	58.94
0.0666	58.82
0.0833	58.70
0.1000	58.61
0.1166	58.50
0.1333	58.40
0.1500	58.36
0.1666	58.31
0.1833	58.23
0.2000	58.18
0.2166	58.14
0.2333	58.10
0.2500	57.98
0.2666	57.94
0.2833	57.87
0.3000	57.82
0.3166	57.76
0.3333	57.73
0.4167	57.48
0.5000	57.25
0.5833	57.00
0.6667	56.89
0.7500	56.72
0.8333	56.55
0.9167	56.40
1.0000	56.25
1.0833	56.12
1.1667	55.98
1.2500	55.86
1.3333	55.74
1.4166	55.63
1.5000	55.52
1.5833	55.41
1.6667	55.32
1.7500	55.22
1.8333	55.14
1.9167	55.05
2.0000	54.97
2.5000	54.58
3.0000	54.23
3.5000	53.98
4.0000	53.79
4.5000	53.64
5.0000	53.53
5.5000	53.43
6.0000	53.36
6.5000	53.31
7.0000	53.26
7.5000	53.22
8.0000	53.19
8.5000	53.16
9.0000	53.15
9.5000	53.14
10.0000	53.13
11.0000	53.10
12.0000	53.09
13.0000	53.08
14.0000	53.06

END

Rising Head

Ready

SE1000B
Environmental Logger
10/15 13:33

Unit# 00763 Test# 2

INPUT 1: Level (F) TOC

Reference	52.95
Scale factor	30.15
Offset	0.00

Step# 0 10/15 13:21

Elapsed Time	Value
slug in 0.0000	52.90
0.0033	52.96
0.0066	52.96
0.0099	52.93
0.0133	52.98
0.0166	52.95
0.0200	49.15
0.0233	46.21
0.0266	45.04
0.0300	45.98
0.0333	44.52
0.0500	44.25
slug out 0.0666	44.97
0.0833	47.47
0.1000	48.85
0.1166	47.00
0.1333	47.13
0.1500	47.25
0.1666	47.31
0.1833	47.37
0.2000	47.41
0.2166	46.61
0.2333	47.54
0.2500	47.48
0.2666	47.44
0.2833	47.75
0.3000	47.73
0.3166	47.76
0.3333	47.82
0.4167	48.04
0.5000	48.26
0.5833	48.48
0.6667	48.67
0.7500	48.86
0.8333	49.04
0.9167	49.21
1.0000	49.37
1.0833	49.53
1.1667	49.68
1.2500	49.80
1.3333	49.96
1.4166	50.06
1.5000	50.21
1.5833	50.24
1.6667	50.39
1.7500	50.56
1.8333	50.67
1.9167	50.76
2.0000	50.85
2.5000	51.34
3.0000	51.71
3.5000	52.00
4.0000	52.22
4.5000	52.38
5.0000	52.65
5.5000	52.79
6.0000	52.86
6.5000	52.90
7.0000	52.92
7.5000	52.94
8.0000	52.94
8.5000	52.94
9.0000	52.95
9.5000	52.95
10.0000	52.95
11.0000	52.95

END

Falling Head

mw 13-1

AR000361

SE1000B
Environmental Logger
10/16 10:11

nit# 00763 Test# 3

INPUT 1: Level (F) TOC

Reference	48.90
Scale factor	30.15
Offset	0.00

Step# 0 10/16 09:57

Elapsed Time	Value
0.0000	52.65
0.0033	53.93
0.0066	53.35
0.0099	51.91
0.0133	52.92
0.0166	53.69
0.0200	53.09
0.0233	54.28
0.0266	52.18
0.0300	53.76
0.0333	53.38
0.0500	50.89
0.0666	54.62
slug out 0.0833	54.47
0.1000	54.29
0.1166	54.09
0.1333	53.94
0.1500	53.75
0.1666	53.58
0.1833	53.46
0.2000	53.31
0.2166	53.18
0.2333	53.06
0.2500	52.95
0.2666	52.88
0.2833	52.71
0.3000	52.62
0.3166	52.51
0.3333	52.41
0.4167	51.96
0.5000	51.58
0.5833	51.28
0.6667	51.00
0.7500	50.77
0.8333	50.57
0.9167	50.40
1.0000	50.26
1.0833	50.12
1.1667	50.01
1.2500	49.90
1.3333	49.83
1.4166	49.74
1.5000	49.68
1.5833	49.61
1.6667	49.55
1.7500	49.50
1.8333	49.46
1.9167	49.42
2.0000	49.38
2.5000	49.22
3.0000	49.11
3.5000	49.05
4.0000	49.01
4.5000	48.97
5.0000	48.95
5.5000	48.93
6.0000	48.92
6.5000	48.91
7.0000	48.90
7.5000	48.90
8.0000	48.90
8.5000	48.89
9.0000	48.88
9.5000	48.89
10.0000	48.89
11.0000	48.88

END

Rising Head

Ready

SE1000B
Environmental Logger
10/16 10:09

Unit# 00763 Test# 2

INPUT 1: Level (F) TOC

Reference	48.90
Scale factor	30.15
Offset	0.00

Step# 0 10/16 09:44

Elapsed Time	Value
step 0.0000	48.85
0.0033	48.85
0.0066	48.84
0.0099	48.88
0.0133	48.88
0.0166	48.88
0.0200	48.82
0.0233	48.84
0.0266	48.90
0.0300	48.86
0.0333	48.88
0.0500	48.87
0.0666	48.69
slug in 0.0833	40.20
0.1000	40.63
0.1166	40.81
0.1333	40.82
0.1500	42.99
0.1666	42.44
0.1833	43.85
0.2000	43.33
0.2166	45.52
0.2333	44.36
0.2500	45.07
0.2666	44.45
0.2833	44.93
0.3000	44.99
0.3166	44.52
0.3333	45.57
0.4167	45.70
0.5000	46.01
0.5833	46.33
0.6667	46.61
0.7500	46.84
0.8333	47.06
0.9167	47.23
1.0000	47.38
1.0833	47.52
1.1667	47.64
1.2500	47.74
1.3333	47.85
1.4166	47.92
1.5000	48.00
1.5833	48.07
1.6667	48.12
1.7500	48.18
1.8333	48.22
1.9167	48.27
2.0000	48.31
2.5000	48.49
3.0000	48.58
3.5000	48.65
4.0000	48.70
4.5000	48.73
5.0000	48.75
5.5000	48.77
6.0000	48.79
6.5000	48.80
7.0000	48.81
7.5000	48.81
8.0000	48.82
8.5000	48.82
9.0000	48.83
9.5000	48.83
10.0000	48.83
11.0000	48.83

END

Falling Head

MW 14-1

SE1000B
Environmental Logger
10/17 14:33

Unit# 00763 Test# 7

INPUT 1: Level (F) TOC

Reference	32.26
Scale factor	30.15
Offset	0.00

Step# 0 10/17 14:12

Elapsed Time	Value
0.0000	35.04
0.0033	36.23
0.0066	33.58
0.0099	32.86
0.0133	37.08
0.0166	37.85
0.0200	36.35
0.0233	37.54
0.0266	38.15
0.0300	38.83
0.0333	37.65
0.0500	33.90
0.0666	37.07
0.0833	38.78
0.1000	38.61
0.1166	38.43
0.1333	38.29
0.1500	38.15
0.1666	38.03
0.1833	37.90
0.2000	37.80
0.2166	37.69
0.2333	37.57
0.2500	37.47
0.2666	37.39
0.2833	37.29
0.3000	37.20
0.3166	37.10
0.3333	37.03
0.4167	36.63
0.5000	36.30
0.5833	36.01
0.6667	35.75
0.7500	35.53
0.8333	35.33
0.9167	35.15
1.0000	34.98
1.0833	34.84
1.1667	34.70
1.2500	34.58
1.3333	34.46
1.4166	34.37
1.5000	34.27
1.5833	34.19
1.6667	34.10
1.7500	34.03
1.8333	33.97
1.9167	33.90
2.0000	33.85
2.5000	33.54
3.0000	33.33
3.5000	33.19
4.0000	33.08
4.5000	33.00
5.0000	32.93
5.5000	32.88
6.0000	32.85
6.5000	32.81
7.0000	32.78
7.5000	32.76
8.0000	32.74
8.5000	32.74
9.0000	32.71
9.5000	32.69
10.0000	32.68
11.0000	32.67
12.0000	32.66
13.0000	32.67
14.0000	32.65
15.0000	32.66
16.0000	32.64
17.0000	32.65

END

Rising Head

Ready

SE1000B
Environmental Logger
10/17 14:30

Unit# 00763 Test# 6

INPUT 1: Level (F) TOC

Reference	32.26
Scale factor	30.15
Offset	0.00

Step# 0 10/17 13:57

Elapsed Time	Value
0.0000	28.40
0.0033	29.13
0.0066	28.14
0.0099	26.55
0.0133	25.68
0.0166	25.12
0.0200	24.37
0.0233	23.98
0.0266	23.64
0.0300	23.81
0.0333	24.73
0.0500	23.52
0.0666	23.55
0.0833	23.79
slug in 0.1000	23.94
0.1166	24.15
0.1333	27.41
0.1500	27.19
0.1666	27.26
0.1833	27.43
0.2000	27.50
0.2166	27.52
0.2333	27.68
0.2500	27.77
0.2666	28.77
0.2833	27.76
0.3000	28.03
0.3166	28.07
0.3333	28.14
0.4167	28.48
0.5000	28.79
0.5833	29.06
0.6667	29.30
0.7500	29.52
0.8333	29.72
0.9167	29.90
1.0000	30.06
1.0833	30.22
1.1667	30.36
1.2500	30.48
1.3333	30.60
1.4166	30.70
1.5000	30.81
1.5833	30.89
1.6667	30.98
1.7500	31.06
1.8333	31.13
1.9167	31.20
2.0000	31.26
2.5000	31.56
3.0000	31.77
3.5000	31.93
4.0000	32.05
4.5000	32.14
5.0000	32.22
5.5000	32.27
6.0000	32.31
6.5000	32.35
7.0000	32.38
7.5000	32.41
8.0000	32.43
8.5000	32.45
9.0000	32.46
9.5000	32.47
10.0000	32.48
11.0000	32.50
12.0000	32.53
13.0000	32.55
14.0000	32.54

END

Falling Head

MW 15-1

AR000362

Read

SE1000B
Environmental Logger
10/15 16:55

Unit# 00763 Test# 8

INPUT 1: Level (F) TOC

Reference 38.50
Scale factor 30.15
Offset 0.00

Step# 0 10/15 16:38

Elapsed Time	Value
0.0000	38.09
0.0033	38.09
0.0066	43.90
0.0099	42.58
0.0133	46.98
0.0166	45.02
0.0200	43.09
0.0233	46.69
0.0266	46.41
0.0300	44.92
0.0333	44.97
0.0500	43.18
0.0666	44.45
0.0833	44.73
0.1000	44.74
0.1166	44.67
0.1333	44.63
0.1500	44.53
0.1666	44.57
0.1833	44.53
0.2000	44.50
0.2166	44.59
0.2333	44.53
0.2500	44.42
0.2666	44.38
0.2833	44.42
0.3000	44.38
0.3166	44.34
0.3333	44.32
0.4167	44.21
0.5000	44.11
0.5833	44.02
0.6667	43.92
0.7500	43.84
0.8333	43.74
0.9167	43.66
1.0000	43.57
1.0833	43.49
1.1667	43.40
1.2500	43.31
1.3333	43.24
1.4166	43.15
1.5000	43.08
1.5833	42.99
1.6667	42.91
1.7500	42.84
1.8333	42.76
1.9167	42.69
2.0000	42.61
2.5000	42.19
3.0000	41.79
3.5000	41.44
4.0000	41.10
4.5000	40.80
5.0000	40.51
5.5000	40.26
6.0000	40.03
6.5000	39.80
7.0000	39.59
7.5000	39.41
8.0000	39.25
8.5000	39.10
9.0000	38.98
9.5000	38.88
10.0000	38.77
11.0000	38.62
12.0000	38.58
13.0000	38.4

Rising Head

Ready

SE1000B
Environmental Logger
10/15 16:34

Unit# 00763 Test# 7

INPUT 1: Level (F) TOC

Reference 38.50
Scale factor 30.15
Offset 0.00

Step# 0 10/15 16:16

Elapsed Time	Value
0.0000	38.27
0.0033	38.26
0.0066	38.20
0.0099	38.17
0.0133	38.12
0.0166	24.00
0.0200	29.18
0.0233	27.62
0.0266	28.77
0.0300	28.48
0.0333	31.34
0.0500	28.85
0.0666	28.86
0.0833	28.67
0.1000	28.78
0.1166	28.83
0.1333	28.93
0.1500	43.83
0.1666	32.03
0.1833	34.35
0.2000	31.89
0.2166	31.92
0.2333	31.92
0.2500	31.98
0.2666	32.02
0.2833	32.00
0.3000	32.02
0.3166	32.04
0.3333	32.06
0.4167	32.13
0.5000	32.22
0.5833	32.30
0.6667	32.37
0.7500	32.46
0.8333	32.54
0.9167	32.61
1.0000	32.69
1.0833	32.76
1.1667	32.85
1.2500	32.91
1.3333	32.99
1.4166	33.07
1.5000	33.13
1.5833	33.20
1.6667	33.29
1.7500	33.23
1.8333	33.49
1.9167	33.49
2.0000	33.55
2.5000	33.95
3.0000	34.31
3.5000	34.66
4.0000	34.97
4.5000	35.31
5.0000	35.60
5.5000	35.87
6.0000	36.10
6.5000	36.32
7.0000	36.52
7.5000	36.70
8.0000	36.87
8.5000	37.01
9.0000	37.13
9.5000	37.26
10.0000	37.35
11.0000	37.53
12.0000	37.66
13.0000	37.77
14.0000	37.85
15.0000	37.90
16.0000	37.94
17.0000	37.98

END

Falling Head

mw 16-1

SE1000B
Environmental Logger
10/17 11:31

Unit# 00763 Test# 3

INPUT 1: Level (F) TOC

Reference 73.00
Scale factor 30.15
Offset 0.00

Step# 0 10/17 11:02

Elapsed Time	Value
0.0000	86.26
0.0033	81.39
0.0066	81.11
0.0099	78.59
0.0133	82.12
0.0166	82.23
0.0200	80.94
0.0233	82.95
0.0266	82.11
0.0300	79.70
0.0333	81.70
0.0500	82.01
0.0666	82.19
0.0833	82.19
0.1000	83.34
0.1166	83.19
0.1333	83.15
0.1500	83.27
0.1666	83.09
0.1833	83.08
0.2000	83.06
0.2166	83.02
0.2333	83.01
0.2500	83.02
0.2666	83.01
0.2833	82.99
0.3000	82.98
0.3166	82.98
0.3333	82.94
0.4167	82.91
0.5000	82.88
0.5833	82.84
0.6667	82.81
0.7500	82.79
0.8333	82.77
0.9167	82.75
1.0000	82.73
1.0833	82.70
1.1667	82.69
1.2500	82.66
1.3333	82.65
1.4166	82.62
1.5000	82.61
1.5833	82.59
1.6667	82.58
1.7500	82.55
1.8333	82.54
1.9167	82.51
2.0000	82.51
2.5000	82.39
3.0000	82.30
3.5000	82.20
4.0000	82.12
4.5000	82.03
5.0000	81.96
5.5000	81.87
6.0000	81.79
6.5000	81.72
7.0000	81.64
7.5000	81.57
8.0000	81.49
8.5000	81.42
9.0000	81.36
9.5000	81.29
10.0000	81.22
11.0000	81.10
12.0000	80.99
13.0000	80.86
14.0000	80.76
15.0000	80.66
16.0000	80.57
17.0000	80.48
18.0000	80.39
19.0000	80.30
20.0000	80.21
21.0000	80.13
22.0000	80.05
23.0000	79.99
24.0000	79.92
25.0000	79.86
26.0000	79.80

END

Rising Head

mw 17-1

Ready
Ready

SE1000B
Environmental Logger
10/17 11:29

Unit# 00763 Test# 2

INPUT 1: Level (F) TOC

Reference 73.00
Scale factor 30.15
Offset 0.00

Step# 0 10/17 10:36

Elapsed Time	Value
0.0000	78.37
0.0033	78.34
0.0066	78.33
0.0099	78.30
0.0133	78.27
0.0166	78.38
0.0200	78.37
0.0233	78.35
0.0266	78.31
0.0300	66.25
0.0333	70.18
0.0500	68.92
0.0666	68.88
0.0833	68.78
0.1000	68.80
0.1166	68.76
0.1333	68.88
0.1500	73.42
0.1666	71.80
0.1833	71.78
0.2000	70.04
0.2166	72.33
0.2333	72.51
0.2500	71.65
0.2666	73.06
0.2833	71.96
0.3000	73.35
0.3166	72.46
0.3333	72.20
0.4167	71.97
0.5000	71.93
0.5833	71.94
0.6667	71.98
0.7500	72.00
0.8333	72.02
0.9167	72.07
1.0000	72.08
1.0833	72.12
1.1667	72.15
1.2500	72.16
1.3333	72.20
1.4166	72.22
1.5000	72.25
1.5833	72.28
1.6667	72.29
1.7500	72.34
1.8333	72.35
1.9167	72.38
2.0000	72.40
2.5000	72.55
3.0000	72.69
3.5000	72.82
4.0000	72.96
4.5000	73.08
5.0000	73.20
5.5000	73.32
6.0000	73.43
6.5000	73.55
7.0000	73.66
7.5000	73.77
8.0000	73.88
8.5000	73.97
9.0000	74.07
9.5000	74.17
10.0000	74.26
11.0000	74.44
12.0000	74.63
13.0000	74.80
14.0000	74.98
15.0000	75.11
16.0000	75.26
17.0000	75.42
18.0000	75.55
19.0000	75.67
20.0000	75.80
21.0000	75.90
22.0000	76.01
23.0000	76.14
24.0000	76.22
25.0000	76.31

END

Falling Head

mw 17-1

AR000363

SE1000B
Environmental Logger
10/16 14:48

Unit# 00763 Test# 9

INPUT 1: Level (F) TOC

erence 49.19
le factor 30.15
fset 0.00

Step# 0 10/16 14:30

Elapsed Time	Value
0.0000	48.81
0.0033	48.80
0.0066	49.98
0.0099	57.00
0.0133	54.67
0.0166	52.29
0.0200	52.54
0.0233	51.78
0.0266	51.34
0.0300	51.64
0.0333	51.45
0.0500	54.58
0.0666	55.17
0.0833	55.02
0.1000	54.85
0.1166	54.74
0.1333	54.71
0.1500	54.54
0.1666	54.41
0.1833	54.34
0.2000	54.26
0.2166	54.18
0.2333	54.12
0.2500	53.99
0.2666	53.94
0.2833	53.85
0.3000	53.80
0.3166	53.68
0.3333	53.61
0.4167	53.27
0.5000	52.97
0.5833	52.70
0.6667	52.44
0.7500	52.21
0.8333	52.00
0.9167	51.82
1.0000	51.64
1.0833	51.48
1.1667	51.34
1.2500	51.19
1.3333	51.07
1.4166	50.96
1.5000	50.85
1.5833	50.75
1.6667	50.66
1.7500	50.57
1.8333	50.49
1.9167	50.40
2.0000	50.32
2.5000	49.98
3.0000	49.75
3.5000	49.59
4.0000	49.47
4.5000	49.38
5.0000	49.30
5.5000	49.24
6.0000	49.19
6.5000	49.15
7.0000	49.12
7.5000	49.09
8.0000	49.06
8.5000	49.04
9.0000	49.02
9.5000	49.00
10.0000	48.99
11.0000	48.97
12.0000	48.95
13.0000	48.93
14.0000	48.92

END

Rising Head

mw 18-1

Ready

SE1000B
Environmental Logger
10/16 14:45

Unit# 00763 Test# 8

INPUT 1: Level (F) TOC

Reference 49.19
Scale factor 30.15
Offset 0.00

Step# 0 10/16 14:15

Elapsed Time	Value
0.0000	48.79
0.0033	48.79
0.0066	48.76
0.0099	48.77
0.0133	48.81
0.0166	48.79
0.0200	45.72
0.0233	44.16
0.0266	45.23
0.0300	44.00
0.0333	41.68
0.0500	41.68
0.0666	41.68
0.0833	42.06
0.1000	42.87
0.1166	42.88
0.1333	43.06
0.1500	43.02
0.1666	44.29
0.1833	43.03
0.2000	43.09
0.2166	43.60
0.2333	45.71
0.2500	43.77
0.2666	43.80
0.2833	43.86
0.3000	43.96
0.3166	43.27
0.3333	44.09
0.4167	44.41
0.5000	44.72
0.5833	44.99
0.6667	45.23
0.7500	45.46
0.8333	45.67
0.9167	45.86
1.0000	46.04
1.0833	46.20
1.1667	46.35
1.2500	46.49
1.3333	46.61
1.4166	46.73
1.5000	46.83
1.5833	46.94
1.6667	47.02
1.7500	47.12
1.8333	47.19
1.9167	47.24
2.0000	47.33
2.5000	47.68
3.0000	47.92
3.5000	48.08
4.0000	48.21
4.5000	48.32
5.0000	48.39
5.5000	48.48
6.0000	48.55
6.5000	48.61
7.0000	48.65
7.5000	48.69
8.0000	48.71
8.5000	48.74
9.0000	48.76
9.5000	48.77
10.0000	48.79
11.0000	48.79
12.0000	48.80
13.0000	48.81
14.0000	48.81

END

Falling Head

SE1000B
Environmental Logger
10/16 14:06

Unit# 00763 Test# 7

INPUT 1: Level (F) TOC

Reference 44.05
Scale factor 30.15
Offset 0.00

Step# 0 10/16 13:28

Elapsed Time	Value
0.0000	38.93
0.0033	39.17
0.0066	48.56
0.0099	52.20
0.0133	39.90
0.0166	42.20
0.0200	44.93
0.0233	44.93
0.0266	43.03
0.0300	48.38
0.0333	43.33
0.0500	44.98
0.0666	48.73
0.0833	44.45
0.1000	46.18
0.1166	46.20
0.1333	46.04
0.1500	46.06
0.1666	46.05
0.1833	46.06
0.2000	46.03
0.2166	46.06
0.2333	46.02
0.2500	46.02
0.2666	46.00
0.2833	46.03
0.3000	46.01
0.3166	46.26
0.3333	46.04
0.4167	46.01
0.5000	46.00
0.5833	45.98
0.6667	45.98
0.7500	45.97
0.8333	45.97
0.9167	45.96
1.0000	45.96
1.0833	45.95
1.1667	45.95
1.2500	45.95
1.3333	45.94
1.4166	45.94
1.5000	45.94
1.5833	45.94
1.6667	45.93
1.7500	45.93
1.8333	45.93
1.9167	45.93
2.0000	45.93
2.5000	45.92
3.0000	45.92
3.5000	45.92
4.0000	45.91
4.5000	45.91
5.0000	45.91
5.5000	45.91
6.0000	45.91
6.5000	45.91
7.0000	45.91
7.5000	45.91
8.0000	45.91
8.5000	45.91
9.0000	45.91
9.5000	45.91
10.0000	45.91
11.0000	45.92
12.0000	45.90
13.0000	45.89
14.0000	45.89
15.0000	45.89
16.0000	45.89
17.0000	45.89
18.0000	45.89
19.0000	45.89
20.0000	45.89
21.0000	45.89
22.0000	45.88
23.0000	45.87
24.0000	45.87
25.0000	45.87
26.0000	45.87
27.0000	45.87
28.0000	45.86
29.0000	45.86
30.0000	45.84
31.0000	45.84
32.0000	45.84

END

Rising Head

mw 19-1

Ready

SE1000B
Environmental Logger
10/16 14:00

Unit# 00763 Test# 6

INPUT 1: Level (F) TOC

Reference 44.05
Scale factor 30.15
Offset 0.00

Step# 0 10/16 12:04

Elapsed Time	Value
0.0000	44.16
0.0033	44.16
0.0066	44.15
0.0099	44.16
0.0133	44.15
0.0166	44.15
0.0200	44.14
0.0233	39.79
0.0266	38.53
0.0300	40.88
0.0333	38.07
0.0500	35.13
0.0666	34.64
0.0833	34.52
0.1000	34.65
0.1166	34.35
0.1333	34.68
0.1500	39.45
0.1666	37.62
0.1833	37.45
0.2000	37.47
0.2166	37.54
0.2333	37.55
0.2500	36.31
0.2666	34.32
0.2833	37.65
0.3000	37.39
0.3166	37.51
0.3333	37.53
0.4167	37.53
0.5000	37.54
0.5833	37.52
0.6667	37.53
0.7500	37.60
0.8333	37.56
0.9167	37.57
1.0000	37.58
1.0833	37.59
1.1667	37.60
1.2500	37.60
1.3333	37.60
1.4166	37.61
1.5000	37.62
1.5833	37.62
1.6667	37.62
1.7500	37.63
1.8333	37.64
1.9167	37.64
2.0000	37.64
2.5000	37.66
3.0000	37.69
3.5000	37.71
4.0000	37.73
4.5000	37.75
5.0000	37.76
5.5000	37.78
6.0000	37.79
6.5000	37.81
7.0000	37.82
7.5000	37.84
8.0000	37.85
8.5000	37.85
9.0000	37.87
9.5000	37.88
10.0000	37.89
11.0000	37.92
12.0000	37.94
13.0000	37.97
14.0000	37.99
15.0000	38.01
16.0000	38.04
17.0000	38.05
18.0000	38.07
19.0000	38.10
20.0000	38.12
21.0000	38.14
22.0000	38.16
23.0000	38.18
24.0000	38.20
25.0000	38.22
26.0000	38.24
27.0000	38.25
28.0000	38.27
29.0000	38.29
30.0000	38.31
31.0000	38.34
32.0000	38.36
33.0000	38.38
34.0000	38.41
35.0000	38.42
36.0000	38.45
37.0000	38.46
38.0000	38.48
39.0000	38.50
40.0000	38.52
41.0000	38.55
42.0000	38.58
43.0000	38.59
44.0000	38.60
45.0000	38.63
46.0000	38.65
47.0000	38.67

Falling Head

48.0000	38.70
49.0000	38.72
50.0000	38.73
51.0000	38.76
52.0000	38.78
53.0000	38.80
54.0000	38.82
55.0000	38.83
56.0000	38.85
57.0000	38.86
58.0000	38.88
59.0000	38.89
60.0000	38.91
61.0000	38.93
62.0000	38.95
63.0000	38.97
64.0000	39.00
65.0000	39.01
66.0000	39.03
67.0000	39.05
68.0000	39.06
69.0000	39.08
70.0000	39.10
71.0000	39.11
72.0000	39.12
73.0000	39.13
74.0000	39.14
75.0000	39.16
76.0000	39.16
77.0000	39.16
78.0000	39.16
79.0000	39.16
80.0000	39.18
81.0000	39.20
82.0000	39.22

END

Ready

SE1000B
Environmental Logger
10/12 14:02

Unit# 00763 Test# 4

INPUT 1: Level (F) TOC

ference	5.91
le factor	30.15
set	0.00

Step# 0 10/12 13:21

Elapsed Time	Value
0.0000	11.64
0.0033	11.64
0.0066	11.64
0.0099	11.65
0.0133	11.64
0.0166	11.65
0.0200	11.62
0.0233	11.62
0.0266	11.60
0.0300	11.60
0.0333	11.60
0.0500	12.26
0.0666	12.24
0.0833	11.63
0.1000	11.62
0.1166	11.61
0.1333	11.60
0.1500	11.59
0.1666	11.58
0.1833	11.58
0.2000	11.57
0.2166	11.56
0.2333	11.55
0.2500	11.55
0.2666	11.54
0.2833	11.54
0.3000	11.53
0.3166	11.52
0.3333	11.52
0.4167	11.49
0.5000	11.46
0.5833	11.43
0.6667	11.41
0.7500	11.38
0.8333	11.36
0.9167	11.33
1.0000	11.31
1.0833	11.30
1.1667	11.27
1.2500	11.25
1.3333	11.23
1.4166	11.21
1.5000	11.18
.5833	11.16
.6667	11.14
1.7500	11.12
1.8333	11.10
1.9167	11.09
2.0000	11.07
2.5000	10.95
3.0000	10.85
3.5000	10.73
4.0000	10.64
4.5000	10.53
5.0000	10.44
5.5000	10.35
6.0000	10.26
6.5000	10.17
7.0000	10.09
7.5000	10.00
8.0000	9.92
8.5000	9.84
9.0000	9.76
9.5000	9.69
10.0000	9.62
11.0000	9.48
12.0000	9.34
13.0000	9.22
14.0000	9.10
15.0000	8.97
16.0000	8.86
17.0000	8.75
18.0000	8.67
19.0000	8.57
20.0000	8.47
21.0000	8.39
22.0000	8.30
23.0000	8.23
24.0000	8.15
25.0000	8.08
26.0000	8.00
27.0000	7.94
28.0000	7.88
29.0000	7.81
30.0000	7.75
31.0000	7.70
32.0000	7.64
33.0000	7.59
34.0000	7.54
35.0000	7.50
36.0000	7.46
37.0000	7.41
9.0000	7.36
.0000	7.32
0000	7.30

Rising Head

MW 20-1

Ready

SE1000B
Environmental Logger
10/12 13:16

Unit# 00763 Test# 3

INPUT 1: Level (F) TOC

Reference	5.91
Scale factor	30.15
Offset	0.00

Step# 0 10/12 12:29

Elapsed Time	Value
0.0000	5.93
0.0033	5.93
0.0066	5.94
0.0099	5.94
0.0133	5.94
0.0166	5.95
0.0200	5.94
0.0233	5.93
0.0266	5.95
0.0300	5.93
0.0333	5.94
0.0500	5.96
0.0666	3.91
0.0833	0.68
0.1000	-2.18
0.1166	-1.99
0.1333	-0.92
0.1500	-1.38
0.1666	-1.32
0.1833	-1.86
0.2000	-0.23
0.2166	-2.31
0.2333	2.46
0.2500	-2.37
0.2666	2.91
0.2833	0.38
0.3000	-0.03
0.3166	-0.00
0.3333	-0.02
0.4167	0.10
0.5000	0.10
0.5833	0.13
0.6667	0.15
0.7500	0.18
0.8333	0.21
0.9167	0.24
1.0000	0.27
1.0833	0.29
1.1667	0.31
1.2500	0.34
1.3333	0.37
1.4166	0.39
1.5000	0.42
1.5833	0.44
1.6667	0.47
1.7500	0.50
1.8333	0.51
1.9167	0.53
2.0000	0.56
2.5000	0.70
3.0000	0.82
3.5000	0.95
4.0000	1.08
4.5000	1.18
5.0000	1.30
5.5000	1.48
6.0000	1.58
6.5000	1.68
7.0000	1.69
7.5000	1.77
8.0000	1.86
8.5000	1.93
9.0000	2.01
9.5000	2.09
10.0000	2.15
11.0000	2.29
12.0000	2.41
13.0000	2.53
14.0000	2.67
15.0000	2.78
16.0000	2.88
17.0000	2.99
18.0000	3.09
19.0000	3.18
20.0000	3.28
21.0000	3.36
22.0000	3.45
23.0000	3.52
24.0000	3.61
25.0000	3.69
26.0000	3.75
27.0000	3.82
28.0000	3.89
29.0000	3.95
30.0000	4.02
31.0000	4.08
32.0000	4.12
33.0000	4.18
34.0000	4.24
35.0000	4.29
36.0000	4.33
37.0000	4.38
38.0000	4.43
39.0000	4.47
40.0000	4.51
41.0000	4.55
42.0000	4.59
43.0000	4.63
44.0000	4.67
45.0000	4.70
46.0000	4.73

END

Falling Head

SE1000B
Environmental Logger
10/17 10:22

Unit# 00763 Test# 1

INPUT 1: Level (F) TOC

Reference	73.00
Scale factor	30.15
Offset	0.00

Step# 0 10/17 09:44

Elapsed Time	Value
0.0000	72.46
0.0033	71.85
0.0066	73.22
0.0099	78.79
0.0133	76.41
0.0166	77.10
0.0200	78.80
0.0233	68.85
0.0266	78.30
0.0300	75.59
0.0333	77.67
0.0500	79.34
0.0666	78.35
0.0833	79.29
0.1000	81.68
0.1166	82.35
0.1333	82.33
0.1500	82.29
0.1666	82.25
0.1833	82.21
0.2000	82.19
0.2166	82.19
0.2333	82.15
0.2500	82.11
0.2666	82.13
0.2833	82.08
0.3000	82.10
0.3166	82.07
0.3333	82.04
0.4167	81.99
0.5000	81.90
0.5833	81.80
0.6667	81.77
0.7500	81.69
0.8333	81.60
0.9167	81.55
1.0000	81.49
1.0833	81.43
1.1667	81.38
1.2500	81.32
1.3333	81.26
1.4166	81.21
1.5000	81.16
1.5833	81.10
1.6667	81.05
1.7500	81.00
1.8333	80.95
1.9167	80.92
2.0000	80.85
2.5000	80.57
3.0000	80.30
3.5000	80.03
4.0000	79.79
4.5000	79.55
5.0000	79.31
5.5000	79.09
6.0000	78.88
6.5000	78.68
7.0000	78.48
7.5000	78.29
8.0000	78.10
8.5000	77.93
9.0000	77.75
9.5000	77.59
10.0000	77.42
11.0000	77.13
12.0000	76.82
13.0000	76.56
14.0000	76.34
15.0000	76.11
16.0000	75.88
17.0000	75.68
18.0000	75.50
19.0000	75.33
20.0000	75.18
21.0000	75.02
22.0000	74.90
23.0000	74.76
24.0000	74.64
25.0000	74.53
26.0000	74.42
27.0000	74.33
28.0000	74.24
29.0000	74.16
30.0000	74.08
31.0000	74.00
32.0000	73.94
33.0000	73.88
34.0000	73.82
35.0000	73.78

END

Rising Head

SE1000B
Environmental Logger
10/17 10:25

Unit# 00763 Test# 0

INPUT 1: Level (F) TOC

Reference	73.00
Scale factor	30.15
Offset	0.00

Step# 0 10/17 09:11

Elapsed Time	Value
0.0000	67.39
0.0033	63.71
0.0066	67.07
0.0099	63.02
0.0133	54.38
0.0166	60.74
0.0200	60.06
0.0233	58.40
0.0266	59.13
0.0300	59.34
0.0333	59.09
0.0500	59.06
0.0666	59.01
0.0833	58.83
0.1000	59.00
0.1166	59.13
0.1333	71.97
0.1500	64.17
0.1666	63.52
0.1833	63.49
0.2000	63.50
0.2166	63.55
0.2333	63.66
0.2500	63.62
0.2666	63.61
0.2833	63.63
0.3000	63.65
0.3166	63.66
0.3333	63.67
0.4167	63.73
0.5000	63.80
0.5833	63.85
0.6667	63.93
0.7500	63.99
0.8333	64.05
0.9167	64.12
1.0000	64.18
1.0833	64.23
1.1667	64.30
1.2500	64.36
1.3333	64.42
1.4166	64.48
1.5000	64.54
1.5833	64.60
1.6667	64.65
1.7500	64.71
1.8333	64.76
1.9167	64.82
2.0000	64.88
2.5000	65.17
3.0000	65.51
3.5000	65.80
4.0000	66.08
4.5000	66.35
5.0000	66.60
5.5000	66.85
6.0000	67.08
6.5000	67.31
7.0000	67.53
7.5000	67.74
8.0000	67.94
8.5000	68.13
9.0000	68.31
9.5000	68.49
10.0000	68.66
11.0000	69.00
12.0000	69.29
13.0000	69.57
14.0000	69.82
15.0000	70.07
16.0000	70.29
17.0000	70.52
18.0000	70.71
19.0000	70.88
20.0000	71.05
21.0000	71.19
22.0000	71.35
23.0000	71.48
24.0000	71.60
25.0000	71.71
26.0000	71.81
27.0000	71.90
28.0000	72.00
29.0000	72.08
30.0000	72.16
31.0000	72.22
32.0000	72.28

END

Falling Head

MW 21-1

Ready

SE1000B
Environmental Logger
10/15 11:34

Unit# 00763 Test# 1

INPUT 1: Level (F) TOC

Reference	49.88
Scale factor	38.15
Offset	0.00

Step# 0 10/15 11:22

Elapsed Time	Value
0.0000	52.75
0.0033	52.37
0.0066	53.06
0.0099	53.56
0.0133	52.87
0.0166	53.27
0.0200	52.72
0.0233	52.48
0.0266	53.05
0.0300	52.16
0.0333	51.21
0.0500	52.12
0.0666	52.33
0.0833	54.44
0.1000	54.35
0.1166	53.95
0.1333	53.58
0.1500	53.26
0.1666	52.95
0.1833	52.67
0.2000	52.42
0.2166	52.17
0.2333	51.95
0.2500	51.75
0.2666	51.58
0.2833	51.42
0.3000	51.26
0.3166	51.12
0.3333	51.00
0.4167	50.52
0.5000	50.26
0.5833	50.11
0.6667	50.04
0.7500	50.00
0.8333	49.98
0.9167	49.97
1.0000	49.96
1.0833	49.96
1.1667	49.96
1.2500	49.95
1.3333	49.95
1.4166	49.95
1.5000	49.95
1.5833	49.95
1.6667	49.95
1.7500	49.95
1.8333	49.95
1.9167	49.95
2.0000	49.95
2.5000	49.94
3.0000	49.94
3.5000	49.94
4.0000	49.94
4.5000	49.94
5.0000	49.94
5.5000	49.94
6.0000	49.94
6.5000	49.94
7.0000	49.95
7.5000	49.95
8.0000	49.95
8.5000	49.95
9.0000	49.95
9.5000	49.96
10.0000	49.96
11.0000	49.96

END

Rising Head

SE1000B
Environmental Logger
Repeated 10/15 11:19

Unit# 00763 Test# 0

INPUT 1: Level (F) TOC

Reference	49.88
Scale factor	38.15
Offset	0.00

Step# 0 10/15 11:06

Elapsed Time	Value
0.0000	44.01
0.0033	45.05
0.0066	43.95
0.0099	43.28
0.0133	44.74
0.0166	44.28
0.0200	45.52
0.0233	44.66
0.0266	44.38
0.0300	43.83
0.0333	44.73
0.0500	46.63
0.0666	46.76
0.0833	46.98
0.1000	44.80
0.1166	46.64
0.1333	45.68
0.1500	47.78
0.1666	49.19
0.1833	47.45
0.2000	47.99
0.2166	48.72
0.2333	51.21
0.2500	49.23
0.2666	49.24
0.2833	49.87
0.3000	49.25
0.3166	49.33
0.3333	49.78
0.4167	49.63
0.5000	49.75
0.5833	49.81
0.6667	49.85
0.7500	49.86
0.8333	49.87
0.9167	49.88
1.0000	49.88
1.0833	49.88
1.1667	49.88
1.2500	49.88
1.3333	49.88
1.4166	49.88
1.5000	49.88
1.5833	49.88
1.6667	49.88
1.7500	49.88
1.8333	49.88
1.9167	49.89
2.0000	49.89
2.5000	49.88
3.0000	49.89
3.5000	49.89
4.0000	49.89
4.5000	49.90
5.0000	49.90
5.5000	49.91
6.0000	49.91
6.5000	49.91
7.0000	49.91
7.5000	49.92
8.0000	49.92
8.5000	49.92
9.0000	49.92
9.5000	49.92
10.0000	49.92
11.0000	49.92

END Repeated

Falling Head

Ready
Ready
Ready

SE1000B
Environmental Logger
01/01 01:57

Unit# 00000 Test# 0

INPUT 1: Level (F) TOC

Reference	49.88
Scale factor	38.15
Offset	0.00

Step# 0 01/01 01:39

Elapsed Time	Value
0.0000	48.94
0.0033	48.93
0.0066	48.93
0.0099	48.93
0.0133	48.94
0.0166	48.94
0.0200	48.94
0.0233	48.93
0.0266	48.94
0.0300	48.95
0.0333	48.94
0.0500	37.57
0.0666	36.67
0.0833	34.95
0.1000	38.29
0.1166	35.57
0.1333	37.16
0.1500	37.59
0.1666	36.89
0.1833	38.35
0.2000	38.25
0.2166	39.48
0.2333	38.97
0.2500	39.21
0.2666	39.39
0.2833	39.55
0.3000	39.52
0.3166	41.45
0.3333	39.88
0.4167	40.48
0.5000	40.66
0.5833	40.79
0.6667	40.86
0.7500	40.88
0.8333	40.90
0.9167	40.91
1.0000	40.91
1.0833	40.92
1.1667	40.92
1.2500	40.92
1.3333	40.92
1.4166	40.92
1.5000	40.92
1.5833	40.92
1.6667	40.92
1.7500	40.93
1.8333	40.92
1.9167	40.93
2.0000	40.92
2.5000	40.91
3.0000	40.91
3.5000	40.91
4.0000	40.91
4.5000	40.91
5.0000	40.91
5.5000	40.91
6.0000	40.91
6.5000	40.91
7.0000	40.91
7.5000	40.91
8.0000	40.91
8.5000	40.91
9.0000	40.91
9.5000	40.91
10.0000	40.91
11.0000	40.91
12.0000	40.91
13.0000	40.91
14.0000	40.91
15.0000	40.93
16.0000	40.91
17.0000	40.91

END

[redacted] Falling Head

MW 22-1

SE10000
Environmental Logger
10/12 11:37

Unit# 00763 Test# 1

INPUT 1:	Level (F)	TOC (stick)
Reference		49.13
Scale factor		30.15
Offset		0.00

Step# 0 10/12 11:26

Elapsed Time	Value
0.0000	51.50
0.0033	49.47
0.0066	50.53
0.0099	51.75
0.0133	52.29
0.0166	51.92
0.0200	52.48
0.0233	50.38
0.0266	54.72
0.0300	55.68
0.0333	55.18
0.0500	55.69
0.0666	55.58
0.0833	55.55
0.1000	55.23
0.1166	55.12
0.1333	55.00
0.1500	54.91
0.1666	54.82
0.1833	54.72
0.2000	54.62
0.2166	54.52
0.2333	54.45
0.2500	54.36
0.2666	54.27
0.2833	54.18
0.3000	54.11
0.3166	54.02
0.3333	53.93
0.4167	53.55
0.5000	53.20
0.5833	52.87
0.6667	52.58
0.7500	52.30
0.8333	52.04
0.9167	51.84
1.0000	51.61
1.0833	51.40
1.1667	51.21
1.2500	51.02
1.3333	50.86
1.4166	50.71
1.5000	50.56
1.5833	50.43
1.6667	50.31
1.7500	50.19
1.8333	50.10
1.9167	50.00
2.0000	49.92
2.5000	49.55
3.0000	49.34
3.5000	49.25
4.0000	49.20
4.5000	49.18
5.0000	49.16
5.5000	49.15
6.0000	49.15
6.5000	49.15
7.0000	49.14
7.5000	49.14
8.0000	49.14
8.5000	49.14
9.0000	49.14
9.5000	49.13

END

Rising Head

MW 23-1
Falling Head

SE10000
Environmental Logger
10/12 12:00

Unit# 00763 Test# 2

INPUT 1:	Level (F)	TOC
Reference		49.13
Scale factor		30.15
Offset		0.00

Step# 0 10/12 11:48

Elapsed Time	Value
0.0000	49.13
0.0033	49.14
0.0066	49.13
0.0099	49.12
0.0133	47.86
0.0166	46.44
0.0200	44.17
0.0233	43.97
0.0266	43.05
0.0300	42.30
0.0333	44.30
0.0500	44.24
0.0666	40.36
0.0833	40.18
0.1000	40.39
0.1166	40.37
0.1333	40.45
0.1500	40.73
0.1666	42.13
0.1833	44.44
0.2000	44.06
0.2166	43.85
0.2333	44.07
0.2500	44.13
0.2666	44.12
0.2833	44.21
0.3000	44.73
0.3166	44.43
0.3333	44.45
0.4167	44.87
0.5000	45.20
0.5833	45.52
0.6667	45.81
0.7500	46.08
0.8333	46.33
0.9167	46.57
1.0000	46.79
1.0833	46.99
1.1667	47.17
1.2500	47.35
1.3333	47.52
1.4166	47.66
1.5000	47.79
1.5833	47.92
1.6667	48.03
1.7500	48.13
1.8333	48.24
1.9167	48.33
2.0000	48.40
2.5000	48.74
3.0000	48.93
3.5000	49.02
4.0000	49.06
4.5000	49.09
5.0000	49.10
5.5000	49.11
6.0000	49.11
6.5000	49.12
7.0000	49.12
7.5000	49.12
8.0000	49.12
8.5000	49.12
9.0000	49.12
9.5000	49.12
10.0000	49.12

END

Falling Head

mw 23-1

Ready

SE10000
Environmental Logger
10/15 14:21

Unit# 00763 Test# 4

INPUT 1:	Level (F)	TOC
Reference		46.86
Scale factor		30.15
Offset		0.00

Step# 0 10/15 14:04
Step# 0 10/15 14:42

Elapsed Time	Value
0.0000	43.98
0.0033	44.03
0.0066	43.99
0.0099	44.78
0.0133	45.47
0.0166	44.13
0.0200	44.96
0.0233	46.41
0.0266	45.26
0.0300	46.04
0.0333	46.78
0.0500	46.47
0.0666	47.08
0.0833	48.37
0.1000	49.12
0.1166	47.51
0.1333	49.25
0.1500	50.38
0.1666	50.26
0.1833	50.21
0.2000	50.15
0.2166	50.08
0.2333	50.05
0.2500	49.99
0.2666	49.98
0.2833	49.96
0.3000	49.95
0.3166	49.93
0.3333	49.92
0.4167	49.84
0.5000	49.80
0.5833	49.75
0.6667	49.72
0.7500	49.70
0.8333	49.67
0.9167	49.64
1.0000	49.62
1.0833	49.60
1.1667	49.58
1.2500	49.56
1.3333	49.55
1.4166	49.55
1.5000	49.53
1.5833	49.51
1.6667	49.49
1.7500	49.47
1.8333	49.45
1.9167	49.44
2.0000	49.43
2.5000	49.36
3.0000	49.30
3.5000	49.24
4.0000	49.18
4.5000	49.14
5.0000	49.09
5.5000	49.04
6.0000	49.00
6.5000	48.95
7.0000	48.92
7.5000	48.88
8.0000	48.84
8.5000	48.80
9.0000	48.76
9.5000	48.74
10.0000	48.70
11.0000	48.64
12.0000	48.57
13.0000	48.52
14.0000	48.47
15.0000	48.42
16.0000	48.36
17.0000	48.32
18.0000	48.27
19.0000	48.23
20.0000	48.18
21.0000	48.15
22.0000	48.11
23.0000	48.07
24.0000	48.03
25.0000	48.00
26.0000	47.96
27.0000	47.94
28.0000	47.91
29.0000	47.88
30.0000	47.85
31.0000	47.82
32.0000	47.79
33.0000	47.76
34.0000	47.73

END

Rising Head

Ready

SE10000
Environmental Logger
10/15 15:50

Unit# 00763 Test# 6

INPUT 1:	Level (F)	TOC
Reference		47.70
Scale factor		30.15
Offset		0.00

Step# 0 10/15 15:10

Elapsed Time	Value
0.0000	47.68
0.0033	47.70
0.0066	47.70
0.0099	47.70
0.0133	47.70
0.0166	47.70
0.0200	47.69
0.0233	47.69
0.0266	47.72
0.0300	47.72
0.0333	47.70
0.0500	47.70
0.0666	47.72
0.0833	38.98
0.1000	38.56
0.1166	38.75
0.1333	38.76
0.1500	38.67
0.1666	38.81
0.1833	39.01
0.2000	42.95
0.2166	41.79
0.2333	41.83
0.2500	41.84
0.2666	42.02
0.2833	41.80
0.3000	41.87
0.3166	41.88
0.3333	41.89
0.4167	41.92
0.5000	41.95
0.5833	41.98
0.6667	42.01
0.7500	42.04
0.8333	42.07
0.9167	42.10
1.0000	42.11
1.0833	42.14
1.1667	42.16
1.2500	42.18
1.3333	42.20
1.4166	42.21
1.5000	42.23
1.5833	42.25
1.6667	42.27
1.7500	42.29
1.8333	42.30
1.9167	42.32
2.0000	42.33
2.5000	42.43
3.0000	42.50
3.5000	42.58
4.0000	42.65
4.5000	42.71
5.0000	42.79
5.5000	42.85
6.0000	42.91
6.5000	42.97
7.0000	43.03
7.5000	43.09
8.0000	43.13
8.5000	43.19
9.0000	43.24
9.5000	43.30
10.0000	43.34
11.0000	43.45
12.0000	43.54
13.0000	43.63
14.0000	43.71
15.0000	43.80
16.0000	43.89
17.0000	43.95
18.0000	44.03
19.0000	44.10
20.0000	44.17
21.0000	44.24
22.0000	44.31
23.0000	44.37
24.0000	44.44
25.0000	44.50
26.0000	44.55
27.0000	44.61
28.0000	44.67
29.0000	44.71
30.0000	44.77
31.0000	44.82
32.0000	44.88
33.0000	44.91
34.0000	44.96
35.0000	45.01
36.0000	45.05
37.0000	45.10
38.0000	45.14
39.0000	45.18

END

Falling Head

mw 24-1

Ready

SE1000B
Environmental Logger
10/16 11:10

Unit# 00763 Test# 5

INPUT 1: Level (F) TOC

Reference 43.20
Scale factor 30.15
Offset 0.00

Step# 0 10/16 10:48

Elapsed Time	Value
0.0000	43.21
0.0033	43.28
0.0066	48.14
0.0099	52.16
0.0133	51.57
0.0166	49.65
0.0200	51.49
0.0233	55.46
0.0266	54.95
0.0300	46.23
slug out 0.0333	56.01
0.0500	58.16
0.0666	49.93
0.0833	49.96
0.1000	49.85
0.1166	49.79
0.1333	49.79
0.1500	49.76
0.1666	49.67
0.1833	49.71
0.2000	49.70
0.2166	49.64
0.2333	49.63
0.2500	49.61
0.2666	49.60
0.2833	49.58
0.3000	49.56
0.3166	49.55
0.3333	49.53
0.4167	49.42
0.5000	49.35
0.5833	49.26
0.6667	49.19
0.7500	49.12
0.8333	49.03
0.9167	48.97
1.0000	48.90
1.0833	48.81
1.1667	48.76
1.2500	48.68
1.3333	48.61
1.4166	48.55
1.5000	48.48
1.5833	48.41
1.6667	48.35
1.7500	48.29
1.8333	48.22
1.9167	48.16
2.0000	48.10
2.5000	47.74
3.0000	47.41
3.5000	47.12
4.0000	46.83
4.5000	46.57
5.0000	46.33
5.5000	46.11
6.0000	45.90
6.5000	45.72
7.0000	45.54
7.5000	45.37
8.0000	45.22
8.5000	45.08
9.0000	44.96
9.5000	44.84
10.0000	44.73
11.0000	44.54
12.0000	44.38
13.0000	44.22
14.0000	44.11
15.0000	44.00
16.0000	43.93
17.0000	43.86
18.0000	43.79
19.0000	43.74
20.0000	43.70

END

Rising Head

Ready
Ready

SE1000B
Environmental Logger
10/16 10:43

Unit# 00763 Test# 4

INPUT 1: Level (F) TOC
43.46
Reference
Scale factor 30.15
Offset 0.00

Step# 0 10/16 10:27

Elapsed Time	Value
start 0.0000	41.48
0.0033	41.47
0.0066	41.47
0.0099	41.45
0.0133	41.52
0.0166	41.46
0.0200	41.46
0.0233	41.42
0.0266	41.41
0.0300	41.41
0.0333	38.38
0.0500	33.19
0.0666	32.06
slug in 0.0833	31.95
0.1000	31.98
0.1166	32.11
0.1333	32.67
0.1500	35.60
0.1666	34.16
0.1833	35.58
0.2000	34.82
0.2166	35.04
0.2333	34.47
0.2500	34.84
0.2666	35.25
0.2833	35.06
0.3000	36.65
0.3166	35.61
0.3333	35.34
0.4167	35.42
0.5000	35.44
0.5833	35.51
0.6667	35.60
0.7500	35.68
0.8333	35.75
0.9167	35.78
1.0000	35.91
1.0833	35.99
1.1667	36.07
1.2500	36.14
1.3333	36.23
1.4166	36.30
1.5000	36.37
1.5833	36.45
1.6667	36.51
1.7500	36.59
1.8333	36.65
1.9167	36.71
2.0000	36.78
2.5000	37.17
3.0000	37.53
3.5000	37.86
4.0000	38.15
4.5000	38.44
5.0000	38.70
5.5000	38.93
6.0000	39.15
6.5000	39.36
7.0000	39.54
7.5000	39.72
8.0000	39.88
8.5000	40.02
9.0000	40.15
9.5000	40.28
10.0000	40.38
11.0000	40.59
12.0000	40.76
13.0000	40.90
14.0000	41.03
15.0000	41.12

END

Falling Head

mw25-1

Ready

SE1000B
Environmental Logger
10/16 09:27

Unit# 00763 Test# 1

INPUT 1: Level (F) TOC

Reference 36.46
Scale factor 30.15
Offset 0.00

Step# 0 10/16 08:59

Elapsed Time	Value
start 0.0000	36.25
0.0033	36.25
0.0066	36.26
0.0099	36.26
0.0133	36.26
0.0166	36.26
0.0200	36.25
0.0233	36.26
0.0266	36.27
0.0300	36.26
0.0333	36.26
0.0500	41.28
0.0666	42.03
0.0833	42.40
0.1000	43.39
0.1166	42.10
0.1333	41.57
slug out 0.1500	43.15
0.1666	43.02
0.1833	42.95
0.2000	42.88
0.2166	42.85
0.2333	42.88
0.2500	42.83
0.2666	42.81
0.2833	42.81
0.3000	42.83
0.3166	42.78
0.3333	42.75
0.4167	42.67
0.5000	42.63
0.5833	42.56
0.6667	42.50
0.7500	42.45
0.8333	42.40
0.9167	42.35
1.0000	42.30
1.0833	42.25
1.1667	42.20
1.2500	42.15
1.3333	42.10
1.4166	42.05
1.5000	42.01
1.5833	41.96
1.6667	41.91
1.7500	41.87
1.8333	41.83
1.9167	41.78
2.0000	41.73
2.5000	41.48
3.0000	41.24
3.5000	41.01
4.0000	40.79
4.5000	40.59
5.0000	40.39
5.5000	40.21
6.0000	40.03
6.5000	39.86
7.0000	39.70
7.5000	39.55
8.0000	39.41
8.5000	39.27
9.0000	39.14
9.5000	39.02
10.0000	38.90
11.0000	38.66
12.0000	38.48
13.0000	38.29
14.0000	38.14
15.0000	37.99
16.0000	37.86
17.0000	37.74
18.0000	37.64
19.0000	37.55
20.0000	37.46
21.0000	37.37
22.0000	37.30
23.0000	37.25
24.0000	37.18
25.0000	37.12
26.0000	37.07
27.0000	37.03
28.0000	36.99

END

Rising Head

SE1000B
Environmental Logger
10/16 08:56

Unit# 00763 Test# 0

INPUT 1: Level (F) TOC

Reference 36.46
Scale factor 30.15
Offset 0.00

Step# 0 10/16 08:27

Elapsed Time	Value
start 0.0000	36.45
0.0033	36.45
0.0066	36.45
0.0099	36.43
0.0133	36.43
0.0166	36.44
0.0200	36.46
0.0233	36.43
0.0266	36.42
0.0300	36.40
0.0333	36.36
slug in 0.0500	30.59
0.0666	27.74
0.0833	27.07
0.1000	27.01
0.1166	26.95
0.1333	27.04
0.1500	26.80
0.1666	26.91
0.1833	27.14
0.2000	29.36
0.2166	28.45
0.2333	30.66
0.2500	29.76
0.2666	30.09
0.2833	29.95
0.3000	30.02
0.3166	29.76
0.3333	30.11
0.4167	30.07
0.5000	30.19
0.5833	30.24
0.6667	30.28
0.7500	30.34
0.8333	30.39
0.9167	30.45
1.0000	30.50
1.0833	30.55
1.1667	30.61
1.2500	30.66
1.3333	30.71
1.4166	30.75
1.5000	30.81
1.5833	30.86
1.6667	30.90
1.7500	30.95
1.8333	31.00
1.9167	31.05
2.0000	31.09
2.5000	31.37
3.0000	31.63
3.5000	31.87
4.0000	32.11
4.5000	32.33
5.0000	32.54
5.5000	32.74
6.0000	32.93
6.5000	33.11
7.0000	33.28
7.5000	33.45
8.0000	33.60
8.5000	33.74
9.0000	33.88
9.5000	34.02
10.0000	34.14
11.0000	34.37
12.0000	34.59
13.0000	34.79
14.0000	34.96
15.0000	35.11
16.0000	35.25
17.0000	35.37
18.0000	35.48
19.0000	35.58
20.0000	35.67
21.0000	35.74
22.0000	35.82
23.0000	35.88
24.0000	35.93
25.0000	35.99
26.0000	36.03

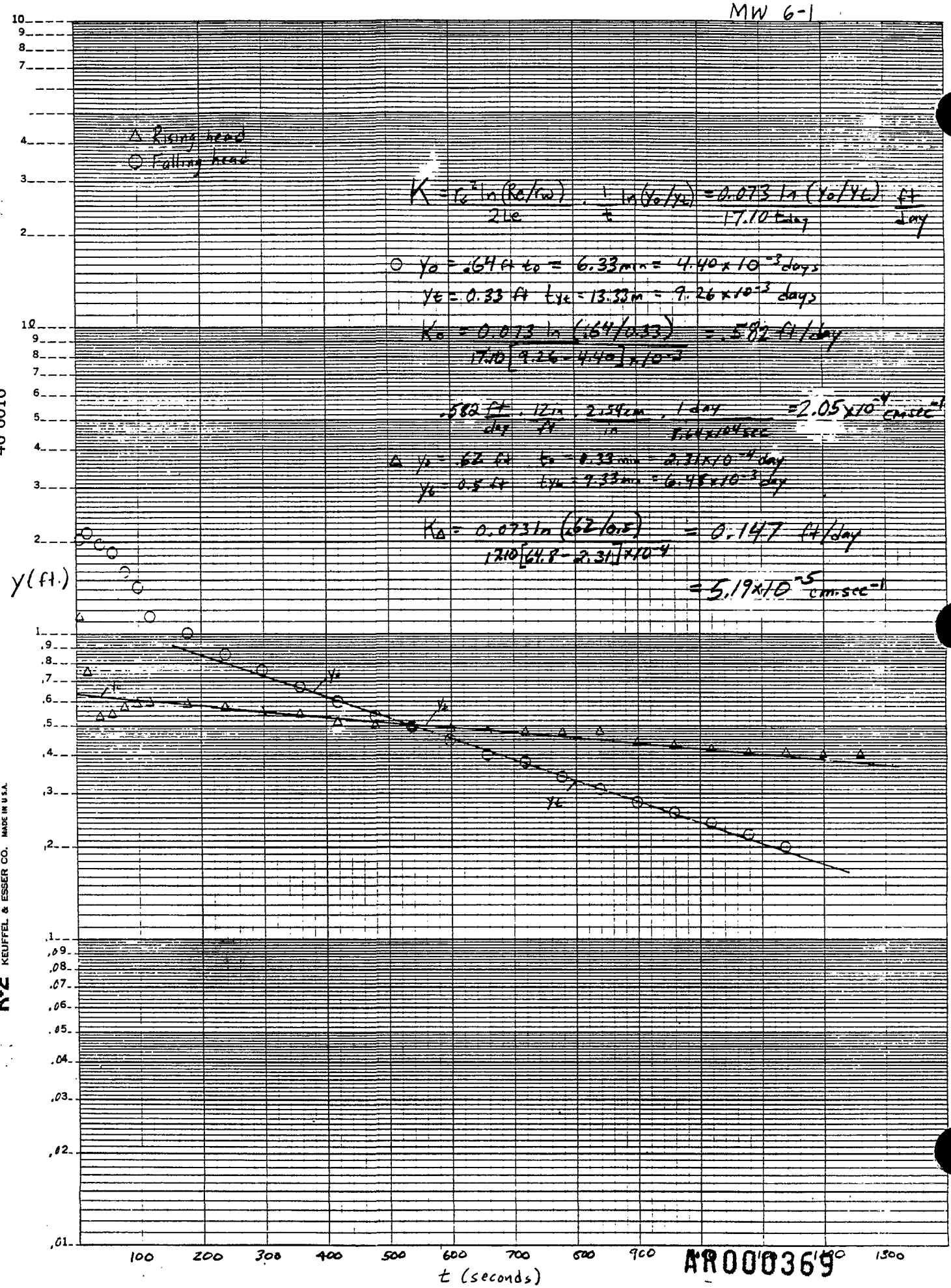
END

Falling Head

mw26-1

AR000368

MW 6-1



$$K = \frac{r_c^2 \ln(Re/r_w)}{2Le} \cdot \frac{1}{t} \ln(y_o/y_t) = \frac{0.073 \ln(y_o/y_t)}{17.10\, t_{day}} \frac{ft}{day}$$

○ $y_o = .64$ ft $t_o = 6.33$ min $= 4.40 \times 10^{-3}$ days

$y_t = 0.33$ ft $t_{y_t} = 13.33$ m $= 9.26 \times 10^{-3}$ days

$$K_o = \frac{0.073 \ln(.64/0.33)}{17.10[9.26 - 4.40]\times 10^{-3}} = .582 \text{ ft/day}$$

$$.582 \frac{ft}{day} \cdot \frac{12 in}{ft} \cdot \frac{2.54 cm}{in} \cdot \frac{1 day}{8.64\times 10^4 sec} = 2.05 \times 10^{-4} cm\,sec^{-1}$$

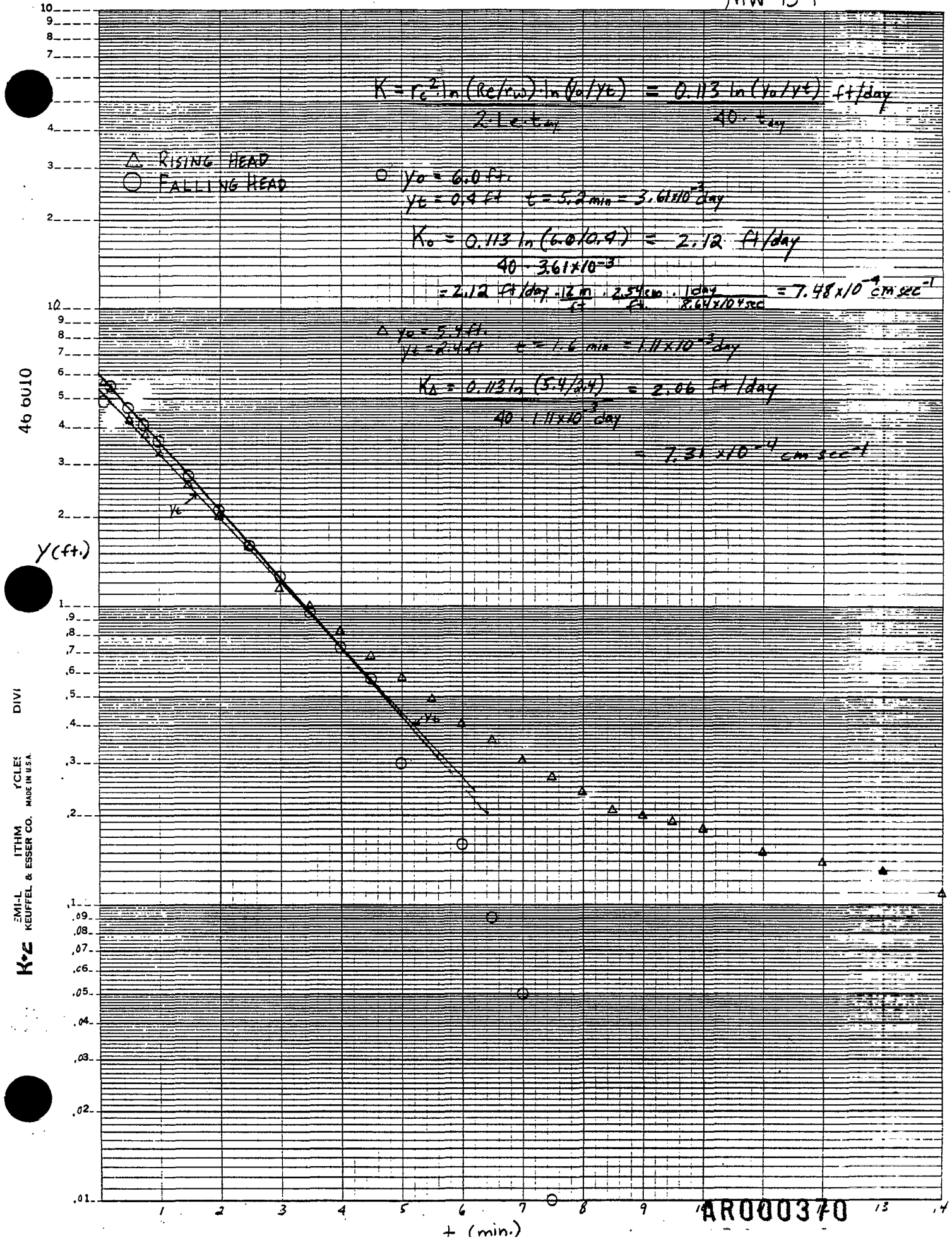
△ $y_o = .62$ ft $t_o = 8.33$ min $= 2.31 \times 10^{-4}$ day

$y_t = 0.5$ ft $t_{y_t} = 9.33$ min $= 6.48 \times 10^{-3}$ day

$$K_\Delta = \frac{0.073 \ln(.62/0.5)}{1210[64.8 - 2.31]\times 10^{-4}} = 0.147 \text{ ft/day}$$

$$= 5.19 \times 10^{-5} cm\,sec^{-1}$$

MW 13-1



$$K = \frac{r_c^2 \ln(Re/r_w) \cdot \ln(y_o/y_t)}{2 L e \cdot t_{day}} = \frac{0.113 \ln(y_o/y_t)}{40 \cdot t_{day}} \text{ ft/day}$$

○ $y_o = 6.0$ ft.
$y_t = 0.4$ ft $\quad t = 5.2 \text{ min} = 3.61 \times 10^{-3}$ day

$$K_o = \frac{0.113 \ln(6.0/0.4)}{40 \cdot 3.61 \times 10^{-3}} = 2.12 \text{ ft/day}$$

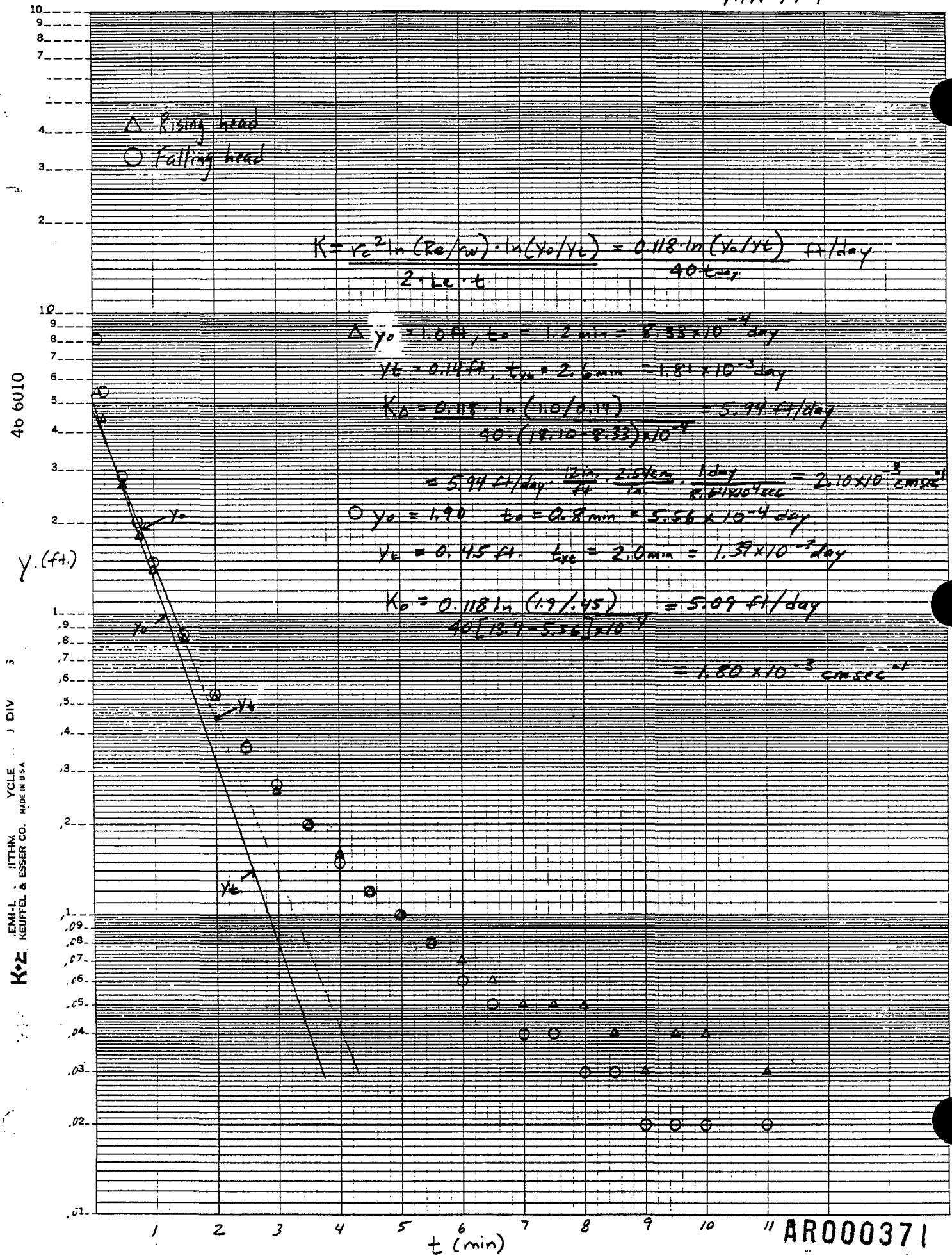
$$= 2.12 \text{ ft/day} \cdot \frac{12 \text{ in}}{\text{ft}} \cdot \frac{2.54 \text{ cm}}{\text{in}} \cdot \frac{1 \text{ day}}{8.64 \times 10^4 \text{ sec}} = 7.48 \times 10^{-4} \text{ cm sec}^{-1}$$

△ $y_o = 5.4$ ft.
$y_t = 2.4$ ft $\quad t = 1.6 \text{ min} = 1.11 \times 10^{-3}$ day

$$K_\Delta = \frac{0.113 \ln(5.4/2.4)}{40 \cdot 1.11 \times 10^{-3} \text{ day}} = 2.06 \text{ ft/day}$$

$$= 7.31 \times 10^{-4} \text{ cm sec}^{-1}$$

MW 14-1



$$K = \frac{r_c^2 \ln(Re/r_w)\cdot \ln(y_0/y_t)}{2\cdot L_e \cdot t} = \frac{0.118\cdot \ln(y_0/y_t)}{40\cdot t_{day}} \text{ ft/day}$$

△ $y_0 = 1.08$, $t_0 = 1.2$ min $= 8.33\times10^{-4}$ day

$y_t = 0.14$ ft, $t_{yt} = 2.6$ min $= 1.81\times10^{-3}$ day

$$K_D = \frac{0.118\cdot \ln(1.0/0.14)}{40\cdot(18.10-8.33)\times10^{-4}} = 5.94 \text{ ft/day}$$

$$= 5.94 \text{ ft/day}\cdot\frac{12 \text{ in}}{1 \text{ ft}}\cdot\frac{2.54 \text{ cm}}{1 \text{ in}}\cdot\frac{1 \text{ day}}{8.64\times10^4 \text{ sec}} = 2.10\times10^{-3} \text{ cm sec}^{-1}$$

○ $y_0 = 1.90$ $t_0 = 0.8$ min $= 5.56\times10^{-4}$ day

$y_t = 0.45$ ft. $t_{yt} = 2.0$ min $= 1.39\times10^{-3}$ day

$$K_D = \frac{0.118 \ln(1.9/.45)}{40[18.9-5.56]\times10^{-4}} = 5.09 \text{ ft/day}$$

$$= 1.80\times10^{-3} \text{ cm sec}^{-1}$$

PREDESIGN REPORT

BLOSENSKI LANDFILL
CHESTER COUNTY, PENNSYLVANIA

APPENDIX 4-4

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 25-1	Sheet 1 of 1
Developed By: P. Gori	Date: 4-3-90

WELL INFORMATION

Installation Date: 3-15-90		
Well Dia. 4 (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 37.3	Before Dev. 37.3 (Feet)	~~35~~ Hours After 37.05 (Ft)
Depth from Top of Well Casing to Bottom of Well 128.0 (Feet)		
Depth to Top of Sediment:	Before Dev. 127.4 (Feet)	Hours After 37.05 (Ft)
Quantity of Water Lost During Drilling, If Application (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 126.0 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique

FIELD INFORMATION

	Start	During		End
Well Development Time	1250	~~NA~~	1310	1320
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	12	NA	~~55~~	5
Physical Character of Water	lt. brown	NA	cl. clear	clear
Quantity of Water Removed (Gallons)	0	NA	240	~300
Development Conditions*	2	NA	-	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1328

Signed/Developer: P. Gori Date: 4-3-90

Signed/Reviewer: _____ Date: _____

WELL DEVELOPMENT FORM

PROJECT

Project Name: Bloomsk: Landfill	Project No.: 32777.001
Well Number: MW 26-1	Sheet 1 of 1
Developed By: P. Gori	Date: 8-1-91 & 8-17

WELL INFORMATION

Installation Date:		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 31.85	Before Dev. 31.85 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 165 (Feet)		
Depth to Top of Sediment:	Before Dev. 163.3 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 162.0 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique ___

FIELD INFORMATION

	Start	During		End
Well Development Time (hrs)	0	4	6	8.5
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	5	5	5	5
Physical Character of Water	cloudy	cloudy	cloudy	clear
Quantity of Water Removed (Gallons)	0	1200	1500	1800
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1

Signed/Developer: P. Gori Date: 8-17-91

Signed/Reviewer: ___ Date: AR000374

WELL DEVELOPMENT FORM

PROJECT

Project Name: Zionsville Landfill	Project No.: 3272.001
Well Number: MW 6-1	Sheet 1 of 1
Developed By: P. Gori	Date: 10-5-90

WELL INFORMATION

Installation Date: 8-27-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 33.0	Before Dev. 33.0 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 45' (Feet)		
Depth to Top of Sediment:	Before Dev. 37.5 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 37.5 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pumped well until dry allowed to recovery 15 mins pumped until dry. repeated cycle.

FIELD INFORMATION

	Start	During		End
Well Development Time	0830	NA	NA	1530
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	1-2	1-2	1-2	1-2
Physical Character of Water	dk. brown cloudy	lt. brown cloudy	cloudy	cloudy
Quantity of Water Removed (Gallons)	0	100	200	300
Development Conditions*	2	2	2	2

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1525

Signed/Developer: P. Gori Date: 10-5-90

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Bloomfield Landfill	Project No.: 3277.001
Well Number: MW-13-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-13-91

WELL INFORMATION

Installation Date: 8-20-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8" (Inches)
Static Water Level: 43.41	Before Dev. 43.41 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 95 (Feet)		
Depth to Top of Sediment:	Before Dev. 95 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 94' (Feet)
Method of Development/Evacuation submersible pump
Description of Development/Surge Technique ___

FIELD INFORMATION

	Start	During		End
Well Development Time	0730	0930	1230	1400
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	8	5	5	3
Physical Character of Water	cloudy	cloudy	cloudy	clear
Quantity of Water Removed (Gallons)	0	400	800	900
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1355

Signed/Developer: Peter Gori Date: 9-13-91

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 14-1	Sheet 1 of 1
Developed By: P. Gori	Date: 4-3-90

WELL INFORMATION

Installation Date: 3-20-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 47.21	Before Dev. 47.21 (Feet)	1/2 Hours After 42.48 (Ft)
Depth from Top of Well Casing to Bottom of Well 125 (Feet)		
Depth to Top of Sediment:	Before Dev. 125 (Feet)	Hours After (Ft)
Quantity of Water Lost During Drilling, If Application (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 124' (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique

FIELD INFORMATION

	Start	During		End
Well Development Time	1340	1400	1415	1430
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	7	7	7	7
Physical Character of Water	cloudy	sl. cloudy sac	sl. clear	clear
Quantity of Water Removed (Gallons)	0	140	245	350
Development Conditions*	2	NA	NA	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1429

Signed/Developer: P. Gori Date: 4-3-90

Signed/Reviewer: Date:

WELL DEVELOPMENT FORM

PROJECT

Project Name: Bloseushi Landfill	Project No.: 3277 co1
Well Number: MW 15-1	Sheet 1 of 1
Developed By: P. Gori	Date: 8-1-91

WELL INFORMATION

Installation Date:		
Well Dia._____(Inches)	Screen Length_____(Feet)	Borehole Dia._____(Inches)
Static Water Level:	Before Dev._____(Feet)	___Hours After_____(Ft)
Depth from Top of Well Casing to Bottom of Well_____(Feet)		
Depth to Top of Sediment:	Before Dev._____(Feet)	___Hours After_____(Ft)
Quantity of Water Lost During Drilling, If Application_____(Gallons)		
Quantity of Standing Water in Well and Annulus Before Development_____(Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped _____(Feet)
Method of Development/Evacuation_____
Description of Development/Surge Technique_____
_____
_____

FIELD INFORMATION

	Start	During		End
Well Development Time				
Specific Conductance (umhos/cm)				
Temperature: Co Fo (Circle One)				
pH (s.u.)				
Approximate Pumping Rate (gpm)				
Physical Character of Water				
Quantity of Water Removed (Gallons)				
Development Conditions*				

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: Yes No Photograph: Yes No Time:_____

Signed/Developer:_____ Date:_____

Signed/Reviewer:_____ Date:_____

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 16-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-11-90

WELL INFORMATION

Installation Date: 8-7-90		
Well Dia. 8" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8" (Inches)
Static Water Level: 36.24	Before Dev. 36.25' (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 145 (Feet)		
Depth to Top of Sediment:	Before Dev. 144.85 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 143.0' (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pump on for 20 mins. then shut off for 10 minutes. Continue until water clear & free of sediment. Then pump continously.

FIELD INFORMATION

	Start	During		End
Well Development Time	0800	NA	NA	1300
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	8	NA	NA	1 7
Physical Character of Water	cloudy lt brown	NA	NA	clear
Quantity of Water Removed (Gallons)	0	NA	NA	1200
Development Conditions*	2	NA	NA	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1255

Signed/Developer: P. Gori Date: 9-11-90

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277001
Well Number: MW 17-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-25-91

WELL INFORMATION

Installation Date: 7-20-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 58.0'	Before Dev. 58.0' (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 170 (Feet)		
Depth to Top of Sediment:	Before Dev. 169.5' (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 168.0 (Feet)
Method of Development/Evacuation submersible pump
Description of Development/Surge Technique ___

FIELD INFORMATION

	Start	During		End
Well Development Time	1030	1130	1230	1430
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	3	3	3	3
Physical Character of Water	cloudy grey sh	cloudy	sl cloudy	clear
Quantity of Water Removed (Gallons)	0	300	600	900
Development Conditions*	2	2	-	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1428

Signed/Developer: P. Gori Date: 9-25-90

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Bloscuski Landfill	Project No.: 3277.001
Well Number: mw 18-1	Sheet 1 of 1
Developed By: R. Gori	Date: 9-12-90

WELL INFORMATION

Installation Date: 9-40-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8" (Inches)
Static Water Level: 43.27	Before Dev. 43.27 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 120 (Feet)		
Depth to Top of Sediment:	Before Dev. 118 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 117 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pump on 20 mins off 10 mins.

FIELD INFORMATION

	Start	During		End
Well Development Time	0730	1100	1230	1330
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: C° F° (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	8	8	8	8
Physical Character of Water	Cloudy Greyish	Cloudy	Cloudy	clear
Quantity of Water Removed (Gallons)	0	~~NA~~	NA	1900
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1325

Signed/Developer: R. Gori Date: 9-12-90

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Olsenski Landfill	Project No.: 3277.001
Well Number: MW 19-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-21-90 & 9-22-90

WELL INFORMATION

Installation Date: 7/26/90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 411.2	Before Dev. 411.2 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 170 (Feet)		
Depth to Top of Sediment:	Before Dev. 170 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 164 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pumped well until dry then waited 15 mins to recovery and pumped until dry repeated cycle.

FIELD INFORMATION

	Start	During		End
Well Development Time (Hrs)	0	NA	NA	4
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	1-2	1-2	1-2	1-2
Physical Character of Water	cloudy greyish	cloudy greyish	cloudy greyish	sl. cloudy
Quantity of Water Removed (Gallons)	0	150	200	250
Development Conditions*	2	2	2	2

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: —

Signed/Developer: P. Gori Date: 9-22-90

Signed/Reviewer: ___ Date:

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 20-1	Sheet 1 of 1
Developed By: P. Bori	Date: 4-3-90

WELL INFORMATION

Installation Date: 3-6-		
Well Dia. 4" (Inches)	Screen Length 20.0 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 41.62'	Before Dev. 41.62 (Feet)	3.5 Hours After 41.61 (Ft)
Depth from Top of Well Casing to Bottom of Well 143.5 (Feet)		
Depth to Top of Sediment:	Before Dev. 143.2 (Feet)	Hours After (Ft)
Quantity of Water Lost During Drilling, If Application NA (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 141.2' (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pump was on until water level reached top of pump. Pump shut off, allowed well to recovery pumped well again. Pumping interval ~ 5 minutes.

FIELD INFORMATION

	Start	During		End
Well Development Time	0915	NA	1050	1130
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	10	7	7	5
Physical Character of Water	cloudy	cloudy	Almost clear	clear
Quantity of Water Removed (Gallons)	0	200	350	~500 gal
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1125

Signed/Developer: P. Bori Date: 4-3-90

Signed/Reviewer: _____ Date: _____

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: mw 21-1	Sheet 1 of 1
Developed By: R Gori	Date: 9-20-90 - 9/27/90

WELL INFORMATION

Installation Date: 7-10-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8" (Inches)
Static Water Level: 7.13	Before Dev. 7.13 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 142 (Feet)		
Depth to Top of Sediment:	Before Dev. 123 (Feet)	___ Hours After 140 (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 139' (Feet)
Method of Development/Evacuation submersible pump
Description of Development/Surge Technique Pump for 1-2 mns (well dry) let recovery 15 mns then pump.

FIELD INFORMATION

	Start	During		End
Well Development Time (hrs)	0	2	3	4
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	1-2	1-2	1-2	1-2
Physical Character of Water	muddy brown	cloudy lt. brown	cloudy lt. brown	sl. cloudy
Quantity of Water Removed (Gallons)	0	100	150	300
Development Conditions*	2	2	2	2

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: —

Signed/Developer: R. Gori Date: 9-27-90

Signed/Reviewer: ___ Date:

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 22-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-19-90

WELL INFORMATION

Installation Date: 9-18-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8" (Inches)
Static Water Level: 51.95	Before Dev. 51.95 (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 135 (Feet)		
Depth to Top of Sediment:	Before Dev. 134.8 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 134 (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique ___

FIELD INFORMATION

	Start	During		End
Well Development Time	0715	1020	1240	1430
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	10	10	10	10
Physical Character of Water	cloudy	cloudy	cloudy	clear
Quantity of Water Removed (Gallons)	0	1800	3050	3000
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1427

Signed/Developer: P. Gori Date: 9-19-90

Signed/Reviewer: ___ Date: ___

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 23-1	Sheet 1 of 1
Developed By: P. Gori	Date: 4-3-90

WELL INFORMATION

Installation Date: 3-9-90		
Well Dia. 4" (Inches)	Screen Length 15 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 45.6	Before Dev. 45.6 (Feet)	2 Hours After 45.65 (Ft)
Depth from Top of Well Casing to Bottom of Well 103 (Feet)		
Depth to Top of Sediment:	Before Dev. 102 (Feet)	Hours After (Ft)
Quantity of Water Lost During Drilling, If Application (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 102' (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique

FIELD INFORMATION

	Start	During		End
Well Development Time	1140	NA	NA	1240
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	10	NA	NA	10
Physical Character of Water	cloudy	cloudy	cl. clear	clear
Quantity of Water Removed (Gallons)	0	NA.	NA	600
Development Conditions*	2	NA	NA	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1238

Signed/Developer: P. Gori Date: 4-3-90

Signed/Reviewer: Date:

WELL DEVELOPMENT FORM

PROJECT

Project Name: Blosenski Landfill	Project No.: 3277.001
Well Number: MW 24-1	Sheet 1 of 1
Developed By: P. Gori	Date: 9-18-90

WELL INFORMATION

Installation Date: 8-22-90		
Well Dia. 4" (Inches)	Screen Length 20 (Feet)	Borehole Dia. 8 (Inches)
Static Water Level: 41.3'	Before Dev. 41.3' (Feet)	___ Hours After ___ (Ft)
Depth from Top of Well Casing to Bottom of Well 95.0 (Feet)		
Depth to Top of Sediment:	Before Dev. 95.0 (Feet)	___ Hours After ___ (Ft)
Quantity of Water Lost During Drilling, If Application ___ (Gallons)		
Quantity of Standing Water in Well and Annulus Before Development ___ (Gallons)		

DEVELOPMENT INFORMATION

Depth from which well was pumped 94.0' (Feet)
Method of Development/Evacuation Submersible pump
Description of Development/Surge Technique Pump well for 10 mins, let recovery. 10 mins. Well pumped dry.

FIELD INFORMATION

	Start	During		End
Well Development Time	0915	1045	1215	1245
Specific Conductance (umhos/cm)	NA	NA	NA	NA
Temperature: Co Fo (Circle One)	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA
Approximate Pumping Rate (gpm)	8	3	3	3
Physical Character of Water	cloudy brownish	cloudy	cloudy	clear
Quantity of Water Removed (Gallons)	0.	500	900	1000
Development Conditions*	2	2	2	1

* Development Conditions:

1) Well Water is Reasonably Clear
2) Presence of Sediment in Well
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus (if applicable)
4) Stabilization of Specific Conductance and Water Temperature

Pint Water Sample Collected: (Yes) No Photograph: (Yes) No Time: 1240

Signed/Developer: P. Gori Date: 9-18-90

Signed/Reviewer: ___ Date: ___