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8 April 1998

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401 Oberlin Road  
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SUBJECT: Letter of Transmittal for Baseline Sampling Reports,  
Ft. Bragg C&D Landfill  
and Ft. Bragg LCID Landfill

Gentlemen:

Fac/Perm/Co#ID #	Date	Doc ID#
2608	7-1-2008	DIN 14508

Please find the enclosed:

One Event Baseline Sampling Report for Lamont Road Construction & Demolition  
Landfill, dated 6 April 1998;

One Event Baseline Sampling Report for Lamont Road Land Clearing and Inert Debris  
Landfill, dated 8 April 1998;

and Boring Records / Laboratories Appendix, which is common to both reports.

This completes my tasks for 100% completion on Mod # 0001 to Delivery Order # 14 of FW  
00819-4 (C&D Landfill) and 95% completion on Mod # 0002 to Delivery Order # 1 of FW 00742-4  
(LCID Landfill).

Sincerely,



Richard R. Rust, PE, PhD  
Environmental Consultant

ONE EVENT BASELINE SAMPLING REPORT

for

4 NEW GROUNDWATER MONITOR WELLS  
(Numbered as MW -4 through -7)  
installed during January 1998

and 1 EXISTING GROUNDWATER MONITOR WELL  
(Numbered as MW-3)

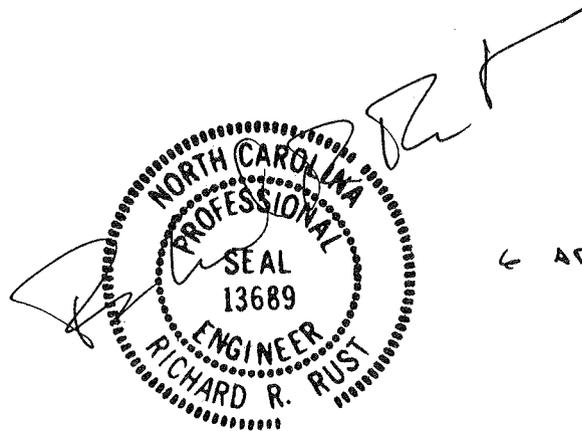
located at the

LAMONT ROAD CONSTRUCTION AND DEMOLITION LANDFILL (unlined)  
FT. BRAGG, NC  
NC DENR Landfill Permit # 26-08, issued 27 Jan 1998

6 April 1998

Prepared for submission to NC DENR by:

Richard R. Rust, PE, PhD  
Environmental Consultant  
5641 Piper Drive  
Fuquay, NC 27526  
(919) 557-0444



Operating under subcontract to:  
RS&H, Architects Engineers, and Planners, Inc.  
Operating under contract to:  
Department of Public Works and Environment, Ft. Bragg, NC  
Reference: FW-00819-4, Mod. 0001 to Delivery Order 14

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Groundwater Contour Map (Figure 1)	

### Boring Records / Laboratories Appendix (Shared with C&D and LCID Landfill Baseline Sampling Reports)

Horizontal and Vertical Survey Control
Boring Logs and Well Completion Records
Soils and Field Laboratory Results
Groundwater Monitoring Field Data Log Sheets
Soils Classification
Constant Head Permeability
Permeability, as measured from slug testing.
Water Quality Sampling
Chain of Custody forms
Volatile Organics Analysis Data Sheets
Inorganic Analysis Data Sheets

## PURPOSE OF THE BASELINE SAMPLING REPORT

The enclosed Baseline Sampling Report addresses 4 groundwater monitor wells installed during January 1998 and one well installed during 1992 at the Ft. Bragg C&D Landfill on Lamont Road, Ft. Bragg, Cumberland County, NC. The purpose of the report is to establish the groundwater conditions at the time of installation of the new wells (immediately prior to opening the C&D Landfill under NC DENR Permit # 26-08) with respect to water quality, direction of groundwater flow, and flow rate. This report provides the basis for determining if groundwater is deteriorating as a result of landfill operations and for designing an assessment program should groundwater contamination be determined "statistically significant".

By comparing laboratory results in this report to results from subsequent samplings, it will be possible to determine if the groundwater quality is deteriorating. Should NC Department of Environment and Natural Resources (NC DENR) or the Department of Defense (DOD) decide that the groundwater is deteriorating at an unacceptable rate, the next logical step would be to require Groundwater Assessment. The purpose of Assessment is to determine: the physical extent of groundwater contamination (horizontally and vertically), the threat to public health, and the method & cost of remediation.

The Baseline Sampling Report is instrumental in designing an Assessment program because it qualifies the historical record of sampling data gathered subsequent to the date of the Report. Sampling data must be "reproducible" to be of use. The Baseline Sampling Report provides flow rate data which can only be obtained from direct sampling of soils in the aquifer (obtained during well installation). By analyzing the relative elevations of groundwater in the wells it is possible to predict the direction of groundwater flow and thus locate the source of contamination. Soils data included in this report will assist in estimating the speed at which contamination is moving, modeling the contamination plume, predicting the location of the plume over time, designing the Assessment program, assessing risk to public health, and subsequent selection of cost effective remediation techniques.

Copies of this Baseline Sampling Report have been provided to the Division of Waste Management (DWM) of the NC Department of Environment and Natural Resources (NC DENR); the Ft. Bragg Directorate of Public Works and Environment (DPWE); and RS&H Engineers, Architects, and Planners, Inc.

#### REFERENCES

Water Quality Monitoring Plan, Lamont Road Construction and Demolition Landfill, Ft. Bragg, NC; Richard R. Rust, PE, PhD, and Ray Daniels, PG, 27 August 1997.

Hydrologic and Geologic Study of the proposed Lamont Road Construction and Demolition Landfill Site, Ft. Bragg, NC; Richard R. Rust, PE, PhD, and Ray Daniels, PG, 7 July 1996.

Baseline Sampling Report for 6 Groundwater Monitor Wells (Numbered as SLMW 6 through 11) installed during the summer of 1995 at the Longstreet Road Sanitary Landfill (unlined), Ft. Bragg, NC NC DENR Permit # 26-02, 19 January 1996; Richard R. Rust, PE, PhD.

DSWM, NC DEHNR; memorandum to Landfill Owners specifying Baseline Sampling Report requirements dated 24 June 1994 and further clarified in memorandum to Landfill Owners dated 18 January 1995.

#### SITE BACKGROUND

The Lamont Road C&D Landfill Site is on the west side of Cooleyconch Mountain. The previous use of this site was for maneuver training conducted continuously for 50 years, borrow pit for sands and clays, temporary storage of petroleum contaminated soils / sludges and unclassified debris from both land clearing and construction demolition. Cooleyconch Mountain is the prominent terrain feature west of main post. The C&D Landfill Site is 1.5 miles west the Longstreet Road Municipal Solid Waste Landfill (closed 1 January 1998, NC DENR Permit # 26-02), and 200 yards south-east of the Lamont Road LCID Landfill (NC DENR Permit # 26C). The Site drains north to Cypress Creek which intersects Little River a mile upstream of the Ft. Bragg Water Plant intake.

Construction and demolition debris were previously disposed under NC DENR permit at the Longstreet Road Municipal Solid Waste Landfill in order to hasten achievement of final contours for closure of this unlined landfill. As early as 1993 closure was scheduled, which finally occurred on 31

December 1997. Prior to disposal in the Sanitary Landfill, C&D and LCID were co-disposed in the Lamont Road LCID Landfill, which is immediately NW of the C&D Landfill Site. The LCID Landfill started as an uncontrolled dump site associated with reclaiming borrow excavation. Its initial operation pre-dated Federal and State regulations governing waste disposal. Access to the LCID Landfill (and the C&D Landfill Site) became controlled as State regulations required, entrances from Lamont Road were padlocked, and truck scales were installed in April 1993. However, the area is and has been openly accessible by back roads and tank trails during and after operating hours.

In 1995 Ft. Bragg selected this Site and contracted for the above referenced Hydrologic and Geologic Study with the intent of permitting the Site for C&D landfill operations by the time the Longstreet Road Municipal Solid Waste Landfill closed, 31 December 1997. 10 piezometers were installed and sounded, aquifer soils were sampled, and the groundwater flow regime was contoured in the Hydrologic and Geologic Study. Site approval was granted by NC DENR. Subsequently, the above referenced Water Quality Monitoring Plan was drafted and reviewed by NC DENR in December 1997. The approved Plan authorized installation of 4 monitor wells (MW's -4, -5, -6, and -7). These wells were installed in January 1998. The C&D Landfill started accepting waste in early February 1998 under NC DENR permit # 26-08, issued 27 January 98.

#### INSTALLATION OF GROUNDWATER MONITORING SYSTEM

In January 1998 four groundwater monitor wells were constructed by Atlantic Boring Contractors, Inc., Fuquay, NC, a registered well driller (NC Registration No. 1747), phone (919) 557-1218. Drilling started at the end of a prolonged period of drought and was accomplished during the second highest January precipitation over the entire period of record. During well installation SPT blow count and split spoon samples were taken every 5 feet and logged. One or more soil samples were taken from the aquifer of each well for laboratory analysis to determine porosity, grain size distribution, bulk density, liquid limit, plasticity index, USCS classification, and hydraulic conductivity by constant head. After well completion, each well was developed and slug tested to determine in-situ hydraulic conductivity. Soils Laboratory Analysis and Slug Testing were performed by Engineering & Environmental Science Company, Raleigh, NC, phone (919) 781-7798. Well completion records including well logs are filed with DWM, NC DENR as part of this report. Horizontal and vertical survey control was brought to top of PVC casing of each well by Regional Land Surveyors, Greensboro, NC, (336) 665-8155 under contract to RS&H.

The new wells were subsequently sampled once for water quality along with existing MW-3. Field parameters of water table elevation, temperature, pH, and conductivity were taken before and after purging. The samples were packed in ice and delivered to American Environmental Network, Cary, NC, phone (919) 677-0090, within 24 hours of sampling. AEN analyzed the samples for a minimum of the Appendix I parameters and the 8 metals appropriate for C&D Landfills as per NC DENR.

MW-4 was originally drilled to 60 feet using roller bit with rotary wash and thought to be productive. It proved to be dry and the well was redrilled to 80 feet using the same technique. The well was slow to recharge after purging prior to sampling, but recharged with clear water in sufficient quantity for sampling within 24 hours after purging, as allowed by NC DENR.

The above work was accomplished under the direction of Richard R. Rust, PE, PhD, 5641 Piper Drive, Fuquay, NC 27526, (919) 557-0444.

## GEOLOGY / HYDROGEOLOGY

The site is located in the southern edge of the Mittendorf formation overlying the Cape Fear clay formation and exhibits characteristics typical of the Mittendorf formation. Intermittent discontinuous clay lenses are bedded in sands and sandy silts. These near surface clay lenses perch local groundwater above the permanent groundwater table. High speed fluvial activity is evidenced by clay rips in the sands, as well as low speed fluvial activity evidenced by deposits of fines and clays.

Fluctuation in permanent water table elevation between the wet and dry seasons is estimated at 4 ft based on data from USGS groundwater monitor wells on Ft. Bragg fitted with continuous water level recording devices. 2 wells are located approximately 10 miles west of the landfill and 3 are located 5 miles east of the landfill. Further information on the location and reliability of this USGS data is provided in the Sources of Additional Information section of this report.

Piezometers installed for the Hydrologic and Geologic Study referenced above indicated the surficial groundwater flowing to the west. Jamie Marlowe, USGS, Raleigh has installed numerous monitor wells on Ft. Bragg. He stated that the permanent aquifer sits on the Cape Fear Aquiclude (tight stiff green gray silty clay located at 180 - 200 ft MSL dipping slightly to the south east). Just above the Cape Fear is a 2 ft gray clay layer. 5 to 15 ft above the Cape Fear is a 2 ft thick discontinuous gray clay lens.

Groundwater elevations taken from MW's -3 through -7 during the January 1998 sampling event were used to produce the Groundwater Contour Map (included in this report as Figure 1). The map indicates surficial groundwater flows northwest. The permanent aquifer flows to the east-southeast.

The Type II wells (MW's -4, -5, & -6) were terminated in surficial aquicludes determined by the presence of gray clay under coarse tan/ orange water bearing sands. Difficulty was encountered in locating a reliable surficial aquifer at MW-4 (upgradient) located on Cooleyconch Mountain. Twice the well was terminated as described above and found to be dry a week later. The aquifers were increasingly more reliable the further away they were located from Cooleyconch Mountain. This may indicate that the clay lenses on Cooleyconch Mountain are only a few square meters in plan view and the area of these aquicludes increases with depth.

The deepest well is MW-7 (Type III), terminated at 304 ft MSL where dry grey clay with blowcounts of 120 / 6" was encountered, believed to be the aquiclude for a "permanent" aquifer. At a depth of 120' depth (314' MSL) the boring rapidly drained of drilling water indicating an extremely porous zone (an undisturbed sample could not be gathered). Water was encountered in sands at 309' MSL. The Shelby Tube taken at 10' above this depth was CL with  $6 \times 10^{-7}$  cm/sec permeability. This aquiclude was sealed to retain water encountered at 324' MSL from the deeper "permanent" aquifer.

MW-3 installed by USGS in May of 1992 hit what is believed to be the same dry grey clay "permanent" aquiclude at 306 ft MSL which continued for 8 feet with blowcounts of 50+. Comparing MW-3 to MW-7, a dip of 0.2% to the east is indicated. Comparing MW-7 to the aquiclude at SLMW 11 (an upgradient well at the Longstreet Road Sanitary Landfill located 0.95 miles east of MW-7) at 282 ft MSL, a dip of 0.4% to the east is indicated, which agrees with the findings of the Longstreet Road Sanitary Landfill Baseline Sampling Report (0.6% dip to the east).

The following tables were generated using the hydraulic conductivities obtained from: slug testing using a continuous data logger, the hydraulic gradients observed during the sampling event, and the Darcy's Law (Velocity = ki, where k is hydraulic conductivity and i is hydraulic gradient). Gradients were determined from the groundwater contour maps drawn by interpolation of water table elevations taken by electric tape in each monitor well during the sampling event. Gradients were determined by change in water table elevation over horizontal distance as measured from the groundwater contour maps in the vicinity of each well. Direction is established by turning a 90 degree angle from tangents to the contours in the vicinity of the well and in the direction of decreasing contour elevations.

MW-	4	5	6	7
k, from Falling Head Slug Test, cm/sec	1.66 x 10 <sup>-4</sup>	1.14 x 10 <sup>-4</sup>	3.71 x 10 <sup>-5</sup>	2.49 x 10 <sup>-5</sup>
k, from Rising Head Slug Test, cm/sec	7.26 x 10 <sup>-4</sup>	1.02 x 10 <sup>-4</sup>	4.79 x 10 <sup>-5</sup>	N/A

MW-	4	5	6	7
i, Gradient, ft/ft	0.0465	0.0333	0.0222	0.02 (assumed)
Velocity, cm/day	0.67-2.92	0.29-0.33	0.07-0.09	0.04
Direction of Flow	WNW	NW	W	ESE

The surficial groundwater under the landfill appears to flow NW. However, this is complicated by small discontinuous clay lenses perching groundwater. Surficial groundwater may cascade from lens to lens enroute to the permanent aquifer. The Cape Fear Aquiclude causes permanent groundwater to flow ESE.

The Boring Records / Laboratories Appendix contains the following information relative to groundwater flow:

Horizontal and Vertical Survey Control for the wells brought to top of the uncapped 2" PVC well casing inside the locking wellhead protective cover.

Groundwater Contour Map. Contours were interpolated by CADD from elevations recorded on Groundwater Monitoring Field Data Log Sheets (provided in this appendix) during the sampling event.

Permeabilities as determined by in-situ slug testing with continuous data logger for horizontal permeability and laboratory constant head permeability testing for vertical permeabilities.

## PROPERTIES OF SOILS

During installation of the new wells undisturbed soil samples were taken for laboratory analysis by Engineering and Environmental Science Co, Raleigh, NC (919) 781-7798.

Undisturbed samples taken from the surficial aquifer and analyzed by Unified Soils Classification System indicate poorly graded sands (SP) with thin discontinuous beds of low plasticity clays (CL) in each well. Vertical coefficients of permeability,  $k$ , as determined by Constant Head Permeability testing are  $10^{-4}$  to  $10^{-5}$  cm/sec in the poorly graded sands and  $10^{-7}$  cm/sec in the low plasticity clay beds.

The Boring Records / Laboratories Appendix contains the following information relative to Properties of Soils:

Grain Size Distribution, Liquid Limit, Plasticity Index, USCS Classification, Moisture Content, Porosity, Bulk Density, and Hydraulic Conductivity for soil samples taken during well installation.

Permeability for each well as measured from slug testing.

## GROUNDWATER QUALITY

Samples taken from MW's -3 through -7 during one sampling event (1/16/98 for MW's -3, -5, -6, and -7; and 1/27/98 for MW-4) were analyzed by AEN, Cary, NC (919) 677-0090 for Appendix I volatile and 8 metal constituents as specified by NC DENR for C&D landfills. The results indicate all wells meet NC Administrative Code 15A Subchapter 2L (November 8, 1993) Paragraph .0202 groundwater quality standards with the exception of MW-4 which exceeds 2L standards for Chloroform (2L standard of 0.19 ug/l) with a sample concentration of 58 ug/L, Chromium (2L standard of 50 ug/l) with a sample concentration of 345 ug/l, and Lead (2L standard of 15 ug/l) with a sample concentration of 17.8 ug/l. Note: MW-4 had very little water in it at the time of sampling, 1/27/98.

The Boring Records / Laboratories Appendix contains the following information relative to groundwater quality sampling:

Groundwater Monitoring Field Data Log Sheets containing water table elevations, pH, temperature, and conductivity (before purging and at sampling), and observed physical properties of water at sampling.

Chain of Custody forms for samples.

Volatile Organics Analysis Data Sheets for Appendix I volatile constituents.

Inorganic Analysis Data Sheets for 8 metals appropriate for C&D Landfill sampling as per NC DENR.

## SOURCES OF ADDITIONAL INFORMATION

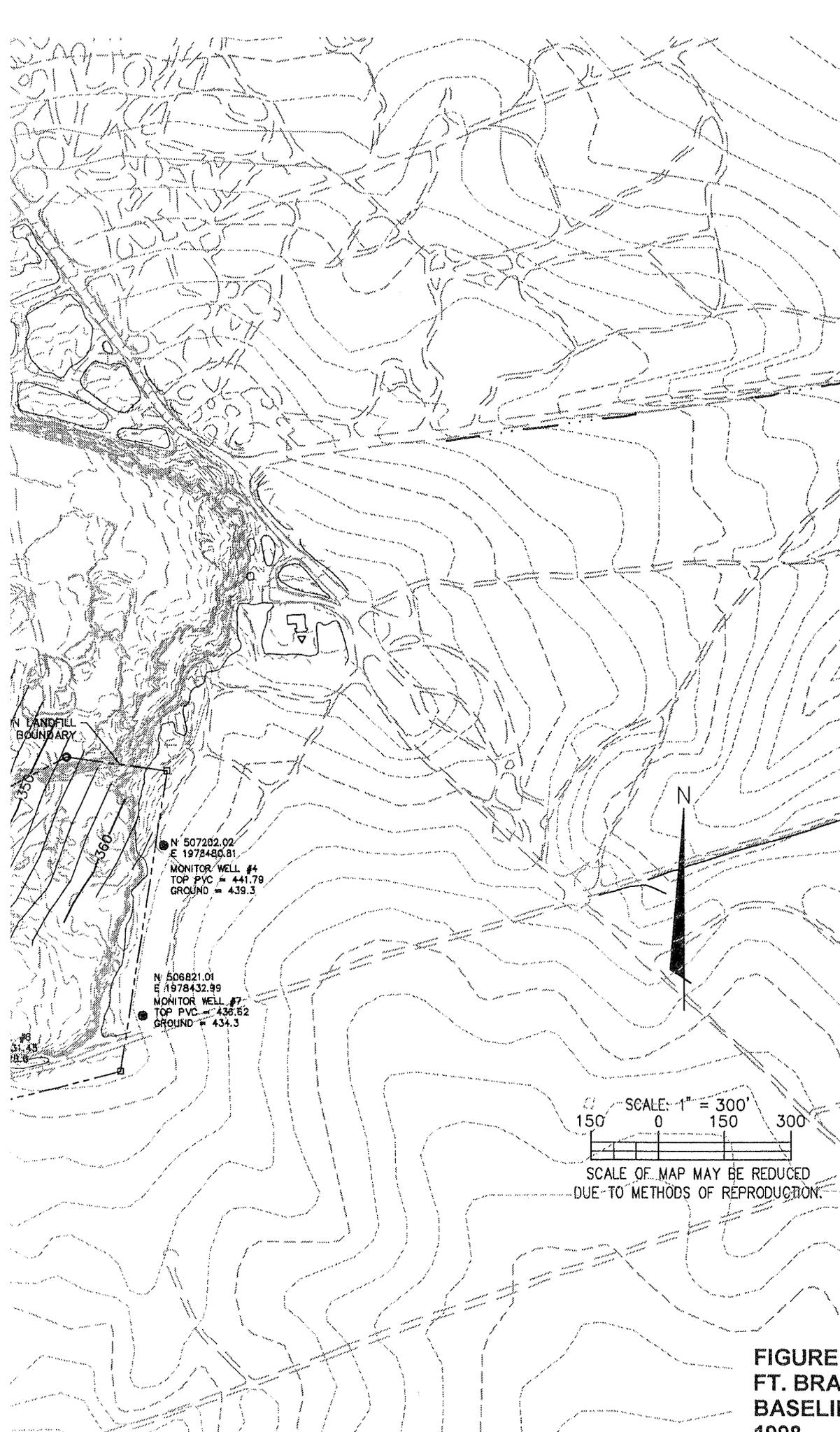
MW-3 adjacent to the Scale House was installed by USGS, Raleigh, on 12 May 1992 to a depth of 120 feet (USGS drilling by US Army Corps of Engineers)(USGS Well No. DLMW1, 350835 0790433 01). Jamie Marlowe and S. S. Howe, USGS, Raleigh, (919) 571-4000, logged MW-3 on 15 May 1992 for single point resistance, spontaneous potential, and caliper and again on 4 August 1992 for natural gamma.

USGS operates groundwater monitor wells with continuous water level recording devices on Ft. Bragg. 2 are located approximately 10 miles west of the landfill and 3 are located 5 miles east of the landfill. The data is useful in estimating seasonal variations in water table elevation and water table elevation response to climatic events such as precipitation and evapotranspiration. Climatic data recorded at Pope AFB weather station, 5 miles east of the landfill is available from NOAA and the USAF. The USGS water table elevation data is maintained in their Raleigh office. The "print out" data should not be relied upon until the paper "tapes" are examined for errors in recalibration of the recording devices. Drastic jumps in elevation between consecutive readings on the print out indicate recalibration errors, which can often be resolved by examining the tapes and adjusting the print out accordingly.

Jamie Marlowe, USGS, Raleigh (919) 571-4000 has installed over 30 monitor wells in conjunction with USGS projects on Ft. Bragg since 1991. In the summer of 1995 USGS opened a Field Office at Ft. Bragg (910) 396-7822, supervised by Richard Kessler from USGS, Raleigh.

Monitor wells MW's -1 and -2, located in the LCID Landfill were of unknown construction and abandoned in February 1998 with abandonment records furnished to NC DEHNR. At the time of abandonment, both wells were surrounded by waste, and MW-2 was submerged under water impounded by LCID. Sampling and laboratory analysis of samples from MW's -1, -2, and -3 were conducted by Law & Company, Consulting and Analytic Chemists, Wilmington, NC and BPA Environmental & Engineering, Inc., Greensboro, NC. The locations of the abandoned wells are shown on maps in the above referenced Hydrologic and Geologic Study and Water Quality Monitoring Plan. For further information on groundwater conditions in the LCID Landfill, see the LCID Landfill Baseline Sampling Report, expected to be completed in April 1998 and filed with NC DENR, DWM, under Permit # 26C. For information about groundwater to the east, see above referenced Baseline Sampling Report for the Longstreet Road Sanitary Landfill filed under Permit # 26-02.

NOTE: Data points used for determining groundwater contours in Figure 1 are as follows: MW's -4, -5, -6, -8, and -9. MW's -3 and -7 were not used as they are intended to monitor the permanent aquifer, located below the surficial aquifer represented by the darker contours. MW's -1, and -2 were abandoned (decommissioned).



**FIGURE #1**  
**FT. BRAGG LCID LANDFILL**  
**BASELINE SAMPLING REPORT,**  
**1998**



ONE EVENT BASELINE SAMPLING REPORT

for

3 GROUNDWATER MONITOR WELLS  
(Numbered as MW's -4, -8, and -9)  
installed during January 1998

and 1 EXISTING GROUNDWATER MONITOR WELL  
(Numbered as MW-3)

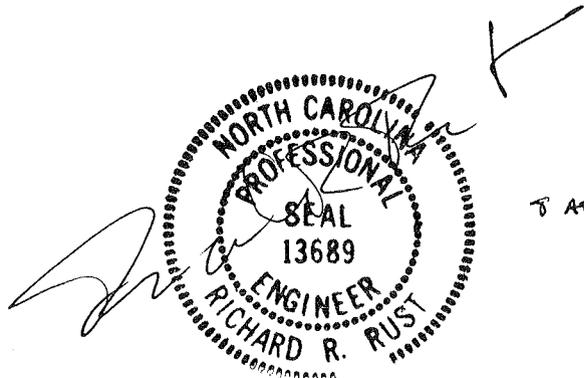
located at the

LAMONT ROAD LAND CLEARING AND INERT DEBRIS LANDFILL (unlined)  
FT. BRAGG, NC  
NC DENR Landfill Permit # 26C

8 April 1998

Prepared for submission to NC DENR by:

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8 APR 98

Operating under subcontract to:  
RS&H, Architects Engineers, and Planners, Inc.  
Operating under contract to:  
Department of Public Works and Environment, Ft. Bragg, NC  
Reference: FW-00742-4, Mod. 0002 to Delivery Order 1

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Boring Logs and Well Completion Records
Soils and Field Laboratory Results
Groundwater Monitoring Field Data Log Sheets
Soils Classification
Constant Head Permeability
Permeability, as measured from slug testing.
Water Quality Sampling
Chain of Custody forms
Volatile Organics Analysis Data Sheets
Inorganic Analysis Data Sheets

## PURPOSE OF THE BASELINE SAMPLING REPORT

The enclosed Baseline Sampling Report addresses 3 groundwater monitor wells installed during January 1998 at the Ft. Bragg LCID Landfill on Lamont Road, Ft. Bragg, Cumberland County, NC. The purpose of the report is to establish the groundwater conditions at the time of well installation with respect to water quality, direction of groundwater flow, and flow rate. This report provides the basis for determining if groundwater is deteriorating as a result of landfill operations and for designing an assessment program should groundwater deterioration be considered "statistically significant".

By comparing laboratory results included in this report to results from subsequent samplings, it will be possible to determine if the groundwater quality is deteriorating. Should NC Department of Environment and Natural Resources (NC DENR) or the Department of Defense (DOD) decide that the groundwater is deteriorating at an unacceptable rate, the next logical step would be to require Groundwater Assessment. The purpose of Assessment is to determine: the physical extent of groundwater contamination (horizontally and vertically), the threat to public health, and the method & cost of remediation.

The Baseline Sampling Report is instrumental in designing an Assessment program because it qualifies the historical record of sampling data gathered subsequent to the date of the Report. Sampling data must be "reproducible" to be of use. The Baseline Sampling Report provides flow rate data which can only be obtained from direct sampling of soils in the aquifer (obtained during well installation). By analyzing the relative elevations of groundwater in the wells it is possible to predict

the direction of groundwater flow and thus locate the source of contamination. Soils data included in this report will assist in estimating the speed at which contamination is moving, modeling the contamination plume, predicting the location of the plume over time, designing the Assessment program, assessing risk to public health, and subsequent selection of cost effective remediation techniques.

Copies of this Baseline Sampling Report have been provided to the Division of Waste Management (DWM) of the NC Department of Environment and Natural Resources (NC DENR); the Ft. Bragg Directorate of Public Works and Environment (DPWE); and RS&H Engineers, Architects, and Planners, Inc.

## REFERENCES

Water Quality Monitoring Plan, Lamont Road Land Clearing and Inert Debris (LCID) Landfill, Ft. Bragg, NC; Richard R. Rust, PE, PhD, and Andrew Raring, PG, 5 December 1997.

Water Quality Monitoring Plan, Lamont Road Construction and Demolition Landfill, Ft. Bragg, NC; Richard R. Rust, PE, PhD, and Ray Daniels, PG, 27 August 1997.

Hydrologic and Geologic Study of the proposed Lamont Road Construction and Demolition Landfill Site, Ft. Bragg, NC; Richard R. Rust, PE, PhD, and Ray Daniels, PG, 7 July 1996.

Baseline Sampling Report for 6 Groundwater Monitor Wells (Numbered as SLMW 6 through 11) installed during the summer of 1995 at the Longstreet Road Sanitary Landfill (unlined), Ft. Bragg, NC NC DENR Permit # 26-02, 19 January 1996; Richard R. Rust, PE, PhD.

DSWM, NC DEHNR; memorandum to Landfill Owners specifying Baseline Sampling Report requirements dated 24 June 1994 and further clarified in memorandum to Landfill Owners dated 18 January 1995.

## SITE BACKGROUND

The Lamont Road LCID Landfill is on the west side of Cooleyconch Mountain. The previous use of this site was for: maneuver training conducted continuously for 50 years, borrow pit for sands and clays, and repository for unclassified debris from land clearing and construction demolition. The LCID Landfill started as an uncontrolled dump site associated with reclaiming borrow excavation. Its initial operation pre-dated Federal and State regulations governing waste disposal. The LCID Landfill has been operated as a controlled repository for construction and demolition (C&D) debris as well as for land clearing and inert debris since its permitting under NC DEHNR Permit No. 26C on 28 August 1987. Since February 1993 C&D debris has been diverted to the Longstreet Road Sanitary Landfill and only LCID has been accepted at the LCID Landfill site. Scales were installed in April 1993. The LCID landfill is the designated disposal site for LCID from Ft. Bragg's and Pope AFB's continuing building program.

Cooleyconch Mountain is the prominent terrain feature west of main post. The LCID Landfill Site is 1.5 miles west the Longstreet Road Municipal Solid Waste Landfill (closed 1 January 1998, NC

DENR Permit # 26-02) and 200 yards north-west of the Lamont Road C&D Landfill (NC DENR Permit # 26-08, issued 27 Jan 1998). In conjunction with the closure of the Longstreet Road Sanitary Landfill and consequent off-post disposal of MSW, Ft. Bragg intends to permit, construct, and operate a waste transfer station SSE of the LCID Landfill and immediately west of the C&D Landfill. The transfer station will be operated under a separate permit and therefore must be buffered from the C&D Landfill and the LCID landfill so that each may be monitored separately for groundwater contamination. The area adjacent and east of the LCID Landfill has been and continues to be excavated as a borrow site for sandy fill material. To the south east of the LCID Landfill (in the C&D Landfill site), petroleum contaminated soils have been spread, dried, and stored for removal by contractor. To the east of the LCID Landfill, petroleum contaminated sludges have been stored in earthen impoundments for removal by contractor. The LCID Landfill drains north to Cypress Creek which intersects Little River a mile upstream of the Ft. Bragg Water Plant intake.

As mentioned above, the LCID Landfill was permitted by NC DENR on 28 August 1987. Monitoring wells 1-3 and another monitoring well labeled "Dry Well" were installed, although the dates and methods of construction are unknown for all but MW-3, installed in 1992. Access to the LCID Landfill (and the C&D Landfill site) became controlled as State regulations required, entrances from Lamont Road were padlocked, and truck scales were installed in April 1993. However, the area is and has been openly accessible by back roads and tank trails during and after operating hours.

In 1995 Ft. Bragg selected the C&D Landfill site (upgradient from the LCID Landfill) and contracted for the above referenced Hydrologic and Geologic Study with the intent of permitting the site for C&D landfill operations by the time the Longstreet Road Municipal Solid Waste Landfill closed, 31 December 1997. In 1996 10 piezometers were installed / sounded and aquifer soils were sampled. The groundwater flow regime was contoured in the C&D Hydrologic and Geologic Study using the 10 piezometers and MW's -1 through -3, serving the LCID. Approval for the C&D site was granted by NC DENR. The above referenced C&D Water Quality Monitoring Plan was approved by NC DENR in December 1997 and authorized installation of 4 monitor wells (MW-4, -5, -6, and -7), accomplished in January 1998. The C&D Landfill started accepting waste in early February 1998.

In conjunction with installation of a groundwater monitoring system for the C&D Landfill, DENR requested upgrading the groundwater monitoring system for the LCID Landfill. MW-2 (adjacent to the old LCID sediment pond) was frequently flooded above the cement grout collar and sometimes flooded above top of casing. MW's -1, -2, and "Dry Well" were surrounded by LCID waste, and all three wells are of unknown construction. In response to DENR, four piezometers (B-11 through B-14) were installed in October 1997 to the north and west of the LCID landfill. The groundwater was determined to flow north. The LCID Water Quality Monitoring Plan was drafted and approved by DENR in January 1998, authorizing installation of MW's -8 & -9 and decommissioning (abandonment) of MW's -1 & -2 and "Dry Well". MW's -8 & -9 were installed downgradient of the LCID at the same time MW-4, -5, -6, and -7 were installed for the C&D Landfill. Of the old LCID monitor wells, MW-3 remains as the upgradient well for the LCID Landfill. MW-4 may also be used to establish upgradient groundwater quality.

#### INSTALLATION OF GROUNDWATER MONITORING SYSTEM

In January 1998 three Type II groundwater monitor wells (MW's -4, -8, & -9) were constructed by Atlantic Boring Contractors, Inc., Fuquay, NC, a registered well driller (NC Registration No. 1747), phone (919) 557-1218. Drilling started at the end of a prolonged period of drought and was

accomplished during the second highest January precipitation over the entire period of record. During well installation SPT blow count and split spoon samples were taken every 5 feet and logged. One or more soil samples were taken from the aquifer of each well for laboratory analysis to determine porosity, grain size distribution, bulk density, liquid limit, plasticity index, USCS classification, and hydraulic conductivity. After well completion, each well was developed and slug tested to determine in-situ hydraulic conductivity. Well completion records including well logs were filed with DWM, NC DENR. Horizontal and vertical survey control was brought to top of PVC casing of each well by Regional Land Surveyors, Greensboro, NC, (336) 665-8155 under contract to RS&H.

MW-4 was originally drilled to 60 feet using roller bit with rotary wash and thought to be productive. It proved to be dry and the well was redrilled to 80 feet using the same technique. The well was slow to recharge after purging prior to sampling, but recharged with clear water in sufficient quantity for sampling within 24 hours after purging, as allowed by NC DENR.

The new wells were subsequently sampled once for water quality along with existing MW-3. Field parameters of water table elevation, temperature, pH, and conductivity were taken before and after purging. The samples were packed in ice and delivered to American Environmental Network, Cary, NC, phone (919) 677-0090, within 24 hours of sampling. AEN analyzed the samples for a minimum of the Appendix I parameters and the 8 metals appropriate for C&D Landfills as per NC DENR.

MW's 1&2 and "Dry Well" were decommissioned (abandoned) and abandonment records were filed with NC DENR.

The above work was accomplished under the direction of Richard R. Rust, PE, PhD, 5641 Piper Drive, Fuquay, NC 27526, (919) 557-0444.

## GEOLOGY / HYDROGEOLOGY

The site is located in the southern edge of the Mittendorf formation overlying the Cape Fear clay formation and exhibits characteristics typical of the Mittendorf formation. Intermittent discontinuous clay lenses are bedded in sands and sandy silts. These near surface clay lenses perch local groundwater above the permanent groundwater table. High speed fluvial activity is evidenced by clay rips in the sands, as well as low speed fluvial activity evidenced by deposits of fines and clays.

Fluctuation in permanent water table elevation between the wet and dry seasons is estimated at 4 ft based on data from USGS groundwater monitor wells on Ft. Bragg fitted with continuous water level recording devices. 2 wells are located approximately 10 miles west of the landfill and 3 are located 5 miles east of the landfill. Further information on the location and reliability of this USGS data is provided in the Sources of Additional Information section of this report.

Piezometers installed for the LCID Landfill Groundwater Monitoring Plan, referenced above, indicated surficial groundwater flowing to the north. Jamie Marlowe, USGS, Raleigh has installed numerous monitor wells on Ft. Bragg. He stated that Ft. Bragg sits on the Cape Fear Aquiclude (tight stiff green gray silty clay located at 180 - 200 ft MSL dipping slightly to the south and south east). Just above the Cape Fear is a 2 ft gray clay layer. 5 to 15 ft above the Cape Fear is a 2 ft thick discontinuous gray clay lens.

Groundwater elevations taken from MW's -3, -4, -5, -8, and -9 during the January 1998 sampling event were used to produce a Groundwater Contour Map (included in this report as Figure 1). The map indicates surficial groundwater flows north-northeast. The permanent aquifer flows to the east-southeast.

The Type II wells (MW's -4, -8, & -9) were terminated in surficial aquicludes determined by the presence of gray clay under coarse tan/ orange water bearing sands. Difficulty was encountered in locating a reliable surficial aquifer at MW-4 (upgradient) located on Cooleyconch Mountain. The aquifers were increasingly more reliable the further away they were located from Cooleyconch Mountain. This may indicate that the clay lenses on Cooleyconch Mountain are only a few square meters in plan view and the area of these aquicludes increases with depth. A productive surficial aquifer was located in MW-9 at 66.5 feet (295.6' MSL), but the aquifer was only 0.3' thick and therefore not believed to be reliable (same difficulty as with MW-4) and the MW-9 boring was continued to 137 ft (225.1' MSL). Upon sampling the water table elevation was 282.99' MSL, 40 feet above top of screen and in an aquiclude as determined by spoons taken at that depth during drilling. DENR agreed that the situation could not be improved by redrilling a proximate hole and setting screen higher. The possibility of an artesian situation exists for this well.

The deepest well installed upgradient of the LCID Landfill for the C&D Landfill is MW-7 (Type III), terminated at 304 ft MSL where dry grey clay with blowcounts of 120 / 6" was encountered, believed to be the aquiclude for a "permanent" aquifer. At a depth of 120' depth (314' MSL) the boring rapidly drained of drilling water indicating an extremely porous zone (an undisturbed sample could not be gathered). Water was encountered in sands at 309' MSL. The Shelby Tube taken at 10' above this depth was CL with  $6 \times 10^{-7}$  cm/sec permeability. This aquiclude was sealed to retain water encountered at 324' MSL from the deeper "permanent" aquifer.

MW-3 installed by USGS in May of 1992 hit what is believed to be the same dry grey clay "permanent" aquiclude at 306 ft MSL which continued for 8 feet with blowcounts of 50+. Comparing MW-3 to MW-7, a dip of 0.2% to the east is indicated. Comparing MW-7 to the aquiclude at SLMW 11 (an upgradient well at the Longstreet Road Sanitary Landfill located 0.95 miles east of MW-7) at 282 ft MSL, a dip of 0.4% to the east is indicated, which agrees with the findings of the Longstreet Road Sanitary Landfill Baseline Sampling Report (0.6% dip to the east).

The following tables were generated using the hydraulic conductivities obtained from: slug testing using a continuous data logger, the hydraulic gradients observed during the sampling event, and the Darcy's Law ( $Velocity = ki$ , where  $k$  is hydraulic conductivity and  $i$  is hydraulic gradient). Gradients were determined from the groundwater contour maps drawn by interpolation of water table elevations taken by electric tape in each monitor well during the sampling event. Gradients were determined by change in water table elevation over horizontal distance as measured from the groundwater contour maps in the vicinity of each well. Direction is established by turning a 90 degree angle from tangents to the contours in the vicinity of the well and in the direction of decreasing contour elevations.

MW-	4	5	8	9
k, from Falling Head Slug Test, cm/sec	$1.66 \times 10^{-4}$	$1.14 \times 10^{-4}$	$3.89 \times 10^{-3}$	$2.91 \times 10^{-5}$
k, from Rising Head Slug Test, cm/sec	$7.26 \times 10^{-4}$	$1.02 \times 10^{-4}$	$6.37 \times 10^{-4}$	$2.50 \times 10^{-5}$

MW-	4	5	8	9
i, Gradient, ft/ft	0.0465	0.0333	0.080	0.080
Velocity, cm/day	0.67-2.92	0.29-0.33	26.9-4.40	0.20-0.17
Direction of Flow	WNW	NW	NNE	NNE

The groundwater under the landfill appears to flow NNE. However, this is complicated by small discontinuous clay lenses perching groundwater. Surficial groundwater may cascade from lens to lens enroute to the permanent aquifer. The Cape Fear Aquiclude causes permanent groundwater to flow ESE.

The Boring Records / Laboratories Appendix contains the following information relative to groundwater flow:

Horizontal and Vertical Survey Control for the wells brought to top of the uncapped 2" PVC well casing inside the locking wellhead protective cover.

Groundwater Contour Map. Contours were interpolated by CADD from elevations recorded on Groundwater Monitoring Field Data Log Sheets (provided in this appendix) during the sampling event.

Permeabilities as determined by in-situ slug testing with continuous data logger for horizontal permeability and laboratory constant head permeability testing for vertical permeabilities.

#### PROPERTIES OF SOILS

During installation of the new wells undisturbed soil samples were taken for laboratory analysis by Engineering and Environmental Science Co, Raleigh, NC (919) 781-7798.

Undisturbed samples taken from the surficial aquifer and analyzed by Unified Soils Classification System indicate poorly graded sands (SP) with thin discontinuous beds of low plasticity clays (CL) in each well. Vertical coefficients of permeability, k, as determined by Constant Head Permeability testing are  $10^{-4}$  to  $10^{-5}$  cm/sec in the poorly graded sands and  $10^{-7}$  cm/sec in the low

plasticity clay beds.

The Boring Records / Laboratories Appendix contains the following information relative to Properties of Soils:

Grain Size Distribution, Liquid Limit, Plasticity Index, USCS Classification, Moisture Content, Porosity, Bulk Density, and Hydraulic Conductivity for soil samples taken during well installation.

Permeability for each well as measured from slug testing.

## GROUNDWATER QUALITY

Groundwater Sampling of now abandoned MW's -1, -2, and -3 on 24 March 1997 found the following: MW-2 had Arsenic, Barium, Chromium, and Lead exceeding 2L standards. MW-2 had Selenium and Chloroethane at less than 2L Standards. MW-3 (upgradient well) had Lead at less than 2L Standards. Results of sampling from MW-2 may be suspect as MW-2 was adjacent to the old LCID sediment pond, frequently flooded above the cement grout collar, and sometimes flooded above top of casing. MW's -1, -2, and "Dry Well" were surrounded by LCID waste, and all three wells were of unknown construction. MW's -1, -2, and "Dry Well" were therefore decommissioned and replaced by MW's -8 & -9.

Samples taken from MW's -3 (1/16/98) and MW's -1, -4, -8, and -9 (1/27/98) were analyzed by AEN, Cary, NC (919) 677-0090 for Appendix I volatile and 8 metal constituents as specified by NC DENR for C&D landfills. The results indicate all wells meet NC Administrative Code 15A Subchapter 2L (November 8, 1993) Paragraph .0202 groundwater quality standards with the following exceptions: MW-4 exceeded 2L standards for Chloroform (2L standard of 0.19 ug/l) with a sample concentration of 58 ug/L, Chromium (2L standard of 50 ug/l) with a sample concentration of 345 ug/l, and Lead (2L standard of 15 ug/l) with a sample concentration of 17.8 ug/l. Note: MW-4 had very little water in it at the time of sampling, 1/27/98. MW-9 exceeded 2L standards for Chloroform (2L standard of 0.19 ug/l) with a sample concentration of 60 ug/L. MW-1 (subsequently decommissioned/abandoned) exceeded 2L standards for Lead (2L standard of 15 ug/l) with a sample concentration of 22.7 ug/l.

The Boring Records / Laboratories Appendix contains the following information relative to groundwater quality sampling:

Groundwater Monitoring Field Data Log Sheets containing water table elevations, pH, temperature, and conductivity (before purging and at sampling), and observed physical properties of water at sampling.

Chain of Custody forms for samples.

Volatile Organics Analysis Data Sheets for Appendix I volatile constituents.

Inorganic Analysis Data Sheets for 8 metals appropriate for C&D Landfill sampling as per NC DENR.

## SOURCES OF ADDITIONAL INFORMATION

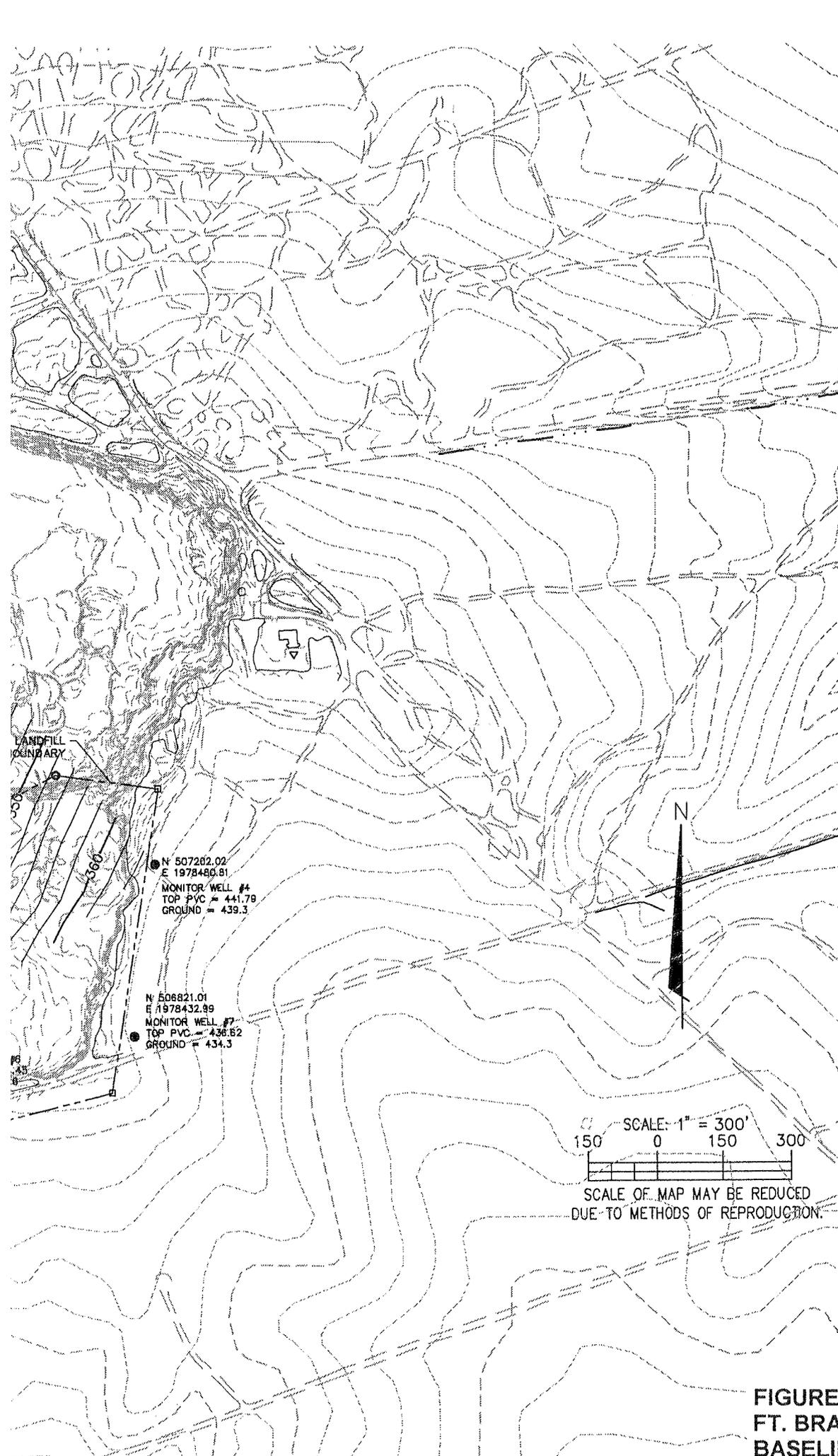
Three monitor wells (MW's 1-3) were maintained and sampled in conjunction with the LCID landfill. MW-3 was installed by USGS, Raleigh, on 12 May 1992 to a depth of 120 feet (USGS drilling by US Army Corps of Engineers)(USGS Well No. DLMW1, 350835 0790433 01) and screened from 109.5 to 119.5 feet. Jamie Marlowe and S. S. Howe, USGS, Raleigh, (919) 571-4000, logged MW-3 on 15 May 1992 for single point resistance, spontaneous potential, and caliper and again on 4 August 1992 for natural gamma.. MW-2 was located inside the northern limit of fill of the LCID Landfill adjacent to the LCID Landfill's old sediment pond (now filled with LCID) and served as the downgradient well for the LCID Landfill. Midway between MW-3 and -2 was MW-1. Immediately adjacent to MW-1 was another well labeled "Dry Well". Sounding of MW-2 and -1 on 15 March 1996 revealed depths from top of casing to bottom of well of 46.75 and 46.96 feet respectively. Logs, well completion and Gamma records exist for MW-3 at USGS's Raleigh office. Records exist for sampling events of MW's -1, -2, and -3 with DPWE, Ft. Bragg, and NC DENR. Sampling and laboratory analysis of samples from MW's -1, -2, and -3 were conducted by Law & Company, Consulting and Analytic Chemists, Wilmington, NC and BPA Environmental & Engineering, Inc., Greensboro, NC. The locations of the abandoned wells are shown on maps in the above referenced Hydrologic and Geologic Study and Water Quality Monitoring Plan.

USGS operates groundwater monitor wells with continuous water level recording devices on Ft. Bragg. 2 are located approximately 10 miles west of the landfill and 3 are located 5 miles east of the landfill. The data is useful in estimating seasonal variations in water table elevation and water table elevation response to climatic events such as precipitation and evapotranspiration. Climatic data recorded at Pope AFB weather station, 5 miles east of the landfill is available from NOAA and the USAF. The USGS water table elevation data is maintained in their Raleigh office. The "print out" data should not be relied upon until the paper "tapes" are examined for errors in recalibration of the recording devices. Drastic jumps in elevation between consecutive readings on the print out indicate recalibration errors, which can often be resolved by examining the tapes and adjusting the print out accordingly.

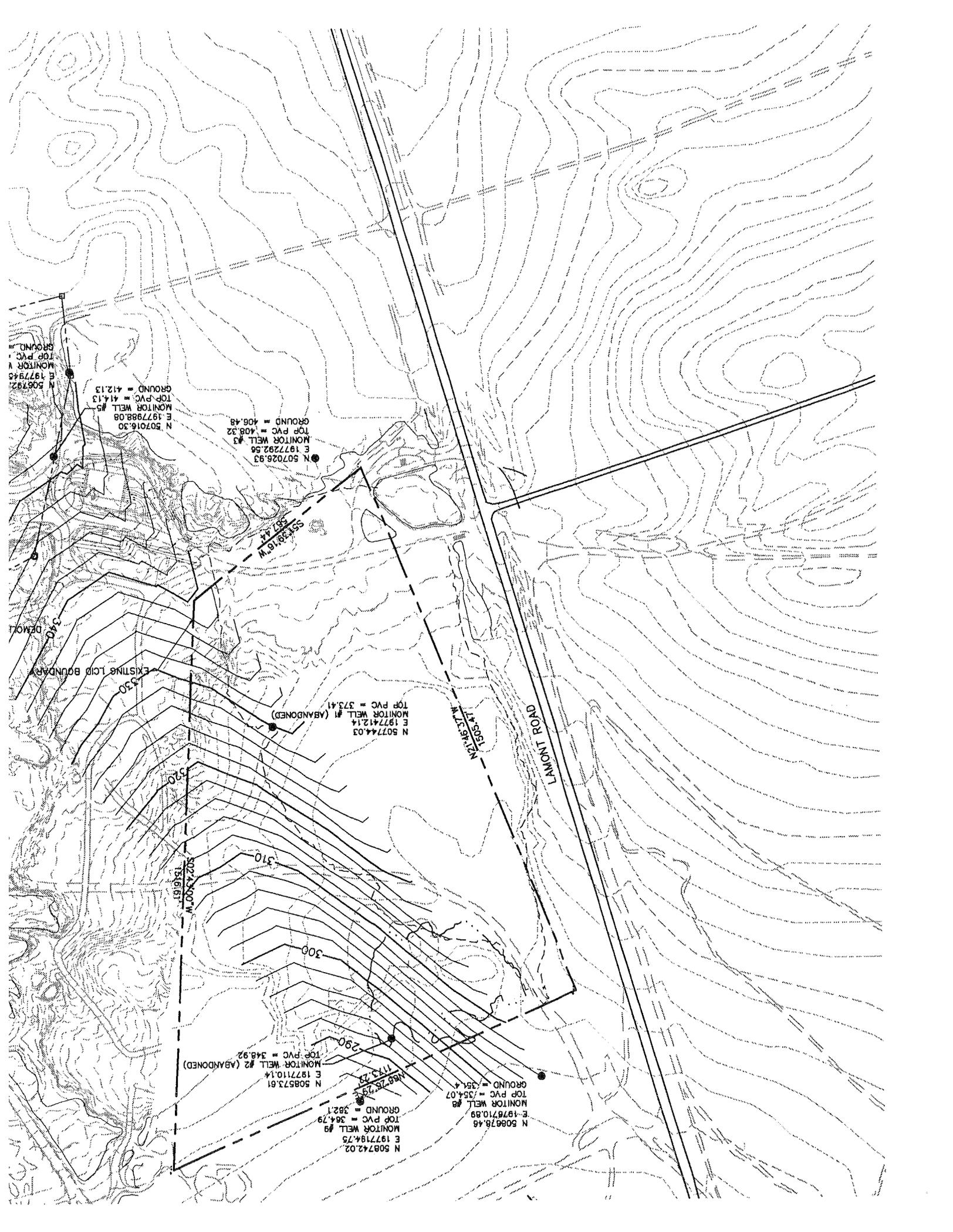
Jamie Marlowe, USGS, Raleigh (919) 571-4000 has installed over 30 monitor wells in conjunction with USGS projects on Ft. Bragg since 1991. In the summer of 1995 USGS opened a Field Office at Ft. Bragg (910) 396-7822, supervised by Richard Kessler from USGS, Raleigh.

For groundwater conditions to the south see the Geologic and Hydrogeologic Study (referenced above) dated 7 July 1996 for the C&D Landfill. This study includes water table elevations, SPT blow count, logs from 10 borings (B-1 through B-10) instrumented with piezometers, and testing of undisturbed soil samples taken during boring. Water table elevations were taken from the borings and LCID MW's -1 through -3 and mapped. Also see the above referenced Water Quality Monitoring Plan, Lamont Road Construction and Demolition Landfill dated 27 August 1997. For information about groundwater to the east, see above referenced Baseline Sampling Report for the Longstreet Road Sanitary Landfill dated 19 January 1996 and filed under Permit # 26-02.

NOTE: Data points used for determining groundwater contours in Figure 1 are as follows: MW's -4, -5, -6, -8, and -9. MW's -3 and -7 were not used as they are intended to monitor the permanent aquifer, located below the surficial aquifer represented by the darker contours. MW's -1, and -2 were abandoned (decommissioned).



**FIGURE #1**  
**FT. BRAGG C&D LANDFILL**  
**BASELINE SAMPLING REPORT,**  
**1998**



**BORING RECORDS / LABORATORIES APPENDIX**  
**for Ft. Bragg C&D and LCID Landfill Baseline Sampling Reports**  
**Lamont Road, Ft. Bragg, NC**

**Horizontal and Vertical Survey Control for the wells**

Casing elevation is to the top of the uncapped 2" PVC well casing inside the locking wellhead protective cover.

**Boring Logs and Well Completion Records**

**Soils & Field Laboratory Results:**

**Groundwater Monitoring Field Data Log Sheets**

containing water table elevations, pH, temperature, and conductivity (before purging and at sampling), and observed physical properties of water at sampling.

**Grain Size Distribution**

Liquid Limit

Plasticity Index

USCS Classification

Moisture Content

Porosity

Densities

Hydraulic Conductivity

Permeability, as measured from slug testing.

**Water Quality Sampling**

Chain of Custody forms.

Volatile Organics Analysis Data Sheets

Appendix I volatile constituents.

Inorganic Analysis Data Sheets

8 metals appropriate for C&D Landfill sampling as per NC DENR.



**Regional Land Surveyors, Inc.**

P.O. Box 35341

Greensboro, NC 27425

(336) 665-8155

(336) 665-8156 Fax

February 20, 1998

**Demolition Debris Landfill  
LCID  
Monitor Well Data**

#	North	East	Top/casing elev.	Ground
4	507,202.02	1,978,480.81	441.79	439.3
5	507,016.30	1,977,988.08	414.13	412.1
6	506,792.65	1,977,945.39	431.45	428.6
7	506,821.01	1,978,432.99	436.62	434.3
8	508,678.46	1,976,710.89	354.07	351.4
9	508,742.02	1,977,194.75	364.79	362.1

Note: All information is based upon horizontal & vertical datum supplied by U.S Army C.O.E. from monument records recorded by Hobbs & Upchurch of Southern Pines, North Carolina; Specifically "LAMONT NE", "LAMONT NW", "LAMONT SE" & "LAMONT SW".



*Gale M. Brown*



STL PROJECT NO.: FT. BRAGG C&D LANDFILL  
 SITE DESCRIPTION: LAMONT RD.  
 COUNTY:  
 BORING NO.: MW-4  
 COLLAR ELEVATION:  
 TOTAL DEPTH: 60'  
 DRILL MACHINE: CME 55  
 DRILL METHOD: 4.5" HSA TO 10', ROTARY WASH 3 7/8" 204 BIT  
 DATE STARTED: 1/5/98  
 DATE COMPLETED: 1/6/98  
 BORING LOCATION: NE of C&D LF



# GEOTECHNICAL BORING LOG

SPECIAL TESTING LABORATORIES  
 OF NORTH CAROLINA, INC.  
 Post Office Box J7805 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

948-1002

OFFSET:  
 GROUND WATER:  
 GEOLOGIST/ENGINEER: RUST

60 HR: DRY @ 24 HR:

ELEV. DEPTH	BLOW COUNT			0	BLCMS PER FOOT					Wet / Dry	SUN NO.	LOG	DESCRIPTION
	5	6	6		20	40	60	80	100				
0													
2.5													
5													
5-7'	2	4	4	5							S-1		RED / SW MED GRAIN MOIST BROWN
7.5													
10													
10-12	2	4	3	5							S-2		RED/BROWN SW COARSE GRAIN MOIST
15													
15-17	3	8	12	16							S-3		15-16.7 TAN SW-SP COARSE GRAIN 16.7-17.0 RED/BROWN SC MOIST
20													
20-22	5	9	9	10							S-4		RED/BROWN TAN SW COARSE GRAIN w/ SMALL TAN CLAY RIPS. CL-CH MOIST
25													
25-27	6	9	10	11							S-5		BEDDED BROWN SW MED GRAIN, FINE TAN SP w/ IRON STAIN, AND THIN GREY CH BEDS / GREY CH RIPS MOIST
30													
30-32	6	6	6	8							S-6		RED/BROWN COARSE SP WITH THIN (0.1") GREY CH BEDS MOIST-WET
35													
35-37	6	6	7	9							S-7		GREY MH-CH MOIST
40													
40-42	9	11	15	14							S-8		BROWN/TAN COARSE SW-SP MOIST w/ IRON STAIN & THIN GREY CH BEDS
45													
45-47	10	12	15	15							S-9		RED/BROWN MEDIUM GRAIN SW-SP w/ THIN GREY CH BEDS MOIST
50													
55													
55-57	7	10	11	11							S-10		TAN SW COARSE WGT. SATURATED w/ GREY CH RIPS
60													
60-62	7	9	10	11							S-11		TAN GREY FINE SW 61.7-62 GREY MH/MOIST CH
55													BORING TERMINATED AT 60'

50-52 SHELBY TUBE

DRY ON 1/10/98  
 & 1/12/98

GREEN 44.5-59.5  
 PLUG 42.5-44.5  
 GROUT 0-42.5

WELL ABANDONED & REDRILLED ON 1/12/98



# GEOTECHNICAL BORING LOG

SPECIAL TESTING LABORATORIES  
OF NORTH CAROLINA, INC.  
Post Office Box J7805 • Raleigh, North Carolina  
(919) 662-1234 • Fax (919) 662-9700

STL PROJECT NO.:  
SITE DESCRIPTION:  
COUNTY:  
BORING NO.: MW 4 CONTD  
COLLAR ELEVATION:  
TOTAL DEPTH: 80'  
DRILL MACHINE: FAILING STRATA STAB 15  
DRILL METHOD: 3 1/8" ROLLER BIT ROTARY WASH  
DATE STARTED: 1/12/98  
DATE COMPLETED: 1/12/98  
BORING LOCATION:

OFFSET:  
GROUND WATER:  
GEOLOGIST/ENGINEER:  
00 HR: DRY 24 HR:  
RUST

ELEV. DEPTH	BLOW COUNT			0	BLOWS PER FOOT					Wet / GW	SAMPLING NO.	LOG	DESCRIPTION
	5	6	8		20	40	60	80	100				
0													
2.5										M			
65-67	5	20	42	57	78					M	S-12		BROWN TAN COARSE SW MOIST-BEDDED
7.5										M			
10										M			
70-72		26	29	42	60						S-13		BROWN TAN COARSE SW WET
73-75	15									M			SHELBY TUBES
75-77		26	32	47	77						S-14		GREY CH - MH W PURPLE IRON STAIN DRY MOIST
20													
80-82		11	19	25	50						S-15		GREY CH W/ PURPLE STAIN MOIST
25													
30													
35													
40													
45													
50													
55													
60													
65													
70													
75													
80													
85													

BORING TERMINATED AT 80'  
SCREEN 60'-80'  
SAND 56'-80'  
BENTONITE 54.5-56'  
GROUT 0-54.5'

STATIC ▽ 1/14/98 76.25' TOC  
▽ 3/16/98 77.9

**WELL COMPLETION RECORD**

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: <b>FT. BRAGG C&amp;D LANDFILL MW-5</b>	PERMIT NO.:
ADDRESS: <b>LAMONT RD, FT. BRAGG, NC</b>	OWNER (print): <b>DPW</b> <b>FT. BRAGG, NC 28307-5000</b>
DRILLING CONTRACTOR: <b>ATLANTIC BORING CONTRACTORS</b>	REGISTRATION NO.: <b>NC 1747</b>

Casing Type: <u>SCH 40 PVC</u> dia. <u>2</u> in.	Grout Depth: from <u>0</u> to <u>58</u> ft. - dia. <u>4</u> in.
Casing Depth: from <u>0</u> to <u>63</u> ft. - dia. <u>2</u> in.	Bentonite Seal: from <u>58</u> to <u>62</u> ft. - dia. <u>4</u> in.
Screen Type: <u>0.010 SCH 40 PVC</u> dia. <u>2</u> in.	Sand/Gravel PK: from <u>62</u> to <u>83</u> ft. - dia. <u>4</u> in.
Screen Depth: from <u>63</u> to <u>78</u> ft. - dia. <u>2</u> in.	Total Well Depth: from <u>0</u> to <u>84</u> ft. - dia. <u>4</u> in.

Static Water Level: 62.60 feet from top of casing Date Measured 1 / 14 / 98

Yield (gpm): N/A Method of Testing: \_\_\_\_\_ Casing is 2.0 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
<u>SEE ATTACHED LOG FOR MW-5</u>		

LOCATION SKETCH
(show distance to numbered roads, or other map reference points) <u>SEE ATTACHED MAP</u>

REMARKS: \_\_\_\_\_

\_\_\_\_\_

DATE: 1/16/98 SIGNATURE: [Signature]





# GEOTECHNICAL BORING LOG

SPECIAL TESTING LABORATORIES  
OF NORTH CAROLINA, INC.  
Post Office Box J7805 • Raleigh, North Carolina  
(919) 662-1234 • Fax (919) 662-9700

STL PROJECT NO.:  
SITE DESCRIPTION:  
COUNTY:  
BORING NO.: MWS CONTD  
COLLAR ELEVATION:  
TOTAL DEPTH:  
DRILL MACHINE:  
DRILL METHOD:  
DATE STARTED:  
DATE COMPLETED:  
BORING LOCATION:

OFFSET:  
GROUND WATER:  
GEOLOGIST/ENGINEER:  
00 HR: DRY 24 HR:

ELEV. DEPTH	BLOW COUNT			BLCWS PER FOOT					Wt /GAL	SAM NO.	LOG	DESCRIPTION
	5'	5'	5'	0	20	40	60	80				
0												
2.5												
5												
65-01 7.5	48	24	28	31						M 3-13		TAN ORANGE, BROWN COARSE SW BEDDED w/ QUARTZ ROBBLES 1/4" MOIST (WET)
10												
76-72 12-74 15	12	28	39	44						M 3-14		BROWN ORANGE COARSE SW BEDDING w/ 1/2" QUARTZ ROBBLES & GRAY CH W/NS 2" THICK
75-77 20	23	56	74	79						3-16		GRAY CH MOIST
80-82 25	35	62	83	91						3-16		GRAY CH MOIST
84-86 30	26	38	40	53						3-17		GRAY CH - MH DRU
35												
40												
45												
50												
55												
60												
55												

TERMINATED BORING  
AT 84'  
SAND PACK 62' - 83'  
SCREEN 63-78'  
BENTONITE 58-62'  
GROUT 0-58'

MOIST  
(WET)

STATC J 62.60' TOC 1/14/99





# GEOTECHNICAL BORING LOG

SPECIAL TESTING LABORATORIES OF NORTH CAROLINA, INC.  
 Post Office Box J7605 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

STL PROJECT NO.:  
 SITE DESCRIPTION:  
 COUNTY:  
 BORING NO.: MW-6 CO#D  
 COLLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE:  
 DRILL METHOD:  
 DATE STARTED:  
 DATE COMPLETED:  
 BORING LOCATION:

OFFSET:  
 GROUND WATER:  
 GEOLOGIST/ENGINEER:  
 00 HR: DRY 24 HR:

ELEV. DEPTH	BLW COUNT			BLWNS PER FOOT						Wet / GW	SAM NO.	LOG	DESCRIPTION
	6'	6'	6'	0	20	40	60	80	100				
0													
2.5													
65-67	5	15	13	21	32						M	S-11	GREY BROWN TAN PURPLE THIN BEDDED FINE SW w/ BANDS GREY CH
7.5											M		
10											M		
70-72	11	13	17	19							M	S-12	TAN GREY ORANGE BEDDED FINE SW (WET)
15											M		
75-77	9	11	19	20								S-13	TAN ORANGE BROWN BEDDED MED SW w/ BANDS OF THIN GREY CH
20													
80-82	8	7	13	15								S-14	75.2-75.5 WET, OTHER MOIST TAN ORANGE PURPLE MED-FINE MOIST-WET AT 81.7
25													
85-87	7	10	13	24								S-15	85-86.7 GREY COARSE SW-SP 86.7-87 TAN-RED SATURATED BEDDED COARSE SW-SP w/ THIN GREY CH BEDS
30													
90-92													
35													
95-97	7	4	14	24								S-16	GREY CH-MH IRON STAIN MOIST-DRY.
40													
45													
50													
55													
60													
65													
70													
75													
80													
85													
90													
95													

SCREEN 79.5-84.5  
 FILTER SAND 77.5-95  
 BENTONITE PLUG 75.5-77.5  
 GROUT 0-75.5

STATIC ▽ 80.87' TOC 1/14/99





# GEOTECHNICAL BORING LOG

**SPECIAL TESTING LABORATORIES OF NORTH CAROLINA, INC.**  
 Post Office Box J7805 • Raleigh, North Carolina  
 (919) 862-1234 • Fax (919) 862-9700

STL PROJECT NO.:  
 SITE DESCRIPTION:  
 COUNTY:  
 BORING NO.: MW-7  
 COLLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE: JTRATA STAR 15  
 DRILL METHOD: 4 1/4" NSA TO 15', 5 1/8" ROLLER BIT ROTARY WASH TO 120'  
 DATE STARTED: 1/6/98  
 DATE COMPLETED: 1/9/98  
 BORING LOCATION: SE OF LEID LF

OFFSET: 3 1/8" ROTARY WASH TO 130'  
 GROUND WATER: 60 HR: DRY 24 HR:  
 GEOLOGIST/ENGINEER: RUST

ELEV. DEPTH	BLOW COUNT			0	BLOWS PER FOOT					Wet / GW	SAMPL NO.	LOG	DESCRIPTION
	5	6	8		20	40	60	80	100				
0													
2.5										M			
5										M			
5-7	12	6	6	7						M	S-1		BROWN/TAN MEDIUM GRAIN SW w/ GREY CH RIPS DRY-MOIST
7.5										M			
10										M			
10-12	7	7	7	13							S-2		RED/BROWN MEDIUM GRAIN SP-SW DRY-MOIST
15										M			
15-17	18	22	27	80							S-3		GREY CH BEDDED WITH BROWN/RED MEDIUM SP PURPLE IRON STAIN DRY-MOIST
20													
20-22	22	23	28	33							S-4		SAME AS S-3
25													
25-27	24	25	31	35							S-5		TAN COARSE SW BEDDED w FINE TAN/ORANGE SW & CLAY (GREY CH) RIPS
30													
30-32	16	23	27	18							S-6		TAN COARSE SAND SW MOIST
35													
36-37	10	10	10	22							S-7		TAN/BROWN FINE SW BEDDED MOIST
40													
40-42	17	34	74	68							S-8		GREY CH MOIST
45													
45-47	33	27	35	83							S-9		GREY CH-CL <sup>SC</sup> MOIST w/ MED GRAIN SAND BEDDED w/ TAN ORANGE FINE SW
50													
50-52	9	18	19	22							S-10		GREY CH-CL <sup>SC</sup> MOIST BEDDED w/ TAN ORANGE FINE SW AND BROWN/RED SW COARSE IRON STAIN
55													
55-57	23	31	33	82							S-11		TAN BROWN COARSE-MED SW MOIST BEDDED w/ GREY/TAN ML <sup>SC</sup>
60													
60-62	34	36	54	57							S-12		SAME AS S-11
65													

2

STL PROJECT NO.:  
 SITE DESCRIPTION:  
 COUNTY:  
 BORING NO.: MW-7 CONTD  
 COLLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE:  
 DRILL METHOD:  
 DATE STARTED:  
 DATE COMPLETED:  
 BORING LOCATION:



**GEOTECHNICAL BORING LOG**

**SPECIAL TESTING LABORATORIES OF NORTH CAROLINA, INC.**  
 Post Office Box J7805 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

OFFSET:  
 GROUND WATER:  
 GEOLOGIST/ENGINEER:  
 @0 HR: DRY @24 HR:

945-2822

ELEV. DEPTH	BLOW COUNT			0	BLOWS PER FOOT					Wet / GW	SWM NO.	LOG	DESCRIPTION
	5	5	5		20	40	60	80	100				
0													
2.5										M			
5										M			
65-67	18	24	51	52						M	5-13		TAN BROWN COARSE SW MOIST BEDDED WITH GREY MH-ML
7.5										M			
10										M			CH
70-72	51	52	50	55						M	5-14		GREY FINE ML-MH WITH ORANGE STAIN MOIST
15										M			
75-77	24	24	24	33							5-15		GREY SC W/PURPLE STAIN MOIST BEDDED WITH GREY MH-ML & FINE ORANGE SAND SW
20											5-16		GREY COARSE SW BEDDED W/ TAN ORANGE MEDIUM SW MOIST PEBBLE SIZE BOUNDED QUARTZ
80-82	65	80	62	63							5-17		BANDED/BEDDED BROWN TAN GREY MEDIUM SW IRON STAIN MOIST
25											5-18		SAME AS 5-17
85-87	20	23	25	21							5-19		GREY CH PURPLE & ORANGE IRON STAIN MOIST
30											5-20		SAME AS 5-19
90-92	10	26	44	52							5-21		GREY ML W/ ORANGE STAINS MOIST-DRY
35											5-22		110-110.5 TAN ORANGE FINE SW MOIST 110.5-110.8 TAN-ORANGE COARSE SW SW 110.8-111 GREY-PURPLE ML MOIST-DRY
95-97	21	23	44	43							5-23		110.5- TAN ORANGE MED-FINE SW MOIST
40													
100-102	30	41	61	65									
45													
105-107	22	27	36	43									
50													
110-112	25	58	100	2"									
55													
115-117													
60													
120	25	22	20	17									
122													
65													

SHIELD TUBE

NOTE: HOLE DRAINED OF WATER AT 120' INDICATING POROUS ZONE

3" SPOON 120.7-121 GREY CH MOIST ORANGE IRON STAIN  
 121-121.6 TAN MEDIUM GRAIN SW SATURATED  
 121.6-122 TAN ORANGE BEDDED SW MOIST-WET

STL PROJECT NO.:  
 SITE DESCRIPTION:  
 COUNTY:  
 BORING NO.: MW-7 CONT'D  
 COLLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE:  
 DRILL METHOD:  
 DATE STARTED:  
 DATE COMPLETED: 1/2/98  
 BORING LOCATION:



**GEOTECHNICAL BORING LOG**

SPECIAL TESTING LABORATORIES  
 OF NORTH CAROLINA, INC.  
 Post Office Box J7803 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

OFFSET:  
 GROUND WATER: @ 0 HR: DRY @ 24 HR:  
 GEOLOGIST/ENGINEER:

8-2-1982

ELEV. DEPTH	BLOW COUNT			0	BLOWS PER FOOT					Wt / GW	SUN NO.	LOG	DESCRIPTION	
	5	5	5		20	40	60	80	100					
122-	0													
124	2.5	42	30	40	44					M	5-24		122-122.5 TAN PURPLE MED GRAIN SW WITH THIN GRAY BN BEDS	
125-	5									M			122.5-123 TAN MED MOIST-WET WET-SATURATED W 1/4" QUARTZ PEBBLES	
127	7.5	20	26	60	63					M	5-25		123-124 TAN ORANGE PURPLE MEDIUM-COURSE SW BEDDED MOIST	
130	10									M	5-26		125-127 TAN COARSE SW (WET)	
131	15	120	120							M			130-131 GREY CH 2/4-MOIST	
	20													
	25													
	30													
	35													
	40													
	45													
	50													
	55													
	60													
	65													

PVC 4" CASING SET TO 120'

BORING TERMINATED AT 130'

SCREEN 118.5'-128.5'  
SAND PACK 117'-130'

BENTONITE 114'-117'  
GROUT TO SURFACE  
OVERFLOW TO OUTER CASING.



# GEOTECHNICAL BORING LOG



**SPECIAL TESTING LABORATORIES OF NORTH CAROLINA, INC.**  
 Post Office Box 17805 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

STL PROJECT NO.:  
 SITE DESCRIPTION: FT BRASS LCID LANDFILL  
 COUNTY:  
 BORING NO.: MW-8  
 COLLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE: STRATA STAR 15  
 DRILL METHOD: 3 1/8" CONE ROTARY WASH  
 DATE STARTED: 1/12/98  
 DATE COMPLETED: 1/13/98  
 BORING LOCATION: N OF LCID

OFFSET:  
 GROUND WATER:  
 GEOLOGIST/ENGINEER: KUST  
 60 HR: DRY 24 HR:

ELEV. DEPTH	BLOW COUNT			BLOWS PER FOOT					Wt / Gm	SAMPLING NO.	LOG	DESCRIPTION
	5	6	6	0	20	40	60	80				
0												
2.5											M	
5											M	
7.5											M	
10											M	
10-12												RED TAN SC MOIST
15											M	
15-17	22	30	30		33							GREY RED TAN ML DRY
20												
20-22	18	23	25		28							TAN-ORANGE BEDDED COARSE TO FINE SW DRY W/ BITS OF STRY CH MH DRY
25												
25-27	16	22	27		35							TAN ORANGE COARSE BEDDED SW MOIST
30												
30-32	14	24	26		23							SAME AS ABOVE
35												
35-37	17	27	29		34							SAME AS ABOVE (WET) IN TAN COARSE SP BED
40												
40-42	13	14	39		42							TAN BROWN ORANGE BEDDED COARSE-FINE SW MOIST
45												
45-47	19	32	21		25							45-45.5 GREY SW MOIST 45.5-46.1 ORANGE TAN BEDDED COARSE SW (WET)
50-52												50-52 SHELBY TUBE
52-54	8	11	17		22							52-53 ORANGE COARSE SP SATURATED 53-53.2 GREY FINE SP SATURATED 53.2-54 TAN FINE SW (WET)
55-57	12	15	16		46							GREY CH RIPS & TAN COARSE SP SATURATED 55-57 ORANGE BROWN BEDDED SW SATURATED IN COARSE SAND BEDS CH CLAY RIPS & THIN BEDS
60												
60-62	32	69	90		105							GREY PURPLE CH DRY-MOIST
55												BORING TERMINATED AT 60'

SCREEN 45'-60'  
 SAND 42'-60'  
 BENTONITE 32-42'  
 GROUT 0-32'







STL PROJECT NO.:  
 SITE DESCRIPTION:  
 COUNTY:  
 BORING NO.: MW9. (CONT'D)  
 CELLAR ELEVATION:  
 TOTAL DEPTH:  
 DRILL MACHINE:  
 DRILL METHOD:  
 DATE STARTED:  
 DATE COMPLETED:  
 BORING LOCATION:



# GEOTECHNICAL BORING LOG

SPECIAL TESTING LABORATORIES  
 OF NORTH CAROLINA, INC.  
 Post Office Box J7803 • Raleigh, North Carolina  
 (919) 662-1234 • Fax (919) 662-9700

OFFSET:  
 GROUND WATER: @ 0 HR: DRY @ 24 HR:  
 GEOLOGIST/ENGINEER:

ELEV. DEPTH	BLOW COUNT			BLWS PER FOOT						Wt / GW	SUM NO.	LOG	DESCRIPTION
	5'	5'	5'	0	20	40	60	80	100				
0													
2.5										M			
5										M			
125-127 7.5	25	31	31	34						M			TAN ORANGE WHITE BEDDED MED GRAIN SW-SP WET
10										M			
130-132 15	33	22	47	23						M			TAN ORANGE BEDDED MED SP WET THIN CH GRAY BEDS IRON STAIN
135-137 20	22	60	16										TAN ORANGE BEDDED MED SP WET
25													
30													
35													
40													
45													
50													
55													
60													
65													

BORING TERMINATED 137'  
 SHELBY ATTEMPT FAILED  
  
 SCREEN  
 121.5 - 136.5  
 SAND  
 108 - 136.5  
 BENTONITE  
 98 - 108  
 GROUT  
 0 - 98'

NORTH CAROLINA DEPARTMENT OF  
ENVIRONMENT AND NATURAL RESOURCES  
DIVISION OF WASTE MANAGEMENT



JAMES B. HUNT JR.  
GOVERNOR

WAYNE McDEVITT  
SECRETARY

WILLIAM L. MEYER  
DIRECTOR

February 16, 1998

Richard R. Rust, P.E., Ph.D.  
5641 Piper Drive  
Fuquay, NC 27526

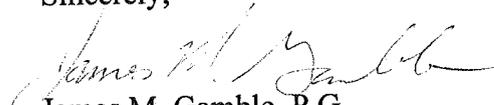
Re: Monitoring Well Installation  
Lamont Road LCID Landfill  
Fort Bragg  
Cumberland County, NC

Mr. Rust:

The Solid Waste Section has reviewed the drilling log for MW9 that you faxed on February 5, 1998. Monitoring well MW9's construction appears consistent with the approved monitoring plan, given the stratigraphy at the site.

If you have additional questions, please feel free to contact me at the letterhead telephone number or address.

Sincerely,

  
James M. Gamble, P.G.  
Hydrogeologist  
Solid Waste Section

Cc: Jim Barber, Fayetteville Regional Office

Attachment: Copy of boring log for MW9

E<sup>2</sup>S

ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY

3008 ANDERSON DRIVE, SUITE 102

RALEIGH, NC 27609

(919) 781-7798

March 6, 1998

Mr. Richard Rust, P.E.  
5641 Piper Dr.  
Fuquay Varina, NC 27526

RE: Monitoring Well Sampling  
C & D Landfill  
Fort Bragg, North Carolina

Dear Mr. Rust:

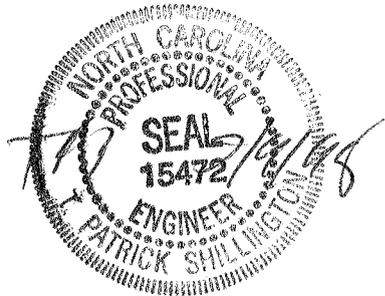
As per your request, Engineering & Environmental Science Company (E<sup>2</sup>S) conducted soil mechanical tests on the soils contained in the Shelby tubes that you submitted. Also, E<sup>2</sup>S sampled the Monitoring Wells at the above referenced site. Table 1 in Attachment A summarizes the field information concerning the Monitoring Well Sampling and Table 2 in Attachment A summarizes the soil test results. The soil lab sheets are contained in Attachment B.

Submitted separately is the slug test data and evaluation conducted by Geo-Solutions, Inc.

Please contact me if you have any questions.

Sincerely,

  
T. Pat Shillington, P.E.  
President



Attachment A: Tables

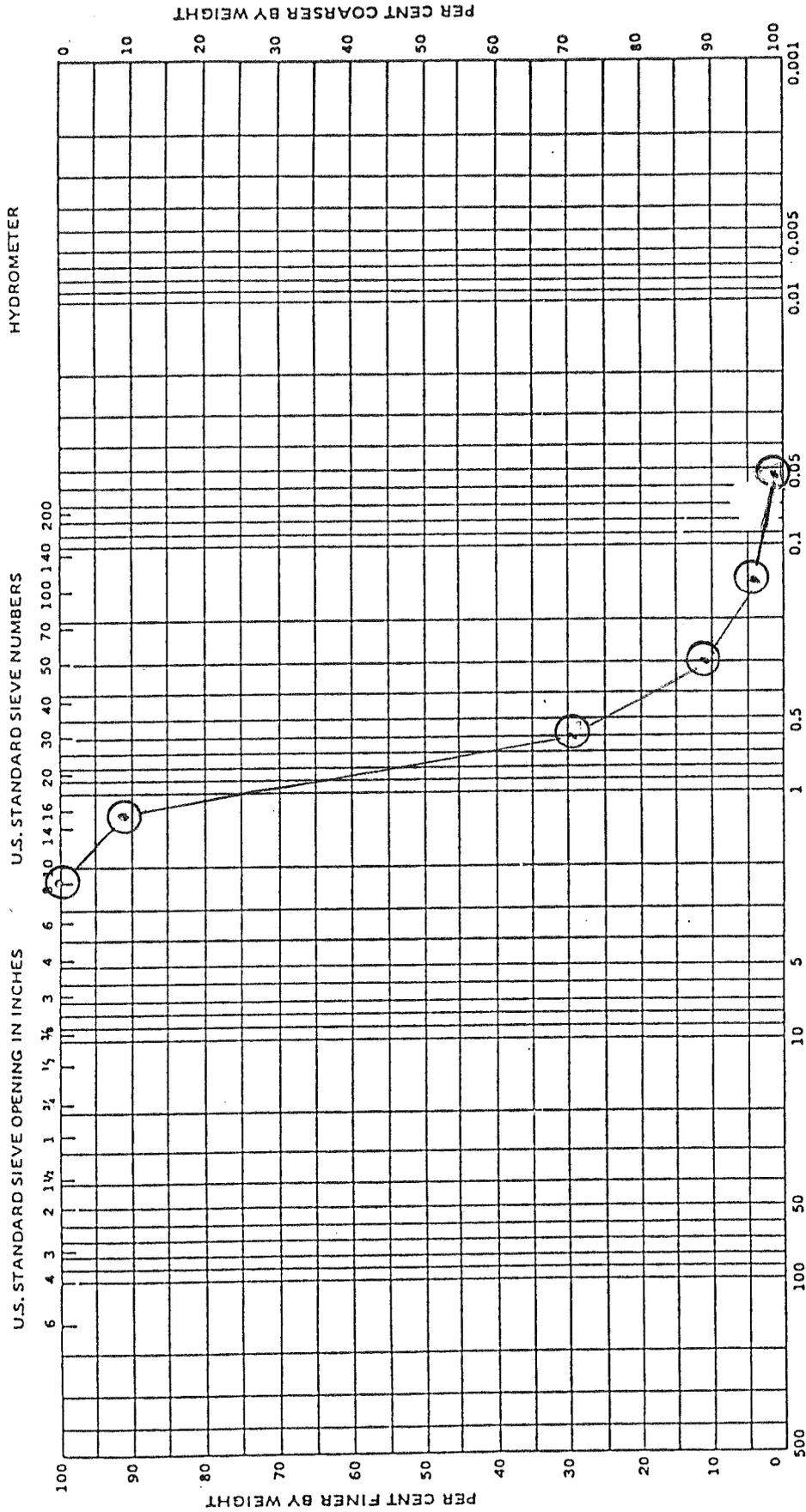
TABLE NO. 1: Field Measurements

Well No.	Depth to Water, ft	pH		Temp., °C		Conductivity		Gallons Removed
		before	after	before	after	before	after	
MW-1	101.83	6.6	6.7	18.4	20.1	71	69	11.3
MW-3	26.74	7.4	7.2	19.4	19.8	164	104	9.7
MW-4	76.15	6.9	6.6	19.1	20.3	12.3	99	2.8
MW-5	62.60	6.8	6.8	18.8	19.6	146	112	10.4
MW-6	80.87	6.7	6.9	19.4	19.8	89	85	10.1
MW-7	112.42	7.5	7.4	17.2	18.4	41	82	9.8
NW-8	47.95	7.5	6.7	20.5	20.6	63	50	8.6
NW-9	81.10	6.9	7.0	18.8	19.8	154	109	32.2

TABLE NO. 2: Soil Analytical Test Results

Location	Gradation Results- % Passing							USCS	Atterburg Limits, %			Wet Den., pcf	Moist. Conen- t, %	Dry Den., pcf	Poro- sity, %	Coef. of Perm. cm/sec
	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	LL		PL	PI						
MW-4 (top)	100	86	30	12	4.7	1.3	--	NP	NP	SP	125.9	23.0	102.4	37.0	$7.2 \times 10^{-5}$	
MW-4 (Bottom)	---	---	---	---	---	64.2	39	15	24	CL	135.6	19.6	113.4	31.4	$9.5 \times 10^{-7}$	
MW-5	100	89	47	13	3.6	0.8	--	NP	NP	SP	131.6	16.9	112.6	31.9	$1.4 \times 10^{-4}$	
MW-6 (Top)	100	75	26	13	5.9	4.7	--	NP	NP	SP	133.4	22.0	109.3	33.9	$8.3 \times 10^{-5}$	
MW-6 (Bottom)	---	---	---	---	---	73.5	27	16	11	CL	139.1	17.3	118.6	28.3	$2.9 \times 10^{-7}$	
MW-7	---	---	---	---	---	60.4	42	13	29	CL	131.1	19.3	109.9	33.5	$6.4 \times 10^{-7}$	
MW-8	100	98	82	33	5.6	2.8	--	NP	NP	SP	125.5	26.6	99.2	40.0	$4.9 \times 10^{-5}$	
MW-9	100	94	41	12	5.6	2.0	--	NP	NP	SP	130.4	17.8	110.7	33.1	$3.2 \times 10^{-4}$	

# GRADATION CURVES

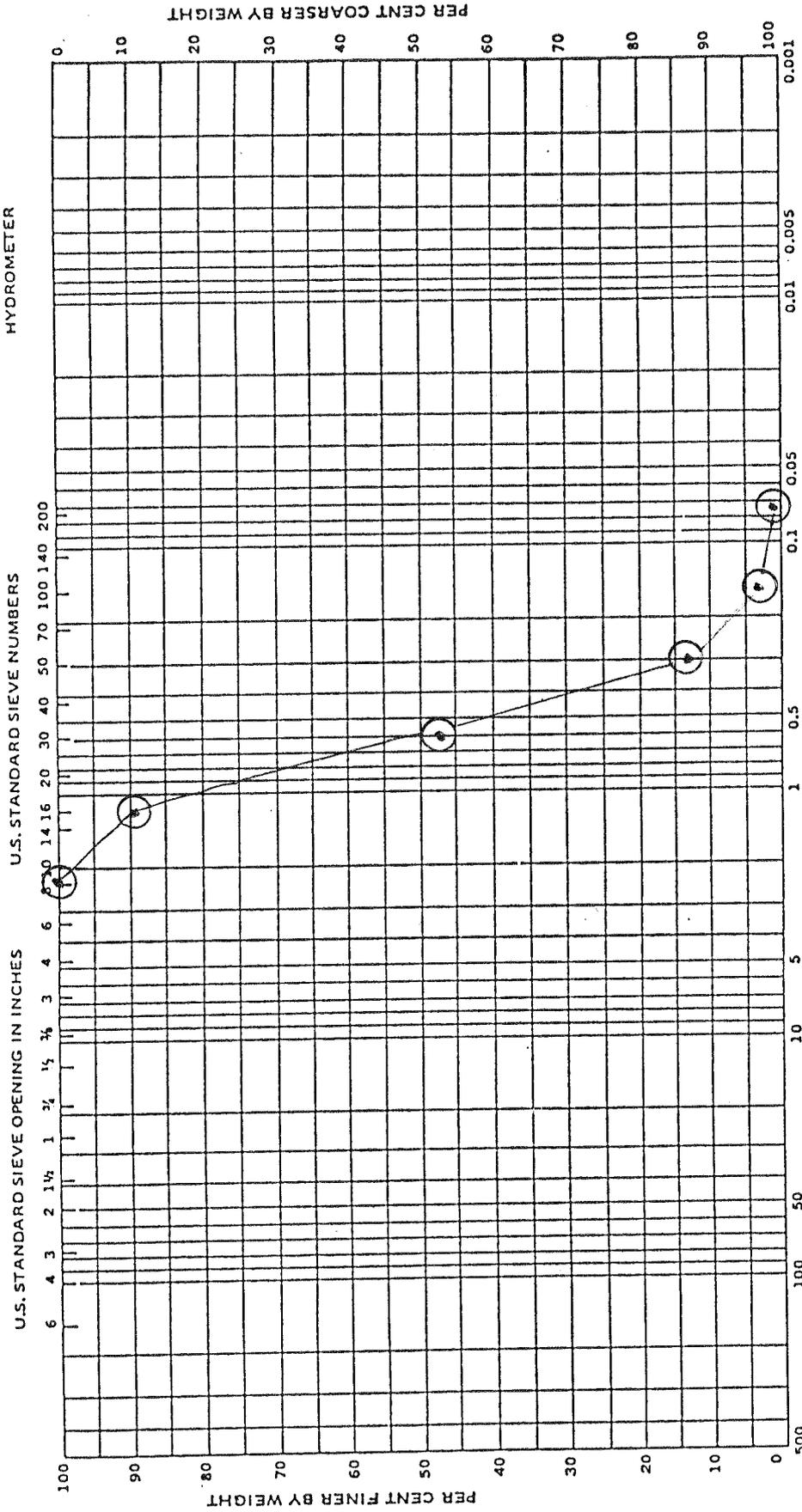


Fort Bragg  
JOB NO. \_\_\_\_\_

BORING NO	ELEV OR DEPTH	GRAVEL			SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
MW-4 (TOP)								



# GRADATION CURVES



COBBLES GRAVEL GRAIN SIZE MILLIMETERS SILT OR CLAY

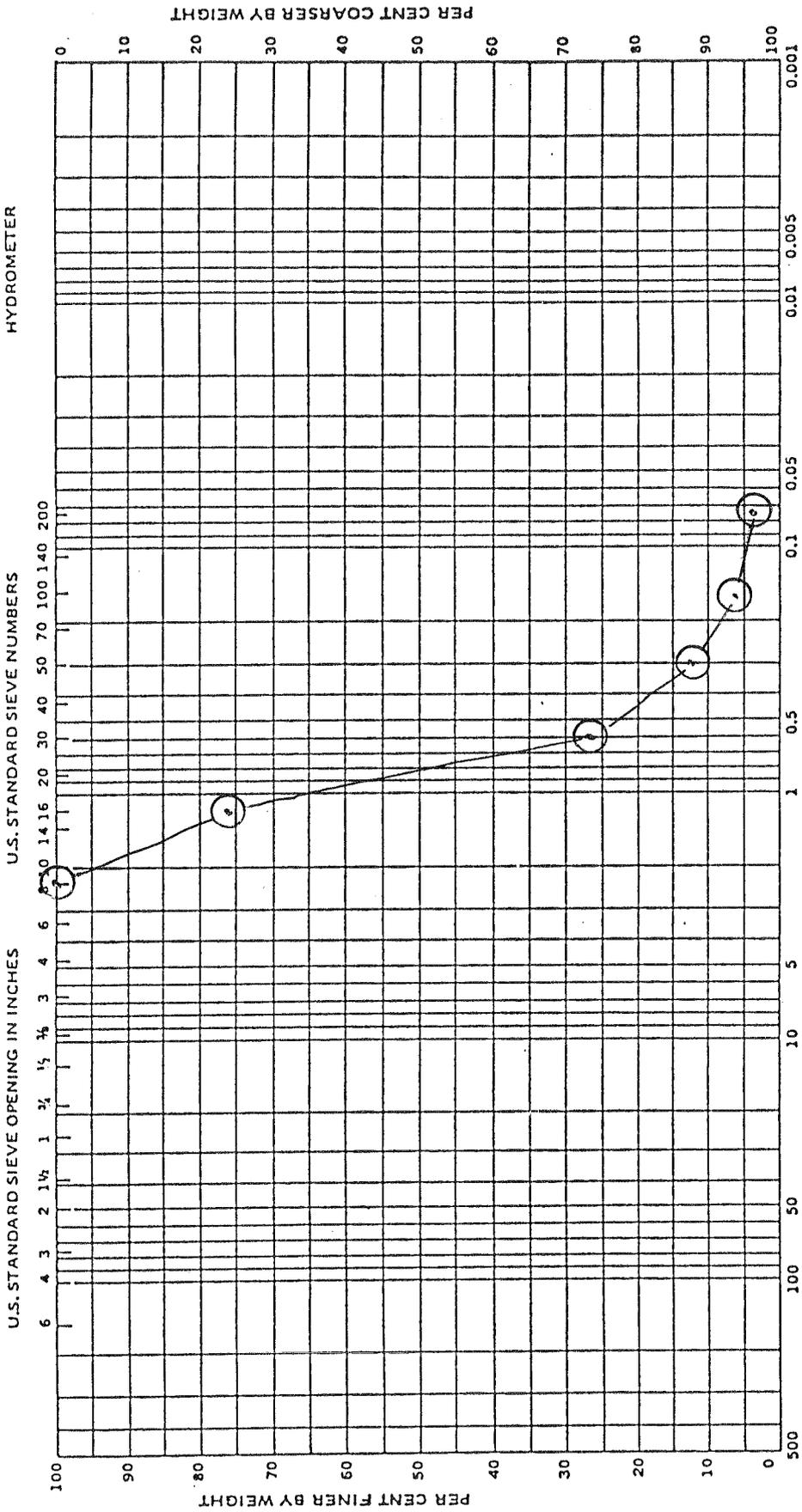
COBBLES	GRAVEL	GRAIN SIZE MILLIMETERS	SILT OR CLAY
COARSE	COARSE	COARSE	COARSE
FINE	FINE	MEDIUM	FINE

BORING NO	ELEV OR DEPTH	MAT	WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
MW-5							

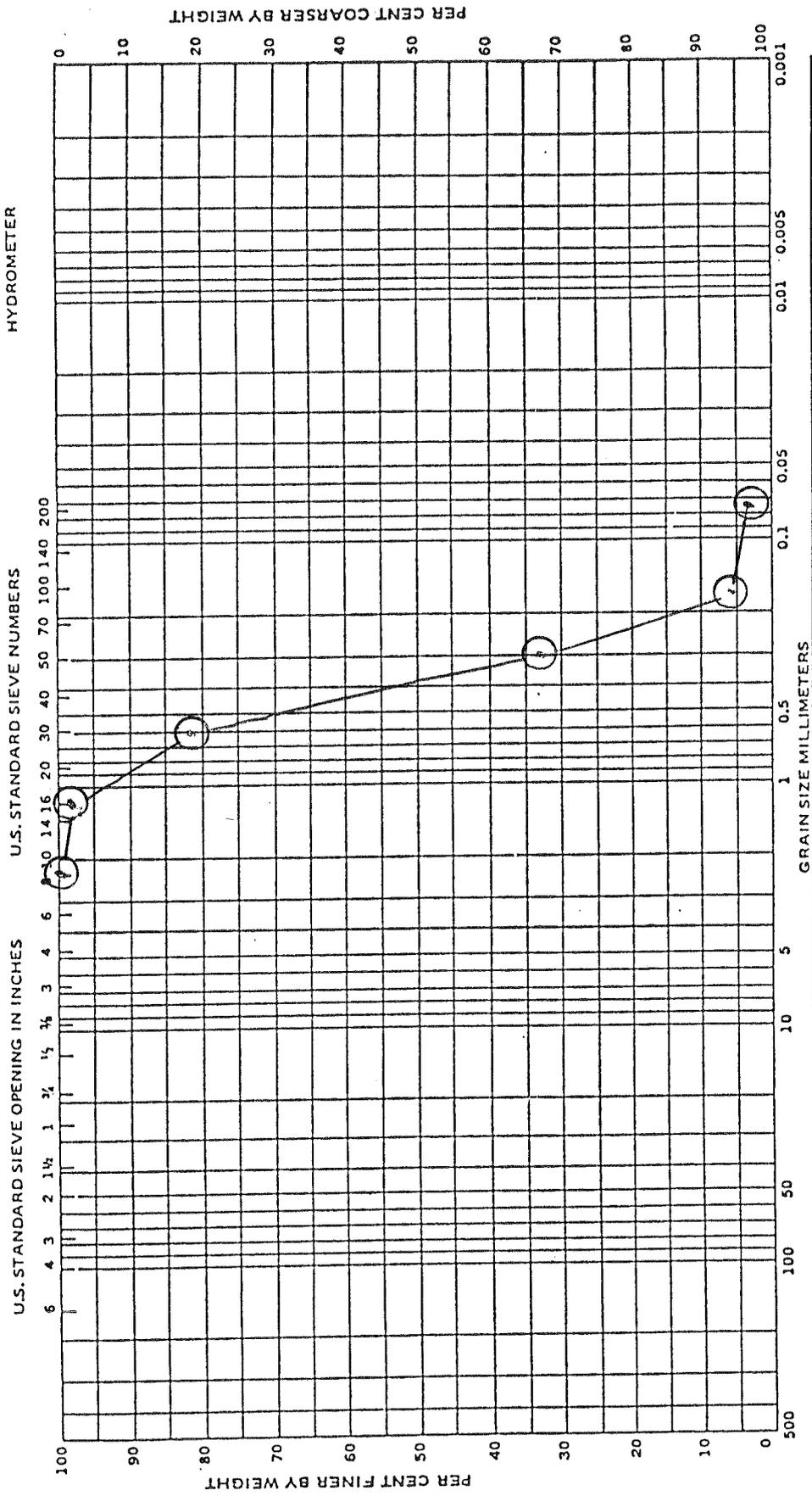
JOB NO. Fort Bragg



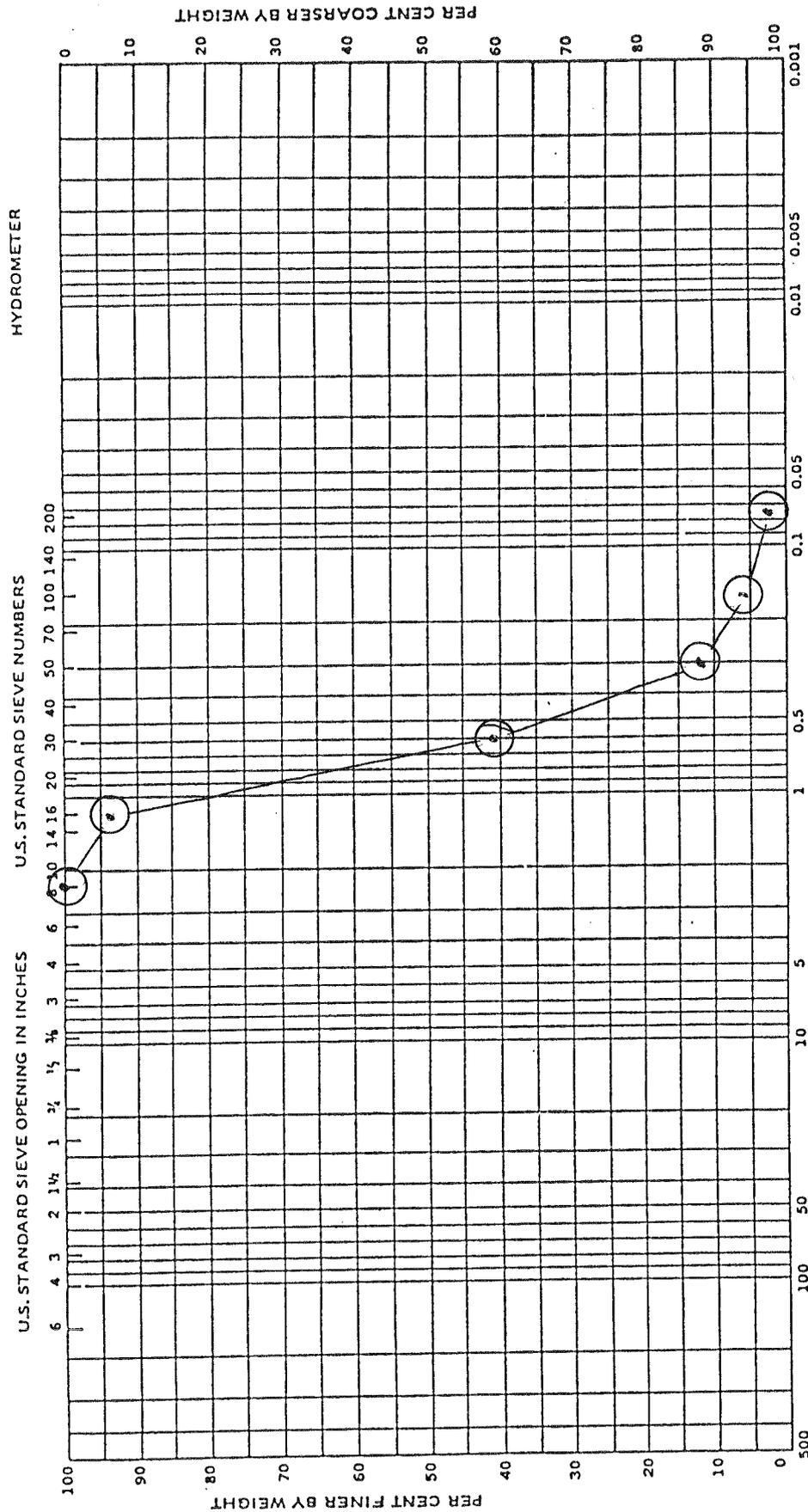
# GRADATION CURVES



# GRADATION CURVES



# GRADATION CURVES



Attachment B: Soil test sheets

SIEVE ANALYSIS

Date 2/23/98

Project C&D Landfill - Fast Grass

Boring No. MW-4 (Bottom 1/2 of Sinker tube) Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_

Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Opening		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
Pan						
0.132	3.36	No. 6				
0.094	2.38	No. 8				
0.079	2.00	No. 10				
0.047	1.19	No. 16				
0.033	0.84	No. 20				
0.023	0.59	No. 30				
0.0165	0.42	No. 40				
0.0117	0.297	No. 50				
0.0083	0.210	No. 70				
0.0059	0.149	No. 100				
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	863.1	35.8	35.8	64.2
Pan						
Total weight in grams			2410.3			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician TMS Computed by TMS Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/59

Project C & D Land 021 - Fort Meigs

Boring No. MW-7 (Bottom of Tube)

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_

Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
		Pan				
0.132	3.36	No. 6				
0.094	2.38	No. 8				
0.079	2.00	No. 10				
0.047	1.19	No. 16				
0.033	0.84	No. 20				
0.023	0.59	No. 30				
0.0165	0.42	No. 40				
0.0117	0.297	No. 50				
0.0083	0.210	No. 70				
0.0059	0.149	No. 100				
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	812.2	39.6	39.6	60.4
		Pan				
Total weight in grams			2052.4			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician TPS

Computed by TPS

Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/99

Project C&D Landfill - Fort. Rags

Boring No. MW-6 (Bottom)

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_

Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
		Pan				
0.132	3.36	No. 6				
0.094	2.38	No. 8				
0.079	2.00	No. 10				
0.047	1.19	No. 16				
0.033	0.84	No. 20				
0.023	0.59	No. 30				
0.0165	0.42	No. 40				
0.0117	0.297	No. 50				
0.0083	0.210	No. 70				
0.0059	0.149	No. 100				
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	612.4	.265	.265	73.5
		Pan				
Total weight in grams			2312.6			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks

Technician TIS

Computed by TIS

Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/68

Project COO Landfill - Four Branch

Boring No. MW-4 (Top 2/3 of tube)

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_ Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
Pan						
0.132	3.36	No. 6				
0.094	2.38	No. 8	0	0	0	100
0.079	2.00	No. 10				
0.047	1.19	No. 16	929.4	14.4	14.4	85.6
0.033	0.84	No. 20				
0.023	0.59	No. 30	3605.6	55.9	70.2	29.8
0.0165	0.42	No. 40				
0.0117	0.297	No. 50	1173.2	0.192	88.4	11.6
0.0083	0.210	No. 70				
0.0059	0.149	No. 100	446.7	6.9	95.3	4.7
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	218.4	3.4	98.7	1.3
Pan			6454.8			
Total weight in grams						

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks

Technician Josh Jordan Computed by TPS Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/99

Project C&D Landfill - Foot Bridge

Boring No. MW-5 Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s =$  \_\_\_\_\_ Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
Pan						
0.132	3.36	No. 6				
0.094	2.38	No. 8	0			100
0.079	2.00	No. 10				
0.047	1.19	No. 16	711.4	10.7	10.7	89.3
0.033	0.84	No. 20				
0.023	0.59	No. 30	2790.5	42.0	52.7	47.3
0.0165	0.42	No. 40				
0.0117	0.297	No. 50	2279.9	34.3	86.9	13.1
0.0083	0.210	No. 70				
0.0059	0.149	No. 100	630.2	9.48	96.4	3.6
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	184.6	2.8	99.2	0.8
Pan						
Total weight in grams			6650.7			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician Josh Jordan Computed by JAS Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/09

Project C&D Level 1011 - Fwd Bridge

Boring No. MW-6 (Top of Tube)

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s =$  \_\_\_\_\_

Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
Pan						
0.132	3.36	No. 6				
0.094	2.38	No. 8	0			
0.079	2.00	No. 10				
0.047	1.19	No. 16	1500.8	24.7	24.7	75.3
0.033	0.84	No. 20				
0.023	0.59	No. 30	2984.6	49.1	73.7	26.3
0.0165	0.42	No. 40				
0.0117	0.297	No. 50	821.9	13.5	87.2	12.8
0.0083	0.210	No. 70				
0.0059	0.149	No. 100	416.3	6.8	94.1	5.9
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	75.1	1.2	95.3	4.7
Pan						
Total weight in grams			6084.2			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician Josh Jordan

Computed by TDS

Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/23/68

Project C&D Roadfill - Farm & Range

Boring No. MW-9

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_

Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
		Pan				
0.132	3.36	No. 6				
0.094	2.38	No. 8	0			
0.079	2.00	No. 10				
0.047	1.19	No. 16	101.2	2.0	2.0	98.0
0.033	0.84	No. 20				
0.023	0.59	No. 30	409.8	16.3	18.3	81.7
0.0165	0.42	No. 40				
0.0117	0.297	No. 50	2432.1	48.8	67.1	32.9
0.0083	0.210	No. 70				
0.0059	0.149	No. 100	1358.7	27.3	94.4	5.6
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	141.9	2.8	97.2	2.8
		Pan				
Total weight in grams			4982.6			

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician \_\_\_\_\_

Computed by \_\_\_\_\_

Checked by \_\_\_\_\_

SIEVE ANALYSIS

Date 2/25/89

Project C&D Lowville - First Bridge

Boring No. MW-9

Sample No. \_\_\_\_\_

Total wt in grams of sample,  $W_s$  = \_\_\_\_\_ Wt in grams of material > No. 4 sieve = \_\_\_\_\_

Sieve Openings		U. S. Standard Sieve Size or Number	Weight Retained in grams	Per Cent Retained		Per Cent Finer by Weight
Inches	Millimeters			Partial	Total	
3.00		3-in.				
2.00		2-in.				
1.50		1-1/2-in.				
1.00	25.4	1-in.				
0.750	19.1	3/4-in.				
0.500	12.7	1/2-in.				
0.375	9.52	3/8-in.				
0.250	6.35	No. 3				
0.187	4.76	No. 4				
Pan						
0.132	3.36	No. 6				
0.094	2.38	No. 8	0			
0.079	2.00	No. 10				
0.047	1.19	No. 16	312.4	5.9	5.9	94.1
0.033	0.84	No. 20				
0.023	0.59	No. 30	2828.3	53.4	59.3	40.7
0.0165	0.42	No. 40				
0.0117	0.297	No. 50	1517.2	28.6	87.9	12.1
0.0083	0.210	No. 70				
0.0059	0.149	No. 100	341.8	6.5	94.4	5.6
0.0041	0.105	No. 140				
0.0029	0.074	No. 200	194.6	3.7	98.0	2.0
Pan			5297.7			
Total weight in grams						

Partial per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{wt in grams of sample used for a given series of sieves}} \times 100$

Total per cent retained =  $\frac{\text{wt in grams retained on a sieve}}{\text{total wt in grams of oven-dry sample}} \times 100$

For an individual sieve, the per cent finer by weight = per cent finer than next larger sieve - per cent retained on individual sieve

Remarks \_\_\_\_\_

Technician \_\_\_\_\_ Computed by \_\_\_\_\_ Checked by \_\_\_\_\_

**ATTERBERG LIMITS TEST**

Project: C&D Landfill - East Pass

Date: 2/24/98

Location: MW-4 (top)

Test By: JT

Reviewed By: TMS

**LIQUID LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, %						
No. blows						
correction factor						
corr. moisture content, g						

Average Corrected Moisture Content: \_\_\_\_\_

**PLASTIC LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, g						<u>NP</u>

Average Moisture Content: NP

PI = LL - PL : NP

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

**ATTERBERG LIMITS TEST**

Project: C&D Landfill - Fort-Bragg

Date: 2/24/48

Location: MW-4 (Bottom)

Test By: JJ

Reviewed By: JRS

**LIQUID LIMIT TEST**

wt. wet + tare, g	91.45	100.09	106.58			
wt. dry + tare, g	73.13	78.94	83.77			
moisture weight, g	18.32	21.15	22.81			
tare No.	1	3	2			
tare weight, g	26.81	24.96	25.13			
dry weight, g	46.32	53.98	58.64			
moisture content, %	39.55	39.18	39.90			
No. blows	22	25	27			
correction factor	0.985	1.0	1.009			
corr. moisture content, g	38.96	39.18	39.25			

Average Corrected Moisture Content: 39.13

**PLASTIC LIMIT TEST**

wt. wet + tare, g	<del>62.99</del>	76.50				
wt. dry + tare, g	58.06	70.10				
moisture weight, g	4.93	6.40				
tare No.	<del>4</del>	<del>5</del>				
tare weight, g	26.34	27.19				
dry weight, g	31.72	42.91				
moisture content, g	15.54	14.92				

Average Moisture Content: 15.23

PI = LL - PL : 23.9

ASTM D 423

TABLE 1 Values of (N/25)<sup>0.12</sup>

N	(N/25) <sup>0.12</sup>	N	(N/25) <sup>0.12</sup>	N	(N/25) <sup>0.12</sup>
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

**ATTERBERG LIMITS TEST**

Project: CAD Lowfill - Fort R-4g

Date: \_\_\_\_\_

Location: MW-5

Test By: \_\_\_\_\_

Reviewed By: \_\_\_\_\_

**LIQUID LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, %						
No. blows						
correction factor						
corr. moisture content, g						

Average Corrected Moisture Content: \_\_\_\_\_

**PLASTIC LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, g		<u>NP</u>				

Average Moisture Content: NP

PI = LL - PL : NP

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

### ATTERBERG LIMITS TEST

Project: CSD Landfill

Date: 2/24/99

Location: HW-6 (Top)

Test By: JJ

Reviewed By: TPS

### LIQUID LIMIT TEST

wt. wet + tare, g							
wt. dry + tare, g							
moisture weight, g							
tare No.							
tare weight, g							
dry weight, g							
moisture content, %							
No. blows							
correction factor							
corr. moisture content, g							

Average Corrected Moisture Content: \_\_\_\_\_

### PLASTIC LIMIT TEST

wt. wet + tare, g							
wt. dry + tare, g							
moisture weight, g							
tare No.							
tare weight, g							
dry weight, g							
moisture content, g							

Average Moisture Content: NP

PI = LL - PL : NP

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

**ATTERBERG LIMITS TEST**

Project: C&D Landfill - Fort Bragg

Date: 2/24/98

Location: MW-6 (Bottom)

Test By: JT

Reviewed By: TBS

**LIQUID LIMIT TEST**

wt. wet + tare, g	104.21	95.90	109.44		
wt. dry + tare, g	87.38	81.08	91.73		
moisture weight, g	16.83	14.82	17.71		
tare No.	7	8	6		
tare weight, g	25.52	26.34	24.81		
dry weight, g	61.86	54.74	66.92		
moisture content, %	27.20	27.07	26.46		
No. blows	21	26	28		
correction factor	.979	1.005	1.014		
corr. moisture content, g	26.63	27.21	26.83		

Average Corrected Moisture Content: 26.89

**PLASTIC LIMIT TEST**

wt. wet + tare, g	<del>98.5</del> 97.49				
wt. dry + tare, g	73.98	68.10			
moisture weight, g	7.61	6.71			
tare No.	9	10			
tare weight, g	27.40	25.71			
dry weight, g	46.58	42.39			
moisture content, g	16.34	15.82			

Average Moisture Content: 16.08

PI = LL - PL : 10.81

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

### ATTERBERG LIMITS TEST

Project: C & D Landfill - Fort - Brass

Date: 2/24/98

Location: MW-7

Test By: JJ

Reviewed By: JAS

### LIQUID LIMIT TEST

wt. wet + tare, g	122.60	114.90	114.11		
wt. dry + tare, g	93.70	86.77	87.81		
moisture weight, g	28.90	26.13	26.30		
tare No.	14	16	13		
tare weight, g	26.32	26.31	25.87		
dry weight, g	67.38	62.46	61.94		
moisture content, %	42.89	41.83	42.46		
No. blows	23	25	26		
correction factor	0.990	1.000	1.005		
corr. moisture content, g	42.46	41.83	42.67		

Average Corrected Moisture Content: 42.32

### PLASTIC LIMIT TEST

	74.61	77.50			
wt. wet + tare, g	<del>74.61</del>	<del>77.50</del>			
wt. dry + tare, g	68.63	71.55			
moisture weight, g	5.98	5.95			
tare No.	18	19			
tare weight, g	24.98	25.31			
dry weight, g	43.65	46.24			
moisture content, g	13.70	12.88			

Average Moisture Content: 13.29

PI = LL - PL : 29.03

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

**ATTERBERG LIMITS TEST**

Project: C & D Landfill - Fort Bragg

Date: 2/24/06

Location: MW-8

Test By: JT

Reviewed By: TOS

**LIQUID LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, %						
No. blows						
correction factor						
corr. moisture content, g						

Average Corrected Moisture Content: \_\_\_\_\_

**PLASTIC LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, g	<u>NP</u>					

Average Moisture Content: NP

PI = LL - PL : NP

ASTM D 423

TABLE 1 Values of  $(N/25)^{0.12}$

N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$	N	$(N/25)^{0.12}$
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

**ATTERBERG LIMITS TEST**

Project: COD Landfill - Fort Bragg

Date: 2/24/06

Location: MU-9

Test By: JT

Reviewed By: TPS

**LIQUID LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, %						
No. blows						
correction factor						
corr. moisture content, g						

Average Corrected Moisture Content: \_\_\_\_\_

**PLASTIC LIMIT TEST**

wt. wet + tare, g						
wt. dry + tare, g						
moisture weight, g						
tare No.						
tare weight, g						
dry weight, g						
moisture content, g						

Average Moisture Content: NP

PI = LL - PL : NP

ASTM D 423

TABLE 1 Values of (N/25)<sup>0.17</sup>

N	(N/25) <sup>0.17</sup>	N	(N/25) <sup>0.17</sup>	N	(N/25) <sup>0.17</sup>
20	0.974	24	0.995	28	1.014
21	0.979	25	1.000	29	1.018
22	0.985	26	1.005	30	1.022
23	0.990	27	1.009		

DENSITY, POROSITY, VOID RATIO, AND DEGREE OF SATURATION TESTS

Project: C&D Landfill - Fast Bridge

Date: 2/23/98

Test By: DF

Reviewed By: TJK

Location	MW-4(Top)	MW-4(Bot)	MW-5	MW-6(Top)	MW-6(Bottom)
wt. wet sample + cylinder, g	1671.8	1762.4	1724.0	1748.60	1791.2
cylinder weight, g	424.5	420.0	420.1	427.9	413.8
wet sample weight, g	1247.3	1342.4	1303.9	1321.7	1377.4
<sup>(1)</sup> wet sample weight, lbs	2.750	2.96	2.88	2.91	3.04
<sup>(2)</sup> cylinder volume, ft <sup>3</sup>	0.02144	0.02144	0.02144	0.02144	0.02144
<sup>(3)</sup> wet density, lb/ft <sup>3</sup>	125.9	135.6	131.6	133.4	139.1
wt. wet sample + tare, g	291.4	307.1	346.8	344.0	341.1
wt. dry sample + tare, g	258.1	275.4	313.0	302.3	310.00
moisture weight, g	33.3	31.7	33.8	41.7	31.1
tare No.					
tare weight, g	113.1	113.1	113.1	113.1	129.7
dry weight, g	145.0	162.3	199.9	189.2	180.3
moisture content, %	22.97	19.56	16.91	22.04	17.3
<sup>(4)</sup> dry density, lb/ft <sup>3</sup>	102.4	113.42	112.6	109.3	118.6
<sup>(5)</sup> porosity, %	37.0	31.41	31.9	33.9	28.3
<sup>(6)</sup> degree of saturation, %	99.5	99.8	85.0	≈100	98.0
<sup>(7)</sup> void ratio					

Notes:

- wet sample weight, g X 0.002205 = wet sample weight, lb
- Cylinder volume =  $\frac{\pi \cdot 2.83^2 (67) \sqrt{1.724}}{4} = 0.02144$
- wet density = wet sample weight/cylinder volume
- dry density = wet density / (1 + moisture content, %/100)
- porosity =  $1 - \text{dry density} / (62.4 \times 2.65)$  *assumed specific gravity of soil*
- degree of saturation = (moisture content/62.4) / porosity
- void ratio = porosity / (1 - porosity)

DENSITY, POROSITY, VOID RATIO, AND DEGREE OF SATURATION TESTS

Project: C&D Landfill - Fort Brass, NC

Date: 2/23/98

Test By: DF

Reviewed By: TAS

Location	MW-7	MW-8	MW-9		
wt. wet sample + cylinder, g	1713.6	1662.7	1707.1		
cylinder weight, g	414.8	420.0	415.7		
wet sample weight, g	1298.8	1242.7	1291.4		
<sup>(1)</sup> wet sample weight, lbs	2.86	2.74	2.85		
<sup>(2)</sup> cylinder volume, ft <sup>3</sup>	0.02184	0.02194	0.02184		
<sup>(3)</sup> wet density, lb/ft <sup>3</sup>	131.1	125.5	130.4		
wt. wet sample + tare, g	343.4	349.5	337.1		
wt. dry sample + tare, g	306.3	300.0	303.3		
moisture weight, g	37.1	49.5	33.8		
tare No.	9				
tare weight, g	113.10	113.10	113.1		
dry weight, g	192.4	186.1	190.2		
moisture content, %	19.3	26.60	17.77		
<sup>(4)</sup> dry density, lb/ft <sup>3</sup>	109.9	99.2	110.7		
<sup>(5)</sup> porosity, %	33.5	40.0	33.1		
<sup>(6)</sup> degree of saturation, %	92.3	71.00	86.0		
<sup>(7)</sup> Void ratio					

Notes:

- wet sample weight, g X 0.002205 = wet sample weight, lb
- Cylinder volume =  $\frac{22.85^3 (6)}{4} \div 728 = 0.02184$
- wet density = wet sample weight/cylinder volume
- dry density = wet density / (1 + moisture content, %/100)
- porosity =  $1 - \text{dry density} / (62.4 \times 2.65)$  *assumed specific gravity of soil*
- degree of saturation = (moisture content/62.4)/porosity
- void ratio = porosity / (1 - porosity)

**CONSTANT HEAD PERMEABILITY TEST**

Project: COO Low Fill - Fort Brass

Test By: JT

Location: MW-4 (Top)

Reviewed By: JPS

$$K = \frac{VLR_T}{hAt}$$

V=quantity of flow,  
 L=sample length, cm: 12.7  
 $R_T$  =temperature correction factor for  
 viscosity of water different than  
 at 20° C  
 A=sample area,  $cm^2$ : 40.56  
 t=elapse time, sec.  
 h=water head, cm

Date	t, sec.	h, cm	Water Temp., C°	$R_T$	V, cc	K, cm/sec
2/27/98	1817	121.92	23.3	0.925	55.67	$7.28 \times 10^{-5}$
2/27/98	1827	121.92	23.3	0.925	53.29	$6.93 \times 10^{-5}$
2/27/98	2028	121.92	23.3	0.925	63.86	$7.48 \times 10^{-5}$

$avg \approx 7.23 \times 10^{-5} \text{ cm/sec}$

**CONSTANT HEAD PERMEABILITY TEST**

Project: C&D Landfill-

Test By: JJ

Location: MW-5

Reviewed By: TPS

$$K = \frac{VLR_T}{hAt}$$

V=quantity of flow,  
 L=sample length, cm: 12.7  
 $R_T$  =temperature correction factor for  
 viscosity of water different than  
 at 20° C  
 A=sample area, cc: 40.56  
 t=elapse time, sec.  
 h=water head, cm

Date	t, sec.	h, cm	Water Temp., C°	$R_T$	V, cc	K, cm/sec
2/27/04	767	121.04	23.2	0.927	50	$1.56 \times 10^{-4}$
2/27/04	893	121.04	23.2	0.927	50	$1.34 \times 10^{-4}$
2/27/09	920	121.04	23.2	0.927	50	$1.30 \times 10^{-4}$

Average =  $1.4 \times 10^{-4}$

**CONSTANT HEAD PERMEABILITY TEST**

Project: C&D Landfill - Fort Brass

Test By: JJ

Location: MW-6 (Top)

Reviewed By: TPS

$$K = \frac{VLR_T}{hAt}$$

V=quantity of flow,  
 L=sample length, cm: 12.7  
 $R_T$  =temperature correction factor for  
 viscosity of water different than  
 at 20° C

A=sample area,  $cm^2$ : 40.56

t=elapse time, sec.

h=water head, cm

Date	t, sec.	h, cm	Water Temp., C°	$R_T$	V, cc	K, cm/sec
2/27/98	1456	121.04	23.7	.925	50	$8.22 \times 10^{-5}$
2/27/98	1501	121.04	23.3	.925	50	$7.97 \times 10^{-5}$
2/27/98	1355	121.04	23.3	.925	50	$8.43 \times 10^{-5}$

Average =  $8.34 \times 10^{-5}$

**CONSTANT HEAD PERMEABILITY TEST**

Project: C&D Landfill Fort Bragg

Test By: JJ

Location: MW-8

Reviewed By: MW-8

$$K = \frac{VLR_T}{hAt}$$

V=quantity of flow,  
 L=sample length, cm: 12.7  
 $R_T$  =temperature correction factor for  
 viscosity of water different than  
 at 20° C

A=sample area, cc: 40.56

t=elapse time, sec.

h=water head, cm

Date	t, sec.	h, cm	Water Temp., C°	$R_T$	V, cc	K, cm/sec
2/27/98	3021	121.04	23.3	0.925	50	$3.96 \times 10^{-5}$
2/27/98	1133	121.04	23.3	0.925	25	$5.28 \times 10^{-5}$
2/27/98	1090	121.04	23.3	0.925	25	$5.49 \times 10^{-5}$

Average  $4.91 \times 10^{-5}$  cm/sec

**CONSTANT HEAD PERMEABILITY TEST**

Project: C&D Landfill - Fort Bragg

Test By: JJ

Location: MW-9

Reviewed By: TPS

$$K = \frac{VL R_T}{hAt}$$

V=quantity of flow,  
 L=sample length, cm: 12.7  
 $R_T$  =temperature correction factor for  
 viscosity of water different than  
 at 20° C

A=sample area, cc: 40.54

t=elapse time, sec.

h=water head, cm

Date	t, sec.	h, cm	Water Temp., C°	$R_T$	V, cc	K, cm/sec
3/3/98	1144	121.04	23.1	0.929	50	$1.05 \times 10^{-4}$
3/3/98	228	121.04	23.1	0.929	50	$5.26 \times 10^{-4}$
3/3/98	372	121.04	23.1	0.929	50	$3.23 \times 10^{-4}$

Average =  $3.18 \times 10^{-4}$

### FALLING HEAD PERMEABILITY TEST

Project: C & N Landfill - Fort Bragg

Test By: JT

Location: MW-4 (Bottom)

Reviewed By: TDS

$$K = 2.303aL / At [\log_{10}(h_0/h_f)] R_T$$

L=sample length, cm: 12.70

$R_T$  = temperature correction factor for viscosity of water different than at 20° C

A=sample area, cm<sup>2</sup>: 40.56

t=elapse time, sec.

$h_0$  = initial height of water head, cm

$h_f$  = final height of water head, cm

a = inside area of standpipe, cm<sup>2</sup>: 0.9975

Start Time	Finish Time	t, sec	$h_0$ , cm	$h_f$ , cm	Water Temp. °C	$R_T$	K, cm/sec
3/3/98 12:01 PM	3/4/98 8:05 AM	72240	200.41	152.70	23.2	0.927	$1.09 \times 10^{-6}$
3/4/98 9:05 AM	3/5/98 4:16 PM	115740	152.70	107.12	23.2	0.927	$8.87 \times 10^{-7}$
3/5/98 4:16 PM	3/6/98 6:21 AM	93900	200.41	151.59	23.2	0.927	$8.61 \times 10^{-7}$

Average  $9.46 \times 10^{-7}$  cm/sec

### FALLING HEAD PERMEABILITY TEST

Project: C&O Landfill - Four Brass

Test By: JJ

Location: MW-6 (Bottom)

Reviewed By: TNS

$$K = 2.303aL / At [\log_{10}(h_o/h_f)] R_T$$

L=sample length, cm: 12.70

$R_T$  = temperature correction factor for viscosity of water different than at 20° C

A=sample area, cm<sup>2</sup>: 40.56

t=elapse time, sec.

$h_o$  = initial height of water head, cm

$h_f$  = final height of water head, cm

a = inside area of standpipe, cm<sup>2</sup>: 0.9975

Start Time	Finish Time	t, sec	$h_o$ , cm	$h_f$ , cm	Water Temp. °C	$R_T$	K, cm/sec
3/31/98 11:59 AM	3/31/98 7:56 PM	71700	201.63	192.13	23.2	0.927	$1.95 \times 10^{-7}$
3/31/98 7:56 PM	3/31/98 4:01 PM	115020	192.13	167.33	23.2	0.927	$3.24 \times 10^{-7}$
3/31/98 4:01 PM	3/31/98 6:10 PM	94440	167.33	150.02	23.2	0.927	$3.36 \times 10^{-7}$

Average:  $2.93 \times 10^{-7}$  cm/sec

### FALLING HEAD PERMEABILITY TEST

Project: CFO Level 5/11 - Ford Burg

Test By: JJ

Location: MW-7

Reviewed By: TAS

$$K = 2.303aL / At [\log_{10}(h_o/h_f)] R_T$$

L=sample length, cm: 2.70

$R_T$  = temperature correction factor for viscosity of water different than at 20° C

A=sample area, cm<sup>2</sup>: 40.56

t=elapse time, sec.

$h_o$  = initial height of water head, cm

$h_f$  = final height of water head, cm

a = inside area of standpipe, cm<sup>2</sup>: 0.0075

Start Time	Finish Time	t, sec	$h_o$ , cm	$h_f$ , cm	Water Temp. °C	$R_T$	K, cm/sec
3/14/07 12:31 PM	3/14/07 1:23 PM	71,520	199.34	166.78	23.2	0.927	$7.22 \times 10^{-7}$
3/14/07 2:08 PM	3/14/07 4:05 PM	11,5920	166.78	135.01	23.2	0.927	$5.28 \times 10^{-7}$
3/15/07 2:55 PM	3/15/07 4:45 PM	94,200	199.34	160.77	23.2	0.927	$6.61 \times 10^{-7}$

average  $6.37 \times 10^{-7}$

## Geo-Solutions, Inc.

2903 Anderson Drive  
Raleigh, NC 27608  
(919) 783-0345



February 5, 1998

Mr. T. Patrick Shillington, P.E.  
Engineering and Environmental Science Company  
3008 Anderson Drive  
Suite 102  
Raleigh, NC 27609

RE: Fort Bragg, N.C.  
Aquifer Testing Results

Dear Bob:

The purpose of this correspondence is to present the results of the aquifer testing conducted on six monitoring wells at the Fort Bragg Construction and Demolition Disposal Area at Fort Bragg, North Carolina. The aquifer testing was performed on January 14 and 27, 1998. The testing consisted of rising and falling head tests (slug tests) on monitoring wells MW-4, MW-5, MW-6, MW-7, MW-8 and MW-9. The tests were conducted by Mr. Richard Bolich of Geo-Solutions, Inc. The purpose of the testing was to assess the values of horizontal hydraulic conductivity (K) at various locations within the water table aquifer at the site.

The tests were performed using a 5.2 foot solid PVC slug to displace water inside the wells. A 20 pounds per square inch (psi) pressure transducer was used to measure water level fluctuations during each test. The pressure transducer and cable were decontaminated with an Alconox solution and a distilled water rinse before use in each well. The pressure transducer was then attached to an electronic data logger (In-Situ SE1000C).

The first portion of each test was a falling head test that measured the rate water levels fell back to static condition after the injection of the PVC slug. Water level data from the transducer was recorded at logarithmic time intervals by the data logger. The falling head test was terminated after water levels had recovered to generally within 95% of their pre-test (static) level.

A rising head test was then performed after the falling head test was completed. The rising head test was conducted by initiating a new logarithmic recording step on the data logger simultaneously with the removal of the slug. The data was checked with hand held readings, and the test was terminated after water levels had recovered to within 95% of the pre-test level. A rising head test was not performed on MW-7 due to the very slow recovery rate.

The slug test data was analyzed using the Bouwer and Rice method (Bouwer and Rice, 1976; Bouwer, 1989a, 1989b) which is an appropriate method for the unconfined aquifer at this site. The Bouwer and Rice method accounts for partial penetration effects and changing aquifer thickness (water table conditions). A packing porosity of 25 percent for the well filter pack was assumed.

The results of the slug test data analyses using the Bouwer and Rice method are summarized on the table below:

WELL	HYDRAULIC CONDUCTIVITY (centimeters/second)	TYPE OF TEST	TOTAL DEPTH OF WELL (feet)
MW-4	$1.66 \times 10^{-4}$	Falling Head	80.0
MW-4	$7.26 \times 10^{-4}$	Rising Head	80.0
MW-5	$1.14 \times 10^{-4}$	Falling Head	78.0
MW-5	$1.02 \times 10^{-4}$	Rising Head	78.0
MW-6	$3.71 \times 10^{-5}$	Falling Head	94.5
MW-6	$4.79 \times 10^{-5}$	Rising Head	94.5
MW-7	$2.49 \times 10^{-5}$	Falling Head	128.0
MW-8	$3.89 \times 10^{-3}$	Falling Head	60.0
MW-8	$6.37 \times 10^{-4}$	Rising Head	60.0
MW-9	$2.91 \times 10^{-5}$	Falling Head	136.0
MW-9	$2.50 \times 10^{-5}$	Rising Head	136.0

The geometric average of these estimates of the hydraulic conductivity for the water table is  $1.01 \times 10^{-4}$  cm/sec (0.29 feet per day). This value may be considered a reasonable estimate of the hydraulic conductivity of the water table aquifer at the Fort Bragg Construction and Demolition Disposal Area site.

Engineering & Environmental Science Company  
Fort Bragg, NC  
Aquifer Slug Testing Report

I hope this report is satisfactory and useful. If I may be of any further assistance, please contact me at any time.

Very Truly Yours,

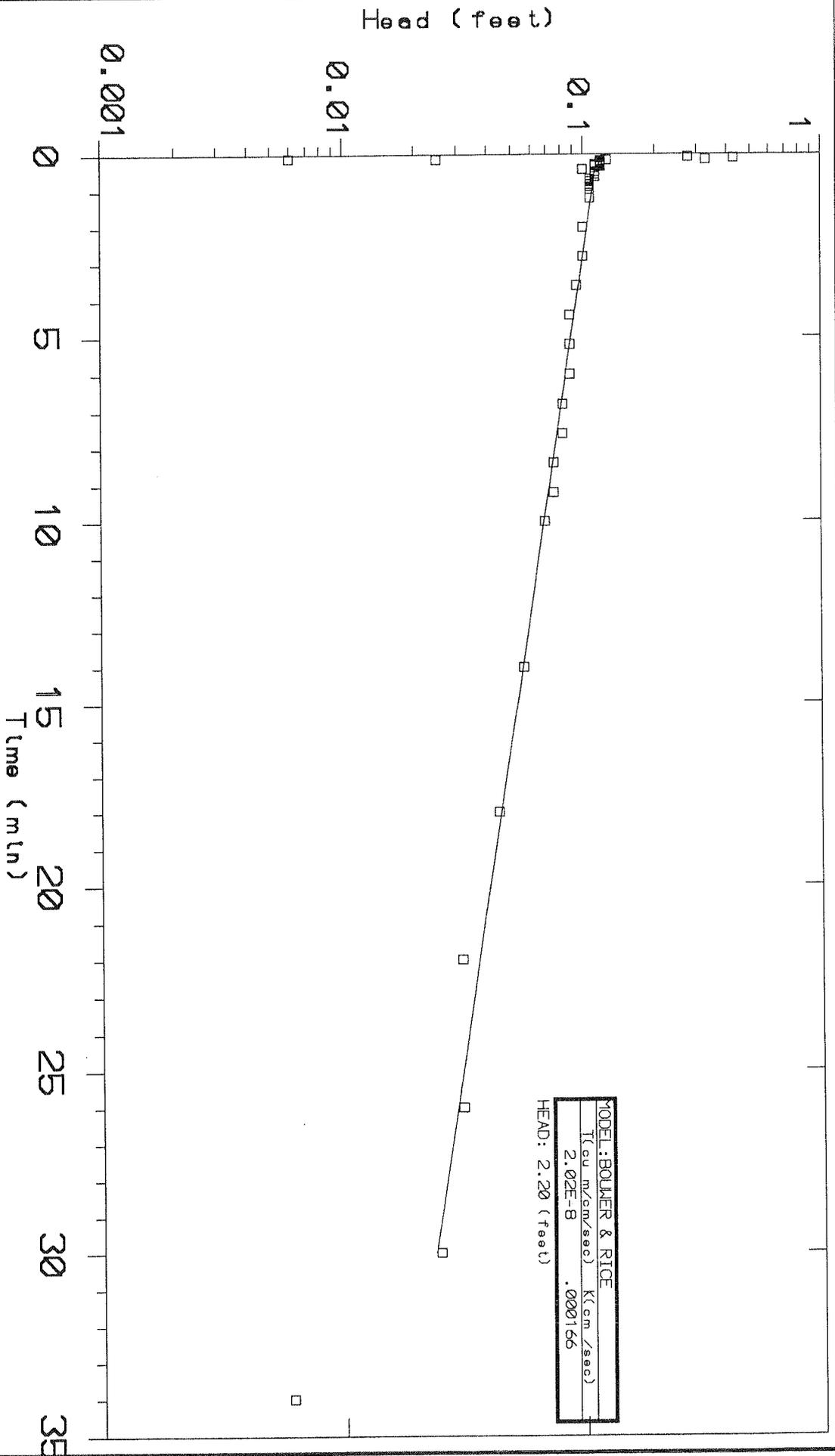
**GEO-SOLUTIONS, INC.**



Richard E. Bolich, P.G.  
President

reb/REB

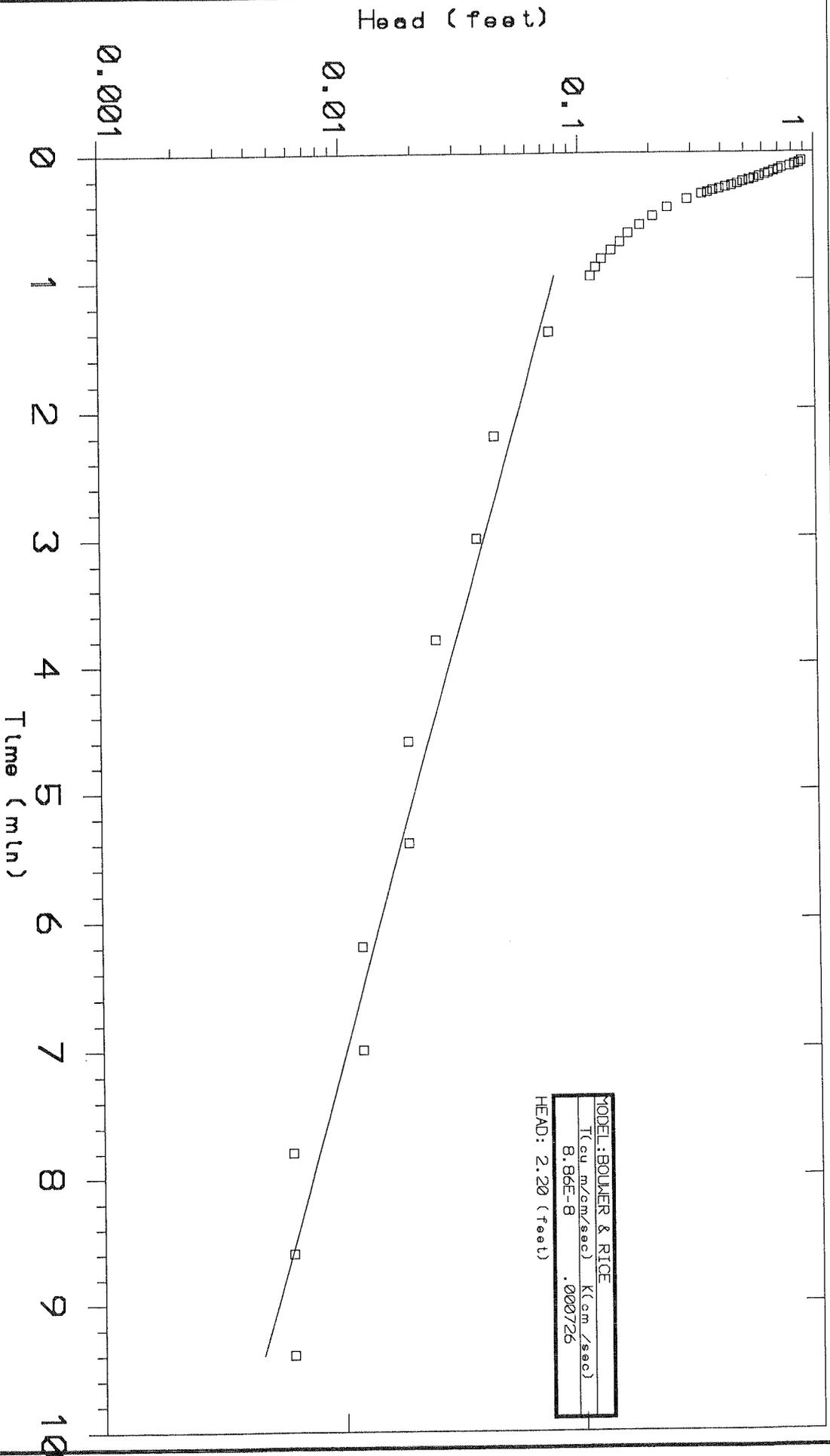
enclosures: Slug Test Data Analyses Plates



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec) K (cm /sec)  
 2.02E-8 .000166  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 4.00 Depth: 80.0 feet  
 Screen: Top: 76.1 Base: 79.5 feet  
 Casing Radius: 1.00 in

Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MW-4



for: **ERES, Inc.**

by: **GEOSOLUTIONS**

**Aquifer: Water Table**

Thickness: 4.00 Depth: 80.0 feet

Screen: Top: 76.1 Base: 79.5 feet

Casing Radius: 1.00 in

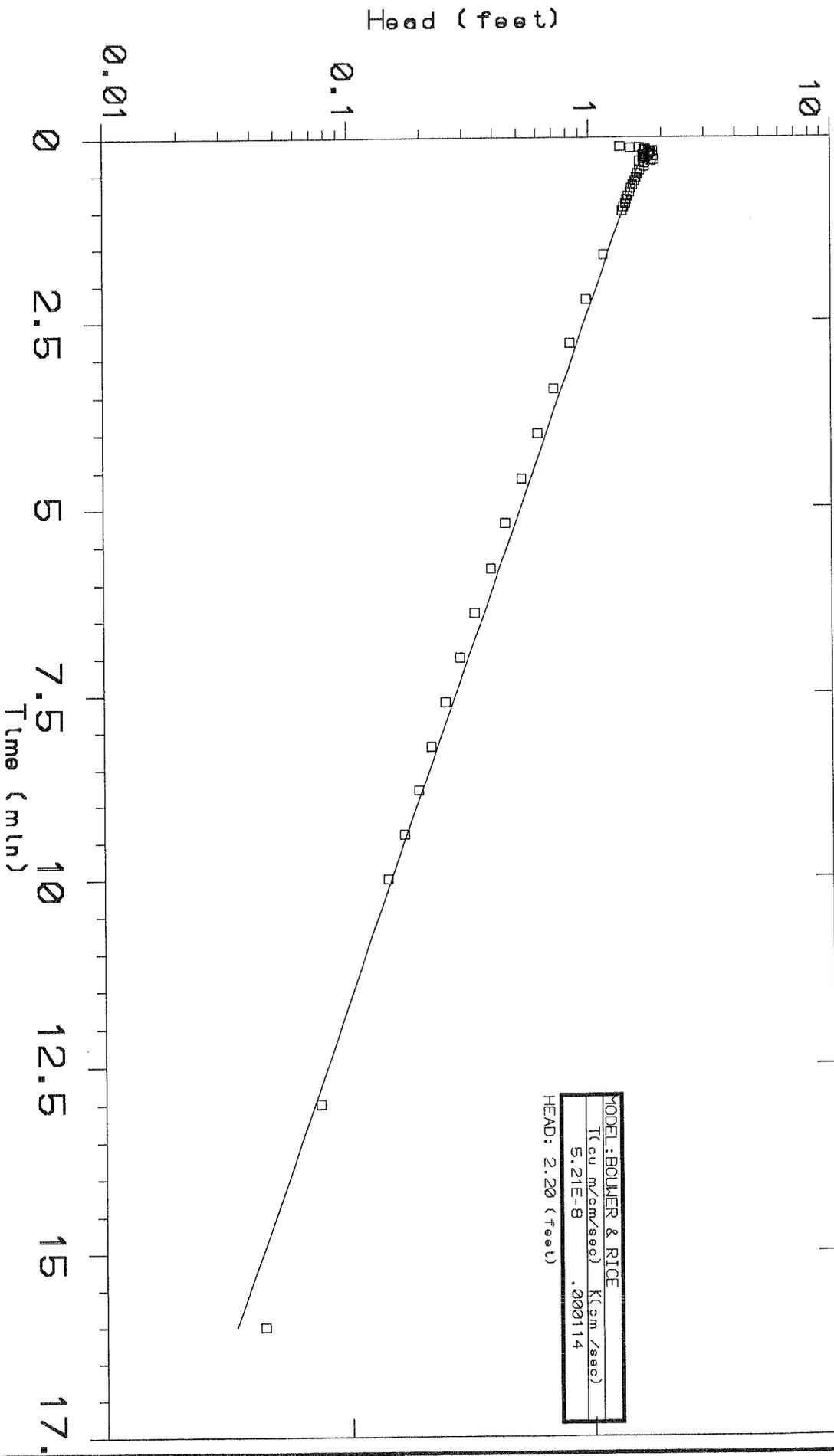
Well Slug Test Data

**C&D Disposal**

**Ft. Bragg**

Date: 02-03-98

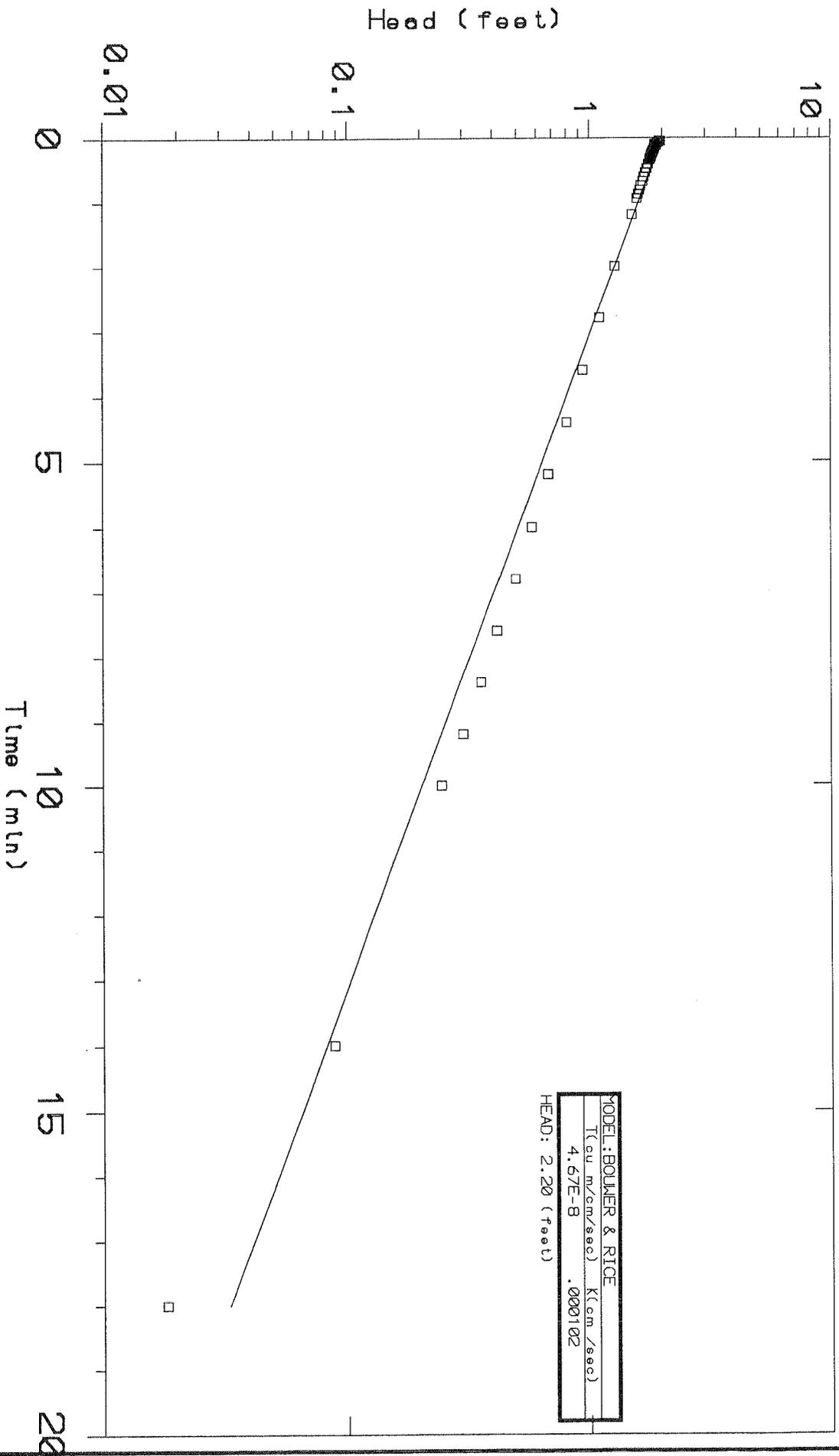
Well No.: MW-4



MODEL: BOLLER & RICE  
 (cu m/cm/sec) K (cm /sec)  
 5.21E-8 .000114  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 15.0 Depth: 78.0 feet  
 Screen: Top: 63.0 Base: 77.5 feet  
 Casing Radius: 1.00 in

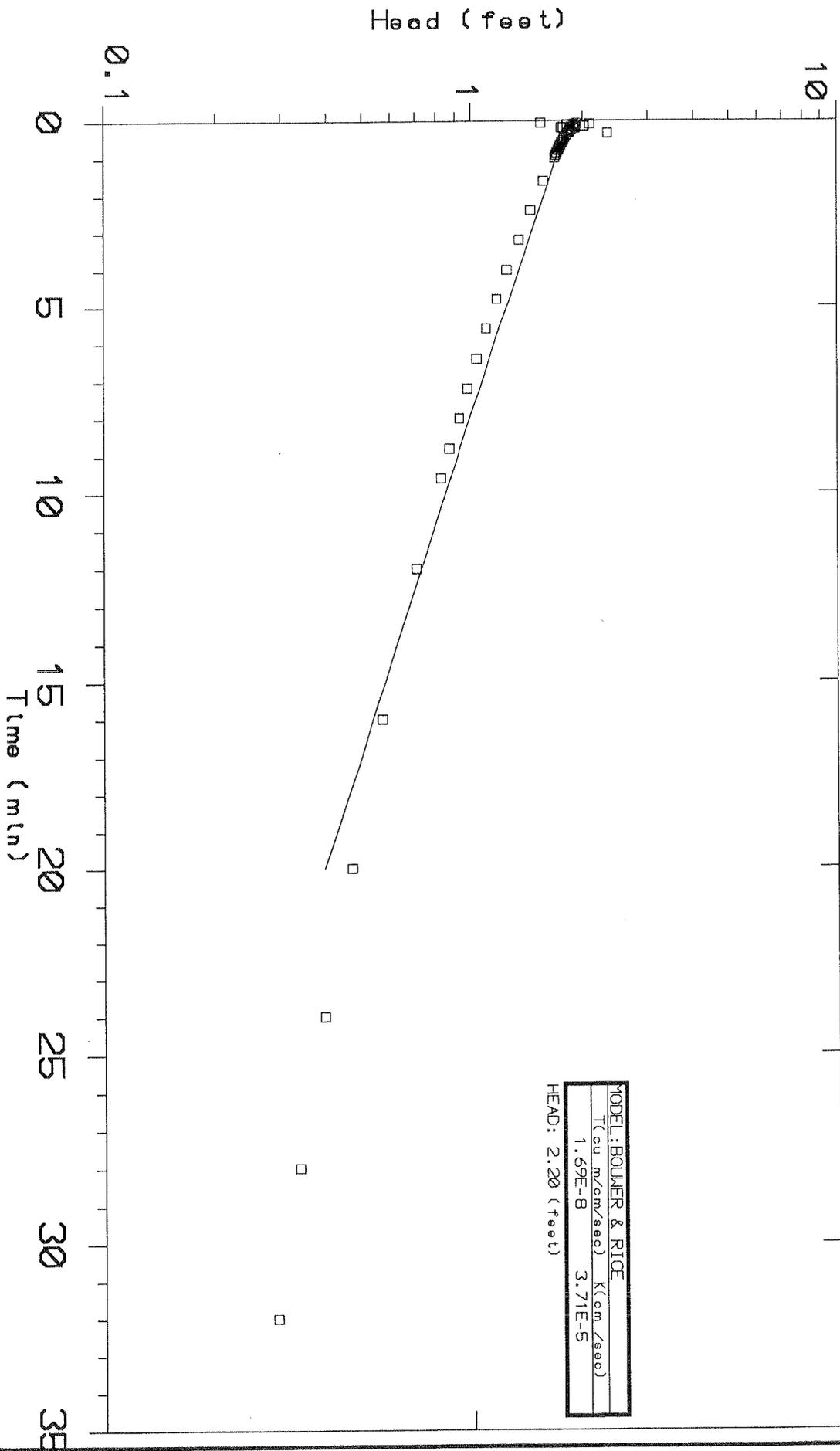
Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MW-5



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec) K (cm/sec)  
 4.67E-8 .000102  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 15.0 Depth: 78.0 feet  
 Screen: Top: 63.0 Base: 77.5 feet  
 Casing Radius: 1.00 in

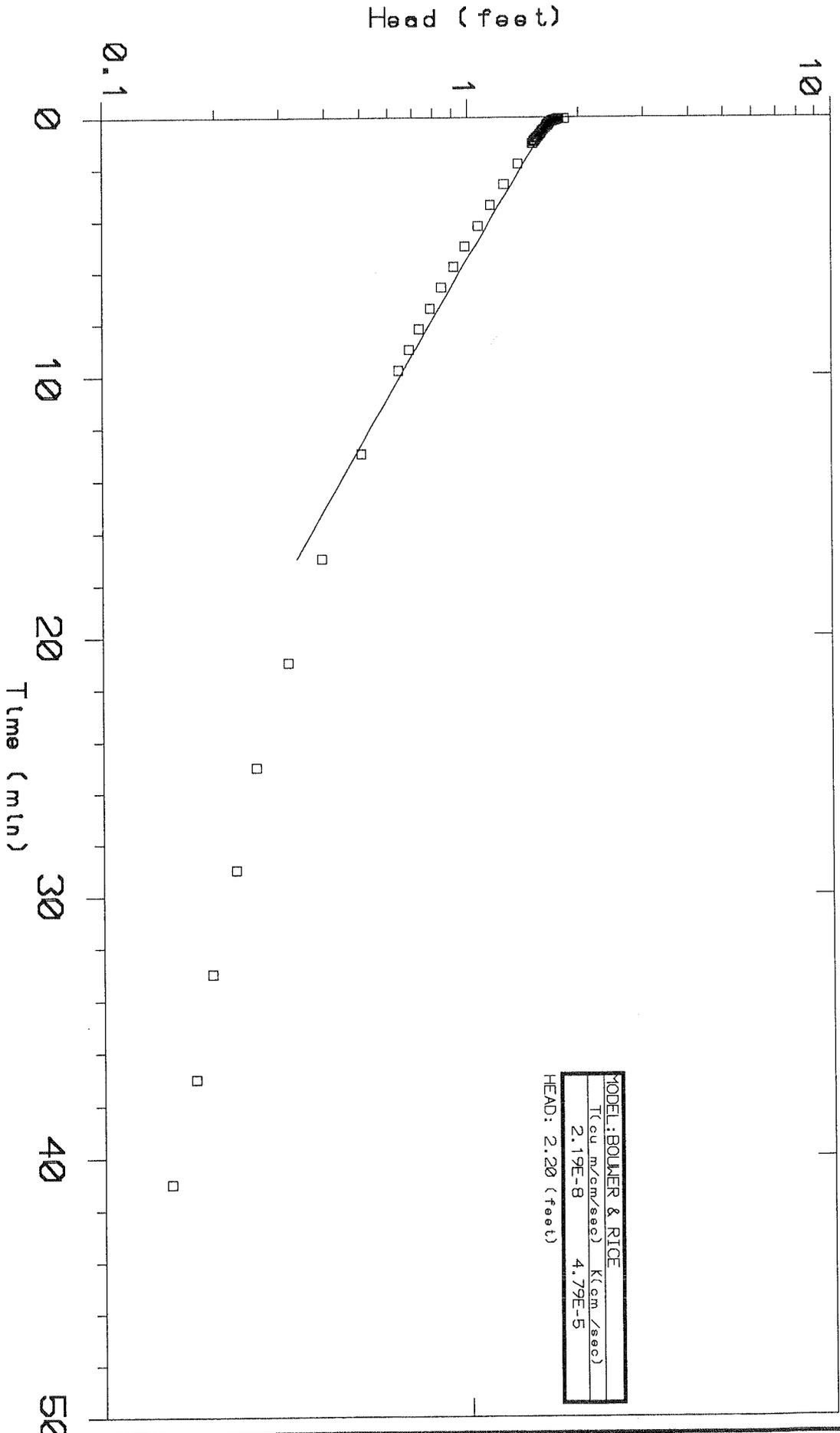
Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MW-5



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec)    K (cm/sec)  
 1.69E-8            3.71E-5  
 HEAD: 2.20 (feet)

for: **ERES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 15.0    Depth: 94.5 feet  
 Screen: Top: 80.9    Base: 94.0 feet  
 Casing Radius: 1.00 in

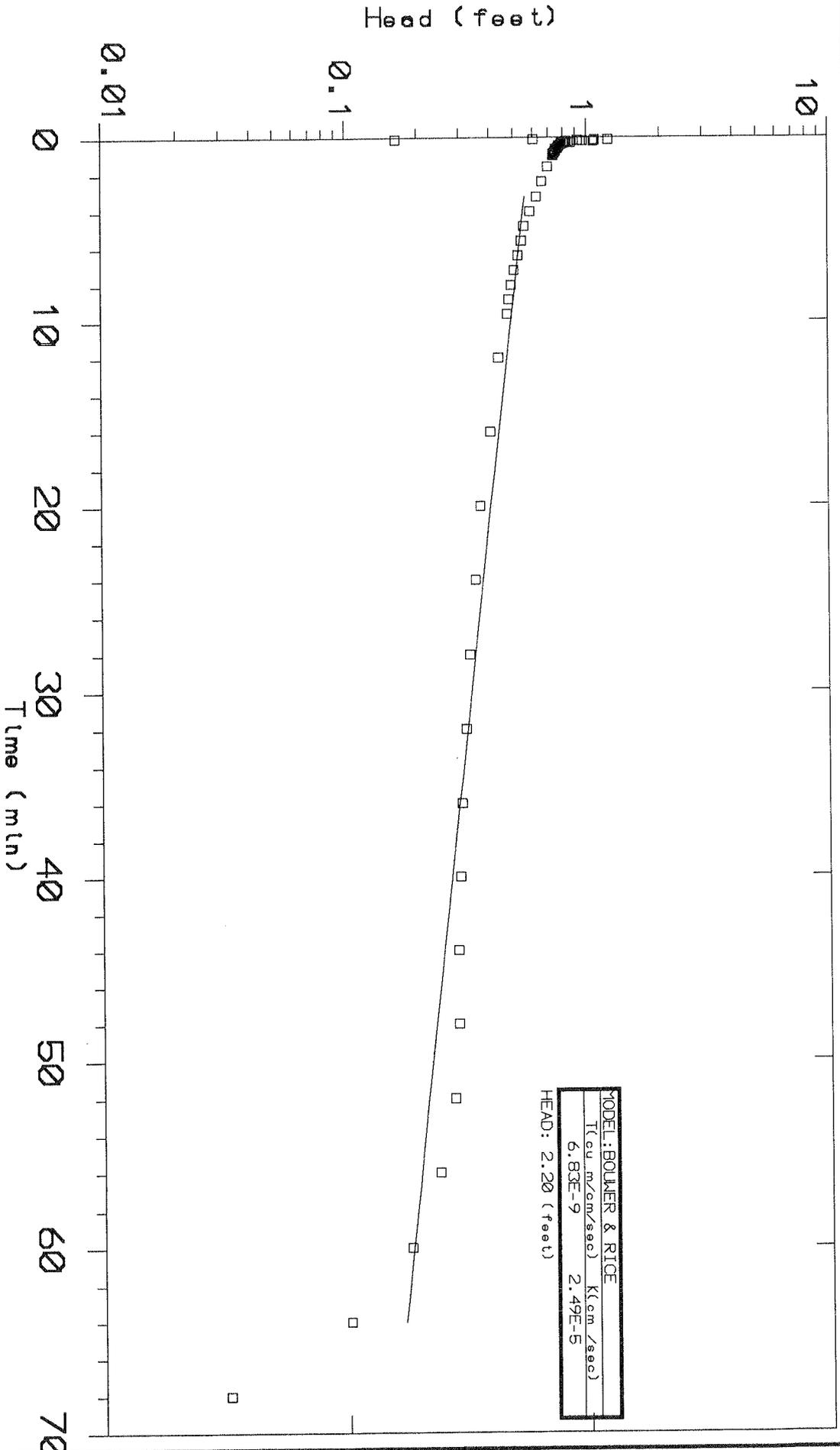
Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98    Well No.: MW-6



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec) K (cm /sec)  
 2.19E-8 4.79E-5  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 15.0 Depth: 94.5 feet  
 Screen: Top: 80.9 Base: 94.0 feet  
 Casing Radius: 1.00 in

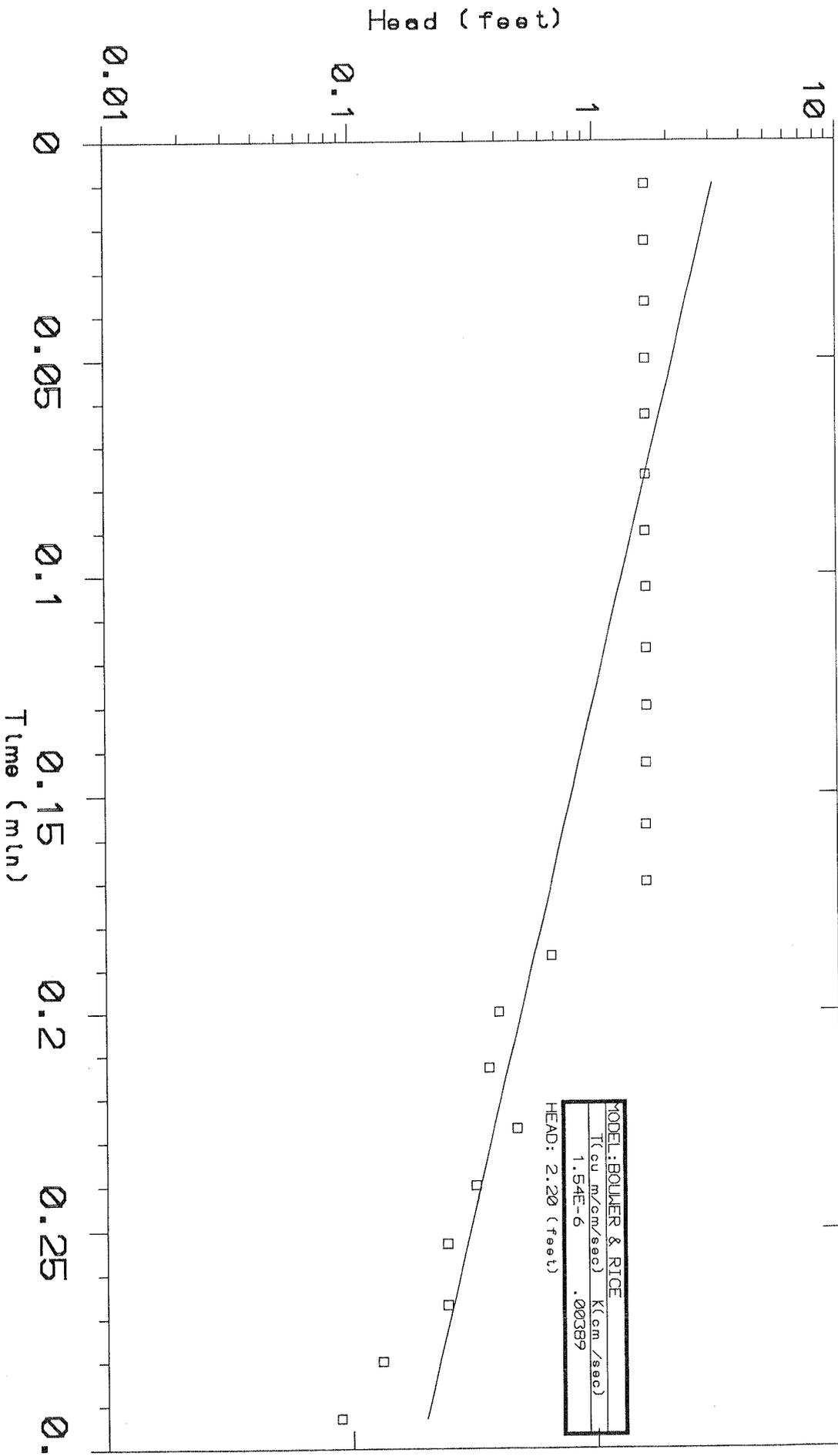
Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MW-6



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec) K (cm/sec)  
 6.83E-9 2.49E-5  
 HEAD: 2.20 (feet)

for: **ERES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 9.00 Depth: 128. feet  
 Screen: Top: 120. Base: 128. feet  
 Casing Radius: 1.00 in

Well Slug Test Data  
**C&D Disposal**  
**Fl. Bragg**  
 Date: 02-03-98 Well No.: MM-7



for: **E&ES, Inc.**

by: **GEOSOLUTIONS**

Aquifer: **Water Table**

Thickness: **13.0** Depth: **60.0** feet

Screen: Top: **47.9** Base: **59.5** feet

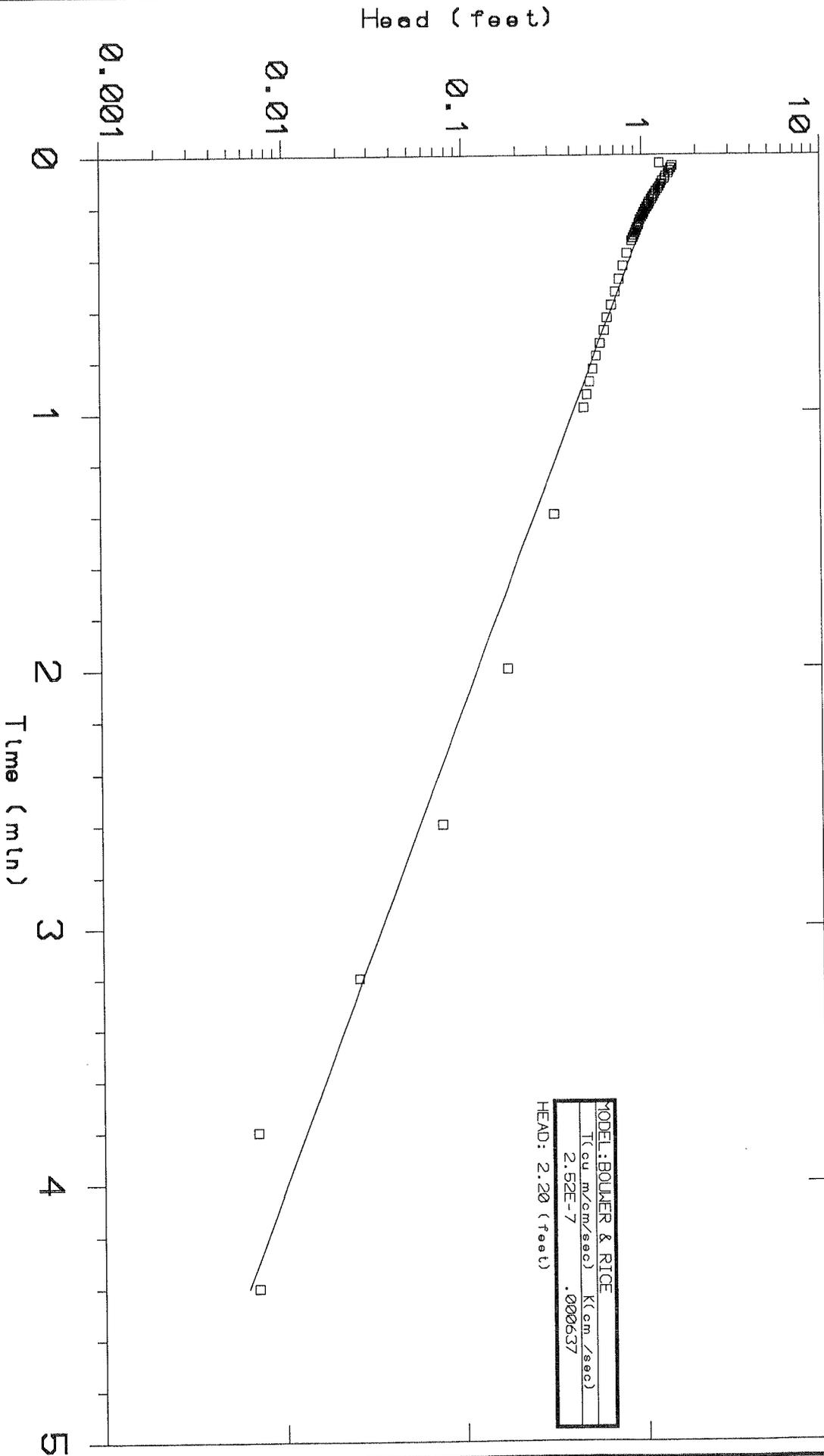
Casing Radius: **1.00** in

Well Slug Test Data

C&D Disposal

Ft. Bragg

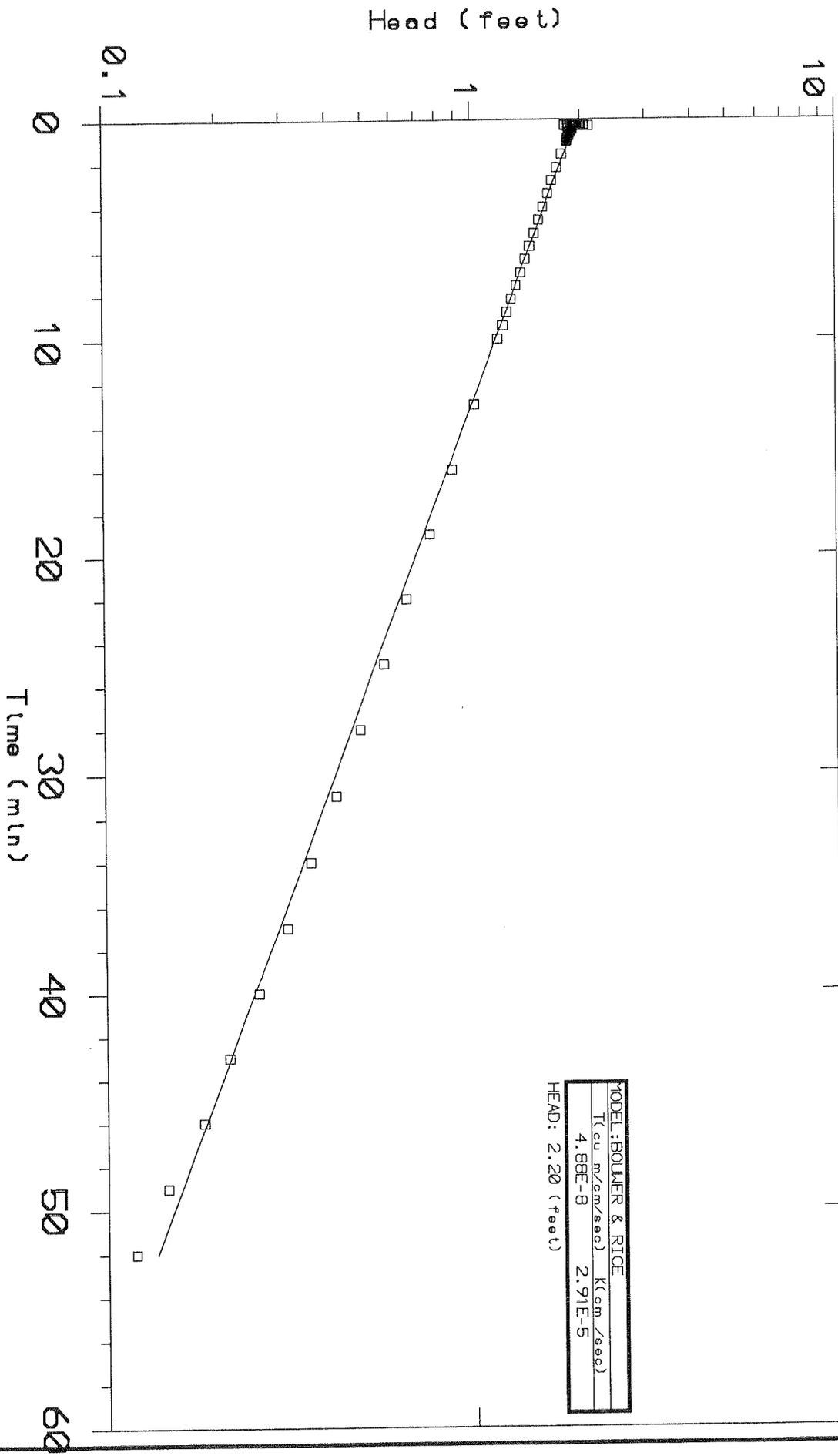
Date: 02-03-98 Well No.: MW-8



MODEL: BOLLER & RICE  
 T (cu m/cm/sec) K (cm /sec)  
 2.52E-7 .000637  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 13.0 Depth: 60.0 feet  
 Screen: Top: 47.9 Base: 59.5 feet  
 Casing Radius: 1.00 in

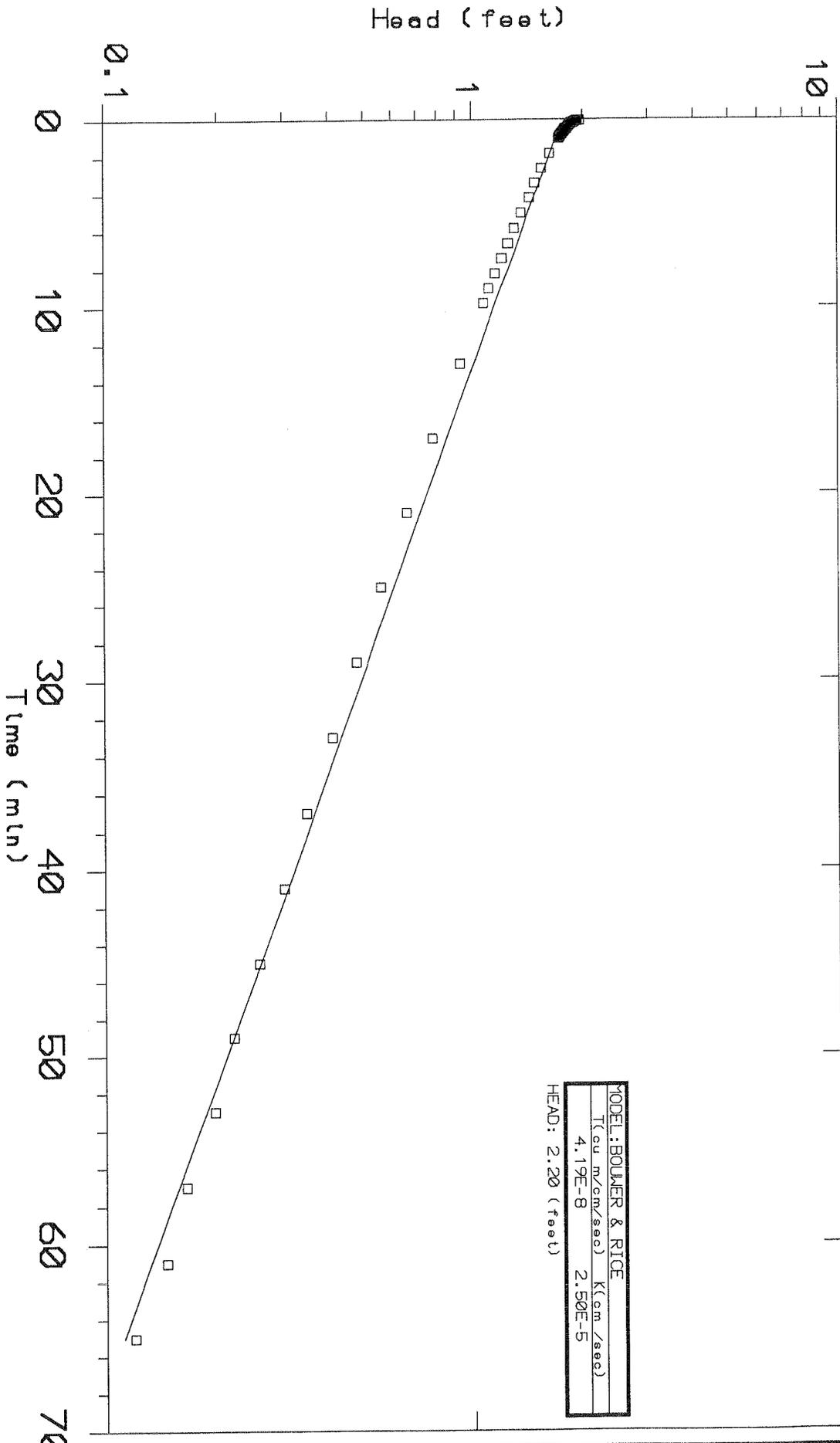
Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MA-8



MODEL: BOLLNER & RICE  
 T (cu m/cm/sec)    K (cm/sec)  
 4.88E-8            2.91E-5  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 55.0    Depth: 136. feet  
 Screen: Top: 121.    Base: 136. feet  
 Casing Radius: 1.00 in

Well Slug Test Data  
**C&D Disposal**  
**Fl. Bragg**  
 Date: 02-03-98    Well No.: MM-9



MODEL: BOULDER & RICE  
 T (cu m/cm/seo) K (cm /seo)  
 4.19E-8 2.50E-5  
 HEAD: 2.20 (feet)

for: **E&ES, Inc.**  
 by: **GEOSOLUTIONS**  
**Aquifer: Water Table**  
 Thickness: 55.0 Depth: 136. feet  
 Screen: Top: 121. Base: 136. feet  
 Casing Radius: 1.00 in

Well Slug Test Data  
**C&D Disposal**  
**Ft. Bragg**  
 Date: 02-03-98 Well No.: MM-9



# American Environmental Network

3000 Weston Parkway • Cary, NC 27513 • (919) 677-0090 • Fax (919) 677-0427 • 1-800-444-9919

C & D

January 26, 1998

Richard Rust  
5641 Piper Drive  
Fuquay-Varina, NC 27526

AEN Project No.: 2492001/9801164  
AEN Reference No.: W9801234  
Client Project I.D.: C&D LANDFILL FT. BRAGG

All clean except for  
Pb in ~~all~~ Rinse Blank.  
Cr in MW-4  
Pb in MW-4  
ZND SAMPLING Cadmium 38.9 vs 5 MW-7

Dear Mr. Rust:

Transmitted herewith are the results of analyses on eight samples submitted to our laboratory.

The samples were received intact.

Analyses were performed according to approved methodologies and meet the requirements of the AEN Quality Assurance Program except where noted. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Thank you for selecting AEN for your sample analysis. Please do not hesitate to call me at 1-919-677-0090 or 1-800-444-9919 should you have any questions regarding this report. We look forward to serving you in the future.

Very truly yours,

AEN, Inc.

Project Management

## IEA/AEN-NORTH CAROLINA CERTIFICATIONS

Certifying State	Program Type	Lab ID #
Alabama	DW	40210
Arizona	DW, WW (Radiolog. Only)	AZ0572
California	DW, WW, HW Radiolog.	1768
Connecticut	DW, WW, Radiolog.	PH-0135
Iowa	WW	352
Kansas	DW, HW, WW, Radiolog.	E-10158
Kentucky	DW	90049
Maryland	DW, Radiolog.	259
Massachusetts	DW, WW	M-NC039
New Jersey	DW, WW Radiolog.	67719 67681
New York	Radiolog.	11422
North Carolina	DW WW Radiolog.	DW 37720 WW 84 Rad 37720
South Carolina	DW, WW, HW	99021
Tennessee	DW UST App List	02914
Utah	Radiolog. RCRA	E-206 E-226
Virginia	DW, Radiolog.	00179
West Virginia	DW, Radiolog.	9908C
Wisconsin	WW	998051010

DW=Drinking Water    WW=Wastewater    HW=Hazardous Waste    Radiolog.=Radiological

# CHAIN OF CUSTODY RECORD

3000 WESTON PKWY.  
 CARY, NC 27513  
 PH# 919-677-0090  
 FAX# 919-677-8702

**NO.** 86036

AEN American Environmental Network, Inc.

**COMPANY/LOCATION**

RICHARD LUST  
 FT DRAGG

NPDES  DRINKING WATER  RCRA  OTHER

STATE CERT. SPECIFY SOLID WASTE SECTION

Page \_\_\_\_\_ of \_\_\_\_\_

PROJECT #	PROJECT NAME	SAMPLERS: (PLEASE PRINT)	SIGNATURE	CONTAINERS #	MATRIX			REQUESTED PARAMETERS	
					SOIL	WATER	OTHER		
MW-3	1-16-98 2:25	✓	COMP	3	✓	✓	✓	METALS & VOC METHODS - ASK BILL SCOTT	
MW-4	1-16-98 2:34	✓	COMP	2	✓	✓	✓		
MW-5	1-16-98 2:45	✓	COMP	3	✓	✓	✓		
MW-6	1-16-98 3:10	✓	COMP	3	✓	✓	✓		
MW-7	1-16-98 3:45	✓	COMP	3	✓	✓	✓		
TRIP	1-16-98				✓				
EQUIP/RINSE	1-16-98				✓				
RELINQUISHED BY (SIGNATURE)								AEN QUOTE NO.	AEN PROJECT NO.
RELINQUISHED BY (SIGNATURE)								629801251	
RECEIVED FOR LAB BY								PROJECT MANAGER (PLEASE PRINT)	P.O. NO.
RECEIVED FOR LAB BY								1/16/98 6:25	
REMARKS ON SAMPLE RECEIPT								1/16/98 1825	
REMARKS								FIELD REMARKS / COMMENTS	
RECEIPT TEMPERATURE= 5°C								2992-001	

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: 980116401  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: MW-3  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received: 01/16/98  
 Date Sampled: 01/16/98  
 Date Analyzed: 01/22/98  
 Lab File ID: 0122K13.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received: 01/16/98

IEA Sample Number: 980116401

Date Sampled: 01/16/98

Client Name: RICHARD RUST

Date Analyzed: 01/22/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0122K13.D

Sample Identification: MW-3

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126801

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204K17.D

Sample Identification: MW-4

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	58	
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126801

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204K17.D

Sample Identification: MW-4

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received: 01/16/98

IEA Sample Number: 980116402

Date Sampled: 01/16/98

Client Name: RICHARD RUST

Date Analyzed: 01/22/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0122K14.D

Sample Identification: MW-4

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	78	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U



INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received: 01/16/98

IEA Sample Number: 980116403

Date Sampled: 01/16/98

Client Name: RICHARD RUST

Date Analyzed: 01/22/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0122K15.D

Sample Identification: MW-5

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	8	
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U



INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received: 01/16/98

IEA Sample Number: 980116404

Date Sampled: 01/16/98

Client Name: RICHARD RUST

Date Analyzed: 01/22/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0122K16.D

Sample Identification: MW-6

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	6	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received: 01/16/98

IEA Sample Number: 980116404

Date Sampled: 01/16/98

Client Name: RICHARD RUST

Date Analyzed: 01/22/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0122K16.D

Sample Identification: MW-6

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: 980116405  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: MW-7  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received: 01/16/98  
 Date Sampled: 01/16/98  
 Date Analyzed: 01/22/98  
 Lab File ID: 0122K17.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: 980116405  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: MW-7  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received: 01/16/98  
 Date Sampled: 01/16/98  
 Date Analyzed: 01/22/98  
 Lab File ID: 0122K17.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U



INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126802

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204K18.D

Sample Identification: MW-7

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: 980116406  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: TRIP  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received: 01/16/98  
 Date Sampled: 01/16/98  
 Date Analyzed: 01/23/98  
 Lab File ID: 0123K03.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: 980116406  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: TRIP  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received: 01/16/98  
 Date Sampled: 01/16/98  
 Date Analyzed: 01/23/98  
 Lab File ID: 0123K03.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: VBLKKW  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: VBLKKW  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received:  
 Date Sampled:  
 Date Analyzed: 01/22/98  
 Lab File ID: 0122K02.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001  
 IEA Sample Number: VBLKKW  
 Client Name: RICHARD RUST  
 Client Project: C&D LANDFILL FT. BRAGG  
 Sample Identification: VBLKKW  
 Matrix: (soil/water) WATER  
 % Moisture: not dec.

Date Received:  
 Date Sampled:  
 Date Analyzed: 01/22/98  
 Lab File ID: 0122K02.D  
 Analyst: COLLINS  
 Dilution Factor: 1.0

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received:

IEA Sample Number: VBLKXX

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 01/23/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0123K02.D

Sample Identification: VBLKXX

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-001

Date Received:

IEA Sample Number: VBLKXX

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 01/23/98

Client Project: C&D LANDFILL FT. BRAGG

Lab File ID: 0123K02.D

Sample Identification: VBLKXX

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U





Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_001  
IEA Sample #: 980116401  
Client Name: RICHARD RUST  
Client Proj. I.D.: C&D LANDFILL FT. BRAGG  
Sample I.D.: MW-3

Matrix: WATER  
Date Received: 01/16/98  
Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	4.23	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
 Level 1 Metals Results Report

IEA Project #: 2492 002  
 IEA Sample #: 980126801  
 Client Name: RICHARD RUST  
 Client Proj. I.D.: C&D LANDFILL FORT BRAGG  
 Sample I.D.: MW-4

Matrix: WATER  
 Date Received: 01/28/98  
 Date Sampled: 01/27/98

Parameter	Method	ZL STD ug/l	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	50	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	5	1.00	4.36	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	50	10.0	345	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	1000	2.00	73.2	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	15	10.0	17.8	01/29/98	01/30/98	RH	R14271	01299805I
MERCURY	EPA 245.1	1.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H
SELENIUM	EPA 200.8	50	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SILVER	EPA 200.7	18	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_001

IEA Sample #: 980116403

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FT. BRAGG

Sample I.D.: MW-5

Matrix: WATER

Date Received: 01/16/98

Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	3.81	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492 001  
 IEA Sample #: 980116404  
 Client Name: RICHARD RUST  
 Client Proj. I.D.: C&D LANDFILL FT. BRAGG  
 Sample I.D.: MW-6

Matrix: WATER  
 Date Received: 01/16/98  
 Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	13.0	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	18.5	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_001

IEA Sample #: 980116405

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FT. BRAGG

Sample I.D.: MW-7

Matrix: WATER

Date Received: 01/16/98

Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	IEA Analyst	Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	1.02	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	24.0	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	15.4	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_002

IEA Sample #: 980126802

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FORT BRAGG

Sample I.D.: MW-7

Matrix: WATER

Date Received: 01/28/98

Date Sampled: 01/27/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	IEA Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	1.00	38.9	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	10.0	10.8	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	2.00	20.9	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
MERCURY	EPA 245.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H
SELENIUM	EPA 200.8	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SILVER	EPA 200.7	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_001  
IEA Sample #: 980116407  
Client Name: RICHARD RUST  
Client Proj. I.D.: C&D LANDFILL FT. BRAGG  
Sample I.D.: EQUIP

Matrix: WATER  
Date Received: 01/16/98  
Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	BQL	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_001  
IEA Sample #: 980116408  
Client Name: RICHARD RUST  
Client Proj. I.D.: C&D LANDFILL FT. BRAGG  
Sample I.D.: RINSE

Matrix: WATER  
Date Received: 01/16/98  
Date Sampled: 01/16/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I
CHROMIUM	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	BQL	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	<del>16.9</del> BQL	01/20/98	01/21/98	RH	R14139	01209801P
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	01229802H
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492\_001

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FT. BRAGG

Sample Number: PBW 01209801P

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CADMIUM	EPA 200.7	1.00	BQL	01/20/98	01/21/98	RH	R14139	01209801P
CHROMIUM	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
COPPER	EPA 200.7	2.00	BQL	01/20/98	01/21/98	RH	R14139	01209801P
LEAD	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SELENIUM	EPA 200.7	20.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P
SILVER	EPA 200.7	10.0	BQL	01/20/98	01/21/98	RH	R14139	01209801P

Corresponding Samples:

980113701, 980114501, 980114601, 980116201, 980116401, 980116403,  
980116404, 980116405, 980116407, 980116408

Comments:

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492 001

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FT. BRAGG

Sample Number: PBW 01209802I

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	IEA Analyst	IEA Run	Prep Batch
CADMIUM	EPA 200.8	1.00	BQL	01/20/98	01/21/98	RH	R14149	01209802I

Corresponding Samples:

980116401, 980116403, 980116404, 980116405, 980116407, 980116408

Comments:

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492 001

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FT. BRAGG

Sample Number: PBW 01229803H

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
MERCURY	EPA 245.1	1.00	BQL	01/22/98	01/23/98	RH	R14159	

Corresponding Samples:

980113701, 980114601, 980116401, 980116403, 980116404, 980116405,  
980116407, 980116408, 980117101, 980117501, 980119702

Comments:



# American Environmental Network

3000 Weston Parkway • Cary, NC 27513 • (919) 677-0090 • Fax (919) 677-0427 • 1-800-444-9919

LCID

February 6, 1998

Richard Rust  
5641 Piper Drive  
Fuquay-Varina, NC 27526

AEN Project No.: 2492002/98091268  
AEN Reference No.: W9801248  
Client Project I.D.: C&D LANDFILL FORT BRAGG

Dear Mr. Rust:

Transmitted herewith are the results of analyses on six samples submitted to our laboratory.

The samples were received intact.

Analyses were performed according to approved methodologies and meet the requirements of the AEN Quality Assurance Program except where noted. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Thank you for selecting AEN for your sample analysis. Please do not hesitate to call me at 1-919-677-0090 or 1-800-444-9919 should you have any questions regarding this report. We look forward to serving you in the future.

Very truly yours,

AEN, Inc.

*f-untz*

Project Management

## IEA/AEN-NORTH CAROLINA CERTIFICATIONS

Certifying State	Program Type	Lab ID #
Alabama	DW	40210
Arizona	DW, WW (Radiolog. Only)	AZ0572
California	DW, WW, HW Radiolog.	1768
Connecticut	DW, WW, Radiolog.	PH-0135
Iowa	WW	352
Kansas	DW, HW, WW, Radiolog.	E-10158
Kentucky	DW	90049
Maryland	DW, Radiolog.	259
Massachusetts	DW, WW	M-NC039
New Jersey	DW, WW Radiolog.	67719 67681
New York	Radiolog.	11422
North Carolina	DW WW Radiolog.	DW 37720 WW 84 Rad 37720
South Carolina	DW, WW, HW	99021
Tennessee	DW UST App List	02914
Utah	Radiolog. RCRA	E-206 E-226
Virginia	DW, Radiolog.	00179
West Virginia	DW, Radiolog.	9908C
Wisconsin	WW	998051010

DW=Drinking Water    WW=Wastewater    HW=Hazardous Waste    Radiolog.=Radiological





INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126803

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204V03.D

Sample Identification: MW-8

Analyst: DIXON

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126804

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L05.D

Sample Identification: MW-9

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	60	
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U



INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126805

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L07.D

Sample Identification: MW-1

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126805

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L07.D

Sample Identification: MW-1

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126806

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L09.D

Sample Identification: Trip Blank

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received: 01/28/98

IEA Sample Number: 980126806

Date Sampled: 01/27/98

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L09.D

Sample Identification: Trip Blank

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKKB

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204K02.D

Sample Identification: VBLKKB

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKKB

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204K02.D

Sample Identification: VBLKKB

Analyst: COLLINS

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKKC

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204V02.D

Sample Identification: VBLKKC

Analyst: DIXON

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKKC

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/04/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0204V02.D

Sample Identification: VBLKKC

Analyst: DIXON

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKLW

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L03.D

Sample Identification: VBLKLW

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
74-87-3	Chloromethane	10	10	U
75-01-4	Vinyl Chloride	10	10	U
74-83-9	Bromomethane	10	10	U
75-00-3	Chloroethane	10	10	U
74-97-5	Bromochloromethane	5	5	U
75-09-2	Methylene Chloride	10	10	U
67-64-1	Acetone	100	100	U
75-69-4	Trichlorofluoromethane	5	5	U
74-88-4	Iodomethane	10	10	U
75-35-4	1,1-Dichloroethene	5	5	U
75-34-3	1,1-Dichloroethane	5	5	U
156-59-2	Cis-1,2-Dichloroethene	5	5	U
156-60-5	Trans-1,2-Dichloroethene	5	5	U
67-66-3	Chloroform	5	5	U
107-06-2	1,2-Dichloroethane	5	5	U
78-93-3	2-Butanone	100	100	U
71-55-6	1,1,1-Trichloroethane	5	5	U
56-23-5	Carbon Tetrachloride	10	10	U
108-05-4	Vinyl Acetate	50	50	U
75-27-4	Bromodichloromethane	5	5	U
74-95-3	Dibromomethane	10	10	U
78-87-5	1,2-Dichloropropane	5	5	U
10061-01-5	Cis-1,3-Dichloropropene	10	10	U
79-01-6	Trichloroethene	5	5	U
124-48-1	Dibromochloromethane	5	5	U
79-00-5	1,1,2-Trichloroethane	5	5	U
71-43-2	Benzene	5	5	U
75-15-0	Carbon Disulfide	100	100	U
10061-02-6	Trans-1,3-Dichloropropene	10	10	U
75-25-2	Bromoform	5	5	U
591-78-6	2-Hexanone	50	50	U
108-10-1	4-Methyl-2-Pentanone	100	100	U
127-18-4	Tetrachloroethene	5	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	5	U

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.  
 SW-846 VOLATILE ORGANICS ANALYSIS DATA SHEET  
 METHOD 8260

IEA Project Number: 2492-002

Date Received:

IEA Sample Number: VBLKLW

Date Sampled:

Client Name: RICHARD RUST

Date Analyzed: 02/05/98

Client Project: C&D LANDFILL FORT BRAGG

Lab File ID: 0205L03.D

Sample Identification: VBLKLW

Analyst: MOORE

Matrix: (soil/water) WATER

Dilution Factor: 1.0

% Moisture: not dec.

CAS NO.	COMPOUND	QUANT LIMIT: ug/l	RESULT: ug/l	Q
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108-88-3	Toluene	5	5	U
108-90-7	Chlorobenzene	5	5	U
100-41-4	Ethylbenzene	5	5	U
100-42-5	Styrene	10	10	U
96-18-4	1,2,3-Trichloropropane	15	15	U
110-57-6	Trans-1,4-Dichloro-2-Butene	100	100	U
96-12-8	1,2-Dibromo-3-Chloropropane	25	25	U
630-20-6	1,1,1,2-Tetrachloroethane	5	5	U
107-13-1	Acrylonitrile	200	200	U
106-93-4	1,2-Dibromoethane	5	5	U
1330-20-7	Xylene (Total)	5	5	U
106-46-7	1,4-Dichlorobenzene	5	5	U
95-50-1	1,2-Dichlorobenzene	5	5	U







Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_002

IEA Sample #: 980126803

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FORT BRAGG

Sample I.D.: MW-8

Matrix: WATER

Date Received: 01/28/98

Date Sampled: 01/27/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	1.00	2.10	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	2.00	2.52	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
MERCURY	EPA 245.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H
SELENIUM	EPA 200.8	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SILVER	EPA 200.7	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report

IEA Project #: 2492\_002  
IEA Sample #: 980126804  
Client Name: RICHARD RUST  
Client Proj. I.D.: C&D LANDFILL FORT BRAGG  
Sample I.D.: MW-9

Matrix: WATER  
Date Received: 01/28/98  
Date Sampled: 01/27/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	1.00	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	10.0	23.2	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	2.00	9.32	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
MERCURY	EPA 245.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H
SELENIUM	EPA 200.8	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SILVER	EPA 200.7	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
 Level 1 Metals Results Report

IEA Project #: 2492 002  
 IEA Sample #: 980126805  
 Client Name: RICHARD RUST  
 Client Proj. I.D.: C&D LANDFILL FORT BRAGG  
 Sample I.D.: MW-1

Matrix: WATER  
 Date Received: 01/28/98  
 Date Sampled: 01/27/98

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	1.00	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	10.0	13.7	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	2.00	100	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	10.0	22.7	01/29/98	01/30/98	RH	R14271	01299805I
MERCURY	EPA 245.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H
SELENIUM	EPA 200.8	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SILVER	EPA 200.7	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Comments:

Client-specific quantitative limits used.

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492\_002

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FORT BRAGG

Sample Number: PBW 01299802H

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	IEA Analyst	Run	Prep Batch
MERCURY	EPA 245.1	1.00	BQL	01/29/98	01/29/98	RH	R14230	01299802H

Corresponding Samples:

980126301, 980126801, 980126802, 980126803, 980126804, 980126805,  
980127401F, 980127402F, 980127403F, 980127404F

Comments:

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492\_002

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FORT BRAGG

Sample Number: PBW 01299805I

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
ARSENIC	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CADMIUM	EPA 200.8	1.00	BQL	01/29/98	01/30/98	RH	R14271	01299805I
CHROMIUM	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
COPPER	EPA 200.8	2.00	BQL	01/29/98	01/30/98	RH	R14271	01299805I
LEAD	EPA 200.8	10.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I
SELENIUM	EPA 200.8	20.0	BQL	01/29/98	01/30/98	RH	R14271	01299805I

Corresponding Samples:

980126801, 980126802, 980126803, 980126804, 980126805

Comments:

Industrial & Environmental Analysts, Inc. (IEA)  
Level 1 Metals Results Report  
PREPARATION BLANKS

IEA Project #: 2492\_002

Matrix: WATER

Client Name: RICHARD RUST

Client Proj. I.D.: C&D LANDFILL FORT BRAGG

Sample Number: PBW 01299805P

Parameter	Method	Quant Limit	Result ( ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
SILVER	EPA 200.7	10.0	BQL	01/29/98	02/05/98	PW	R14306	01299805P

Corresponding Samples:

980126801, 980126802, 980126803, 980126804, 980126805

Comments: