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**Field And Laboratory Investigations To Determine  
The Behavior Of Ethylene Dibromide (EDB)  
In Soil And Ground Water In Florida**

**FINAL REPORT**



**FDER Contract  
Number EDB 004**



**SEPTEMBER 1986**

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## CONTENTS

|   |                               | <u>Page</u> |
|---|-------------------------------|-------------|
| 1 | EXECUTIVE SUMMARY             | 1-1         |
| 2 | INTRODUCTION                  | 2-1         |
|   | Purpose and Scope             | 2-1         |
|   | Acknowledgements              | 2-1         |
| 3 | BACKGROUND                    | 3-1         |
|   | EDB Use                       | 3-1         |
|   | EDB Contamination             | 3-3         |
| 4 | INVESTIGATION                 | 4-1         |
|   | Project Approach              | 4-1         |
|   | Task I - Study Site Selection | 4-1         |
|   | Task II - Mobility Dynamics   | 4-6         |
| 5 | INTERPRETATION                | 5-1         |
|   | Highlands County Study Area   | 5-1         |
|   | Jackson County Study Area     | 5-9         |
|   | Polk County Study Area        | 5-17        |
| 6 | CONCLUSIONS                   | 6-1         |
| 7 | RECOMMENDATIONS               | 7-1         |
| 8 | REFERENCES                    | 8-1         |

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E



## FIGURES

|      |                                                                | <u>Page</u> |
|------|----------------------------------------------------------------|-------------|
| 4.1  | LOCATION OF PRELIMINARY SITE SELECTION INVESTIGATIONS          | 4-4         |
| 4.2  | EDB APPLICATION AND TOPOGRAPHY OF THE KUHLMAN STUDY SITE       | 4-7         |
| 4.3  | EDB APPLICATION AND TOPOGRAPHY OF THE MALONE EAST STUDY SITE   | 4-8         |
| 4.4  | EDB APPLICATION AND TOPOGRAPHY OF THE LAKE WALES STUDY SITE    | 4-9         |
| 4.5  | KUHLMAN STUDY SITE MONITOR WELLS AND SOIL BORING LOCATIONS     | 4-12        |
| 4.6  | MALONE EAST SITE MONITOR WELLS AND SOIL BORING LOCATIONS       | 4-13        |
| 4.7  | LAKE WALES STUDY SITE MONITOR WELLS AND SOIL BORINGS LOCATIONS | 4-14        |
| 4.8  | WATER TABLE MONITOR WELL DETAILS                               | 4-19        |
| 4.9  | WELL HC-1 DETAILS AND GEOLOGY                                  | 4-20        |
| 4.10 | WELL JC-1 DETAILS AND GEOLOGY                                  | 4-21        |
| 4.11 | WELL PC-1 DETAILS AND GEOLOGY                                  | 4-22        |
| 4.12 | WELL HC-1 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-31        |
| 4.13 | WELL HC-2 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-32        |
| 4.14 | WELL HC-3 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-32        |
| 4.15 | WELL HC-4 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-33        |
| 4.16 | WELL HC-5 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-33        |
| 4.17 | WELL HC-6 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-34        |
| 4.18 | WELL HC-7 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-34        |

## FIGURES

|      |                                                                | <u>Page</u> |
|------|----------------------------------------------------------------|-------------|
| 4.19 | WELL JC-1 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-35        |
| 4.20 | WELL JC-2 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-35        |
| 4.21 | WELL JC-3 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-36        |
| 4.22 | WELL JC-CH EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION | 4-36        |
| 4.23 | WELL JC-GH EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION | 4-37        |
| 4.24 | WELL JC-JD EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION | 4-37        |
| 4.25 | WELL JC-VT EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION | 4-38        |
| 4.26 | WELL PC-1 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-39        |
| 4.27 | WELL PC-3 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-39        |
| 4.28 | WELL PC-5 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-40        |
| 4.29 | WELL PC-6 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-40        |
| 4.30 | WELL PC-7 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION  | 4-41        |
| 5.1  | LOCATION AND TOPOGRAPHY OF KUHLMAN STUDY SITE                  | 5-2         |
| 5.2  | KARST FEATURES AT THE KUHLMAN STUDY SITE                       | 5-5         |
| 5.3  | GEOLOGIC CROSS-SECTION OF THE KUHLMAN STUDY SITE               | 5-6         |
| 5.4  | LOCATION AND TOPOGRAPHY OF MALONE EAST STUDY SITE              | 5-10        |
| 5.5  | KARST FEATURES AT THE MALONE EAST STUDY SITE                   | 5-13        |

## FIGURES

|     |                                                         | <u>Page</u> |
|-----|---------------------------------------------------------|-------------|
| 5.6 | GEOLOGIC CROSS-SECTION OF THE MALONE<br>EAST STUDY SITE | 5-14        |
| 5.7 | LOCATION AND TOPOGRAPHY OF LAKE WALES<br>STUDY SITE     | 5-18        |
| 5.8 | KARST FEATURES AT THE LAKE WALES STUDY<br>SITE          | 5-20        |
| 5.9 | GEOLOGIC CROSS-SECTION OF THE LAKE WALES<br>STUDY SITE  | 5-22        |

## TABLES

|     |                                    | <u>Page</u> |
|-----|------------------------------------|-------------|
| 4-1 | WELL CONSTRUCTION AND PUMPING DATA | 4-23        |



Section 1  
EXECUTIVE SUMMARY

INTRODUCTION

The soil fumigant ethylene dibromide (EDB) was applied to Florida soils for more than 20 years as a means of controlling the burrowing nematode. Application of EDB to central Florida citrus grove buffer zones, totalling 422 acres, was conducted by the Florida Department of Agriculture. In northwest Florida EDB was used by farmers to protect peanut and soybean crops.

Because this chemical has been determined to have possibly adverse human health effects at low concentrations, the use of EDB was suspended in Florida in July 1983. Florida established a drinking water standard of 0.02 ppb for EDB. A state-wide EDB sampling program had by July, 1986 tested 10,844 wells. Contamination has been found in 22 counties representing 1,254 (11.6 percent of total wells sampled) individual drinking water wells.

An investigation to develop additional background information concerning the magnitude of the EDB contamination and to determine the behavior of EDB in soils and groundwater was funded by the Florida Department of Environmental Regulation (FDER). The investigation was divided into three portions: Task I - Site Selection; Task II - EDB Mobility Dynamics, and Task III - EDB Degradation. The first two tasks were performed by CH2M HILL, Inc.; the third task was undertaken by the Pesticide Research Laboratory at the University of Florida. This study reports on the investigations and results of Tasks I and II.

## Project Approach

The project was approached in two stages: the selection of three suitable study sites, and consideration of the mobility of EDB through the soil and water. Specific criteria were developed by FDER for site selection in order to conduct the field portion of the EDB investigation under conditions that would best generate answers concerning the mobility dynamics of EDB in Florida soils and aquifers. These site selection criteria were as follows:

1. The history of EDB application at site must be documentable.
2. The long-term or short-term application of EDB should be continuous until the July 1983 suspension.
3. The site should be near public water supply sources that are already contaminated or have, potentially, high contamination risk due to site proximity.
4. The area in which the site is located should have additional hydrogeologic information available.
5. The site should be near an EDB application area that can be considered a most likely source of contamination. Known EDB application areas located relatively far from contaminated wells are less likely to be the sole contaminating source because of the possibility of unrecorded EDB application near these wells.

Use of the above criteria led to the selection of three sites at which the EDB investigations would be conducted. These included the Kuhlman Area in Highlands County, the Malone East Area in Jackson County, and Lake Wales in Polk County.

At each of the three selected study sites, an exploratory borehole was drilled to define the near-surface geologic sequence. Additional borings were then performed above and below the water table in order to obtain undisturbed soil samples for residual EDB content determination as well as hydraulic and particle size analysis. A nearby rain gauge with long-term daily records was located. Such data were needed to assess the impact of rainfall events on EDB content.

A series of water table monitor wells and one or more deep wells into the first confined aquifer or limestone beneath each site were installed. Construction of the deeper wells was conducted in a manner such that "carrydown" of EDB during the course of drilling would not occur.

Following well construction and development, dedicated sampling pump systems were installed. Samples were recovered from the wells for EDB analysis on a quarterly basis for one year. Static water level measurements were also made during each sampling event.

#### CONCLUSIONS

1. EDB is readily leached from Florida's unsaturated sandy soils into underlying aquifers. Soil samples taken beneath and adjacent to EDB buffer zones or other application areas showed less than 200 ng/Kg of EDB. Although it was not determined how long the leaching



process takes, it is likely that all of the EDB was leached from these soils in much less than a year.

2. There is preliminary evidence that the duration of EDB contamination in aquifers will be on the order of tens of years, perhaps in excess of one hundred years.
3. Dilution is likely to be the major factor for resolution of the EDB contamination problem. Dilution appears to be less active in those areas with slow rates of groundwater movement.
4. Assuming that the EDB is already present in an aquifer, dry seasons tend to result in higher concentrations of EDB in groundwater. Conversely, the lowest EDB concentrations occurred shortly after the rainy season. This dry/wet relationship is simply a reflection of halting/restarting the dilution process.
5. The period of investigation (four quarterly samplings) was insufficient to predict long-term EDB contamination trends.
6. Limestone aquifers in Florida's karstic regions are very vulnerable to contamination by long-lived chemicals. Proximity of sinkholes to areas of EDB application favors the contamination of underlying limestone aquifers. Deep, flat water tables beneath high sand ridges can be an indication of contaminant movement through underlying karst structures into deeper limestone aquifers.
7. Regions with thick sequences of low permeability earth materials beneath unconfined aquifers are less vulnerable to deep aquifer contamination than regions lacking confining beds overlying such deep aquifers.

An understanding of the geologic framework and local hydrology is critical to predicting contaminant movement and destiny.

8. EDB contamination at the Highlands County (Kuhlman) site is concentrated within the surficial aquifer. It is not possible to state whether this contamination will move into the Floridan aquifer by means of possible karst structures underlying the area.
9. EDB contamination at the Jackson County (Malone East) site is concentrated within the Floridan aquifer. This contamination has moved from temporary residence in the surficial aquifer down sinkholes into the Floridan aquifer.
10. Low levels of EDB remain in the groundwaters of the surficial aquifer at the Polk County (Lake Wales) site, but appear to be moving into the deeper Floridan aquifer.
11. Contamination of groundwater by EDB appears to be independent of the type of crop on which it was used.

#### RECOMMENDATIONS

1. Chemicals applied to the soils of Florida are very likely to find their way into aquifers used as sources of public and private drinking water supplies.
2. Since EDB is one of many chemicals which have been or are being applied to soils throughout Florida, it would be beneficial to establish and use some sort of inexpensively analyzed tracer substance(s) to indicate impending contamination.

3. The extreme vulnerability of the karst region of northern Jackson County, a recharge area, warrants more detailed investigations of the long-term impact of agricultural and waste disposal activities in that area.
4. Continue to monitor EDB content of the limestone aquifer monitor wells at all three study sites.
5. The present study involved only four quarters of sampling. This was insufficient time to predict long-term trends in groundwater contamination, therefore, sampling of most wells should be continued. The results should be included in an annual report of an interpretive nature.





## Section 2 INTRODUCTION

### PURPOSE AND SCOPE

The purpose of this investigation for the Florida Department of Environmental Regulation (FDER) was to develop additional background information concerning the possible magnitude of the ethylene dibromide (EDB) contamination in Florida and to determine the behavior of EDB in soils and groundwater.

The present investigation was divided into two portions: Task I--Site Selection, and Task II--EDB Mobility Dynamics. Three study sites were to be identified in Florida: two located near citrus groves within the "Highlands Ridge" area in Highlands and Polk Counties and the third site located in the peanut/soybean-growing area of northwest Florida. Once the study sites were identified, hydrogeologic investigations would be conducted to determine the concentration, rate of movement, and residence time of EDB in/through the soil and groundwater underlying each site.

Task III -- EDB Degradation Study was performed by the Pesticide Research Laboratory, Department of Food and Human Nutrition, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida. The objective of this task was to determine the mechanisms and rates of chemical and bacterial degradation of EDB in Florida soils and groundwater. The results of the EDB degradation study were not available at the time that Tasks I and II were completed.

### ACKNOWLEDGEMENTS

During the course of these investigations assistance was provided to us by many individuals and institutions. This

assistance was provided in a great variety of forms too numerous to list here. We wish to thank them and express our appreciation.

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Ms. Dee Johnson, Highlands County Health Unit  
Mr. George Wolfe, Highlands County Health Unit  
Mr. Tim Hurner, Highlands County Agricultural  
Extension Office

#### JACKSON COUNTY

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Ms. Vera Mae Tucker  
Mr. and Mrs. George Hagler  
Hickory Grove Free Will Baptist Church  
Mr. Doyle Robinson, Jackson County Health Unit  
Mr. Bill Dean, Jackson County Health Unit  
Mr. Leonard Cobb, Jackson County Agricultural Extension  
Office

#### POLK COUNTY

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Burns Avenue Church of God, Lake Wales  
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Mr. Don Guthrie, Polk County Health Unit

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South Florida Water Management District

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Pittsburgh Testing Laboratory, Tampa

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## Section 3 BACKGROUND

### EDB USE

#### REASONS

The soil fumigant EDB was applied to Florida soils for more than 20 years. The primary purpose for its use was for control of the burrowing nematode, a parasitic worm which attacks the small roots and root hairs of citrus trees and other crops.

#### APPLICATION

Most of the EDB application was to well-drained sandy soils in Central Florida citrus groves. The major portion of the EDB application to the citrus areas, totalling 422 acres, was conducted by the Florida Department of Agriculture. In recent years, however, EDB was applied to sandy soils in peanut/soybean-growing areas in Northwest Florida and to vegetable crops throughout the state.

The manner in which the EDB was applied is detailed in the Burrowing Nematode Control Manual (Florida Department of Agriculture, 1984). The EDB was injected at least 8 inches beneath the soil surface through tubes behind coulter openers or chisels. The resulting furrows were closed by hilling soil over them, by press wheels, or some other means to prevent loss of the EDB fumes from the soil.

#### Citrus Groves

In citrus groves, EDB was used to create buffers to prevent the movement of nematodes from one area to another and to fumigate acreage in which once producing trees had been destroyed ("push-and-treat" sites).

Buffer zones are long, narrow strips of land fumigated usually twice a year for the purpose of preventing nematode movement. Buffer lengths and widths varied depending upon the specific needs at the site, the availability of space, and the topography. Frequently, unpaved roadways, railroad right-of-ways, or other cleared areas were incorporated into buffers to increase their widths.

Initial buffer treatment involved application rates of 50 gallons EDB (85 percent active agent) per acre. This was followed by retreatment every 6 months using 25 gallons EDB per acre. When retreating wide buffers or those incorporating roadways or cleared areas, the outer 8-foot wide belt on each side would be treated.

At "push-and-treat" sites, a parcel of land would be fumigated with EDB at a rate of 25 gallons per acre. This followed the clearing and burning of all trees and roots on the property. Pushing and treating was performed on citrus trees within a delineated area so infested with nematodes that crop production was significantly reduced, or in areas where buffers had failed.

#### Peanut/Soybean Crops

EDB was used as a soil fumigant for peanut and soybean crops. It was generally applied 2 to 3 weeks prior to planting to avoid potential growth problems encountered when application occurred at the same time as planting. The methods employed for applying EDB were similar to those used in citrus-growing areas, however, application rates tended to be much lower, ranging from 0.88 gallons to 4.50 gallons per acre (Dunn, 1983a, b).

## EDB CONTAMINATION

### CONTAMINATION LOCATIONS AND LEVELS

On July 5, 1983, the Florida Department of Health and Rehabilitative Services began testing drinking water supply wells for EDB. Through the end of June 1986, over 10,800 wells had been tested in every county except Monroe (FDER, 1986a). Contamination was found in 1,254 wells or 11.7 percent. These wells were located in 22 counties throughout the state.

The level of EDB contamination in individual wells in Florida has ranged from the detection level of 0.02 parts per billion (ppb) to 700 ppb.

### EDB USE SUSPENSION AND DRINKING WATER STANDARD

On July 29, 1983, following the discovery of contamination in several wells in Central Florida, the Florida Department of Agriculture suspended its use of EDB, which it had been applying to citrus groves for over 20 years. EDB had been determined to have possibly adverse human health effects at low concentrations.

On May 23, 1984, the state Environmental Protection Commission established a maximum contaminant level for EDB in drinking water of 0.02 ppb, the present level of detection.



## Section 4 INVESTIGATION

### PROJECT APPROACH

The investigation was approached as having two definable main stages or tasks. These included:

Task I--Selection of three suitable sites at which Task II would be conducted.

Task II--Investigation of the mobility of EDB through the soil and groundwater.

Task I was accomplished through development of a two-staged selection process for evaluating the many potential study sites. Task II involved conducting hydrogeologic investigations at the selected sites and monitoring EDB levels in wells specially constructed for this purpose.

### TASK I--STUDY SITE SELECTION

#### PURPOSE

The purpose of Task I was to evaluate the many locations throughout the state at which EDB had been applied and to select three sites that would offer the best conditions to generate answers concerning the mobility dynamics of EDB in Florida soils and aquifers.

#### PRELIMINARY SELECTION PROCESS

##### Date Review

During initial meetings with the FDER, data from the State's EDB sampling program were reviewed. This information

included topographic maps on which known EDB application areas and contaminated wells were located, and computer printouts of owners' names, addresses, and concentrations of EDB in wells which had been tested by the State. This information indicated that the citrus region in Polk County and Highlands County contained the greatest incidences of EDB-contaminated wells. Additionally, groundwater in Jackson County in northwest Florida appeared to be impacted. Based upon the large volume and availability of data, these three counties were chosen for further review.

### Site Selection

Preliminary site selection activities were initiated by the distribution of introductory letters explaining the investigations and the work that would be performed. These were sent to offices and agencies thought to have information regarding the use of EDB and knowledge of the extent of contamination in each of the counties selected. These included:

- o Northwest, South, and Southwest Florida Water Management Districts
- o Florida Department of Agriculture, Division of Plant Industry offices in Sebring and Winter Haven
- o FDER District and Branch Offices
- o U.S. Soil and Conservation Service field offices in Marianna (Jackson County) and Sebring (Highlands County)
- o Health Departments in each selected county
- o Agricultural Extension Offices in each selected county



These were followed up with telephone calls and personal contacts which provided information on the extent of the EDB contamination problem, the type and variety of data that were available, and information regarding the availability of specific sites for locating the study.

Based upon an understanding of how, when, and where EDB was used, a search was undertaken to identify within each county EDB "hot spots", locations where the fumigant was applied and where numerous contaminated wells were concentrated. This preliminary search identified seven potential areas for study in Highlands County, seven in Polk County, and two in Jackson County. These are displayed in Figure 4.1 and listed below:

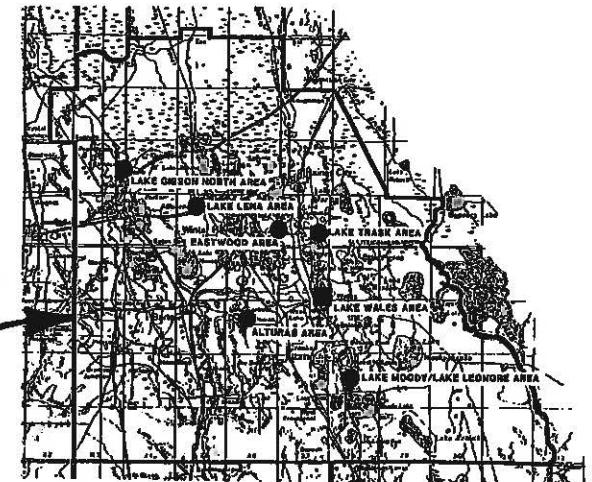
Highlands County: Lake Brentwood  
Avon Park, South  
Lake Letta  
Dinner Lake  
DeSoto City  
Kuhlman  
Lake Francis

Jackson County: Bascom  
Malone, East

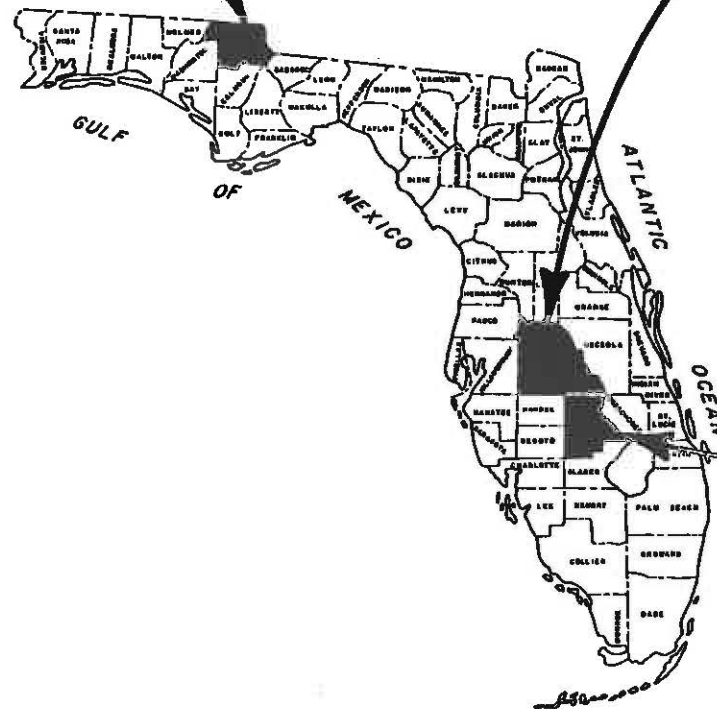
Polk County: Lake Gibson, North  
Lake Lena  
Eastwood  
Lake Trask  
Alturas  
Lake Moody/Lake Lenore



JACKSON COUNTY

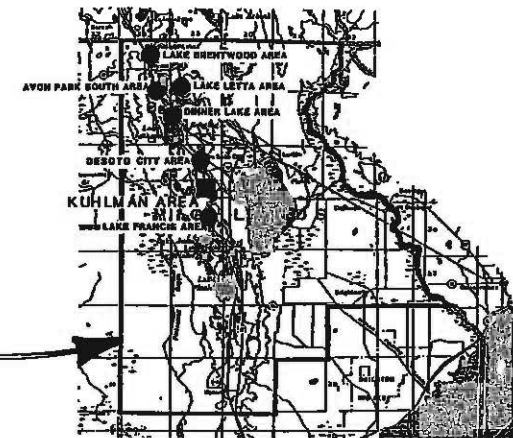


POLK COUNTY



**LEGEND**

- PRELIMINARY SITE
- FINAL SITE



HIGHLANDS COUNTY

LOCATION OF PRELIMINARY SITE SELECTION INVESTIGATIONS

FIGURE 4.1

## FINAL SELECTION PROCESS

The selection process used specific criteria developed by the FDER to evaluate and compare the sites previously identified as potential study areas. These are listed below:

1. The history of EDB application at the site must be documentable.
2. The long-term or short-term application of EDB should be continuous until the July 1983 suspension.
3. The site should be near public water supply sources that are already contaminated or have, potentially, high contamination risk due to site proximity.
4. The area in which the site is located should have additional hydrogeologic information available.
5. The site should be near an EDB application area than can be considered a likely source of contamination. Known EDB application areas located relatively far from contaminated wells are less likely to be the sole contaminating source because of the possibility of unrecorded EDB application near these wells.

Comparisons using these criteria resulted in the early elimination of several sites in Highlands and Polk Counties. More concentrated evaluations were performed on the remaining sites. This work is documented in the Task I-- Site Selection Report (CH2M HILL, 1984).

## SITE SELECTION RESULTS

The evaluations performed led to the selection of three sites at which the EDB investigations would be conducted. These include:

- o Highlands County - Kuhlman
- o Jackson County - Malone East
- o Polk County - Lake Wales

Figures 4.2, 4.3, and 4.4 show the location of each site within their respective county. They also indicate the location of EDB application and contaminated wells.

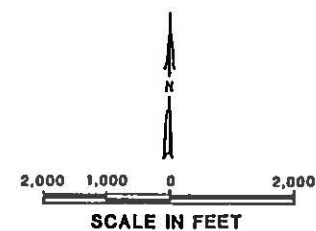
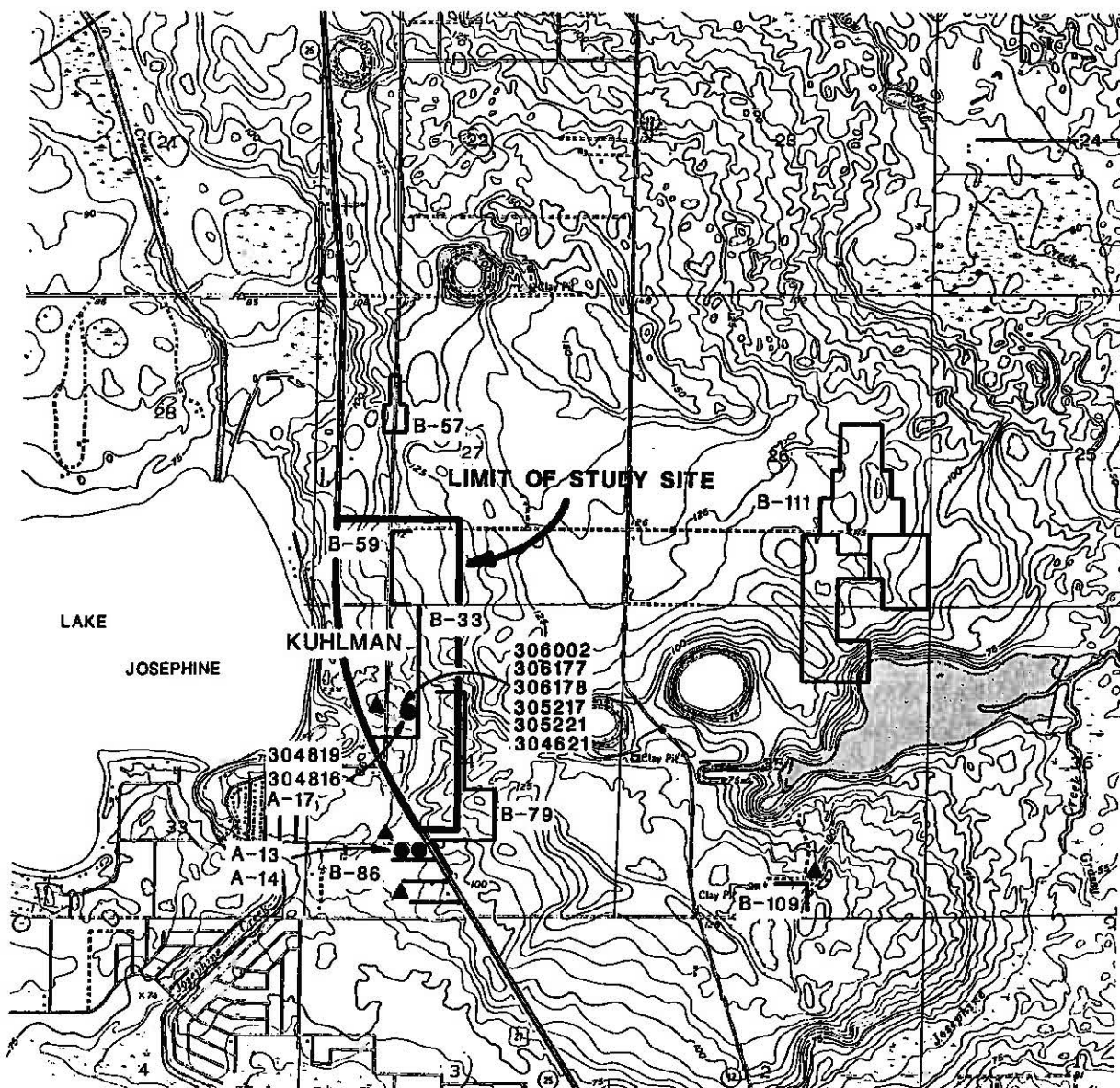
These sites were selected because they met all of the site criteria that had been developed. In addition, it appeared that gaining access to the sites to perform the investigation, though not a criterion, would not be difficult.

An in-depth discussion of each site's geologic and hydrogeologic features, EDB application periods and well contamination levels and locations, is presented in Section 5.

## TASK II--MOBILITY DYNAMICS

### PURPOSE

The primary purpose of Task II was to develop additional background information concerning the possible magnitude of EDB contamination, and to determine the behavior of EDB in soils and groundwater in Florida. Specifically, it was desired that 1) the concentration and rate of movement of EDB in and through soils on the study sites be determined, 2) the concentration and rate of movement of EDB in the shallow and deep aquifers underlying these sites be determined, and 3) the residence time of EDB in the shallow and deep aquifers at these sites be determined.



EDB APPLICATION AND TOPOGRAPHY  
OF THE KUHLMAN STUDY SITE

LEGEND



EDB BUFFER ZONE



PUSH - AND - TREAT AREA



CONTAMINATED WELL  
( $>0.1$  ppb)

FIGURE 4.2







Critical to the accomplishment of this task were the drilling and sampling to be conducted at each site. During the course of test drilling to define the hydrologic characteristics of the sediments beneath each site, soil samples or cores were to be taken for hydraulic analysis (permeability), EDB content determination, and particle size analysis. The installation of permanent groundwater sampling locations for water level and water quality was required. Another data component needed in order to assess contaminant movement was a nearby rain gauge with long-term daily records. Such data were needed to assess the impact of rainfall events as the driving force for impulses of EDB entering the groundwater system, if EDB continued to be present in the soil horizon.

#### EXPLORATORY BOREHOLES

At each of the three study sites, an exploratory borehole was drilled to define the general lithology of the near-surface sediments beneath the site. The borehole was drilled so that site-specific lithologic information would be available to aid in the decision-making process for soil sampling, and for shallow and deep monitor well design and construction.

#### Methodology

The exploratory borehole procedure employed by the test boring contractor, Pittsburgh Testing Laboratory (Tampa), was the Standard Penetration Test method (ASTM D 1586). The method involved drilling 3.5 feet with a mud-rotary drilling rig and then taking a 1.5-foot split-spoon sample. Drilling continued until the first limestone was reached, or after the boring had penetrated at least 100 feet of sediments. Exploratory borehole depths at the Highlands County



(Kuhlman), Jackson County (Malone East), and Polk County (Lake Wales) study sites were 120, 60, and 125 feet, respectively. Only the Jackson County borehole penetrated limestone. All exploratory boreholes were plugged by pumping a cement/bentonite mix into the borehole by means of a tremie pipe held at the bottom of the hole.

### Location

The locations of the exploratory boreholes at the three study sites are shown in Figures 4.5 - 4.7. The locations were selected on the basis of being possible sites for monitor wells or soil samplings.

### Lithology

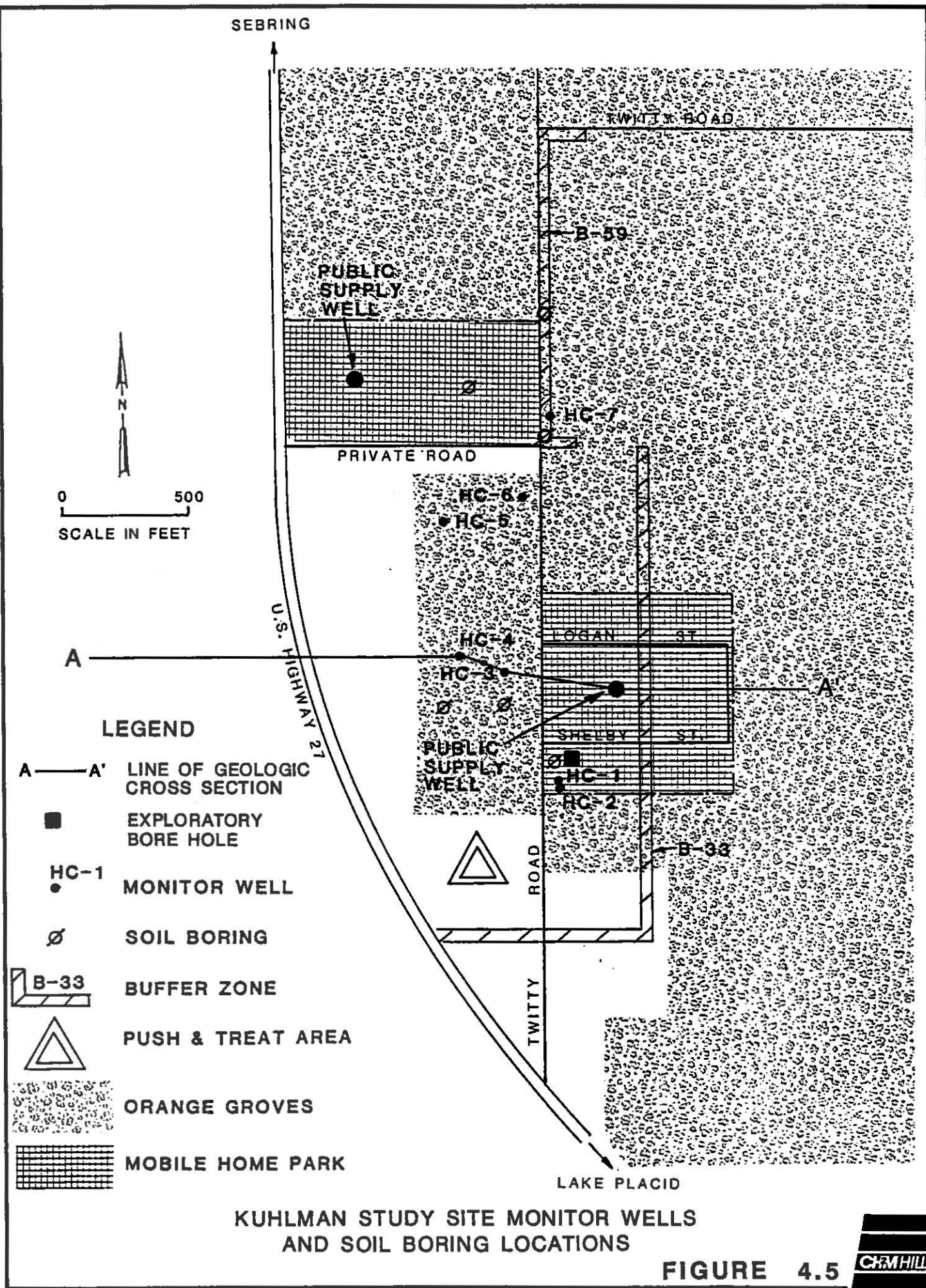
The lithology of the materials encountered in the exploratory boreholes is presented in Appendix A.

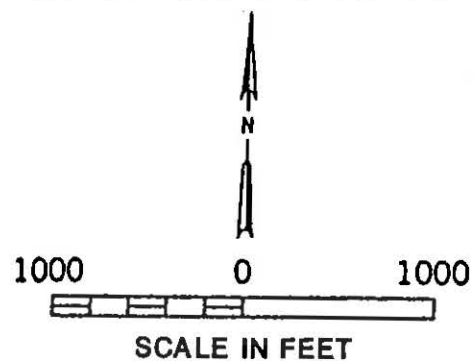
### SOIL SAMPLES

Once the general near-surface lithologic sequence at a study site had been determined, additional borings were performed to obtain Shelby tube (undisturbed) samples of soils at various depths. These soil samples were to be subjected to EDB analysis and permeability and particle size analysis.

### Methodology

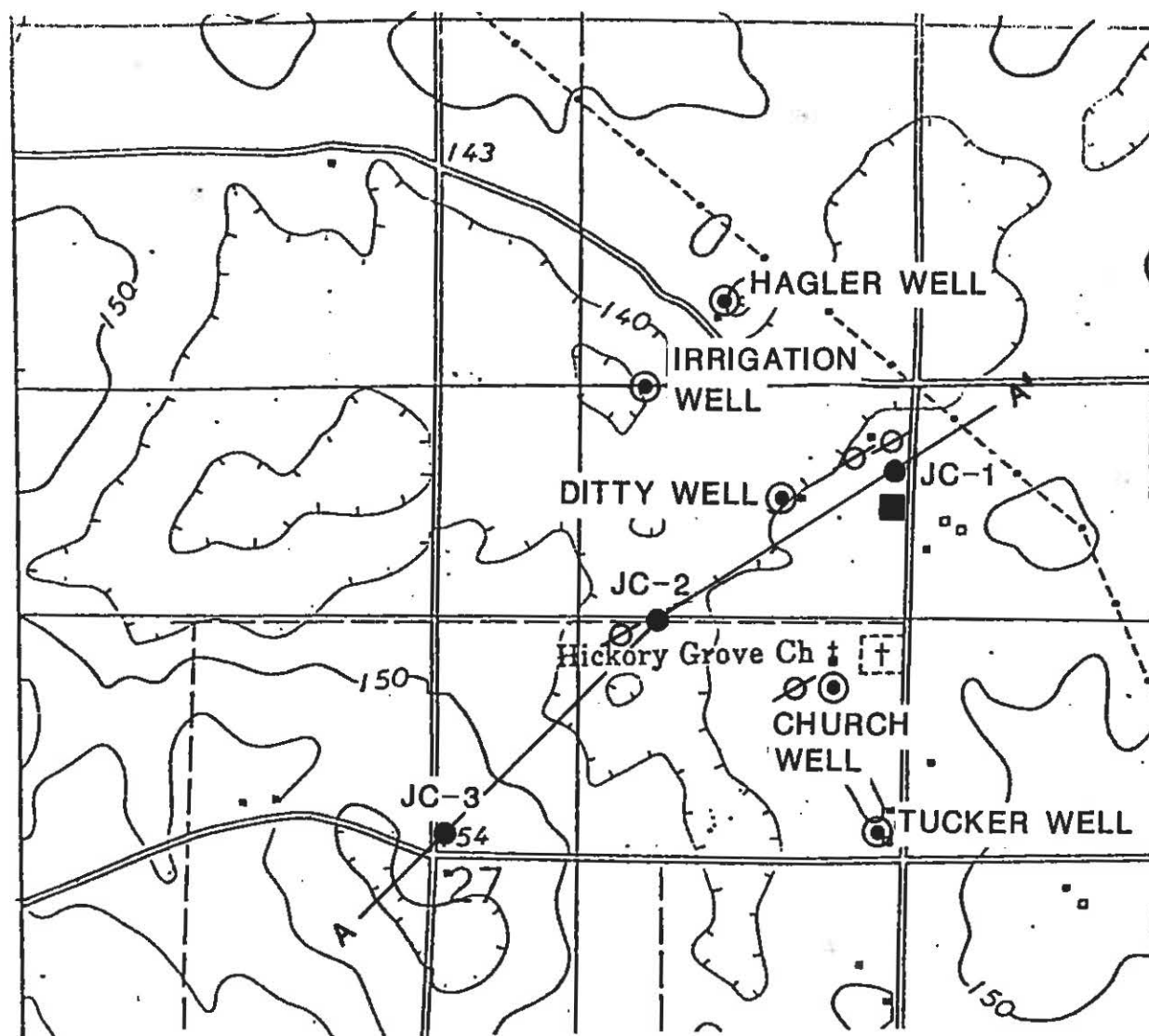
The test boring contractor, using the mud-rotary method, drilled to selected horizons and pushed a chemically clean, 3-inch diameter, 30-inch long, steel Shelby tube. The Shelby tubes had been cleaned in the following manner:alconox soap wash, deionized water rinse, methanol rinse, organic-free water rinse, and 105-degree (C) oven drying,



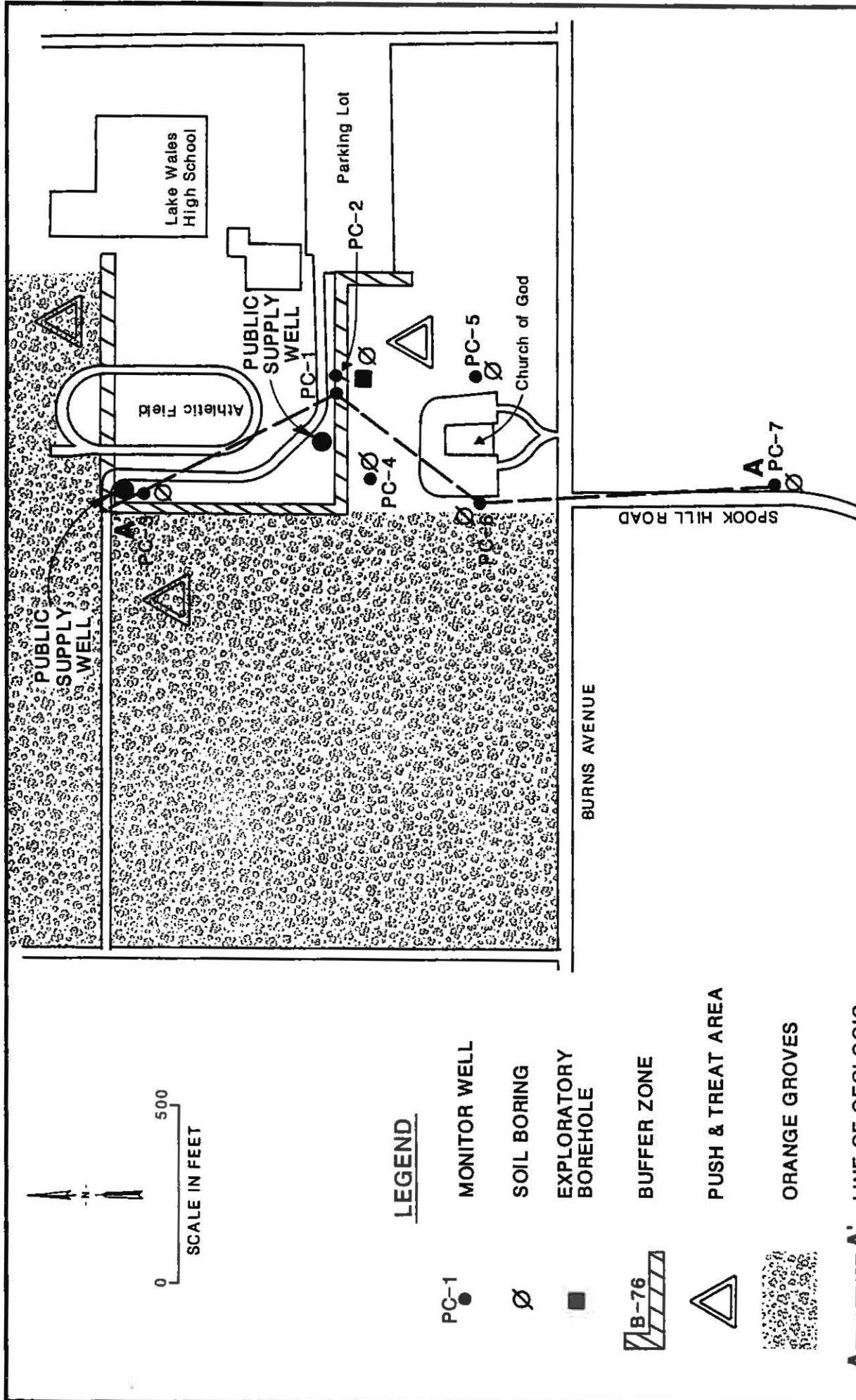


# **LEGEND**

- MONITOR WELL
- JC-1
- ⊗ SOIL BORING
- EXPLORATORY BOREHOLE
- ⊙ PRIVATE WELL
- A — A' LINE OF GEOLOGIC CROSS SECTION



MALONE EAST STUDY SITE MONITOR WELLS AND SOIL BORING LOCATIONS



LAKE WALES STUDY SITE MONITOR WELLS AND SOIL BORINGS LOCATIONS

with storage in aluminum foil wrap. After being pushed and removed from the borehole, the tube was immediately sealed at both ends with heated paraffin wax and then placed in an iced cooler.

Upon returning from the field, the tubes were placed in a vise and cut into segments with a large, unlubricated, pipe cutter. One complete set of segmented Shelby tubes was resealed with paraffin wax and forwarded to Pittsburgh Testing Laboratory (Tampa) for permeability testing and particle size analysis. A second set of Shelby tube segments was prepared for shipment to CH2M HILL's laboratory in Montgomery, Alabama, for EDB analysis. The method of Shelby tube handling/preparation for this stage of the study is described below under the subject of leach/batch testing.

#### Location

The locations of the various soil borings at the three study sites are shown in Figures 4.5 - 4.7. The soil borings were located on or downgradient from EDB buffer zones, push-and-treat areas, or other areas of known EDB application. Records of sampled depth intervals are provided in Appendix A.

#### Particle Size/Permeability Analysis

The Shelby tube segments submitted by CH2M HILL to Pittsburgh Testing Laboratory (Tampa) were subjected to particle size analysis and permeability testing. The results are presented in Appendix B.

#### Batch Testing

Shelby tube segments were prepared for shipment to CH2M HILL's laboratory according to the following procedure.

Approximately 6-inch tube segments were placed in a vise. A 1-inch diameter stainless steel coring device and push-rod were used to extract a core of the sample from the center of the Shelby tube. The sediment core was placed in a chemically clean (see Methodology, above) glass container, and then placed in a cooler accompanied by frozen packages of coolant ("blue ice"). Between corings, the corer and sample push-rod were cleaned and steel-wire brushed with running, hot, Tampa city tapwater, followed by a trisodium phosphate soak, a deionized water rinse, and a methanol (pesticide grade) rinse.

The sample cores, cooled, were received in CH2M HILL's laboratory and subjected to batch testing. These tests were conducted by mixing EDB contaminated soil with water in a sealed container and then sampling at given time intervals. The leachate from the soils was analyzed by Selected Ion Monitoring Gas Chromatography/Mass Spectrometry. All sample leachate measured less than 200 ng/kg of EDB. Analytical results are presented in Appendix C.

#### MONITOR WELLS

An important FDER requirement aspect of the site selection process was the criterion that sufficient existing hydro-geologic information be available, so that groundwater conditions could be reasonably predicted prior to field investigations. This information was to be used to develop well drilling and soils testing specifications that were to be submitted to contractors for bidding purposes.

Good to excellent geologic information was available for the various areas in the form of reports and unpublished data prepared/collected by sources such as the Florida Geological Survey, the U.S. Geological Survey, the Northwest Florida



Water Management District, the South Florida Water Management District, and consultants. All of this information was reviewed in order to prepare shallow and deep monitor well designs and specifications.

With the exception of the previously discussed, relatively shallow exploratory boreholes drilled at each of the study sites, minimal site-specific information was available regarding the deeper geologic units. Therefore, the deep monitor wells to be drilled at the sites were also exploratory in nature.

The well designs and specifications were prepared so as to avoid the introduction of EDB from offsite sources: cross-contamination between well sites or the "carrydown" of EDB from higher to lower soil and water levels during the drilling process. Among the techniques used were the following:

1. All drilling tools were steam cleaned prior to the start of work on the project, and prior to moving the drilling rig onto each new study site.
2. All tools were thoroughly rinsed (inside and outside) with water (from an approved source) and methanol (pesticide grade) and allowed to air dry prior to starting drilling operations at a new well site.
3. Teflon tape was used in "making up" all tool joints (hemp twine was used as a substitute when drilling deep boreholes to avoid "binding" of tool threads). No grease was allowed.
4. Only uncoated steel pipe was allowed.

5. No additives were used in the cement grout.
6. Deep monitor wells were pressure grouted by the introduction of the cement slurry through a cement line installed in each well casing. Water table monitor well inner casings (4-inch diameter) with well screens were cemented with pressure tremie lines after installation of sandpack.
7. Water from completed wells was not allowed to be used in the drilling of other wells. Water for drilling was obtained, in all cases, from EDB-free, approved potable water supplies.
8. All steel pipe and screen used during well construction were washed with a trisodium phosphate solution and rinsed with methanol and EDB-free water prior to installation.
9. All tools used to install the sandpack around the well screens were washed with a trisodium phosphate solution and rinsed with methanol and EDB-free water prior to being used to place the sandpack.
10. All drilling fluids, cuttings, and water pumped from the wells were retained onsite. Water pumped from the deep wells was pumped to a point no closer than 200 feet from a water table monitor well.

#### Well Design

Monitor well construction details for the three study sites are shown in Figures 4.8 - 4.11 and listed in Table 4-1.



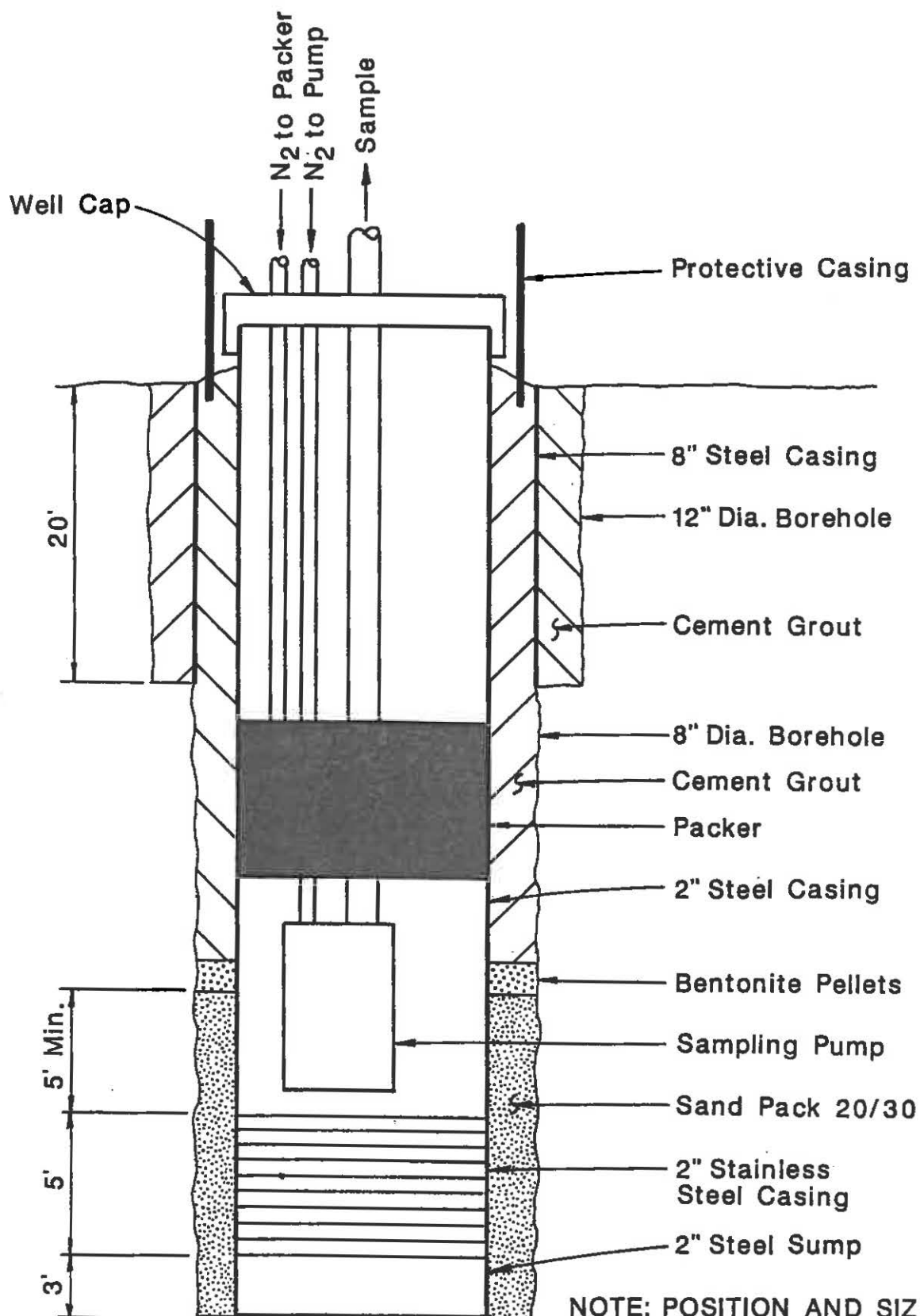


FIGURE 4.8 WATER TABLE MONITOR WELL DETAILS

DEPTH IN FEET BELOW LAND SURFACE

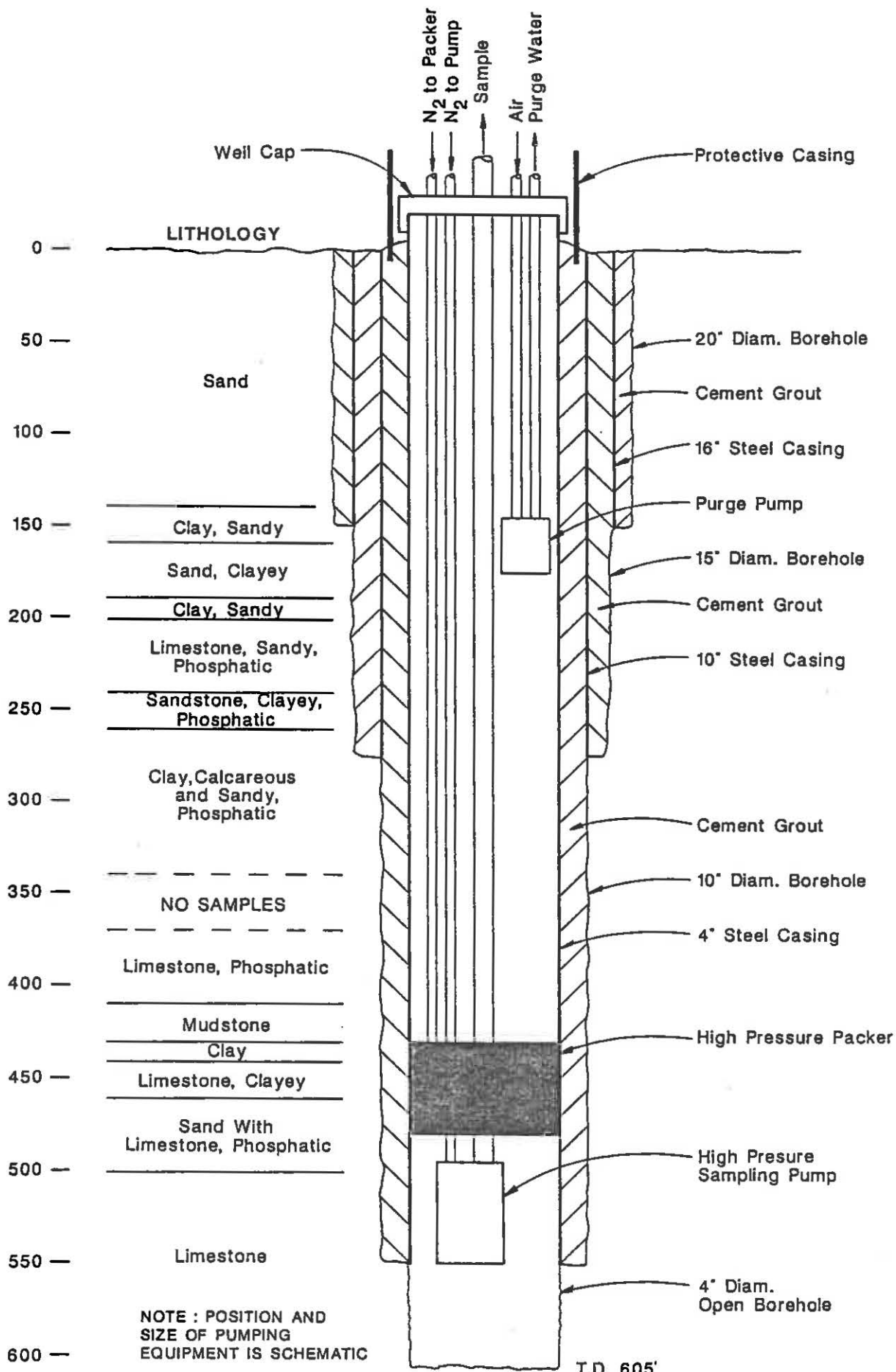


FIGURE 4.9 – WELL HC-1 DETAILS AND GEOLOGY

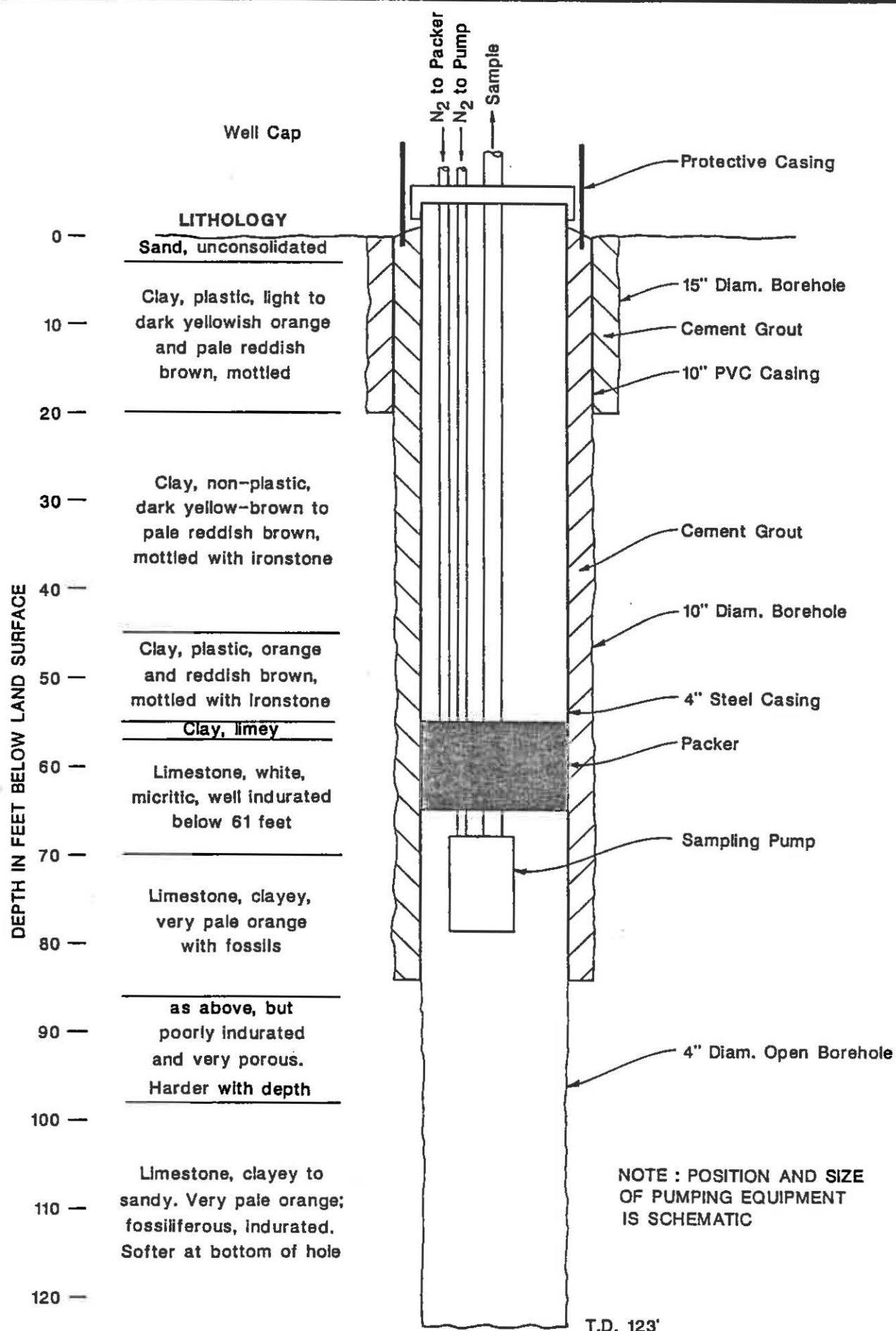
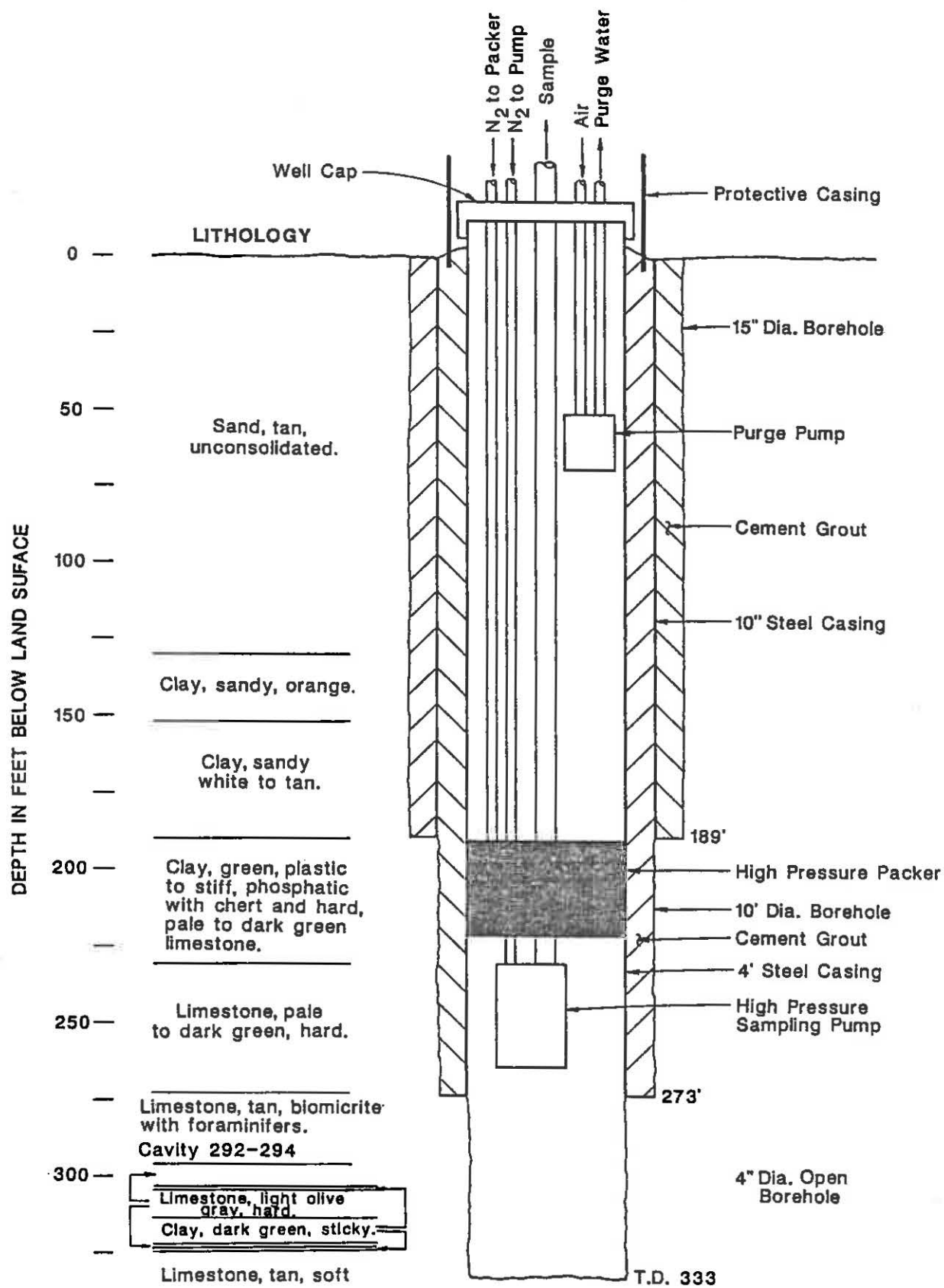


FIGURE 4.10 – WELL JC-1 DETAILS AND GEOLOGY



Note:  
POSITION AND SIZE OF PUMPING  
EQUIPMENT IS SCHEMATIC

FIGURE 4.11 – WELL PC-1 DETAILS AND GEOLOGY

Table 4-1  
WELL CONSTRUCTION AND PUMPING DATA

| Well Number | Depth of Well Below Top Casing (feet) | Depth of Well Below Land Surface (feet) | Depth of Bottom of Final Casing Below Land Surface (feet) | Elevation, Top Protective Casing (msl) | Final Casing Borehole Diameter (inches) | Final Casing Length (feet) | Open Borehole or Screen | Approximate Depth to Water from Casing Top (feet) | Packer Setting Below Casing Top (feet) | Volume Below Packer Making One Well Volume (gal) | Well Tested gallons/min | Time Necessary to Pump 3 Volumes | Packer psi Needed | Calculated Minimum Pump psi Needed |
|-------------|---------------------------------------|-----------------------------------------|-----------------------------------------------------------|----------------------------------------|-----------------------------------------|----------------------------|-------------------------|---------------------------------------------------|----------------------------------------|--------------------------------------------------|-------------------------|----------------------------------|-------------------|------------------------------------|
| JC-1        | 124                                   | 123                                     | 83                                                        | 148.31                                 | 4                                       | 84                         | OB                      | 45.0                                              | 77                                     | 30.7                                             | 0.625                   | 2h 28m                           | 45                | 35                                 |
| JC-2        | 124                                   | 123                                     | 62                                                        | 138.43                                 | 4                                       | 63                         | OB                      | 34.9                                              | 56                                     | 43.7                                             | 0.734                   | 2h 59m                           | 40                | 26                                 |
| JC-3        | 124                                   | 123                                     | 83                                                        | 158.31                                 | 4                                       | 84                         | OB                      | 54.5                                              | 77                                     | 30.7                                             | 0.435                   | 3h 32m                           | 40                | 35                                 |
| HC-1        | 607                                   | 605                                     | 565                                                       | 90.25                                  | 4                                       | 567                        | OB                      | 21.5                                              | 533                                    | 48.3                                             | pp 2.48<br>sp 0.18      | 59m<br>2h 50m                    | 250               | 231                                |
| HC-2        | * 92                                  | 90                                      | 82                                                        | 89.92                                  | 2                                       | 84                         | S                       | 15.8                                              | 77                                     | 2.0                                              | 0.41                    | 15m                              | 45                | 35                                 |
| HC-3        | * 92                                  | 90                                      | 82                                                        | 91.27                                  | 2                                       | 84                         | S                       | 17.7                                              | 77                                     | 2.0                                              | 0.50                    | 12m                              | 45                | 35                                 |
| HC-4        | * 92                                  | 90                                      | 82                                                        | 91.38                                  | 2                                       | 84                         | S                       | 17.3                                              | 77                                     | 2.0                                              | 0.37                    | 17m                              | 45                | 35                                 |
| HC-5        | * 92                                  | 90                                      | 82                                                        | 91.17                                  | 2                                       | 84                         | S                       | 19.1                                              | 77                                     | 2.0                                              | 0.66                    | 10m                              | 45                | 35                                 |
| HC-6        | * 92                                  | 90                                      | 82                                                        | 99.89                                  | 2                                       | 84                         | S                       | 26.3                                              | 77                                     | 2.0                                              | 0.58                    | 11m                              | 45                | 35                                 |
| HC-7        | * 92                                  | 90                                      | 82                                                        | 100.68                                 | 2                                       | 84                         | S                       | 27.6                                              | 77                                     | 2.0                                              | 0.53                    | 12m                              | 45                | 35                                 |
| PC-1        | 335                                   | 333                                     | 271                                                       | 228.11                                 | 4                                       | 273                        | OB                      | 129.7                                             | 266                                    | 45.0                                             | P 0.984<br>S 0.287      | 2h 17m<br>53m                    | 90                | 117                                |
| PC-2        | *113                                  | 111                                     | 103                                                       | 228.61                                 | 2                                       | 105                        | S                       | --                                                | Not Installed                          | Dry                                              | --                      | --                               | Dry               | Dry                                |
| PC-3        | *133                                  | 132                                     | 124                                                       | 233.59                                 | 2                                       | 125                        | S                       | 122.7                                             | 129                                    | 0.979                                            | 0.162<br>0.037          | Variable                         | 40                | 55                                 |
| PC-4        | *113                                  | 110.5                                   | 102.5                                                     | 225.78                                 | 2                                       | 105                        | S                       | --                                                | Not Installed                          | Dry                                              | --                      | --                               | Dry               | Dry                                |
| PC-5        | *135                                  | 133                                     | 125                                                       | 213.27                                 | 2                                       | **127                      | S                       | 105.0                                             | 119                                    | 2.1                                              | 0.208                   | 31m                              | 35                | 53                                 |
| PC-6        | *134                                  | 132                                     | 124                                                       | 213.33                                 | 2                                       | 126                        | S                       | 104.4                                             | 119                                    | 2.0                                              | 0.132                   | 46m                              | 35                | 53                                 |
| PC-7        | * 50                                  | 48.5                                    | 40.5                                                      | 123.81                                 | 2                                       | 42                         | S                       | 19.1                                              | 35                                     | 2.0                                              | 0.452                   | 14m                              | 35                | 17                                 |

pp = purge pump

sp = sample pump

\* = includes 3-foot sump

\*\* = Added 9-inch rising to inner casing

Shallow (water table) monitor wells were cased with 2-inch diameter steel casing, and have 2-inch diameter stainless steel screens. These wells were equipped with a steel sediment sump below the well screen. The deep (limestone) monitor wells have a final casing of 4-inch diameter steel and terminate in an open borehole in the limestone.

#### Well Location

Monitor well locations for the three study sites are shown in Figures 4.5 - 4.7, presented earlier.

#### Well Construction and Development

All monitor well drilling was performed by Mixon Foundation & Drilling, Inc. (Tampa) using the mud-rotary drilling method. A steam cleaned mud pan was used for all drilling.

Installation of the water table monitor wells at the Highlands County (Kuhlman) and Polk County (Lake Wales) sites was similar. Figure 4.8 shows the essential design used.

Construction of the deep monitor wells into the limestone underlying each of the study sites was dependent upon site geologic conditions and depth to limestone. At the Jackson County (Malone East) site, construction was uncomplicated, as shown for Well JC-1 (Figure 4.10). Drilling of the Polk County (Lake Wales) site deep monitor PC-1 (Figure 4.11) was only time consuming because of its depth and the need to use a drilling mud de-sander for the upper portion of the borehole.

Construction of the 605-foot deep well, HC-1, at the Highlands County (Kuhlman) site was more difficult. At this site, it was necessary to drill a 6-inch diameter, 340-foot

deep pilot/exploratory hole in order to obtain preliminary information regarding possible depths at which to set the upper casings. Drilling a larger diameter borehole through what was later determined to be almost 150 feet of unconsolidated sand would have chanced the borehole to being filled with sloughing sand prior to casing installation and grouting. A 16-inch diameter well casing was installed in the upper portion of the borehole to allow deeper drilling through the sand. Construction details for Well HC-1 are shown in Figure 4.9.

Following placement of the casing and screen assembly in the shallow (water table) wells or upon completion of the open borehole in the deep wells, and following cement grouting and curing, the wells were developed by air-lift pumping until clean formation water was being produced. The water table wells and limestone (deep) wells were pumped an additional 1 to 3 and 12 hours, respectively, to be better assured that any introduced contamination was removed from the wells. Prior to any sampling, the wells were further developed with the dedicated pumps described in the following sampling section.

## SAMPLING

### Sampling Equipment

The factors guiding the type of pump to be used for sampling the monitor wells were:

1. Data consistency with time
2. Sampling device isolation from the outside environment
3. Sampling ease with dependable equipment, possibly by different personnel

4. Pumping ability from shallow to very deep, small-diameter wells at reasonable cost
5. Proper volatile compound (EDB) recovery.

The WELL WIZARD dedicated sampling pump manufactured by Q.E.D. Environmental Systems, Inc., was selected for installation in all of the monitor wells constructed for this study. Equipment availability and service from a local supplier were critical factors in this selection.

A Teflon bladder-equipped, high-pressure sampling pump (WELL WIZARD Model P-1201-H), with a high-pressure packer (Purge Mizer Model 4400) above the pump and Teflon-lined polyethylene delivery tubing, was installed at intake depths of 269 and 536 feet below land surface, respectively, in Wells PC-1 and HC-1, near the bottom of the 4-inch casing. A Model HR-4500 Purge Master pump (approximately 3 gpm) was installed 116 and 466 feet above the sampling pump in Well PC-1 and HC-1, respectively. The purge pump was operated with a high-pressure, portable air compressor with driver/controller (Model 3111-H). Bottled nitrogen gas was used to expand the packer (250+ psi) and operate the bladder pump for sampling. The position of these various sampling components in these two wells is shown in Figures 4.9 and 4.11.

Each of the monitor wells at the Jackson County (Malone East) site is equipped with a Model T-1200 pump and a Model 4400 packer directly above the open limestone borehole (Figure 4.10).

All shallow (water table) monitor wells at the Highlands County (Kuhlman) and Polk County (Lake Wales) sites are equipped with Model T-1200 pumps and a Model 4200 packer. The pump intake is directly above the top of the well screen, with the packer positioned approximately 2 to 3 feet above the top of the 3-foot long pump (Figure 4.8).



## Installation

The sampling assemblies (bladder pump, expandable packer, purge pump, and associated air lines and tubing) were installed in a chemically clean manner. All sampling pump items were pre-assembled and were removed directly from sealed shipping containers and lowered into the well using disposable surgical gloves. The area around each well was covered with a large sheet of polyethylene so as to avoid contamination from the soil during pump assembly installation.

Installation of the bladder pump and associated air lines and delivery tubing in Well HC-1 to a depth of 536 feet resulted in buoyancy problems after the pump had been lowered to a depth of 300 feet. This situation was overcome by adding a series of stainless steel weights on top of the pump.

## Sampling Technique

The sampling of each well was a process that involved three separate routines: determining the static water level, purging a minimum of three well volumes (or borehole volumes, in the cases of deep wells HC-1 and PC-1), and recovery of a water sample.

Static water level measurements were made upon arrival at each well site. An electric tape was lowered into the well through a hole in the well cap designed for this purpose. Once the water level was determined, the tape was removed and cleaned with a cloth saturated with a trisodium phosphate solution. The tape never came in contact with the ground and the cloth was discarded after each use.

Prior to purging the water table monitor wells and the three Jackson County (Malone East) limestone monitor wells, the well packer was inflated to isolate the water below it from the remainder of the well, thereby effectively reducing the volume of water needed to be pumped. Each packer was inflated with the WELL WIZARD portable air compressor and driver/controller. Based upon previously calculated data, each well was then purged until three volumes of water below the packer had been removed.

Discharged water from the well was periodically monitored for pH and specific conductance. Sampling did not occur until values for these two parameters had stabilized. Discharge rates were also calculated to determine the amount of time required to purge the wells.

The purging procedures differed slightly for the deeper limestone aquifer monitor wells. The high-rate purge pump, used only in wells HC-1 and PC-1, was employed while the packer above the sampling pump was deflated. The purge pump was operated with the portable air compressor until three volumes of the well casing and borehole below the packer had been purged.

The portable air compressor used to operate the purge pump could not produce enough pressure to inflate the packers in Wells HC-1 and PC-1; therefore, bottled nitrogen gas was used for this purpose. Expansion of the packer took place after shutting off the purge pump. Once the packer was expanded with the nitrogen gas, the sample pump was activated with the gas and the sample pump delivery tubing was purged with sampling pump water of an amount equal to five delivery tubing volumes.

Upon completion of all well purging activities water samples were taken. Samples were collected in 120 ml amber jars with Teflon septum caps and immediately placed in coolers with ice. Disposable surgical gloves were worn while recovering each sample.

At selected wells, duplicate and split samples were recovered by technicians of the respective County Health Unit. These samples were then forwarded to State of Florida laboratories in Jacksonville and Gainesville for analysis as part of the quality assurance procedures. The results of these samples analyses are in the files of the Groundwater Section of FDER.

Table 4-1, above, presents data regarding well construction, pump and packer depths, and required purging times. This table was prepared in advance during post-installation pump and controller/driver testing and was referred to during each sampling event.

#### Sample Analysis

Following the sampling of all monitor wells at a site, the coolers containing water samples, ice, and chain-of-custody forms were shipped via bus to the CH2M HILL laboratory in Montgomery, Alabama.

Analytical Method Summary - 100 ml of sample were extracted two times with 1 ml of solvent. 3  $\mu$ l of this extract were then injected into a gas chromatograph equipped with an electron capture detector for separation and analysis. The extraction and analysis time ranged between 10 to 50 minutes per sample depending upon the analytical conditions chosen. Confirmatory analyses for concentrations of 5  $\mu$ g/L or greater were performed using a GC/MS in place of the

electron capture detector. Standards were spiked into organic-free water and were extracted and analyzed in the manner described above in order to evaluate the potential for possible extraction losses.

Analytical Results - The EDB analytical results are presented in Appendix D and in graphic form in Figures 4.12 - 4.30. The water level and precipitation data shown on these figures are discussed in Section 5.

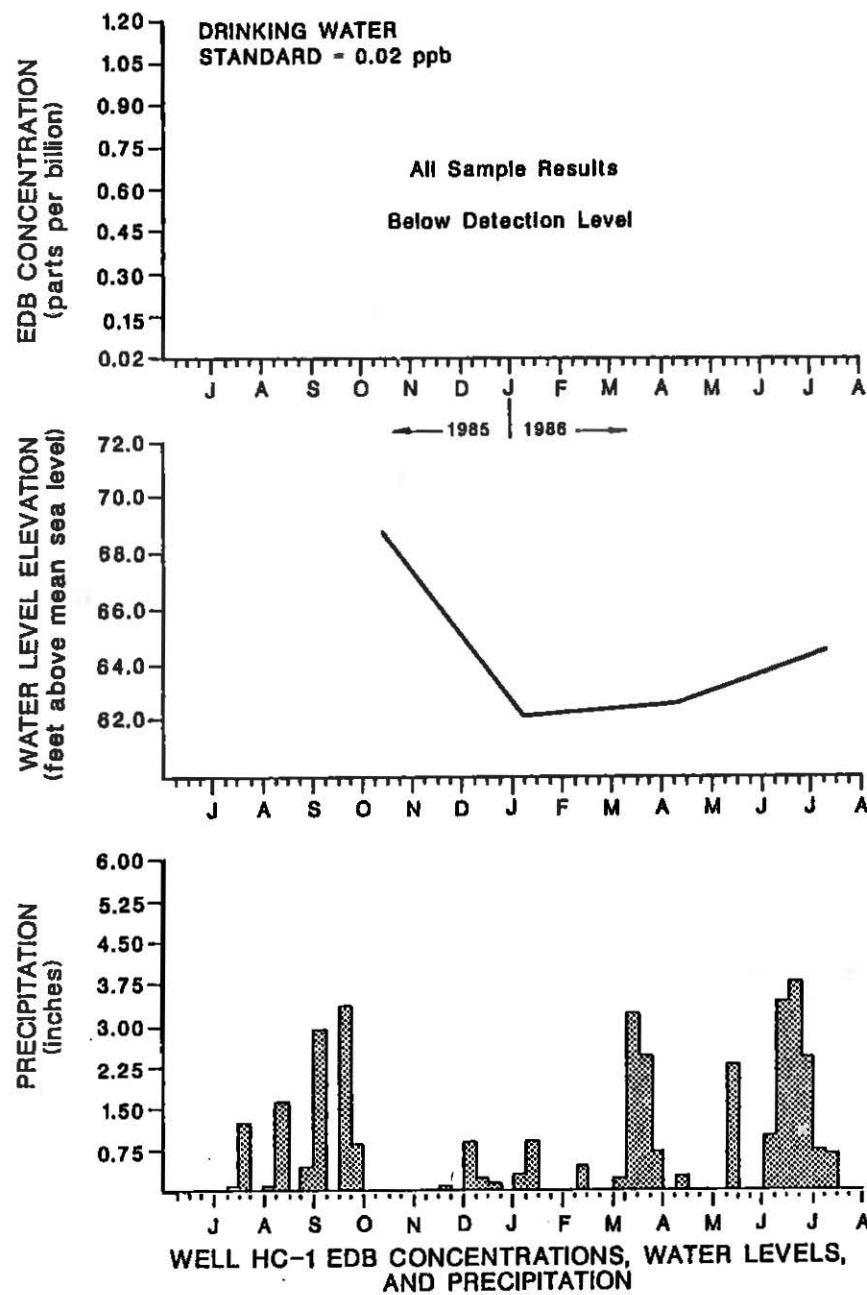
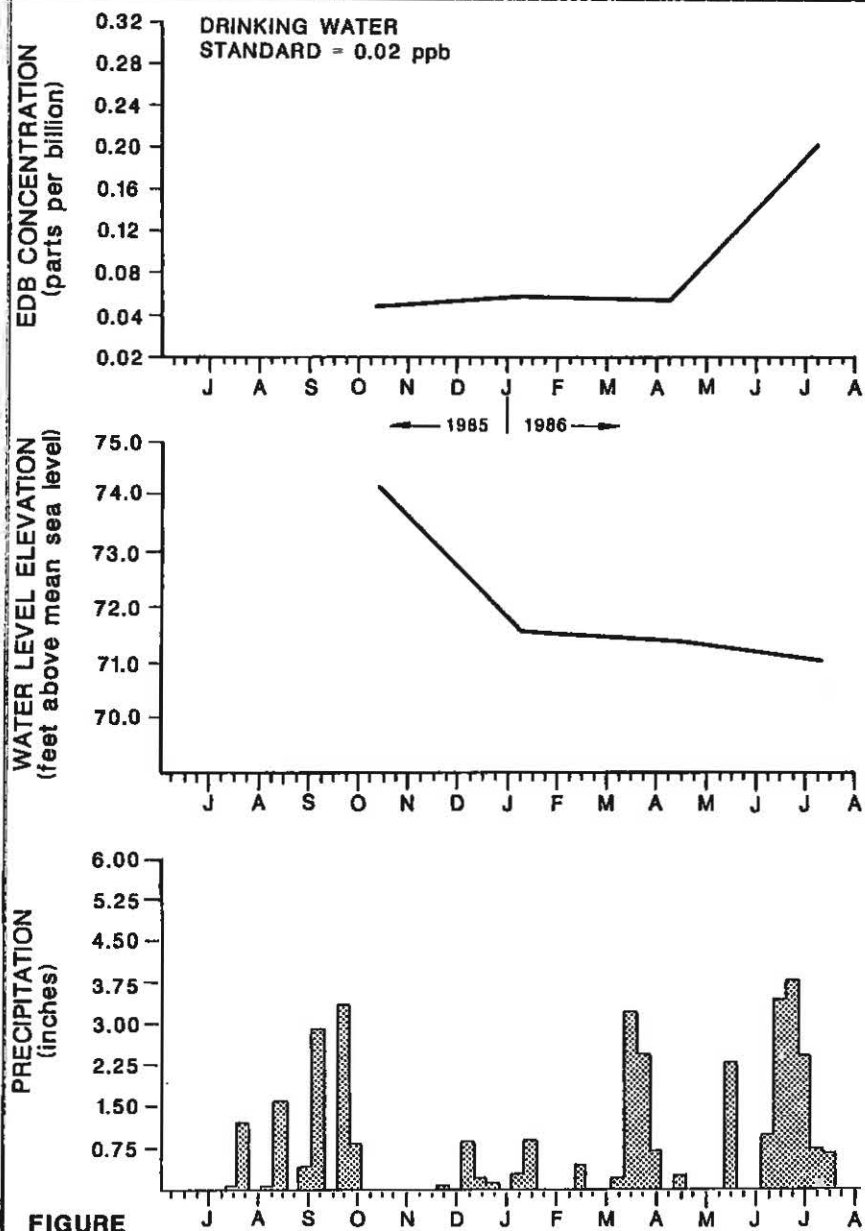
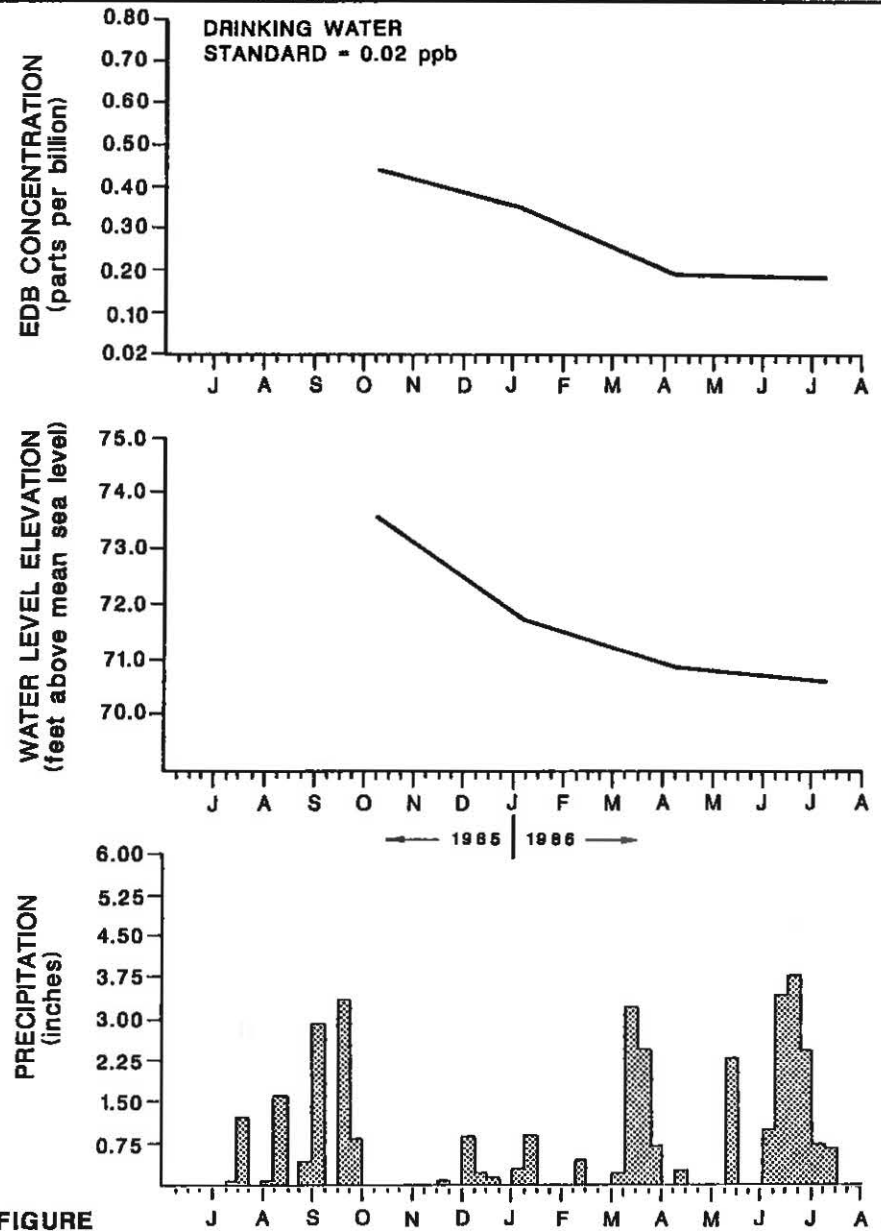


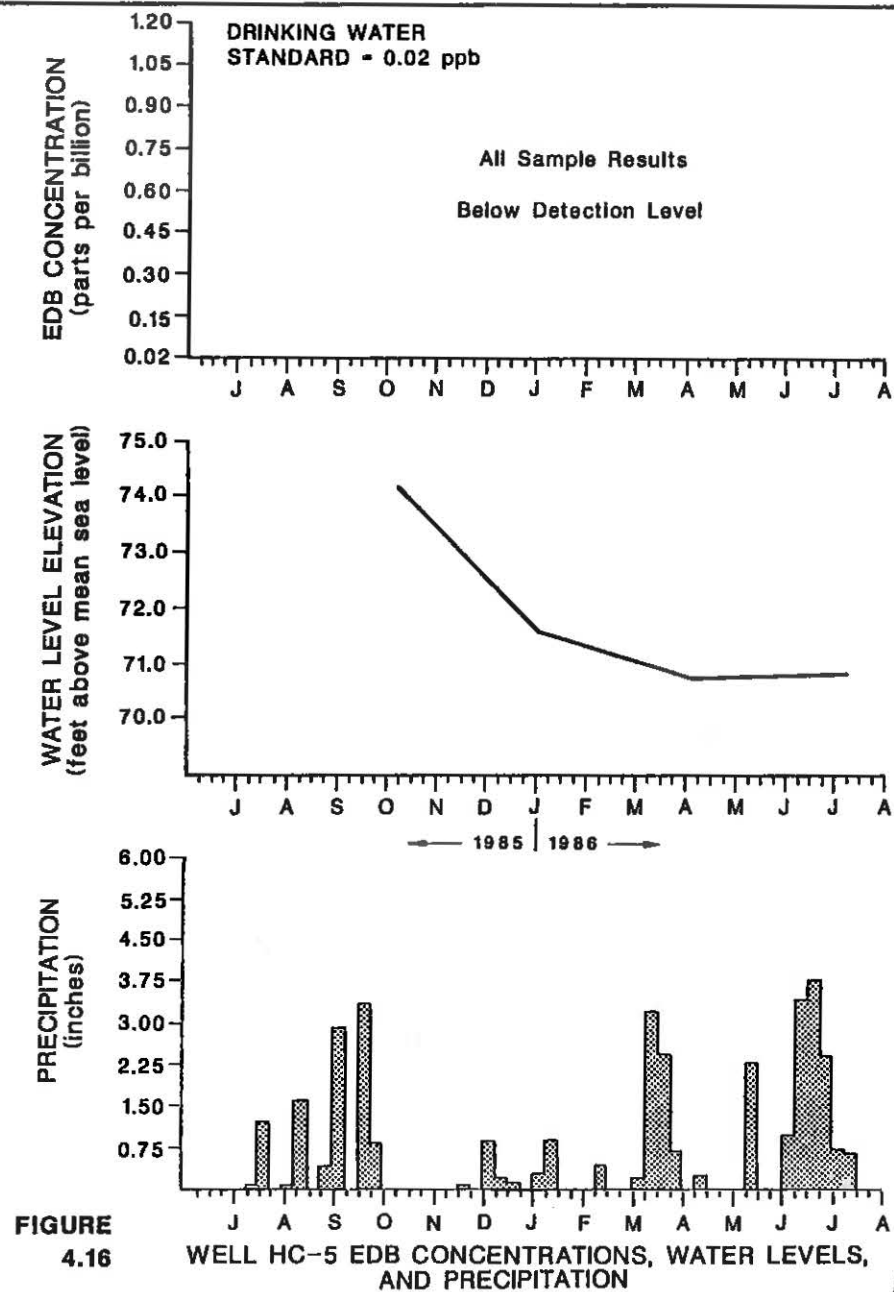
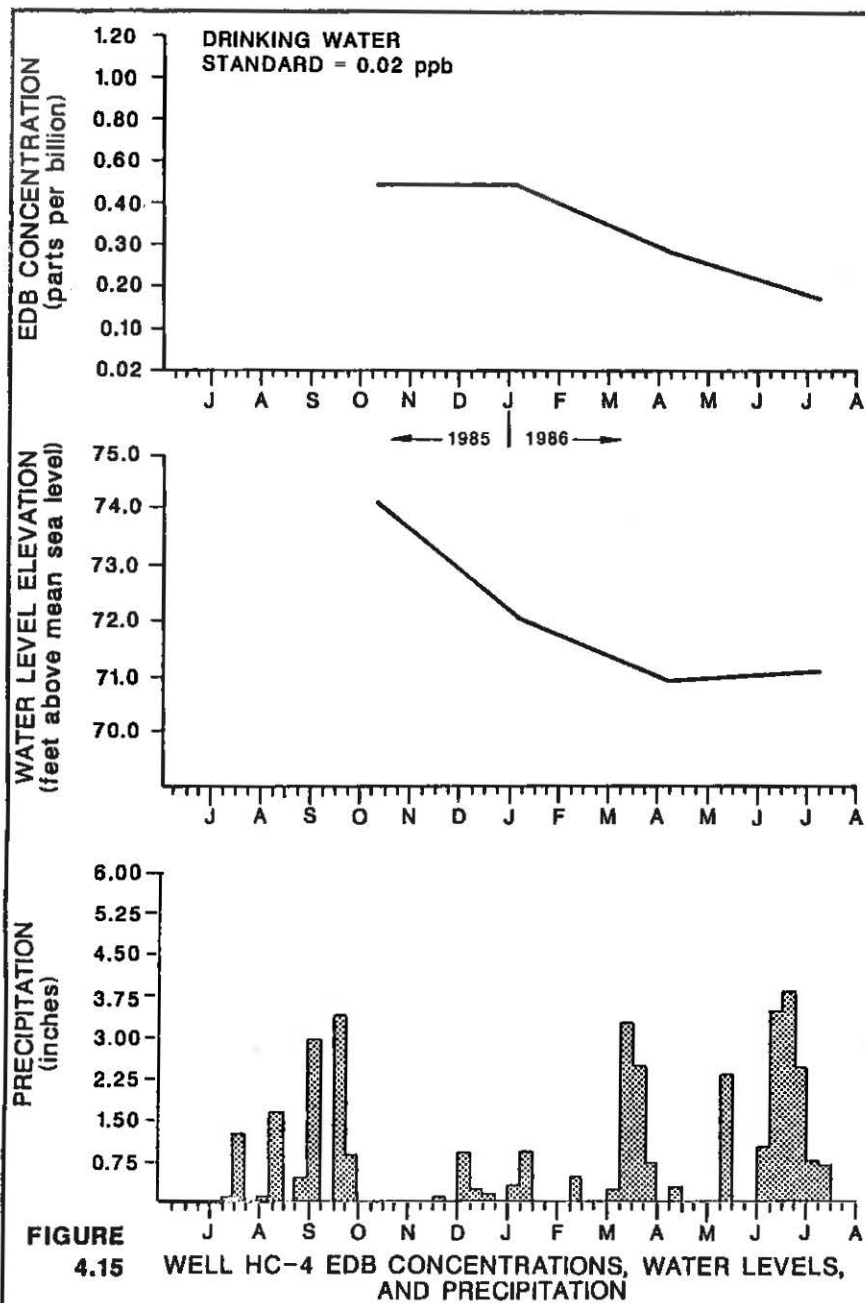
FIGURE 4.12

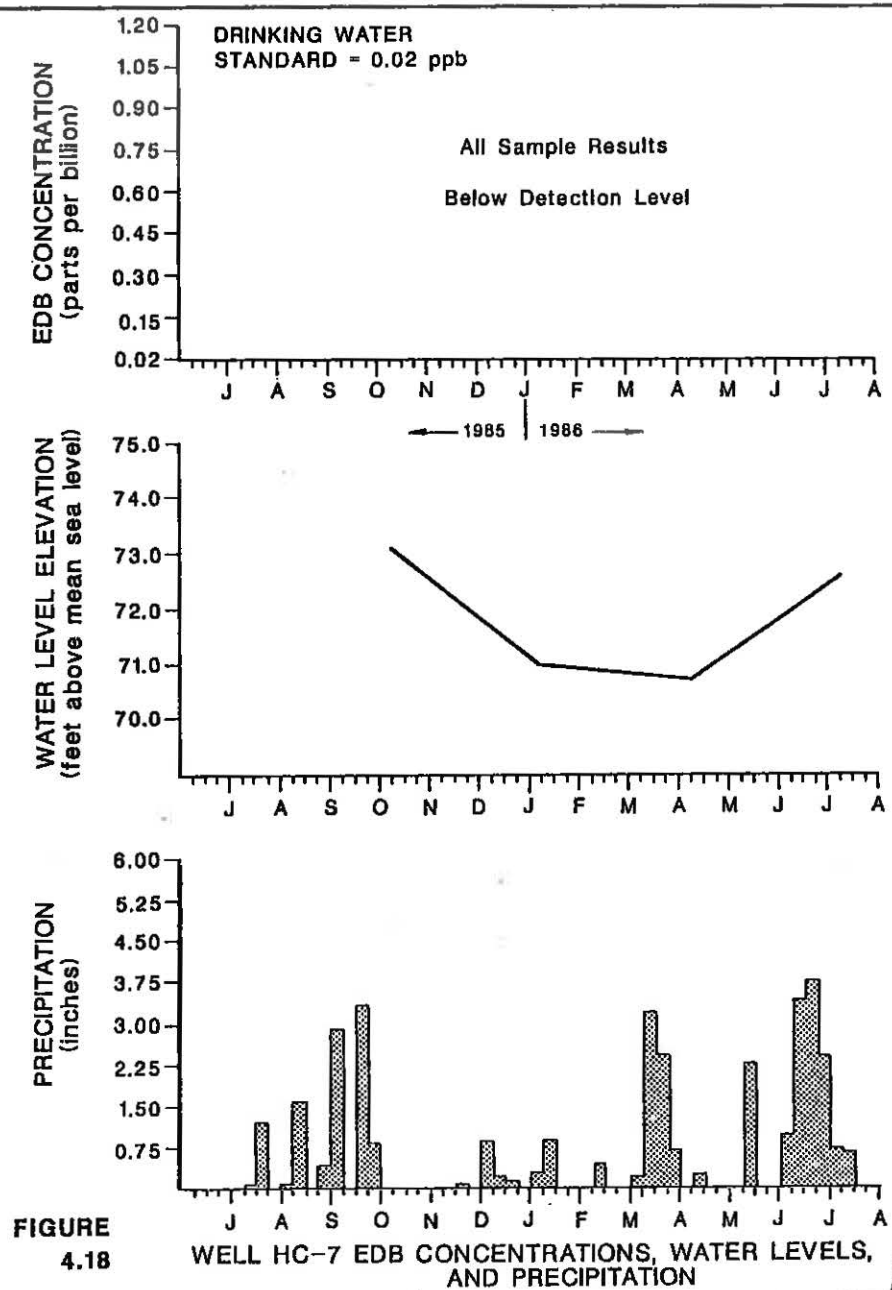
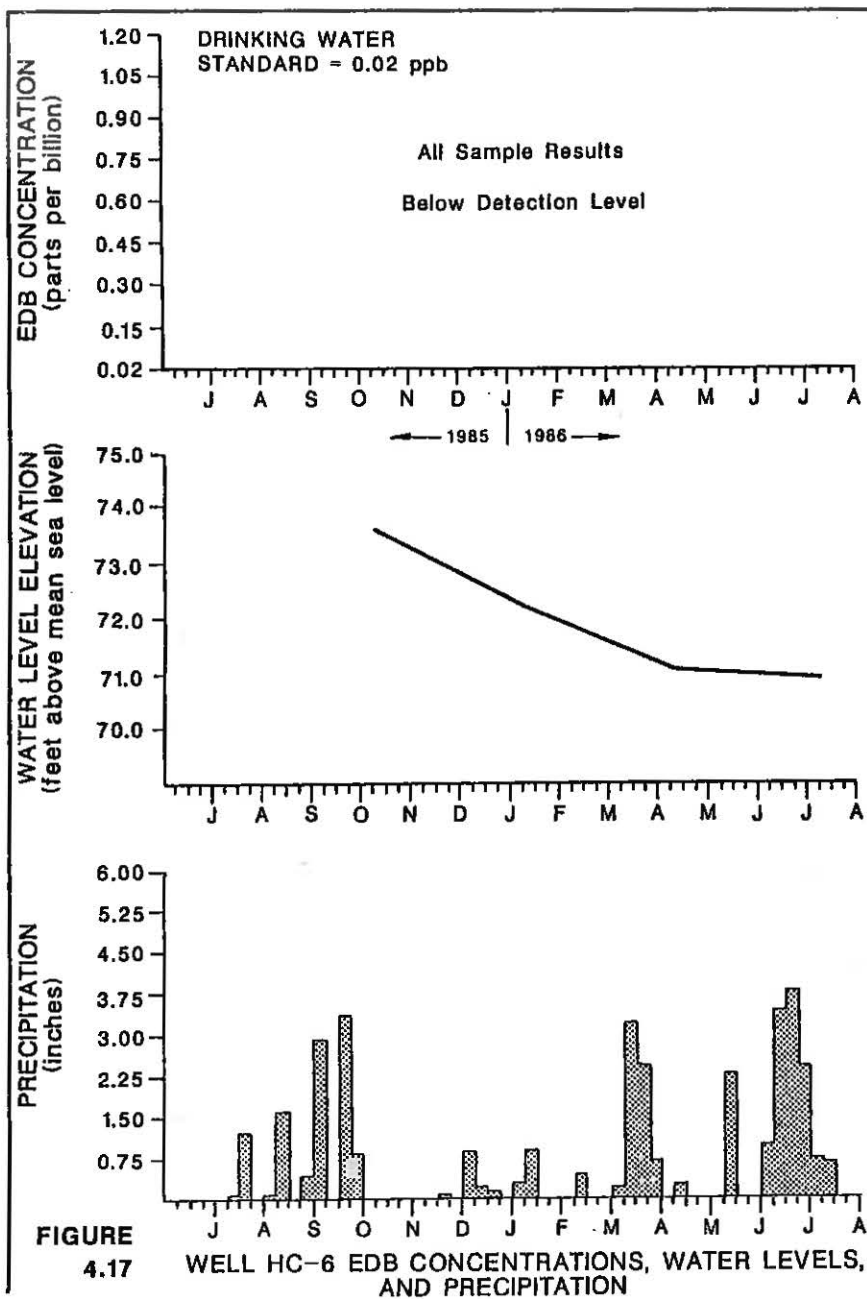


**FIGURE 4.13** WELL HC-2 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION

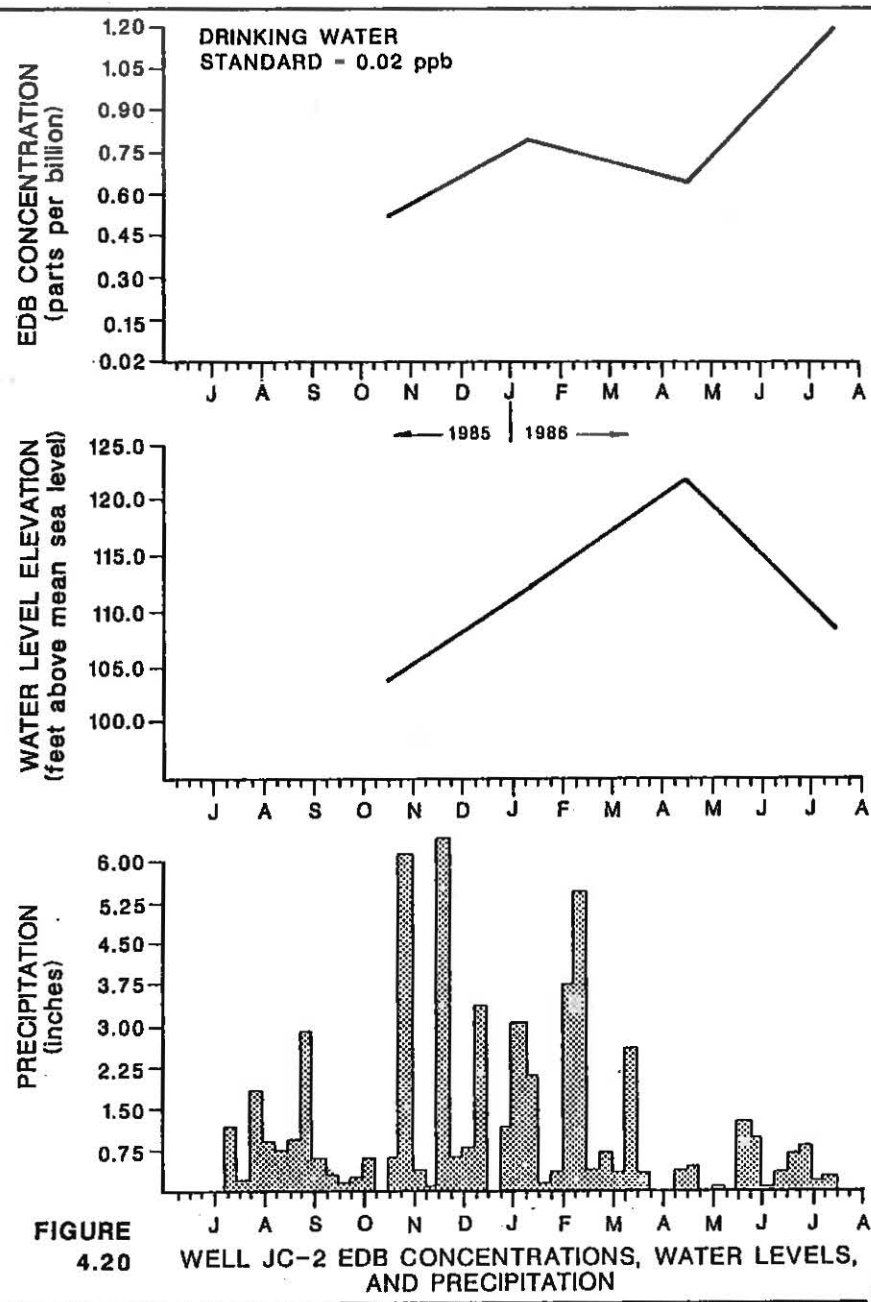
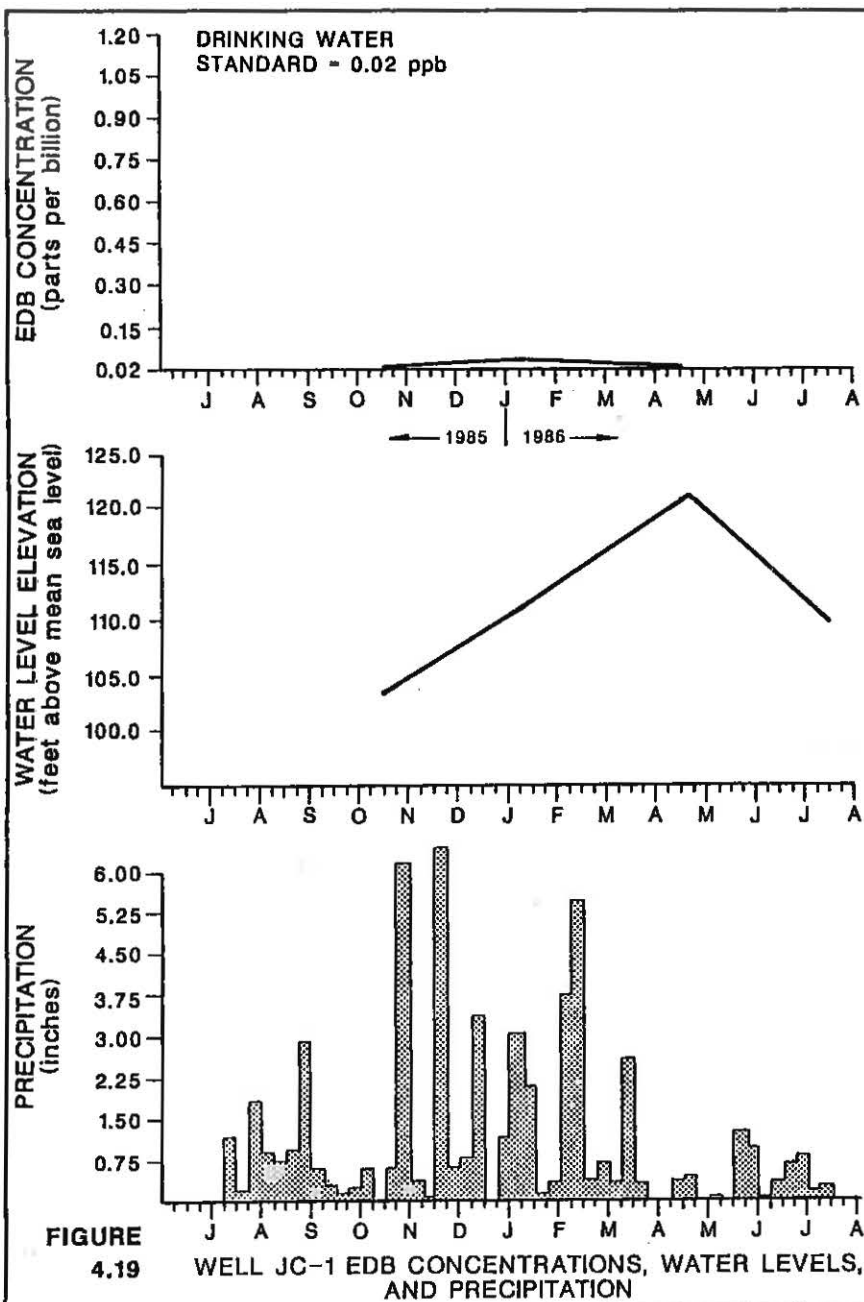


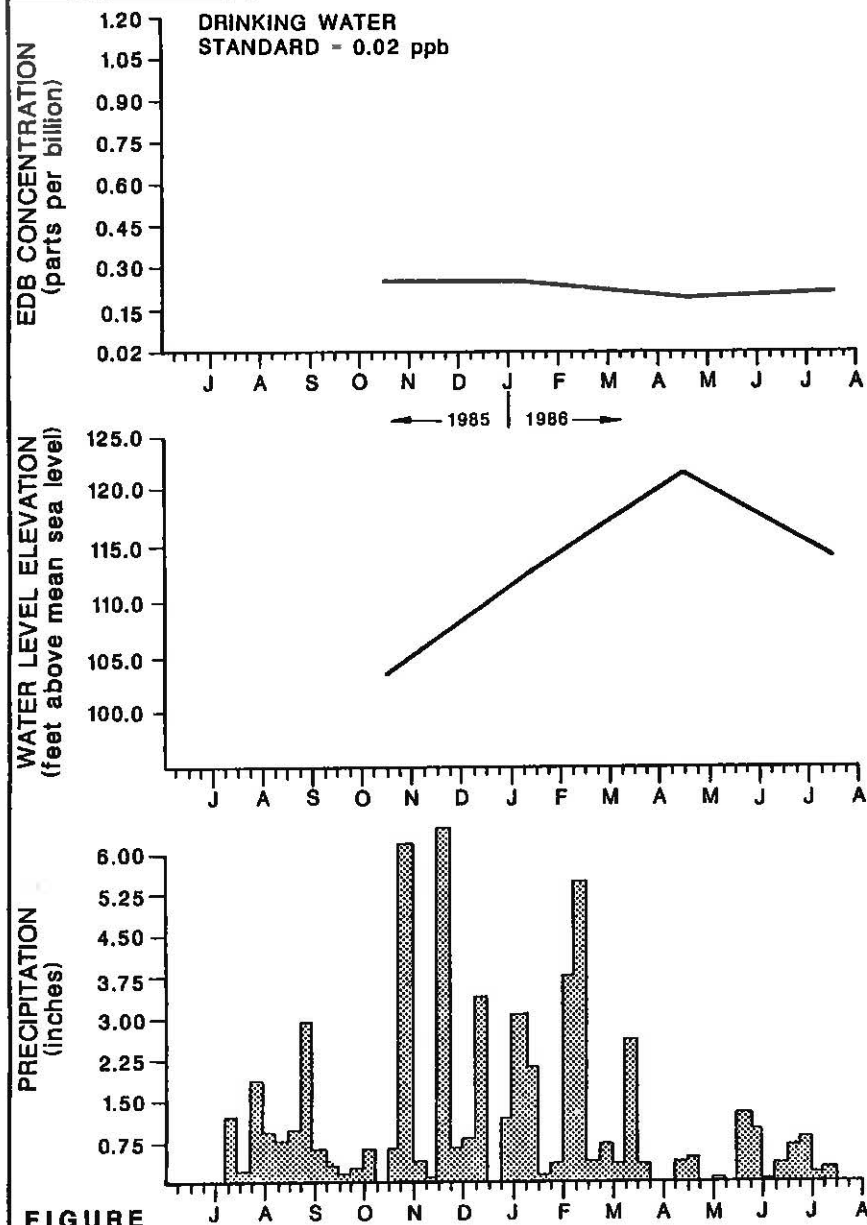
**FIGURE 4.14** WELL HC-3 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION



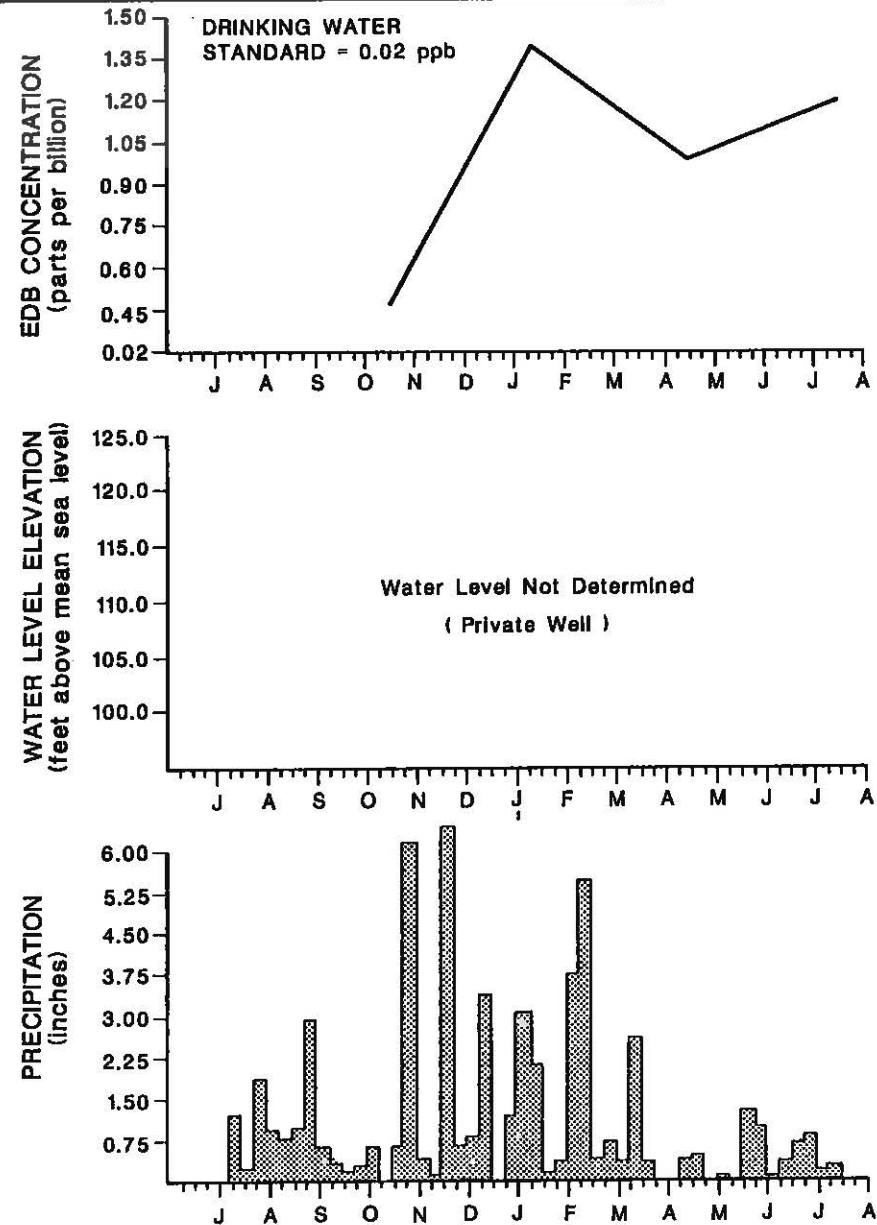




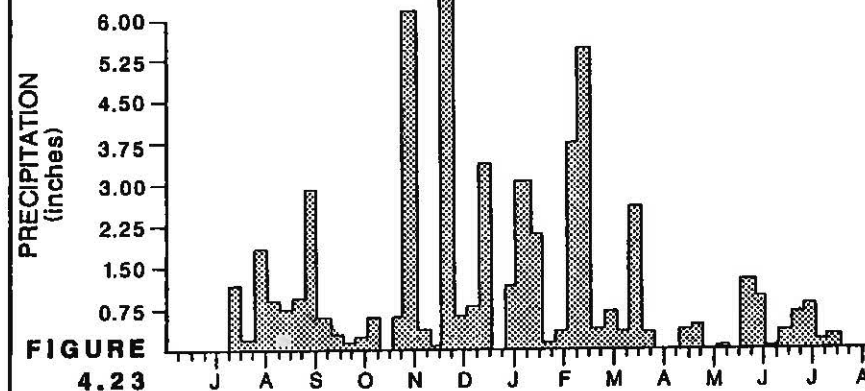
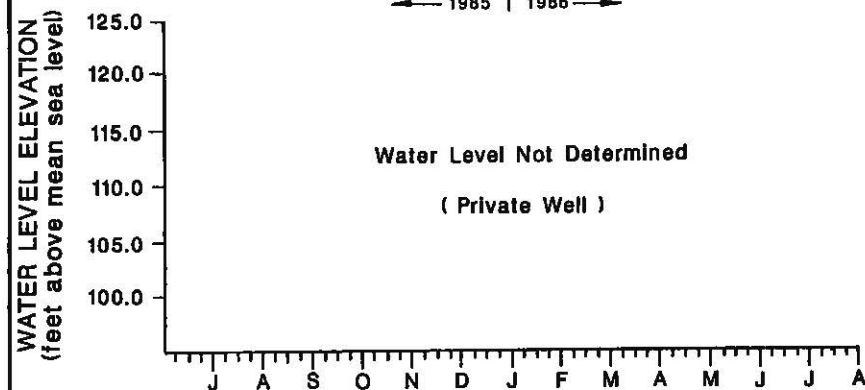
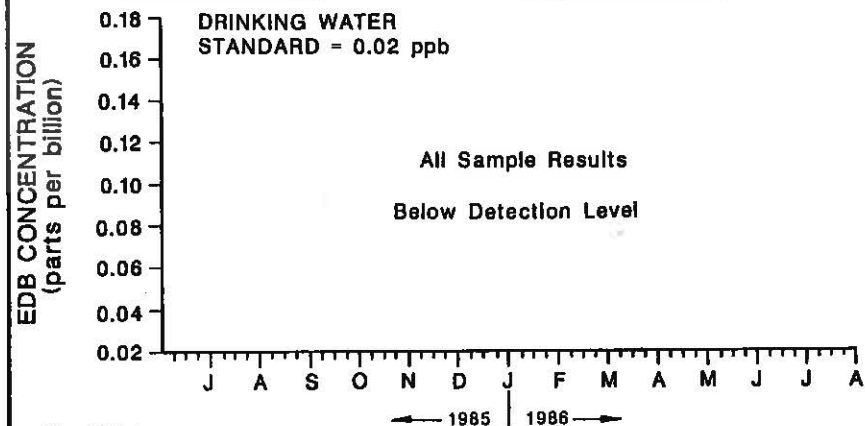




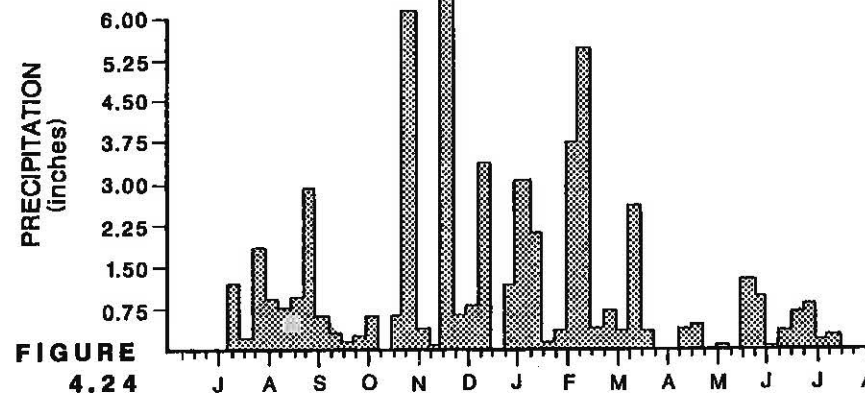
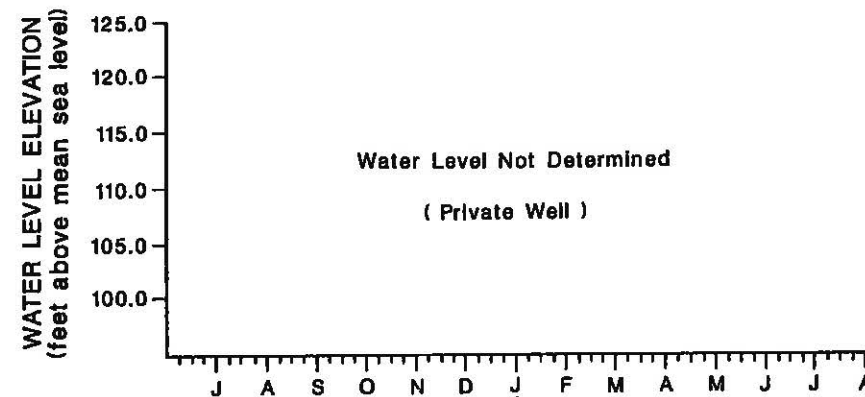
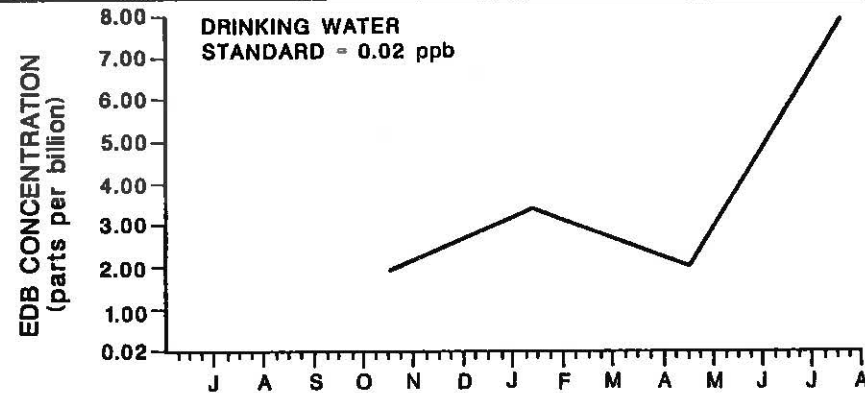
**FIGURE 4.21** WELL JC-3 EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION



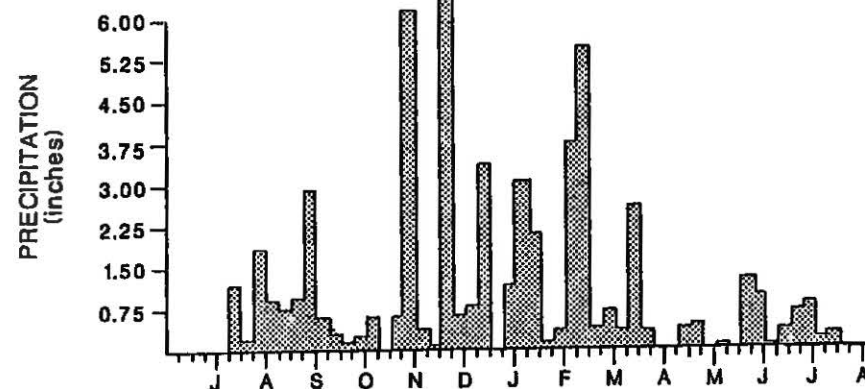
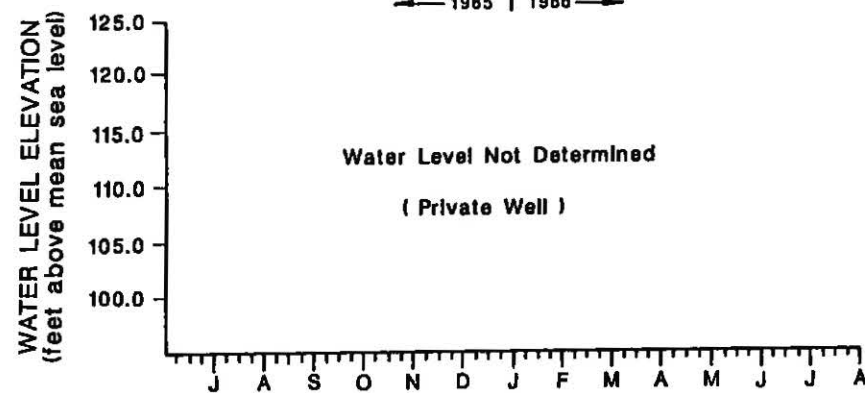
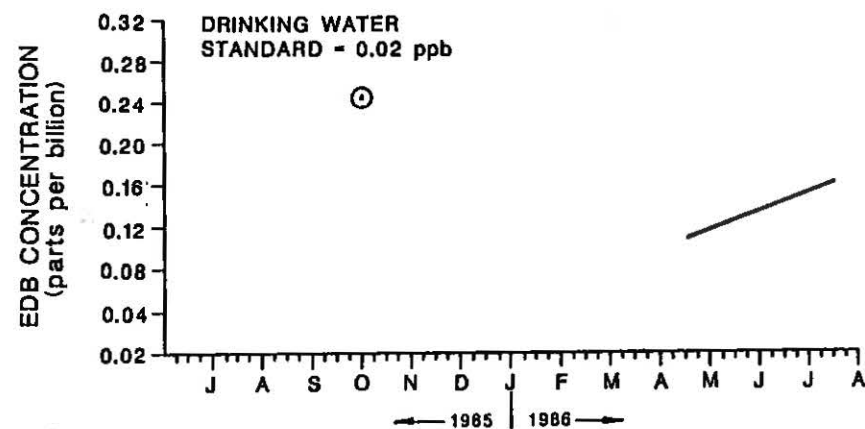
**FIGURE 4.22** WELL JC-CH (HICKORY GROVE CHURCH) EDB CONCENTRATIONS, WATER LEVEL, AND PRECIPITATION



WELL JC-GH (HAGLER RESIDENCE) EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION

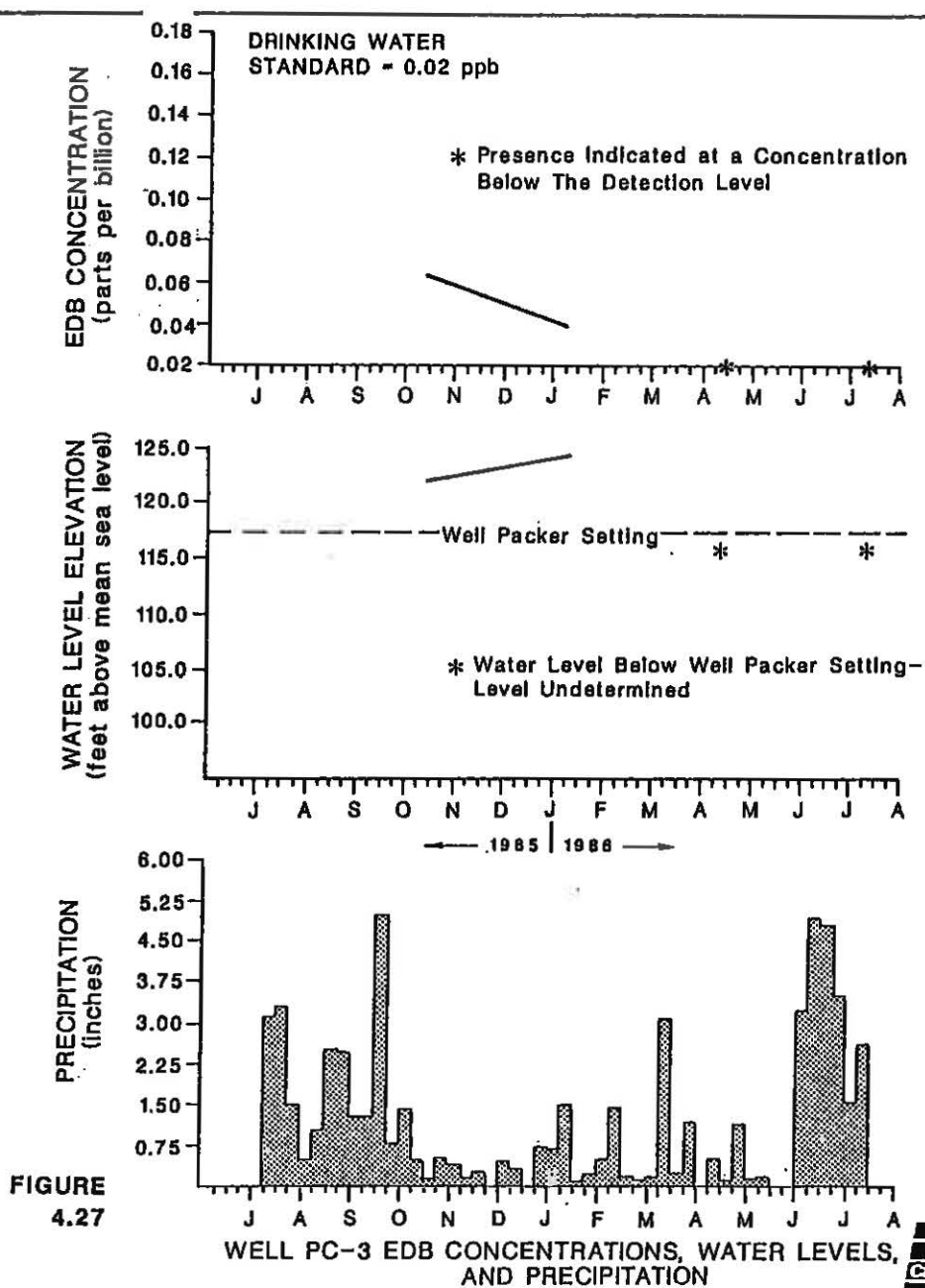
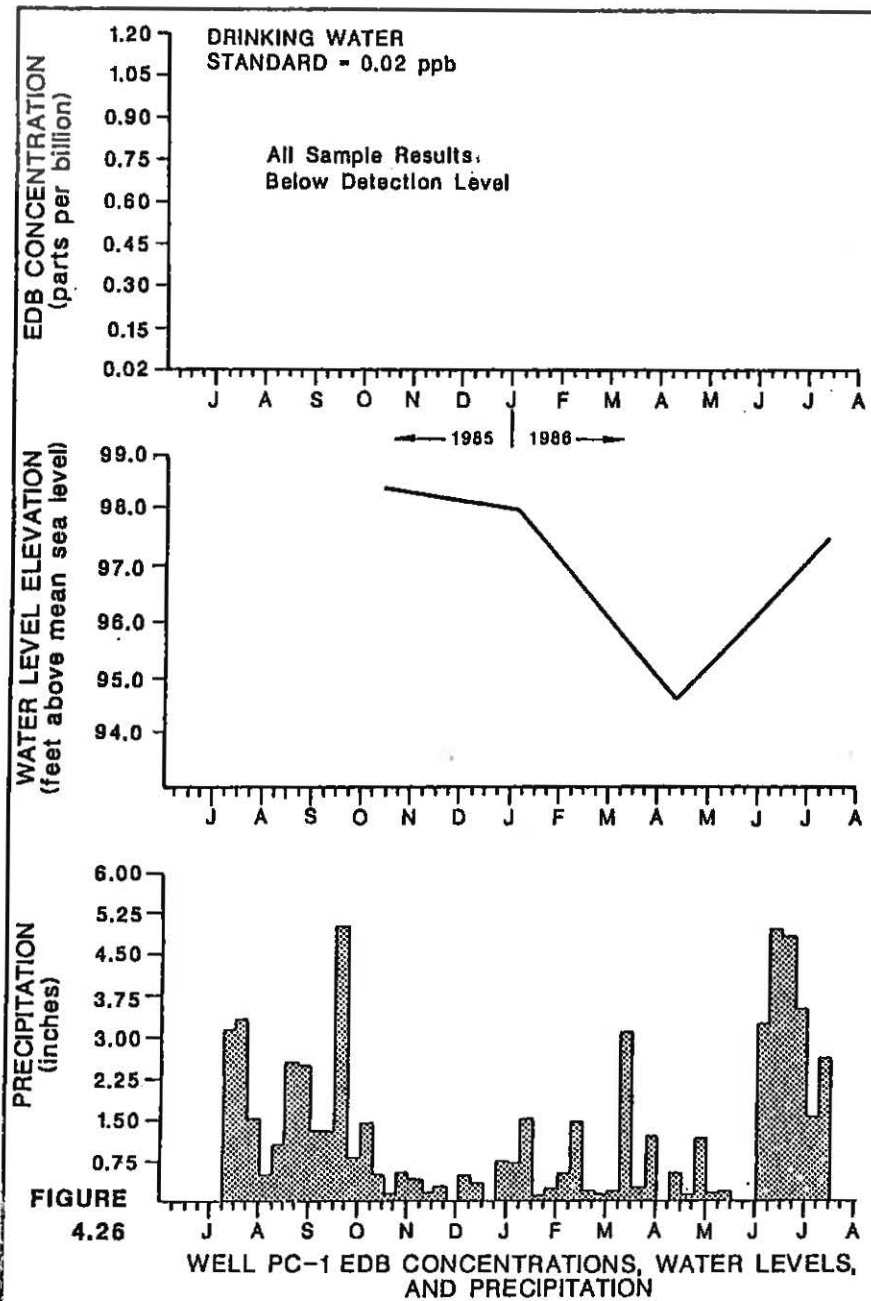


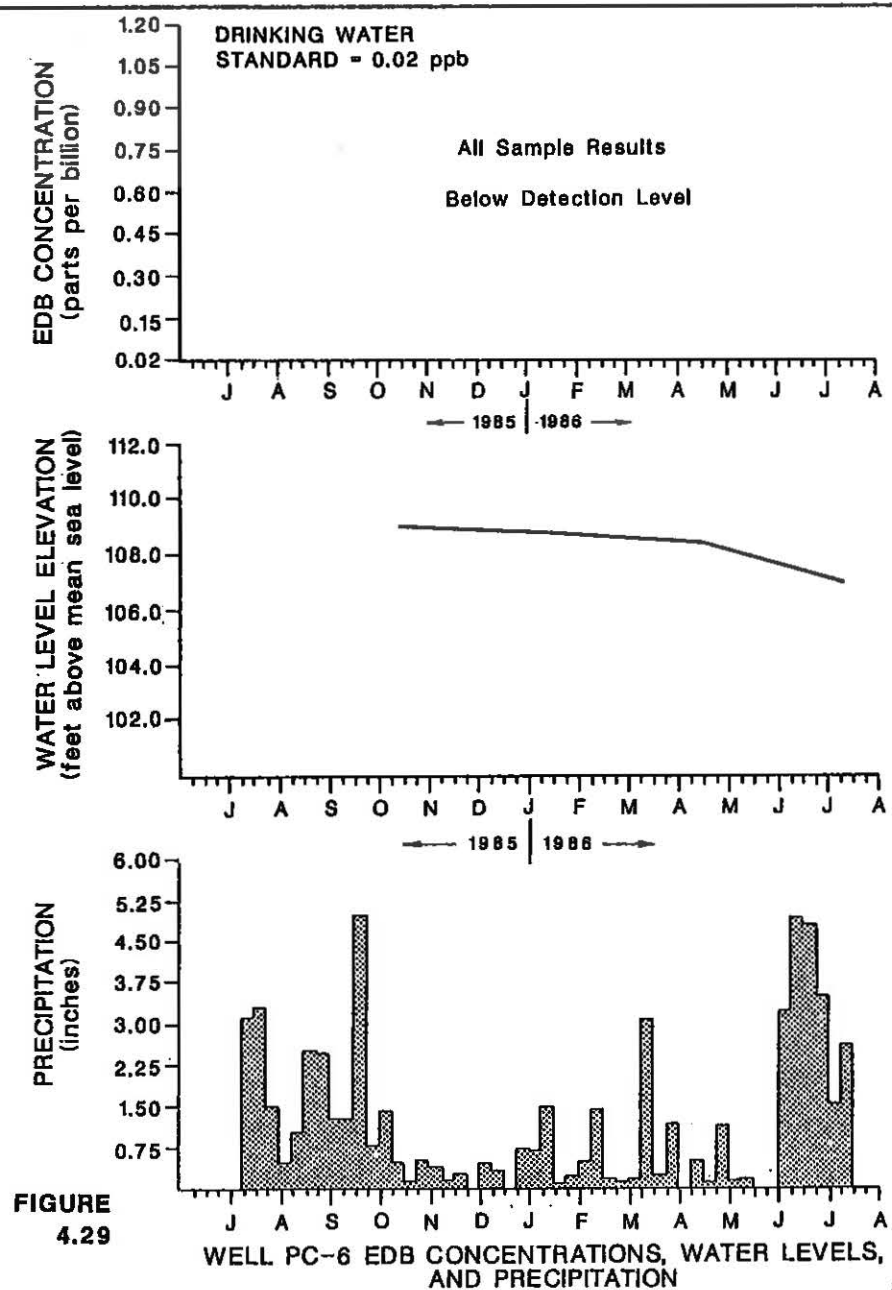
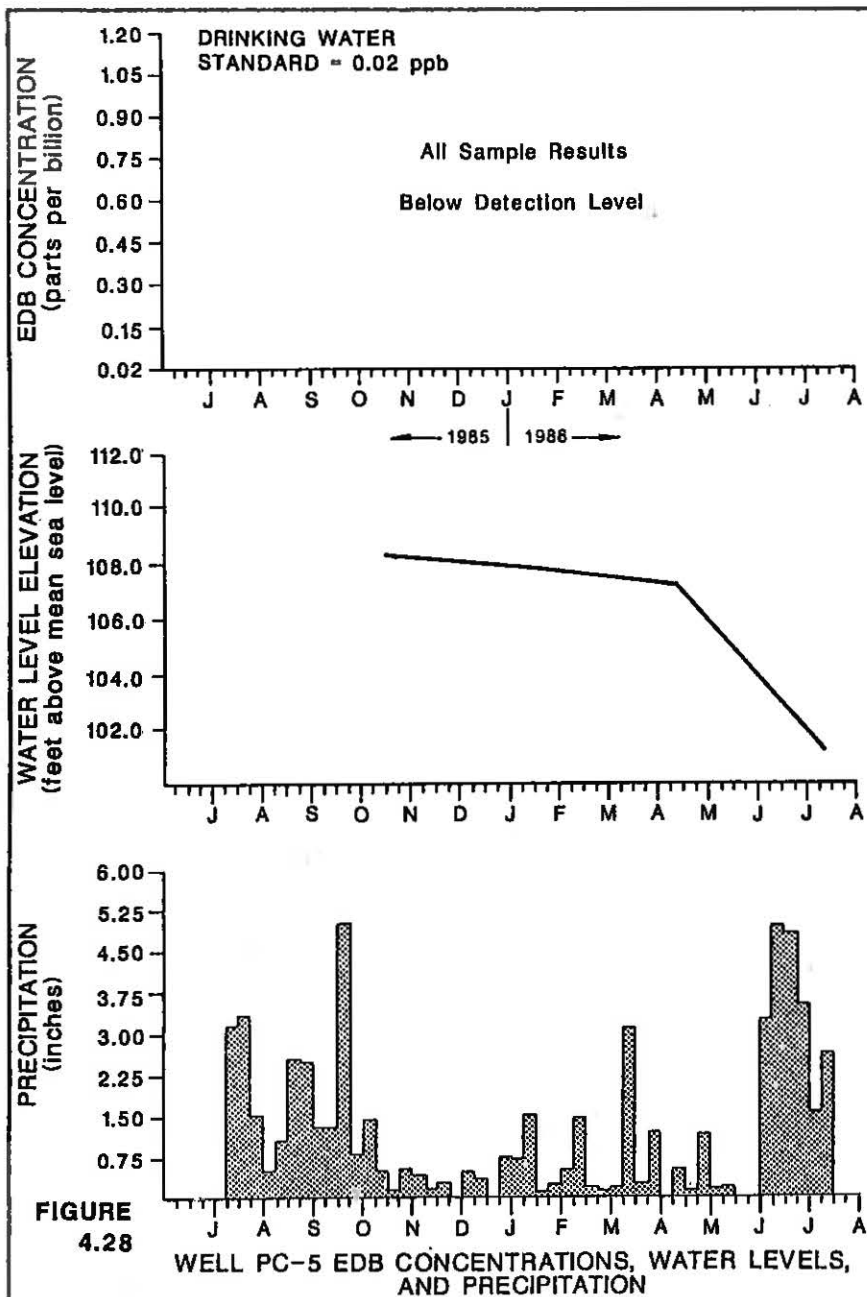
WELL JC-JD (DITTY RESIDENCE) EDB CONCENTRATIONS, WATER LEVELS, AND PRECIPITATION



WELL JC-VT (TUCKER RESIDENCE) EDB CONCENTRATIONS,  
WATER LEVELS, AND PRECIPITATION

FIGURE 4.25





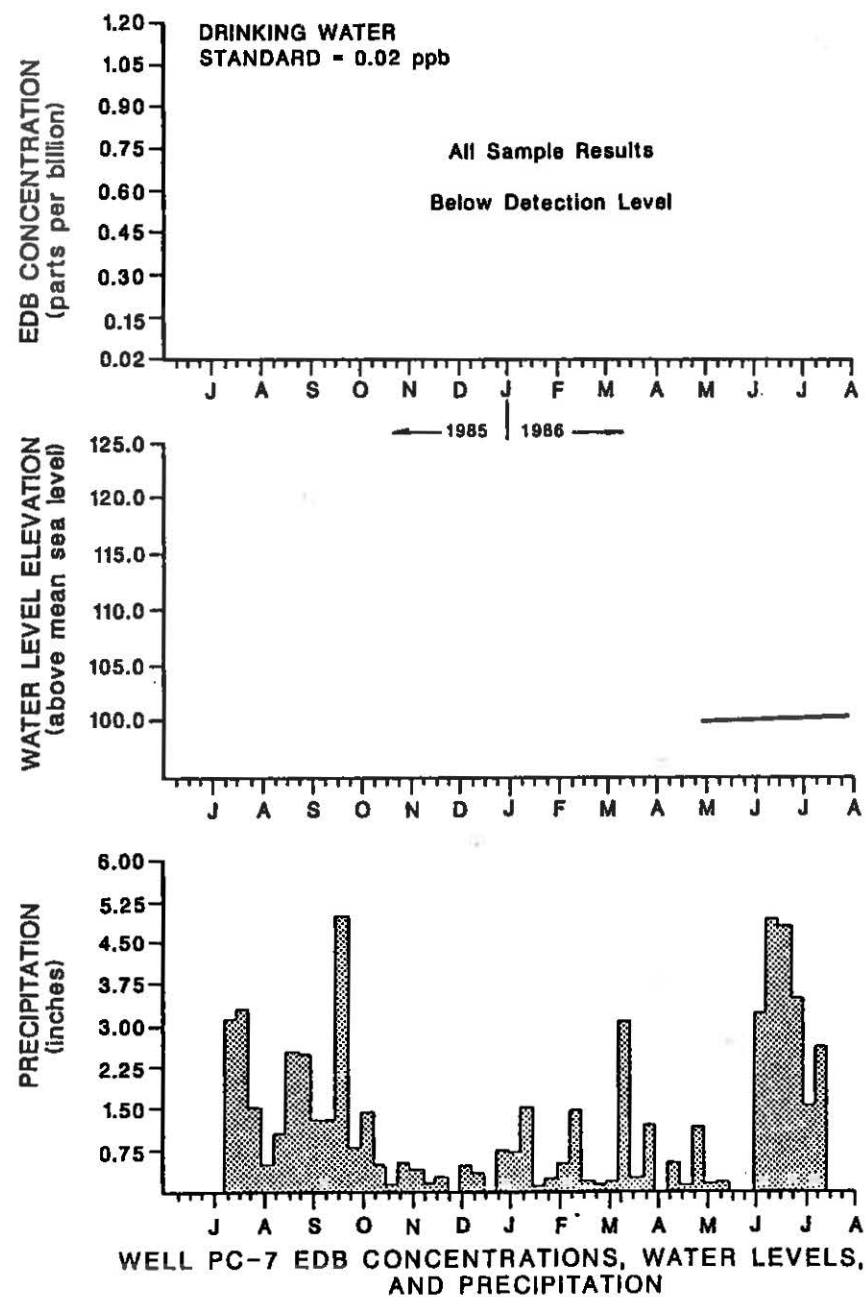


FIGURE 4.30





Section 5  
INTERPRETATION

HIGHLANDS COUNTY STUDY AREA

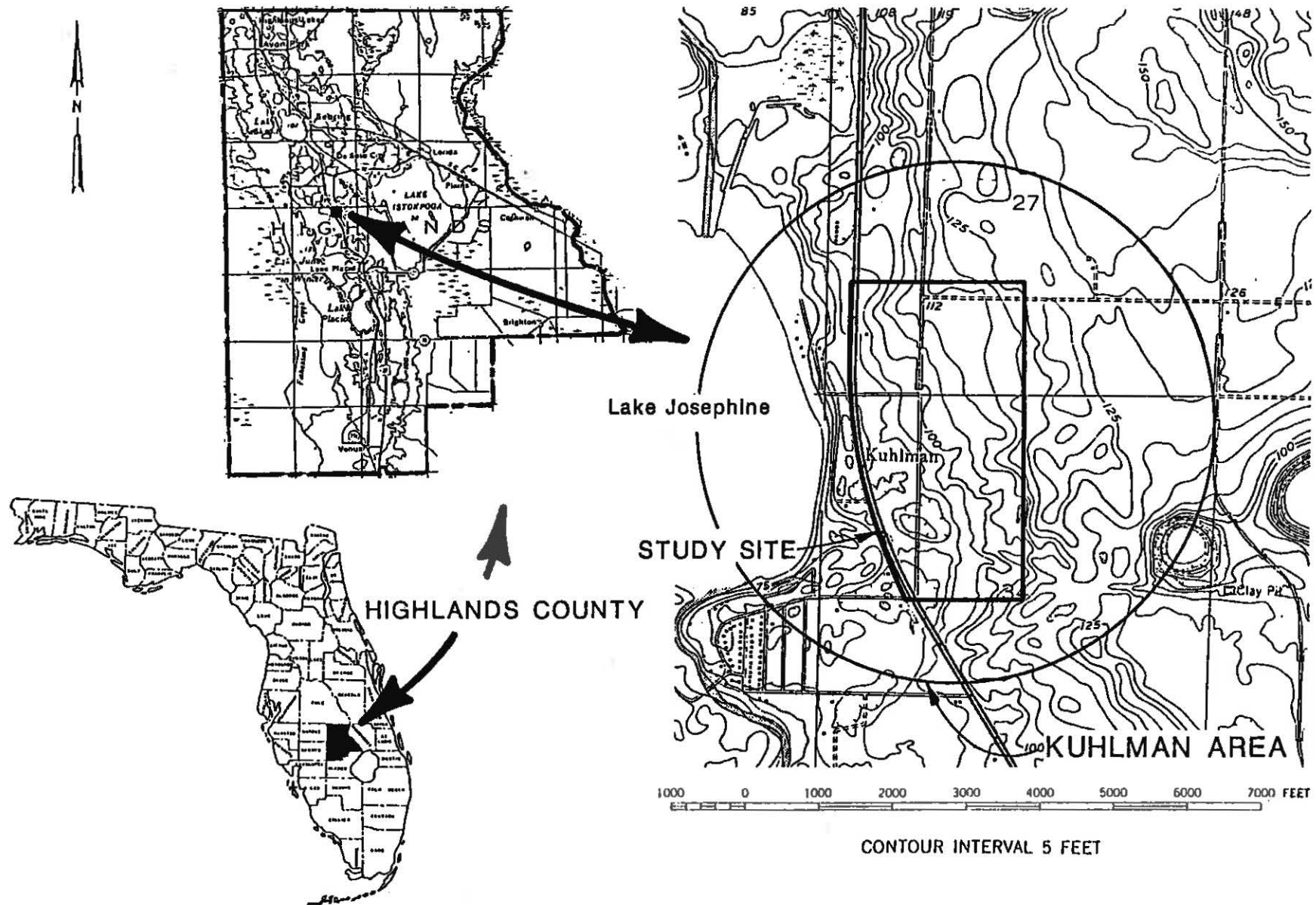
DESCRIPTION OF KUHLMAN SITE

The Kuhlman Site was selected for investigation because of its high concentration of EDB-positive wells (Figure 4.2). The site is located south of Sebring and DeSoto City, Florida, near the eastern shore of Lake Josephine (Figure 5.1). The land surface slopes to the west from a high sand ridge covered with citrus groves.

EDB APPLICATION HISTORY

There are two buffer zones and a push-and-treat area near the site (Figure 4.5). At buffer zone B-33, Florida Department of Agriculture records indicate EDB application last occurred in 1969 when the buffer was pushed and treated. Regular EDB application along the 3,380- to 5,700-foot long buffer started in 1963 and ended in November, 1968. Buffer zone B-59, 1,400-2,510 feet long was used from 1964 to May, 1983. Considering the two different time periods during which EDB was applied, and the time that has elapsed since then, it was likely that EDB concentrations in the groundwater might be different downgradient from the two buffers.

A mobile home community, beginning development in 1970, sits astride buffer zone B-33. Although 14 years had passed since the last period of EDB application, two 85-foot deep public supply wells at the site produced groundwater in 1983 containing 5.90 and 7.88 ppb EDB, respectively (Florida Department of Health and Rehabilitative Services records). Six other water table wells sampled in this same mobile home



LOCATION AND TOPOGRAPHY OF KUHLMAN STUDY SITE

FIGURE 5.1

community by HRS contained EDB concentrations ranging from 0.2 to 4.88 ppb.

A second mobile home community is located immediately to the west of a portion of buffer zone B-59. As mentioned, EDB application to this buffer was as late as May, 1983. The public-supply well of this community also failed to meet the EDB drinking water standard of 0.02 ppb.

## SITE HYDROGEOLOGY

### General Geology

Information concerning the geology of the Kuhlman area was obtained from earlier investigations. A 1,520-foot deep exploratory borehole 3.2 miles to the north of the site at DeSoto City (CH2M HILL, 1986), drilled to search for an alternate water supply for surficial (water table) aquifer wells contaminated with EDB, revealed that the depth to the major limestone aquifer was probably in excess of 500 feet. Other data was obtained from the drilling logs of Well W-1464, a 1455-foot deep exploratory well located 1.75 miles to the southeast of the Kuhlman Site (Shaw and Trost, 1984).

The geologic sequence for the study site is shown in Figure 4.9 and Appendix E. The geologic column is that described from Floridan aquifer EDB Monitor Well HC-1, drilled at the Kuhlman Site. The upper 140 feet comprise the water table aquifer. Approximately 360 feet of low-yielding sands, limestones and clays of undifferentiated age and Tamiami and Hawthorn Formations separate the water table from the deeper Floridan aquifer. The degree of confinement offered by the 360-foot thick low permeability zone was unknown prior to drilling Monitor Well HC-1, which taps the Suwannee Limestone (Upper Floridan aquifer).

### Karst Interpretation

Stereo-paired, black and white, aerial photographs, at a scale of 1:24,000, for October, 1965 and March, 1986 were obtained from the Topographic Bureau of the Florida Department of Transportation. Figure 5.2 shows the karst (sinkhole) features observed on the aerial photographs. Sinkholes present tend to be deep and well formed. The depth, however, is unknown, but the first occurrence of soluble carbonate rock beneath the site is 200 or, perhaps, as much as 500 feet below land surface.

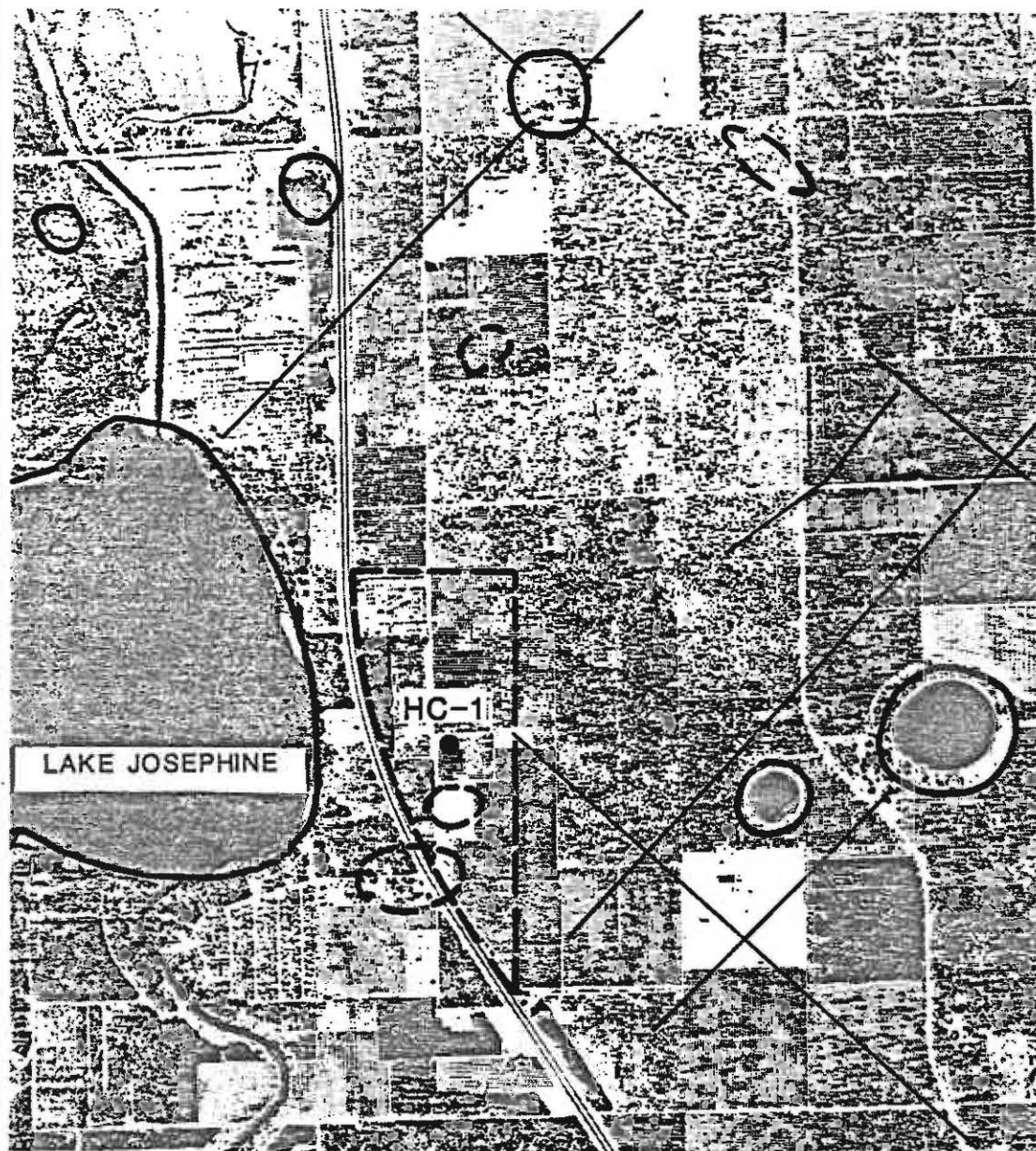
In some cases, coalescing sinkholes have formed lakes such as Lake Josephine. These sinkholes, lakes, other surface depressions, and soil tonal changes are aligned in two directions, northwest-southeast and northeast-southwest. Two poorly defined surface depressions occur in the southern portion of the Kuhlman Site.

### Site Hydrology

Figure 5.3 is a geologic cross section across the Kuhlman Site. The line of the cross section is shown on Figure 4.5. Shown on the cross section are the locations of buffer B-33 and the public supply wells downgradient from B-33.

### Surficial Aquifer

The surficial (water table) aquifer at the Kuhlman Site consists of 140 feet of unconsolidated, fine- to coarse-grained, yellowish brown sand. The permeability of the upper 30 feet of sand ranges from  $8.89 \times 10^{-2}$  to  $1.19 \times 10^{-3}$  cm/sec (Appendix B). The surficial aquifer rests upon a 360-foot thick sequence of low permeability sediments.

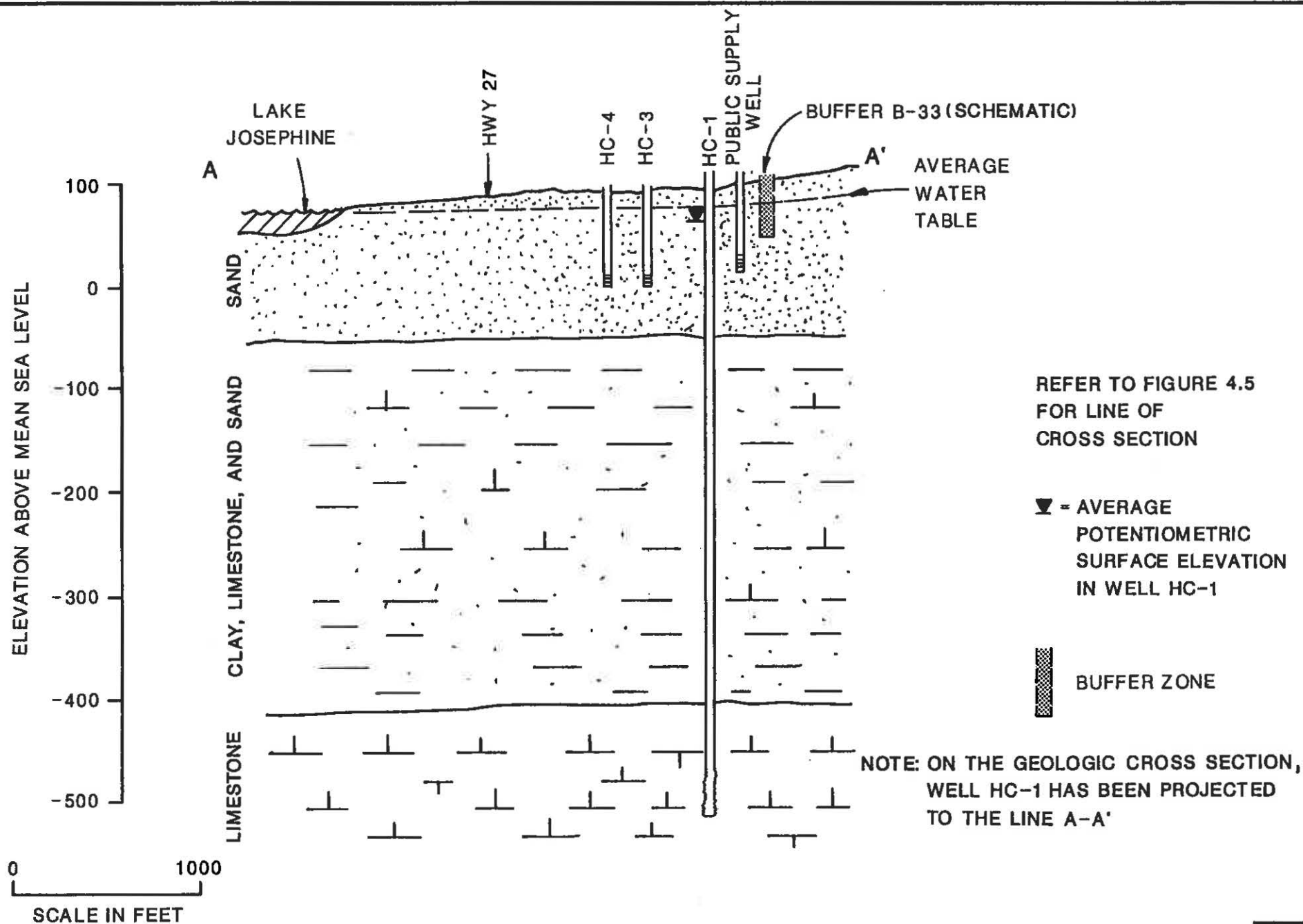


# **LEGEND**

-  SINKHOLE
-  KARST DEPRESSION
-  FRACTURE TRACES
-  STUDY SITE
-  EDB LIMESTONE MONITORING WELL
-  HC-1

KARST FEATURES AT THE KUHLMAN STUDY SITE

**FIGURE 5.2**



GEOLOGIC CROSS-SECTION OF THE KUHLMAN STUDY SITE

FIGURE 5.3



The water table within these sands is flat, with no defined flow direction; it was not possible to prepare a water table map of the site for any of the four quarterly sampling periods. The difference in water table elevation across the site is generally only slightly greater than one foot. Figures 4.12 - 4.18 show the changes in water table elevation over the four quarterly sampling periods. Groundwater levels declined throughout the period in all wells, except HC-7.

Groundwater flow in the surficial aquifer at the site appears to be controlled by the close proximity of Lake Josephine, 400-700 feet due west. The result is that groundwater flows westerly from the site, but very slowly. When the lake is full during the rainy season, groundwater flow is, probably, minimal.

#### Floridan Aquifer

The limestone aquifer monitored by Well HC-1 consists of almost the entire sequence of the Suwannee Limestone, the upper portion of the Floridan aquifer. Groundwater flow in the Floridan aquifer is towards the southwest (Barr and Schiner, 1983).

Figure 4.12 shows the change in water level elevation in Well HC-1 over the four quarterly sampling periods. The initial 7-foot decline and subsequent rise in water level results from the combined effect of seasonal low precipitation and increased withdrawals from wells, followed by recharge and lesser pumping.

#### EDB CONTAMINATION

Results of EDB analysis for the four quarterly sampling periods are presented in Appendix D. No EDB was detected in

waters from the deep monitor well, HC-1 (Figure 4.5). Shallow monitor wells HC-5, HC-6 and HC-7 also contained no EDB during the sampling period.

EDB levels in Well HC-2 (Figure 4.13), immediately down-gradient from buffer B-33 and adjacent to the two public water supply wells containing 5.90 and 7.88 ppb EDB (Figure 4.5), rose from an average of about 0.05 ppb during the first three quarters of sampling to 0.20 ppb in the last quarter. The EDB content of Wells HC-3 and HC-4 (Figure 4.14 and 4.15) declined continuously throughout the same four quarters, from about 0.5 ppb to less than 0.2 ppb.

#### ASSESSMENT OF PRESENT CONDITIONS

EDB contamination at the Kuhlman Site is concentrated within the surficial aquifer, downgradient from the mobile home park crossed by buffer B-33. During the four quarters of sampling, contamination was not detected in deep monitor Well HC-1.

The presence of EDB only in the three southernmost shallow monitor wells is not readily explained. Monitor Well HC-7 was drilled directly on top of buffer B-59, yet no EDB was detected. It is possible that the EDB has moved eastward from B-59, or that it is present at a different depth than the 82-87 feet monitored by HC-7. This depth interval was chosen because it corresponded to the depth of the contaminated public supply wells, 85 feet. All of the Kuhlman Site shallow wells were designed to monitor this same depth.

#### LONG-TERM IMPACT

It is not possible to say whether EDB contamination will eventually move into deeper aquifers. The karst analysis



revealed the presence of existing sinkholes that may be of considerable depth. But, more importantly, the analysis also indicates that a regular, intersecting pattern of fracture traces is present throughout the area. The implication is that there may be other sinkholes or potential sinkholes present.

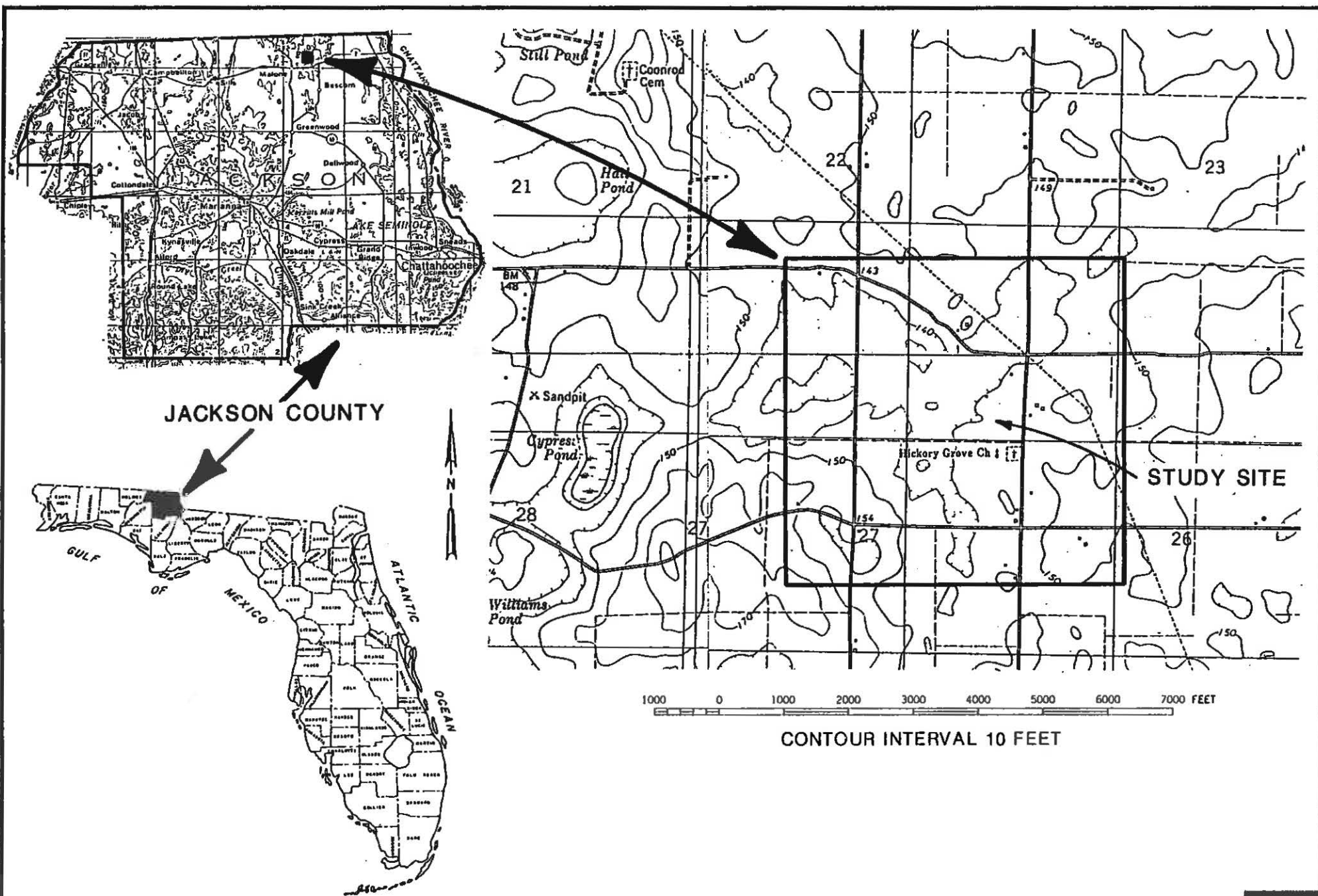
The long-term impact of EDB on the Floridan aquifer in the Kuhlman area can best be evaluated by observing the future water quality of the new public water-supply wells at DeSoto City. These wells were drilled into the deeper portions of the Floridan aquifer, which is presently EDB-free. If these wells remain free of EDB over the years, then the probability increases that Floridan aquifer wells drilled in the Kuhlman area would remain free of contamination by EDB.

The low rate of groundwater flow on the water table and the high EDB concentrations in the shallow monitor wells down-gradient from the mobile home park crossed by buffer B-33, point to the fact that EDB will be present in the water table aquifer for a very long time even though the last episode of EDB application was in 1969.

#### JACKSON COUNTY STUDY AREA

The Malone East Site is located in northeastern Jackson County, near Malone, Florida (Figure 5.4). It is situated within a one-mile wide, 25-foot deep karst depression, one of many on a sandy, rolling plain. There are no surface water streams in the area; all drainage is internal to karst depressions.

The area was chosen as a study site because of its great number of wells with a high EDB content. By September 17, 1986, 1,985 wells in Jackson County had been sampled for



LOCATION AND TOPOGRAPHY OF THE MALONE EAST STUDY SITE

EDB; 365, or approximately 18.4 percent, were found to be contaminated (FDER, 1986). The purpose and rate of EDB application in Jackson County was to control nematodes in peanut/soybean growing areas. Application rates were 5-25 times less than used in the citrus-producing region.

#### EDB APPLICATION HISTORY

EDB use at the site occurred annually until the July, 1983 suspension. The spring of 1983 was the last application period. The amount of EDB applied was on the order of 0.88 to 4.5 gallons per acre, depending upon the crop row spacing and the concentration of EDB (12 to 18.1 lbs/gallon) applied (Dunn, 1983a,b). The precise amount of EDB applied is not known.

#### SITE HYDROGEOLOGY

##### General Geology

The geologic sequence for the Malone East study site is shown in Figure 4.10 and Appendix E. The Malone East Site is underlain by a thin veneer of sand which overlies a very impermeable clay ( $5.39 \times 10^{-7}$  to  $2.0 \times 10^{-9}$  cm/sec -- Appendix B). Beneath the clay are limestones of the Ocala Group. Information concerning the geology of the study site came, primarily, from geologic and borehole geophysical logs maintained in the files of the Florida Geological Survey and the Northwest Florida Water Management District.

The groundwater resources of Jackson County and their vulnerability to contamination are described by Wagner (1984). Other geologic information relative to the geology of the various rock units and their hydrologic characteristics was developed during the course of drilling a 458-foot deep

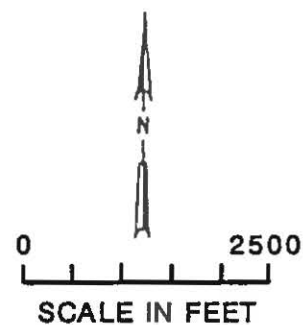
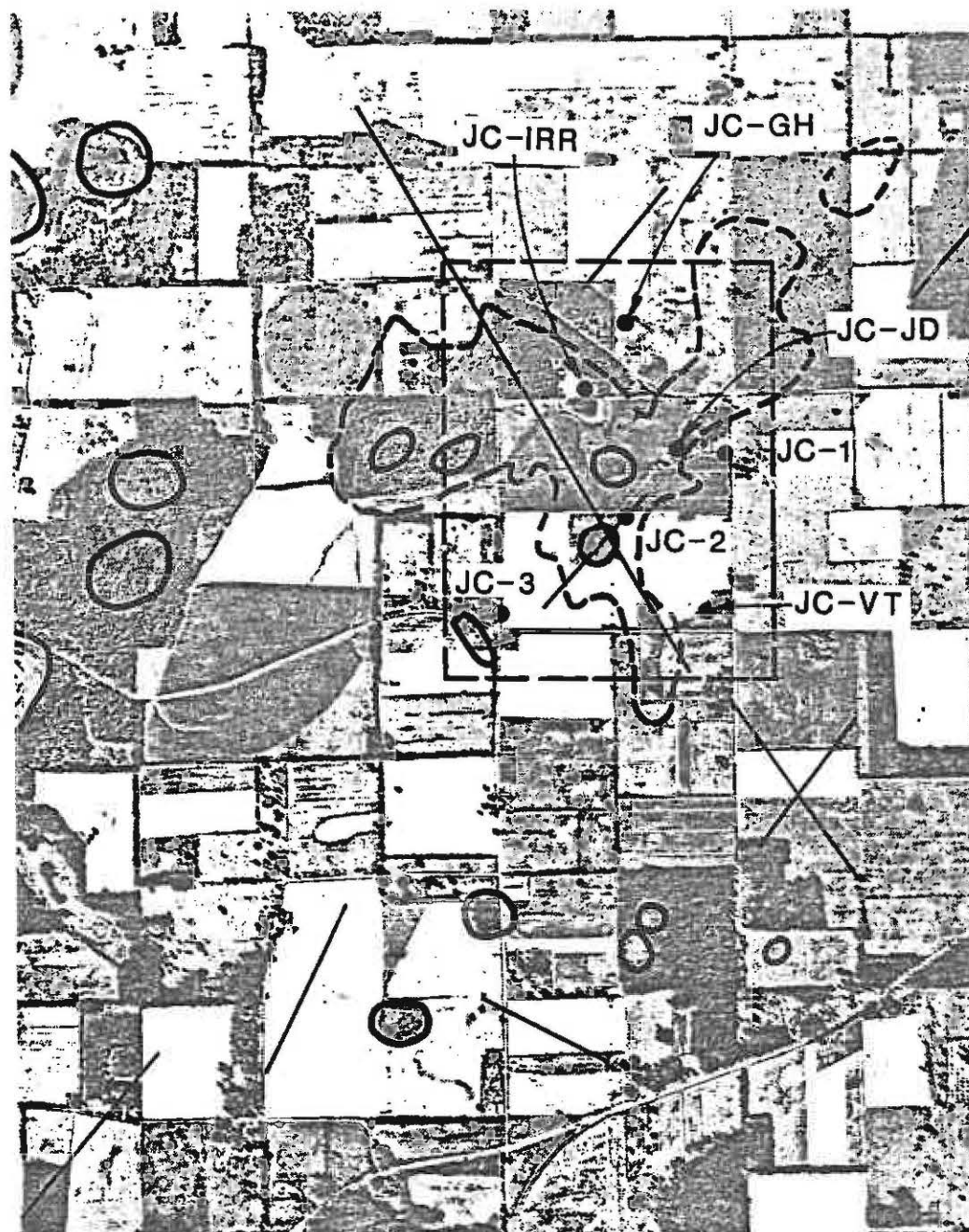
exploratory well in nearby Malone, Florida (CH2M HILL, 1985). The thickness of the limestone at the Malone site was 136 feet. The limestone, which is contaminated with EDB, is separated from the underlying Claiborne aquifer by 44 feet of tight sands, silts and clays, partially indurated.

#### Karst Interpretation

Stereo-paired, black and white, aerial photographs, at a scale of 1:24,000, for March, 1971 and October, 1984 were obtained from the Topographic Bureau of the Florida Department of Transportation. Figure 5.5 shows the karst (sink-hole) features observed on the aerial photographs. Superimposed on the figure is the general outline of the karst depression dominating the site. Within this depression are a number of sinkholes. Controlling the formation and, perhaps, the ultimate location of sinkholes is a system of northwest-southeast and northeast-southwest aligned fracture traces. Readily noted fracture traces have been plotted on Figure 5.5

#### Site Hydrology

Figure 5.6 is a northeast-southwest geologic cross section across the Malone East Site. The karst depression shown on Figure 5.5 is located between limestone aquifer monitor wells JC-1 and JC-3. In the lower portion of the depression is a sand-filled sinkhole. During periods of heavy rainfall the karst depression will flood, as it did in early 1984. Drainage is downward through the sinkhole into the Floridan aquifer. A second sinkhole is shown just to the southwest of Well JC-3; it is also shown on Figures 5.4 and 5.5 as a karst depression. The depth of the sinkholes is unknown; cavities possibly related to this karst system were encountered in drilling monitor wells JC-2 and JC-3. Their

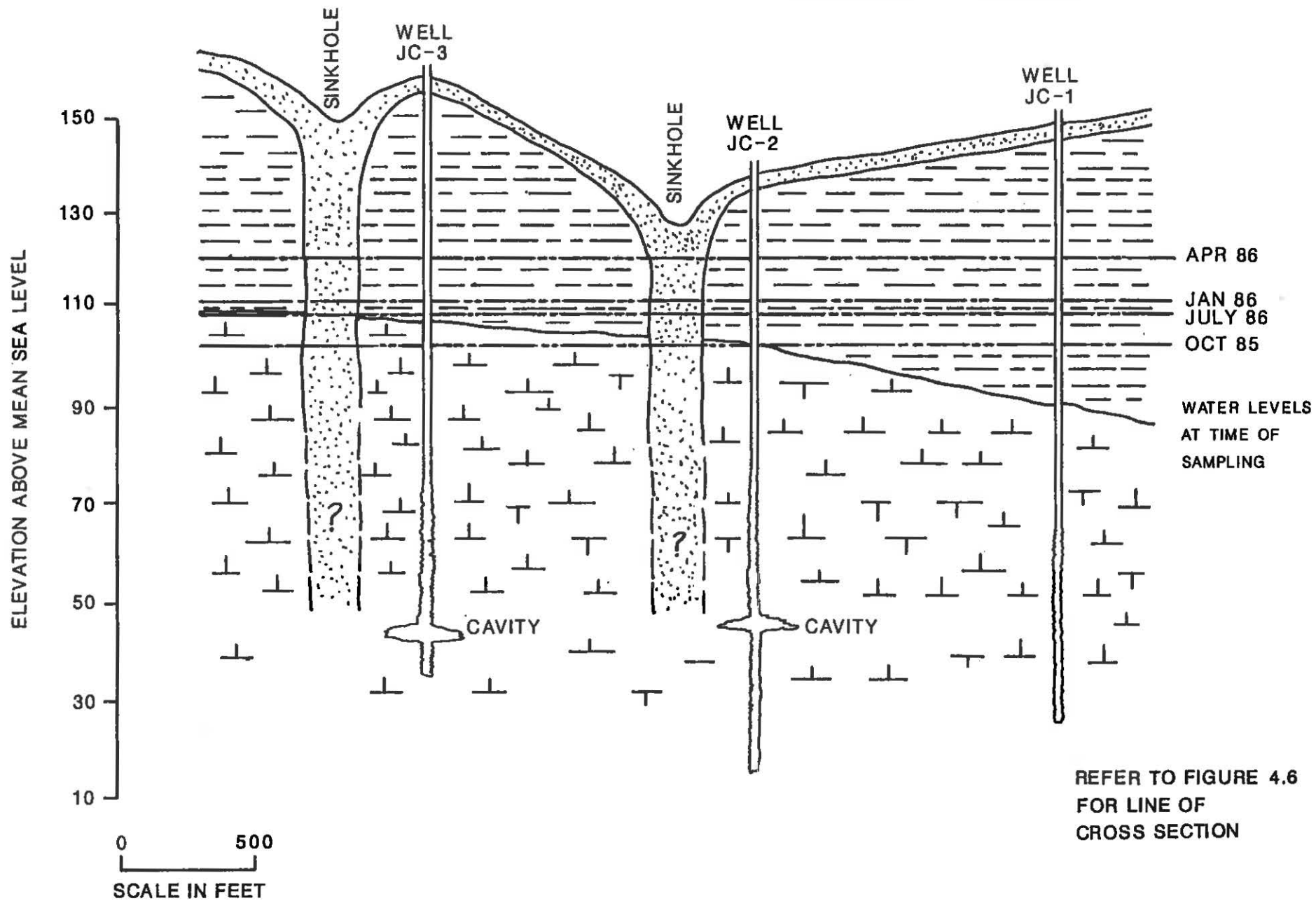


# **LEGEND**

-  SINKHOLE
-  KARST DEPRESSION
-  FRACTURE TRACES
-  JC-1 EDB LIMESTONE MONITOR WELL
-  STUDY SITE

**KARST FEATURES AT THE MALONE EAST STUDY SITE**

**FIGURE 5.5**



GEOLOGIC CROSS SECTION OF THE MALONE EAST STUDY SITE

FIGURE 5.6



occurrence at about the same elevation (50 feet above mean sea level) implies that they and the sinkholes may be interconnected.

#### Surficial Aquifer

The sands at the Malone East site do not maintain groundwater within them for a long enough period of time to form a water table. Rainwater percolating through the soil, or irrigation water applied to the peanuts/soybeans, moves down to the low permeability clay layer. This water then flows downgradient on top of the clay surface into the sinkholes. In this manner agricultural chemicals readily enter the Floridan aquifer.

#### Floridan Aquifer

The range in elevation of the water level within the limestone aquifer was almost 18 feet during the EDB investigation at the Malone East site (Figure 5.6). Inspection of the geologic cross section reveals that there can be considerable flow down the sand-filled sinkhole pipe, carrying contaminants to greater depths. This mechanism could also explain the very thin (3 feet) veneer of sand at the site; the sand that was originally at the site has moved down the sinkholes. This erosional process; however, is slow enough that it would not be noticed.

With a slight lag time, groundwater levels in the limestone monitor wells at the Malone East Site respond closely to seasonal rainfall (Figures 4.19-4.24). The highest water level elevations for the four quarters of sampling occurred in May, 1986. The rise in groundwater levels during periods of heavy rainfall in November-December, 1985, was supplemented by additional rain in January-February, 1986. The

lowest water levels occurred during October, 1985, following a dry summer. And, with the onset of the drought of the spring and summer of 1986, water levels again declined.

Groundwater flow in the Floridan aquifer is southeasterly from the site (Johnston and others, 1981).

Groundwater levels were not measured in the private wells sampled on and adjacent to the Malone East Site. It is to be assumed that, except for pumping periods, the water levels were the same in these wells.

#### EDB Contamination

Figures 4.19 - 4.25, presented earlier, indicate that rain-water recharging the limestone aquifer beneath the Malone East Site is diluting the EDB in the groundwater. However, with the onset of the 1986 mid-year drought, EDB levels began to rise markedly in Well JC-2, the Hickory Grove Church well, and the Ditty well. EDB concentration in the Tucker well, and in Wells JC-1 and JC-3 declined slightly.

EDB concentrations in Well JC-2, the Ditty well, the Hickory Grove Church well, and the Tucker well were as high as 60, 400, 70, and 12.5 times the Florida drinking water standard (0.02 ppb), respectively.

No EDB contamination was found in the Hagler well or the Ditty irrigation well. Both of these wells are on the north side of the karst depression. The irrigation well is used for irrigation of the peanut/soybean crops on the Malone East Site. The irrigation well was sampled only once during the four quarters. Present information is insufficient to explain the absence of EDB in these two wells.



## Assessment of Present Conditions

Groundwater within the Floridan aquifer at the Malone East Site is contaminated with EDB at levels up to 400 times the drinking water standard. During the course of the four quarters of sampling, no long-term trends in EDB concentration were noted. However, a seasonal dilution process is in operation. The highest EDB concentration occurred during the dry season, while the lowest concentrations occurred during the rainy seasons.

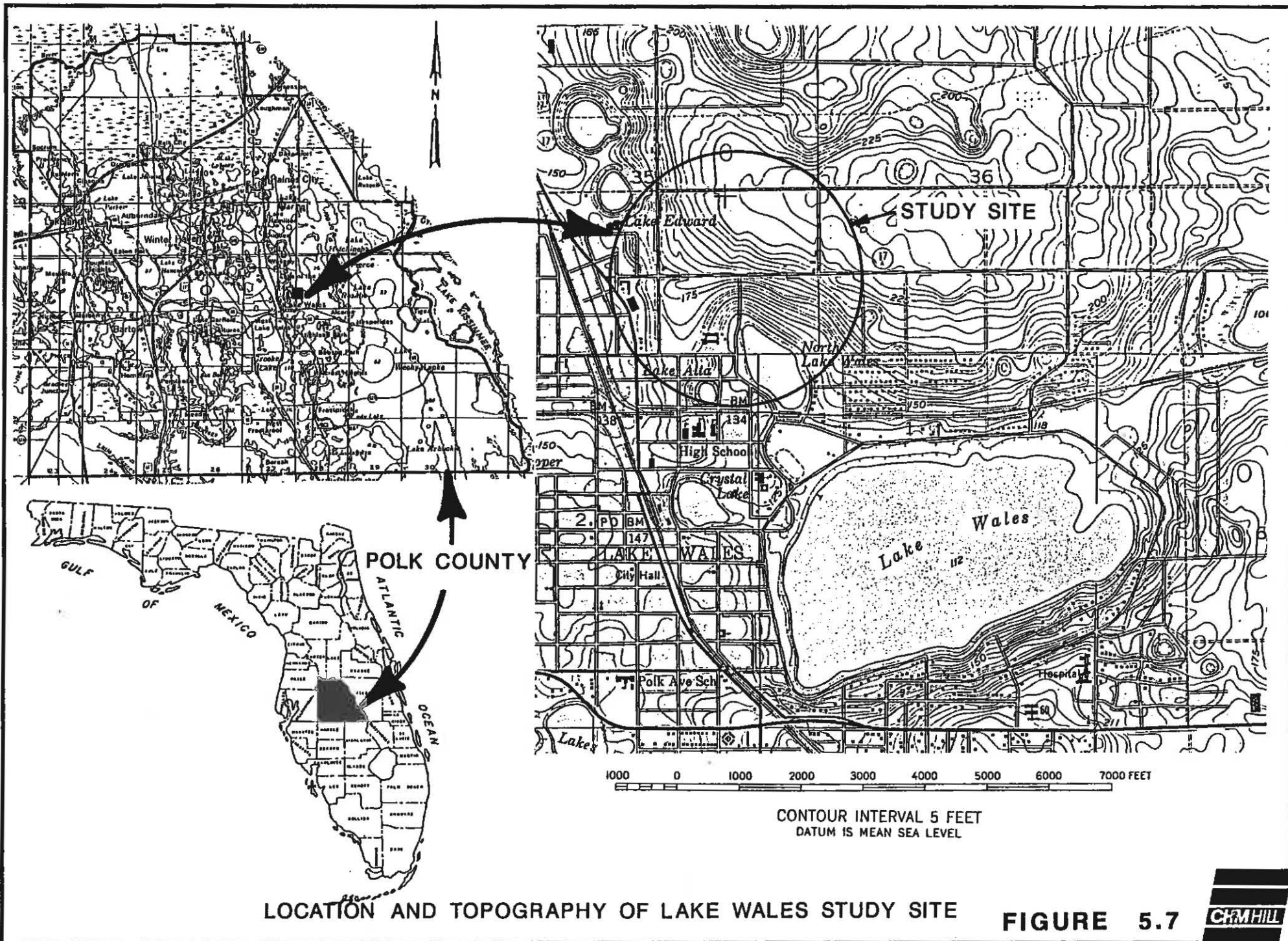
## LONG-TERM IMPACT

The concentration of EDB in the Floridan aquifer at the Malone East Site may remain high for an extended period. It appears that dilution will be the major mechanism for resolving the problem. However, the EDB degradation studies being performed by the Pesticide Research Laboratory as Task III of the project are showing a half-life for EDB of 1 to 1.5 years; this could be another important mechanism. (Alan Auwarter, FDER, September, 1986, Personal Communication).

## POLK COUNTY STUDY AREA

### DESCRIPTION OF LAKE WALES SITE

The Lake Wales Site is located in east-central Polk County on the northeastern side of the City of Lake Wales. The site is situated on a high sand ridge overlooking Lake Wales (Figure 5.7). The site was chosen because of the presence of high levels of EDB in a new Floridan aquifer wellfield developed by the City of Lake Wales.



LOCATION AND TOPOGRAPHY OF LAKE WALES STUDY SITE

FIGURE 5.7

## EDB APPLICATION HISTORY

EDB was first applied to buffer B-76 in July, 1960 to protect local citrus groves. The length of the buffer ranged from 2,500 to 10,350 feet. Application of EDB last occurred in February, 1983. The buffer cuts through the City of Lake Wales wellfield at Water Treatment Plant No. 3.

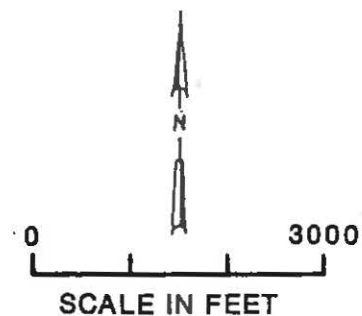
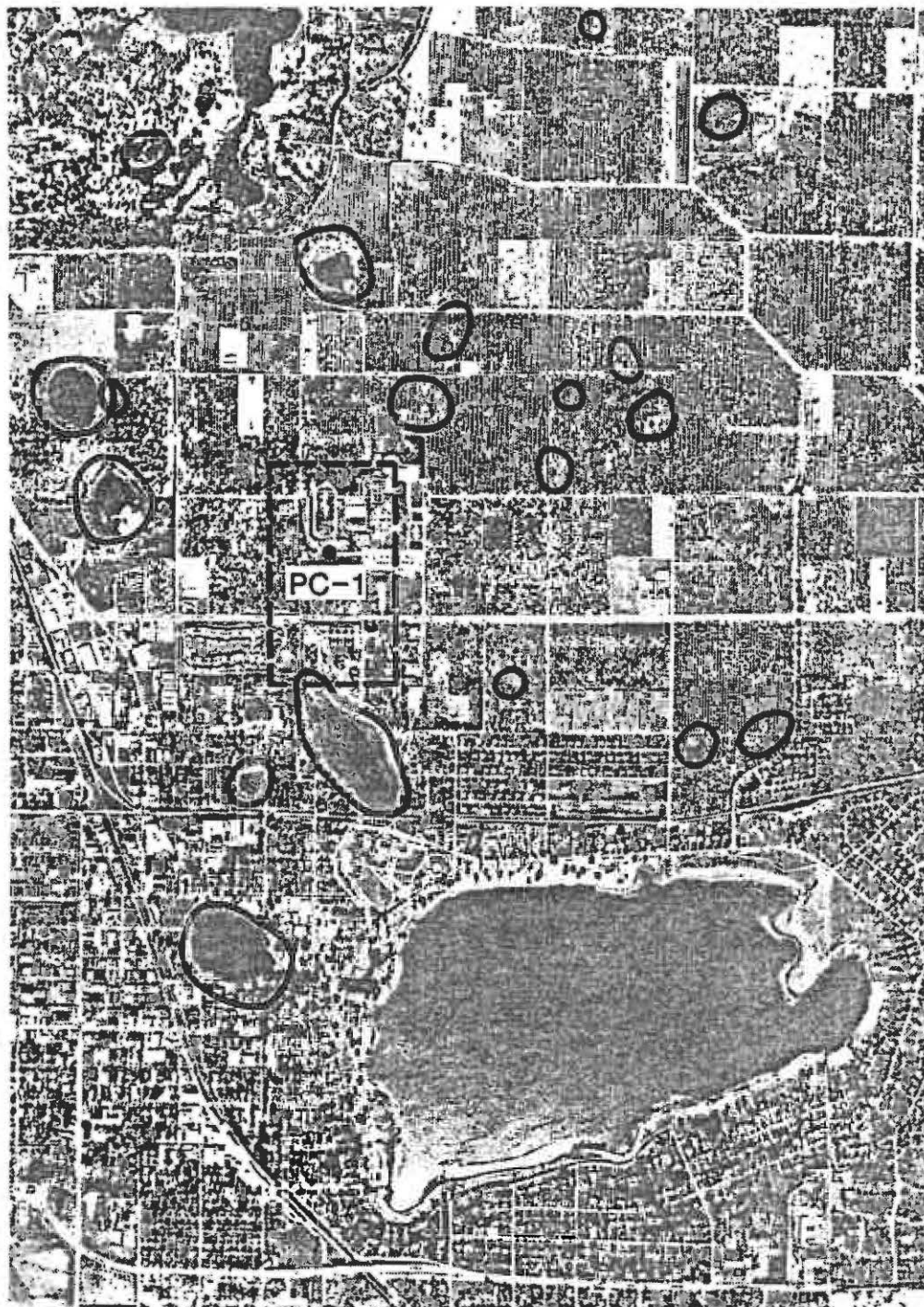
## SITE HYDROGEOLOGY

### General Geology

Figure 4.11 and Appendix E shows the general geologic sequence at the Lakes Wales Site. Approximately 125-130 feet of unconsolidated, fine- to medium-grained, yellowish sands overlie a 140-foot thick sequence of low permeability clays and limestones (Hawthorn Formation). Beneath these materials are limestones of the Ocala Group, the upper portion of the Floridan aquifer at the site. The City of Lake Wales wells obtain their water from the deeper Avon Park Limestone.

### Karst Interpretation

Stereo-paired, black and white, aerial photographs, at a scale of 1:24,000, for December, 1961 and November, 1984 were obtained from the Topographic Bureau of the Florida Department of Transportation. Figure 5.8 shows the karst (sinkhole) features observed on the aerial photographs. The Lake Wales Site is surrounded by a number of large sinkholes. The ones to the south or west are water-filled and at a lower elevation. The ones to the north and northeast tend to be dry.



NOTE :  
NO FRACTURE  
TRACES WERE  
OBSERVED;  
SEDIMENT COVER  
IS TOO THICK

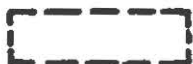
#### LEGEND



SINKHOLE



PC-1 EDB LIMESTONE MONITORING WELL



STUDY SITE

KARST FEATURES AT THE LAKE WALES STUDY SITE

FIGURE 5.8

CH2M HILL



No extensive fracture trace systems were noted on the aerial photographs used for the karst analysis. However, the various sinkholes line up in northwest-southeast and northeast-southwest directions, as if controlled by deeper fractures underlying the thick sand sequence.

### Site Hydrology

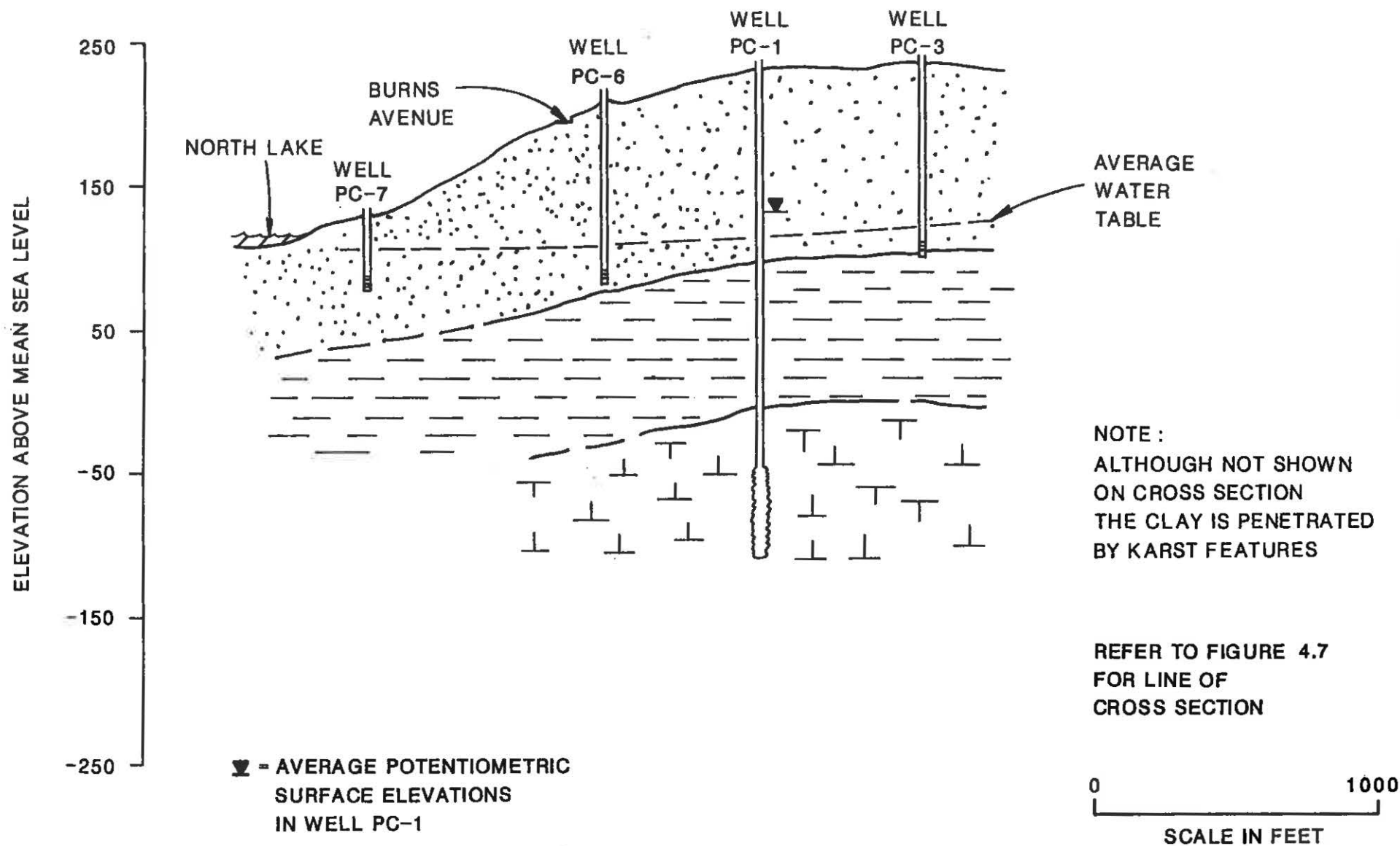
Figure 5.9 is a north-south geologic cross section through the study site. The location of the cross section is shown on Figure 4.7.

Surficial Aquifer - The most obvious feature of the site is the depressed and flat water table; over the 4,000-foot distance between wells PC-3 and PC-7 the change in water table elevation is only 8.4 feet. Considering the possible presence of an extensive karst system beneath the thick sand sequence, it is likely that this water table is the result of deep drainage into the underlying limestones of the Floridan aquifer.

Floridan Aquifer - The Avon Park Limestone of the lower portion of the Floridan aquifer is the source of groundwater for the City of Lake Wales wellfield. The City wells are known to be contaminated with about 1 ppb EDB. However, no EDB was detected in Well PC-1 which monitors the upper portion of the Floridan aquifer (the uppermost Ocala Group limestones). Apparently EDB may have moved downward through sinkhole conduits and into the deeper Floridan aquifer, by-passing the upper portion.

### EDB CONTAMINATION

No EDB was found in limestone monitor well PC-1. The only well containing EDB was PC-3. EDB levels in PC-3 declined over the four quarters of sampling.



GEOLOGIC CROSS-SECTION OF THE LAKE WALES STUDY SITE

## ASSESSMENT OF PRESENT CONDITIONS

Low levels of EDB were found in the water table aquifer and none was found in the uppermost Floridan aquifer. The lack of EDB in Well PC-1 (Upper Floridan aquifer) was considered previously in the discussion of the Floridan aquifer. The low level or lack of EDB in the water table aquifer can best be explained by the process of dilution and deep flushing into the Floridan aquifer through karst features.

## LONG-TERM IMPACT

EDB may remain in the lower portion of the Floridan aquifer (Avon Park Limestone) for an extended period. Dilution will slowly decrease the concentration of EDB, as may natural degradation processes (see Jackson County long-term impact).







Section 6  
CONCLUSIONS

1. EDB is readily leached from Florida's sandy soils into underlying aquifers. Soil samples taken beneath and adjacent to EDB buffer zones or other application areas showed less than 200 ng/Kg of EDB. Although it was not determined how long the leaching process takes, it is likely that all of the EDB was leached from these soils in much less than a year.
2. The period of investigation (four quarterly samplings) was insufficient to predict long-term EDB contamination trends.
3. Dilution appears to be a major factor for resolution of the EDB contamination problem.
4. Florida's karstic landscape is very vulnerable to contamination by long-lived chemicals.
5. Regions with thick sequences of low permeability earth materials beneath contaminated near-surface aquifers are less vulnerable to deep aquifer contamination.
6. Contamination of groundwater by EDB appears to be independent of the type of crop on which it was used.
7. Assuming that EDB is already present in an aquifer, dry seasons tend to result in higher levels of EDB in groundwater. Conversely, the lowest EDB levels occurred shortly after the rainy season. This dry/wet relationship is simply a reflection of halting/restarting the dilution process. At the Jackson County (Malone East) site the sharp rise in EDB content in the Floridan

aquifer paralleled the onset of the drought of mid-1986 in the southeastern United States.

8. An understanding of the geologic framework and local hydrology is critical to predicting contaminant movement and destiny.
9. Dilution is slowest in those areas with slower rates of groundwater movement.
10. Deep, flat water tables beneath high sand ridges can be an indication of deep contaminant movement through underlying karst structures.
11. Proximity of sinkholes to areas of EDB application favors the contamination of underlying limestone aquifers.
12. There is preliminary evidence that, if dilution is the major operating factor, the duration of EDB contamination in aquifers may be on the order of tens of years, perhaps in excess of one hundred years. This does not consider the process of natural degradation of EDB in groundwaters, addressed in Task III of the project.
13. EDB contamination at the Highlands County (Kuhlman) site is concentrated within the surficial aquifer. It is not possible to state whether this contamination will move into the Floridan aquifer by means of possible karst structures underlying the area.
14. Low levels of EDB remain in the surficial aquifer at the Polk County (Lake Wales) site, but are moving into the deeper Floridan aquifer. Dilution of the EDB is responsible for the low levels detected in the surficial aquifer.



Section 7  
RECOMMENDATIONS

1. Continue to monitor EDB content of the limestone aquifer monitor wells at all three study sites. At the Jackson County (Malone East) site, this would involve Well JC-2 as a minimum.
2. Since EDB is one of many chemicals which have been or are being applied to soils throughout Florida, it would be beneficial to establish and use some sort of inexpensively analyzed tracer substance(s) to indicate impending contamination. Such a parameter might be nitrates, commonly associated with agricultural activities in the form of fertilizers. A rise in the concentration of the tracer substance(s) to certain levels would trigger further detailed sampling for a wide range of long-lived agricultural chemicals.
3. Chemicals applied to the soils of Florida are very likely to find their way into aquifers used as sources of public and private drinking water supplies. It would be prudent to ensure that these chemicals, unlike EDB, have a rapid breakdown process in the soil where they are applied. Additionally, the decay products of these chemicals should also be of a non-impacting nature.
4. The present study involved only four quarters of sampling. This was insufficient time to predict long-term trends in groundwater contamination, therefore, sampling of most wells should be continued. The results should be included in an annual report of an interpretive nature.

5. The EDB content of the DeSoto City replacement wells should be monitored closely. A long-term lack of EDB in these groundwaters bodes well for the surrounding area in Highlands County, including the Kuhlman site.
6. The extreme vulnerability of the karst region of northern Jackson County, a recharge area, warrants more detailed investigations of the long-term impact of agricultural and waste disposal activities in that area. This region should be considered of critical concern because of the relative ease with which EDB entered the deeper groundwater system.



Section 8  
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## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client CH<sup>2</sup>M Hill

Project JACKSON County EDB

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. JE-1 Date 8-21-84 Sheet 1 of 3

Type of Boring SPT Rig CME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used X

Boring begun 8:45 AM Boring completed 3:30 PM

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum

Field Party: Shumate, Harris, Miller  
Engold

| Depth of Casing, ft. | Sample No. | Sample depth from to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                        |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            | Sand catcher used entire           |
|                      |            |                                |                       |                        |                              |                       | 1             |            | Boring depth                       |
|                      |            |                                |                       |                        |                              |                       | 2             |            | Brown f. sd                        |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                    |
|                      | 1          | 3 1/2 - 5                      | 2-1-2                 | 13"                    |                              |                       | 4             |            | v. loose light yellow Brn slightly |
|                      |            |                                |                       |                        |                              |                       | 5             |            | clayey to coarse sd.               |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                    |
|                      | 2          | 8 1/2 - 10                     | 8-13-3                | 9"                     |                              |                       | 9             |            | v. stiff light gray sandy          |
|                      |            |                                |                       |                        |                              |                       | 10            |            | clay with Burgundy marbling        |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                    |
|                      | 3          | 13 1/2 - 15                    | 8-12-13               | 15"                    |                              |                       | 14            |            | v. stiff light gray sandy          |
|                      |            |                                |                       |                        |                              |                       | 15            |            | clay w/ Burgundy marbling          |
|                      |            |                                |                       |                        |                              |                       | 16            |            | sand content much greater          |
|                      |            |                                |                       |                        |                              |                       | 17            |            | than 10' sample                    |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                    |
|                      | 4          | 18 1/2 - 20                    | 8-12-12               | 15"                    |                              |                       | 20            |            | v. firm Burgundy orange +          |
|                      |            |                                |                       |                        |                              |                       | 21            |            | light gray marbled to              |
|                      |            |                                |                       |                        |                              |                       | 22            |            | med slightly                       |
|                      |            |                                |                       |                        |                              |                       | 23            |            | clay + clay sd.                    |

# PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client \_\_\_\_\_  
Project \_\_\_\_\_

Location of Boring:

|             |  |
|-------------|--|
| Water Level |  |
|-------------|--|

|      |  |
|------|--|
| Time |  |
|------|--|

|      |  |
|------|--|
| Date |  |
|------|--|

Boring No. JE-6 Date \_\_\_\_\_ Sheet 2 of \_\_\_\_\_

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

[illegible]

# PITTSBURGH TESTING LABORATORY

# LOG OF BORING

No.

Client \_\_\_\_\_  
Project \_\_\_\_\_

**Location of Boring:**

Water Level

Time

Date \_\_\_\_\_

Boring No. JE-6 Date \_\_\_\_\_ Sheet 3 of 3

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                  |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|--------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 40            |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                              |
|                      | 9          | 43 <sup>1/2</sup> -45          | 3-4-6                 | 18"                    |                              |                       | 45            |            | stiff light gray slightly sandy clay with orange mottling    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                              |
|                      | 10         | 48 <sup>1/2</sup> -50          | 3-3-9                 | 18"                    |                              |                       | 50            |            | stiff orange + light gray mottled silty clay                 |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                              |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                              |
|                      | 11         | 53 <sup>1/2</sup> -55          | 2                     | 18" 1'                 |                              |                       | 55            |            | very soft orange silty clay                                  |
|                      |            |                                |                       |                        |                              |                       | 6             |            | rods dropped to 58'                                          |
|                      |            |                                |                       |                        |                              |                       | 7             |            | 105' 100' 10' circulation                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            | VOID 55-59"                                                  |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                              |
|                      | 12         | 59-59 <sup>1/2</sup>           | 12                    | 6"                     |                              |                       | 60            |            | Fine white highly weathered silty clay                       |
|                      |            |                                |                       |                        |                              |                       | 1             |            | hole plugged at 50' with burlap + bentonite grout to surface |

# PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client CH - mfm

Project JACKSON COUNTY EDB

**Location of Boring:**

Water Level!

Time

Date \_\_\_\_\_

Boring No. 23 Date 8-21-87 Sheet 1 of 2

Type of Boring WASH Rig CME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used X

Boring begun 3:30<sup>pm</sup> Boring completed 6:00<sup>pm</sup>

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: *Shiwanese, Harris, Miller*

Elm 98/9

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION<br>Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            | 2-4                            |                       |                        |                              |                       | 3             |            | A tube pushed                                                                                                                                                                                      |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 12            |            | pushed extra tube at 12 to hard to push                                                                                                                                                            |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                                                                                                                                                                                    |
|                      |            | 13-15                          |                       |                        |                              |                       | 14            |            | B tube pushed                                                                                                                                                                                      |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                                                                                                                                                                                                    |



# PITTSBURGH TESTING LABORATORY

# LOG OF BORING

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

Client CH M H

Project Jackson County EDB

**Location of Boring:**

| Water Level |
|-------------|
|-------------|

Time

Date \_\_\_\_\_

Boring No. 33 Date 8-21-84 Sheet 2 of 5

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: \_\_\_\_\_

[illegible]

# PITTSBURGH TESTING LABORATORY

# LOG OF BORING

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

Client CHM HHS  
Project JACKSON COUNTY EOB

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

Boring No. 754-2 Date 8-22-84 Sheet 1 of 2  
Type of Boring WASH Rig CME 55  
Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used CLAY  
Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_  
Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum \_\_\_\_\_  
Field Party: Shumate, Harris, Miller  
Elmgold

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                    |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                |
|                      |            | 2-4                            |                       |                        |                              |                       | 3             | A          |                                                |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                                |
|                      |            | 12-12.5                        |                       |                        |                              |                       | 12            |            | 2 tubes pushed 1st u dense soil collapsed tube |
|                      |            |                                |                       |                        |                              |                       | 13            | B          |                                                |
|                      |            | 13-14                          |                       |                        |                              |                       | 14            |            | 2nd pushed 1'                                  |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                                                |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                                |



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

**Client** \_\_\_\_\_

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

|             |  |
|-------------|--|
| Water Level |  |
|-------------|--|

| Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

|      |  |
|------|--|
| Date |  |
|------|--|

Boring No. JS-112 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: \_\_\_\_\_

[illegible]

# PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client CH-WHP  
Project Jackson County

**Location of Boring:**

Water Level

Time

Date \_\_\_\_\_

Boring No. \_\_\_\_\_ Date 8-22-88 Sheet 1 of 2

Type of Boring WASH Rig CME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used ☒

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation referred to \_\_\_\_\_

**Datum**

Field Party: Shuman's, Harry Miller

[illegible]

## No. \_\_\_\_\_

Boring No. 5SH 3 Date            Sheet 2 of 2

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datur

Field Party: \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

[illegible]

# PITTSBURGH TESTING LABORATORY

# LOG OF BORING

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

Client CH-1

Project Jackson County EOB

Location of Boring: \_\_\_\_\_

|             |  |
|-------------|--|
| Water Level |  |
|-------------|--|

|      |  |
|------|--|
| Time |  |
|------|--|

|        |  |
|--------|--|
| Date . |  |
|--------|--|

Boring No. JSH-4 Date 8 22 84 Sheet 1 of 2

Type of Boring wash Rig CME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used clear

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

\_\_\_\_\_ Datum

Field Party: S. J. M. HARRIS, Major

Angola

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION<br>Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            | 2-4                            |                       |                        |                              |                       | 2             | A          | shells pushed at intervals indicated                                                                                                                                                               |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                                                                                                                                                                                    |
|                      |            | 12-14                          |                       |                        |                              |                       | 13            | B          |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 14            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                                                                                                                                                                                    |

## No. \_\_\_\_\_

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation\_\_\_\_\_referred to\_\_\_\_\_

Datum

Field Party: \_\_\_\_\_

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

|             |       |
|-------------|-------|
| Water Level | _____ |
| Time        | _____ |
| Date        | _____ |

[illegible]





## PITTSBURGH TESTING LABORATORY

# LOG OF BORING

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

Client \_\_\_\_\_  
Project \_\_\_\_\_

**Location of Boring:**

Water Level

Time

Date \_\_\_\_\_

Boring No. PE-1 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum

Field Party: \_\_\_\_\_

[illegible]

## No. \_\_\_\_\_

Boring No. PE-1 Date \_\_\_\_\_ Sheet 3 of 7

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

[illegible]



## No. \_\_\_\_\_

Boring No. PE-1 Date \_\_\_\_\_ Sheet 4 of 7

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                      |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                  |
|                      | 13         | 63½ - 65                       | 17-18-30              |                        | 14"                          |                       | 4             |            | Dense light yellow fi to med so. |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                  |
|                      | 14         | 68½ - 70                       | 18-20-32              |                        | 12"                          |                       | 9             |            | v dense light yellow gray        |
|                      |            |                                |                       |                        |                              |                       | 10            |            | fi so v. slightly clayey         |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                  |
|                      | 15         | 73½ - 75                       | 20-35-45              |                        | 14"                          |                       | 14            |            | v. dense white fi to med. so.    |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                  |
|                      | 16         | 78½ - 80                       | 16-21-25              |                        | 8"                           |                       | 19            |            | dense white slightly clayey      |
|                      |            |                                |                       |                        |                              |                       | 20            |            | fi to med so.                    |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                  |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                                  |

## No. \_\_\_\_\_

Boring No. 1E / Date \_\_\_\_\_ Sheet 5 of 7

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

\_\_\_\_\_ Datum

Field Party: \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

[illegible]

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client \_\_\_\_\_  
Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. PE-1 Date \_\_\_\_\_ Sheet 6 of 7

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION             |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                         |
|                      | 20         | 103 1/2                        | 104 1/2               | 30-65                  | 8"                           |                       | 105           |            | sampler at 10' interval |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                         |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 14            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 23            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 24            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 25            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 26            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 27            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 28            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 29            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 30            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 31            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 32            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 33            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 34            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 35            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 36            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 37            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 38            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 39            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 40            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 41            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 42            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 43            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 44            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 45            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 46            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 47            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 48            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 49            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 50            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 51            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 52            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 53            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 54            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 55            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 56            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 57            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 58            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 59            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 60            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 61            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 62            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 63            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 64            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 65            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 66            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 67            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 68            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 69            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 70            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 71            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 72            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 73            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 74            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 75            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 76            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 77            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 78            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 79            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 80            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 81            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 82            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 83            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 84            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 85            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 86            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 87            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 88            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 89            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 90            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 91            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 92            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 93            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 94            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 95            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 96            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 97            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 98            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 99            |            |                         |
|                      |            |                                |                       |                        |                              |                       | 100           |            |                         |

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing; depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

sampled at 10' interval

drove sampler 1' in dense white silty med. sa.

straight drilled to 123 1/2'

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

No. TAM-1212

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. HE-1 Date \_\_\_\_\_ Sheet 5 of 6

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                          |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|--------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 80            |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 4             |            | VERY dense light brown f. to med. s. |
|                      | 17         | 83 1/2 - 85                    | 25-26-31              |                        | 12"                          |                       | 85            |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 9             |            | " " " " " " " " " "                  |
|                      | 18         | 88 1/2 - 90                    | 17-32-35              |                        |                              |                       | 90            |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 3             |            | straight drill to 118 1/2'           |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 95            |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 100           |            |                                      |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                      |

Engineer \_\_\_\_\_

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

.0. TAM-1212

Project

Location of Boring:

Water Level

Time

Date

Boring No. HE-1

Date

Sheet 6 of 6

Type of Boring Rig

Casing used Size Drilling mud used

Boring begun Boring completed

Ground Elevation referred to

Datum

Field Party:

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                                       |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-----------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 100           |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 105           |            | straight drill to 118 1/2'                                                        |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 110           |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 115           |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                   |
|                      |            |                                |                       |                        |                              |                       | 9             |            | U. Dense white f. ss                                                              |
| 19                   | 118 1/2'   | 119 1/2'                       | 30-70                 | 8"                     |                              |                       | 120           | EOB        | Hole grouted with 3 bags portland cement and 20 lbs Bentonite from bottom to top. |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                   |

Engineer



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM- 1212CH<sup>2</sup>M HillProject Highlands County EDBLocation of Boring: 1Water Level 16

Time

Date

Boring No. HSH-1 Date 9-4-84 Sheet 1 of 1Type of Boring Auger Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used no

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum

Field Party: Shumate, Harris, Eingold

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION     |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-----------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            | shelby sampling |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                 |
|                      | A          | 2 - 4 1/2                      |                       |                        |                              |                       | 4             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                 |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 14            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                 |
|                      | B          | 13 1/2 - 16                    |                       |                        |                              |                       | 16            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 23            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 24            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 25            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 26            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 27            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 28            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 29            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 30            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 31            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 32            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 33            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 34            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 35            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 36            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 37            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 38            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 39            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 40            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 41            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 42            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 43            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 44            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 45            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 46            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 47            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 48            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 49            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 50            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 51            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 52            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 53            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 54            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 55            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 56            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 57            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 58            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 59            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 60            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 61            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 62            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 63            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 64            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 65            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 66            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 67            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 68            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 69            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 70            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 71            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 72            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 73            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 74            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 75            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 76            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 77            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 78            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 79            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 80            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 81            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 82            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 83            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 84            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 85            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 86            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 87            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 88            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 89            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 90            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 91            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 92            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 93            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 94            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 95            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 96            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 97            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 98            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 99            |            |                 |
|                      |            |                                |                       |                        |                              |                       | 100           |            |                 |

Hole is back filled upon completion

note: Hole was originally drilled to 16' + tube pushed down recovery because of saturated soil. Re-drilled new hole + sample B was recovered, making total footage this hole 34'

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

No. TAM-1212C. CH<sup>2</sup>M HillProject Highlands County EDB

Location of Boring:

Water Level

est. 32-33

Time

Date

Boring No. HSH-2 Date 9-5-84 Sheet 1 of 2Type of Boring Auger Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used no

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Date

Field Party: Shumate, Harris, Eingok

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |
|                      |            |                                |                       |                        |                              |                       | 1             |            |
|                      |            |                                |                       |                        |                              |                       | 2             |            |
|                      |            |                                |                       |                        |                              |                       | 3             |            |
|                      |            |                                |                       |                        |                              |                       | 4             |            |
|                      |            |                                |                       |                        |                              |                       | 5             |            |
|                      |            |                                |                       |                        |                              |                       | 6             |            |
|                      |            |                                |                       |                        |                              |                       | 7             |            |
|                      |            |                                |                       |                        |                              |                       | 8             |            |
|                      |            |                                |                       |                        |                              |                       | 9             |            |
|                      |            |                                |                       |                        |                              |                       | 0             |            |
|                      |            |                                |                       |                        |                              |                       | 1             |            |
|                      |            |                                |                       |                        |                              |                       | 2             |            |
|                      |            |                                |                       |                        |                              |                       | 3             |            |
|                      |            |                                |                       |                        |                              |                       | 4             |            |
|                      |            |                                |                       |                        |                              |                       | 5             |            |
|                      |            |                                |                       |                        |                              |                       | 6             |            |
|                      |            |                                |                       |                        |                              |                       | 7             |            |
|                      |            |                                |                       |                        |                              |                       | 8             |            |
|                      |            |                                |                       |                        |                              |                       | 9             |            |
|                      |            |                                |                       |                        |                              |                       | 20            |            |
|                      |            |                                |                       |                        |                              |                       | 1             |            |

## DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

shelby sampling

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

o No. TAM-1212

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. HS# 2 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                                                                                                                                         |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 20            |            | Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 2.5           |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |
|                      | B          | 28-30 1/2                      |                       |                        |                              |                       | 30            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |

Engineer \_\_\_\_\_



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM-1212CH<sup>2</sup>M HillProject Highlands County EOB

Location of Boring:

Water Level

14' 3"

Time

Date

Boring No. HSK-3 Date 9-5-84 Sheet 1 of 1Type of Boring Auger Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used No

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: Shumate, Harris, Eingo

Datur

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                        |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            | shelby sampling                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                    |
|                      | A          | 2 - 4 1/2                      |                       |                        |                              |                       | 4             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                    |
|                      | B          | 13" 15 1/2                     |                       |                        |                              |                       | 14            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 20            |            | augered to 20' to find water table |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 23            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 24            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 25            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 26            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 27            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 28            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 29            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 30            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 31            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 32            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 33            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 34            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 35            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 36            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 37            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 38            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 39            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 40            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 41            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 42            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 43            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 44            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 45            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 46            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 47            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 48            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 49            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 50            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 51            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 52            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 53            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 54            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 55            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 56            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 57            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 58            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 59            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 60            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 61            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 62            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 63            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 64            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 65            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 66            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 67            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 68            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 69            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 70            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 71            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 72            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 73            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 74            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 75            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 76            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 77            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 78            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 79            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 80            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 81            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 82            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 83            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 84            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 85            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 86            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 87            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 88            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 89            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 90            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 91            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 92            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 93            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 94            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 95            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 96            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 97            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 98            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 99            |            |                                    |
|                      |            |                                |                       |                        |                              |                       | 100           |            |                                    |

EOB

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM-1212CH<sup>2</sup>m HillProject Highland County EDB

Location of Boring:

Water Level

16 - 16 1/2

Time

Date

Boring No. HSM-4 Date 9-5-84 Sheet 1 of 1Type of Boring SPT Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used NO

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: Shumate, Harris, Eingel

| Depth of Casing, ft. | Sample No. | Sample depth from top (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                         |
|----------------------|------------|---------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------------------|
|                      |            |                                 |                       |                        |                              |                       | 0             |            | shelly sampling                     |
|                      |            |                                 |                       |                        |                              |                       | 1             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 2             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 3             |            |                                     |
|                      | A          | 2 - 4 1/2                       |                       |                        |                              |                       | 4             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 5             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 6             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 7             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 8             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 9             |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 10            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 11            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 12            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 13            |            |                                     |
|                      | B          | 12 - 14 1/2                     |                       |                        |                              |                       | 14            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 15            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 16            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 17            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 18            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 19            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 20            |            | drilled hole to 20' for water table |
|                      |            |                                 |                       |                        |                              |                       | 21            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 22            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 23            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 24            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 25            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 26            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 27            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 28            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 29            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 30            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 31            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 32            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 33            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 34            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 35            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 36            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 37            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 38            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 39            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 40            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 41            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 42            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 43            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 44            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 45            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 46            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 47            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 48            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 49            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 50            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 51            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 52            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 53            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 54            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 55            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 56            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 57            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 58            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 59            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 60            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 61            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 62            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 63            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 64            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 65            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 66            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 67            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 68            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 69            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 70            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 71            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 72            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 73            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 74            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 75            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 76            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 77            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 78            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 79            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 80            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 81            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 82            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 83            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 84            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 85            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 86            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 87            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 88            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 89            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 90            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 91            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 92            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 93            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 94            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 95            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 96            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 97            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 98            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 99            |            |                                     |
|                      |            |                                 |                       |                        |                              |                       | 100           |            |                                     |

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM-1212CH<sup>2</sup>M HillProject Highlands County EDB

Location of Boring:

Water Level

est. 31-32

Time

Date

Boring No. HSH-5 Date 9-5-84 Sheet 1 of 2Type of Boring Auger Rig CME-55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used NO

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: Shumate, Harris, Eingo

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |
|                      |            |                                |                       |                        |                              |                       | 1             |            |
|                      |            |                                |                       |                        |                              |                       | 2             |            |
|                      |            |                                |                       |                        |                              |                       | 3             |            |
|                      |            |                                |                       |                        |                              |                       | 4             |            |
|                      |            |                                |                       |                        |                              |                       | 5             |            |
|                      |            |                                |                       |                        |                              |                       | 6             |            |
|                      |            |                                |                       |                        |                              |                       | 7             |            |
|                      |            |                                |                       |                        |                              |                       | 8             |            |
|                      |            |                                |                       |                        |                              |                       | 9             |            |
|                      |            |                                |                       |                        |                              |                       | 10            |            |
|                      |            |                                |                       |                        |                              |                       | 11            |            |
|                      |            |                                |                       |                        |                              |                       | 12            |            |
|                      |            |                                |                       |                        |                              |                       | 13            |            |
|                      |            |                                |                       |                        |                              |                       | 14            |            |
|                      |            |                                |                       |                        |                              |                       | 15            |            |
|                      |            |                                |                       |                        |                              |                       | 16            |            |
|                      |            |                                |                       |                        |                              |                       | 17            |            |
|                      |            |                                |                       |                        |                              |                       | 18            |            |
|                      |            |                                |                       |                        |                              |                       | 19            |            |
|                      |            |                                |                       |                        |                              |                       | 20            |            |
|                      |            |                                |                       |                        |                              |                       | 21            |            |
|                      |            |                                |                       |                        |                              |                       | 22            |            |
|                      |            |                                |                       |                        |                              |                       | 23            |            |
|                      |            |                                |                       |                        |                              |                       | 24            |            |
|                      |            |                                |                       |                        |                              |                       | 25            |            |
|                      |            |                                |                       |                        |                              |                       | 26            |            |
|                      |            |                                |                       |                        |                              |                       | 27            |            |
|                      |            |                                |                       |                        |                              |                       | 28            |            |
|                      |            |                                |                       |                        |                              |                       | 29            |            |
|                      |            |                                |                       |                        |                              |                       | 30            |            |
|                      |            |                                |                       |                        |                              |                       | 31            |            |
|                      |            |                                |                       |                        |                              |                       | 32            |            |

## DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

shallow samplingA 2-4 1/2

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

40. TAM-1212

Boring No. HSH-5 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

## Project

Location of Boring:

| Water Level |
|-------------|
|-------------|

Time

Date \_\_\_\_\_

[illegible]

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM-1212CH<sup>2</sup>m HillProject Highlands County EDB

Location of Boring:

Water Level

23-24

Time

Date

Boring No. #5H-6 Date 9-5-84 Sheet 1 of 2Type of Boring Auger Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used NO

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: Shumate, Harris, Eingel

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                                                                                                                                         |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            | Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                     |
|                      | A          | 2-4 1/2                        |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 14            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                                                                                                                                                                     |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                                                                                                                                                                                     |
|                      | B          | 18 1/2-21                      |                       |                        |                              |                       | 21            |            |                                                                                                                                                                                     |



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

No. TAM-1212

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. HSH-6 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                                                                                                                                         |  |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                      |            |                                |                       |                        |                              |                       |               |            | Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |  |
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 26            |            | total depth of 1st Boring.                                                                                                                                                          |  |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 0             |            | note 1st hole drilled to 26'                                                                                                                                                        |  |
|                      |            |                                |                       |                        |                              |                       | 1             |            | water table encountered so                                                                                                                                                          |  |
|                      |            |                                |                       |                        |                              |                       | 2             |            | new hole was drilled to                                                                                                                                                             |  |
|                      |            |                                |                       |                        |                              |                       | 3             |            | 18 1/2' + tube was pushed to 21'                                                                                                                                                    |  |
|                      |            |                                |                       |                        |                              |                       | 4             |            | total for the two borings                                                                                                                                                           |  |
|                      |            |                                |                       |                        |                              |                       | 5             |            | was 47'                                                                                                                                                                             |  |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                     |  |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |  |

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client \_\_\_\_\_

Project \_\_\_\_\_

Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. PE-1 Date \_\_\_\_\_ Sheet 2 of 7

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from top (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                                                                                                                                                         |
|----------------------|------------|---------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                 |                       |                        |                              |                       | 0             |            | Soil type, color, texture, consistency, sampler driving notes; blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|                      |            |                                 |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 4             |            | light orange and orange v. slightly claye layered ss.                                                                                                                               |
|                      | D1         | 12.5                            | 1                     | 2                      | 5                            |                       | 4.25          |            | last 2" is a med silty light orange slightly ss clay                                                                                                                                |
|                      |            |                                 |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 7             |            | hole grouted with 3 bags portland + 25 lbs. of cementite from bottom to top.                                                                                                        |
|                      |            |                                 |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 10            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 11            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 12            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 13            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 14            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 15            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 16            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 17            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 18            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 19            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 20            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 21            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 22            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 23            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 24            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 25            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 26            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 27            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 28            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 29            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 30            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 31            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 32            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 33            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 34            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 35            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 36            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 37            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 38            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 39            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 40            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 41            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 42            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 43            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 44            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 45            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 46            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 47            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 48            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 49            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 50            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 51            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 52            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 53            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 54            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 55            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 56            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 57            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 58            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 59            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 60            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 61            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 62            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 63            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 64            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 65            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 66            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 67            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 68            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 69            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 70            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 71            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 72            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 73            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 74            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 75            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 76            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 77            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 78            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 79            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 80            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 81            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 82            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 83            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 84            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 85            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 86            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 87            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 88            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 89            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 90            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 91            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 92            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 93            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 94            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 95            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 96            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 97            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 98            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 99            |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 100           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 101           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 102           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 103           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 104           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 105           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 106           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 107           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 108           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 109           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 110           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 111           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 112           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 113           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 114           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 115           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 116           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 117           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 118           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 119           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 120           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 121           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 122           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 123           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 124           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 125           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 126           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 127           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 128           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 129           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 130           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 131           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 132           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 133           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 134           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 135           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 136           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 137           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 138           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 139           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 140           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 141           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 142           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 143           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 144           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 145           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 146           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 147           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 148           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 149           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 150           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 151           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 152           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 153           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 154           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 155           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 156           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 157           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 158           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 159           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 160           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 161           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 162           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 163           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 164           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 165           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 166           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 167           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 168           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 169           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 170           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 171           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 172           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 173           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 174           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 175           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 176           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 177           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 178           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 179           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 180           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 181           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 182           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 183           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 184           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 185           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 186           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 187           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 188           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 189           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 190           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 191           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 192           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 193           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 194           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 195           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 196           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 197           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 198           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 199           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 200           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 201           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 202           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 203           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 204           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 205           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 206           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 207           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 208           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 209           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 210           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 211           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       | 212           |            |                                                                                                                                                                                     |
|                      |            |                                 |                       |                        |                              |                       |               |            |                                                                                                                                                                                     |

## No. \_\_\_\_\_

Boring No. \_\_\_\_\_ Date 1-28-14 Sheet 1 of 2

Type of Boring Auger Rig Cable & 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_, referred to \_\_\_\_\_

\_\_\_\_\_ Datum

Field Party: Schumate Harris - Ewing

\_\_\_\_\_ Datum

Field Party: Schumate Harris - Ewing

[illegible]



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client \_\_\_\_\_  
Project \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

PSH 1  
 Boring No. \_\_\_\_\_ Date \_\_\_\_\_ Sheet 2 of 2  
 Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_  
 Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_  
 Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_  
 Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum \_\_\_\_\_  
 Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION<br>Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                                    |
|                      | B          | 23-25                          |                       |                        |                              |                       | 2.5           |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |

# PITTSBURGH TESTING LABORATORY

## LOG OF BORING

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

Client CH<sup>2</sup>M [11]

Project Polk County EDB

Location of Boring:

|             |          |
|-------------|----------|
| Water Level | Below 25 |
|-------------|----------|

|      |    |
|------|----|
| Time | 10 |
|------|----|

|      |  |
|------|--|
| Date |  |
|------|--|

Boring No. PSH-2 Date 8-28-81 Sheet 1 of 2

Type of Boring AUGER Rig ME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: Skumate - Harris - Spier Datum

Field Party: Shumate - Harris - Spivey

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION<br>Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            | 2/4                            |                       |                        |                              |                       | 4             |            | A                                                                                                                                                                                                  |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 11            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 12            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 13            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 14            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 16            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 17            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 18            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 19            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 21            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 22            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 23            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 24            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 25            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 26            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 27            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 28            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 29            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 30            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 31            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 32            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 33            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 34            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 35            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 36            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 37            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 38            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 39            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 40            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 41            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 42            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 43            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 44            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 45            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 46            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 47            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 48            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 49            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 50            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 51            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 52            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 53            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 54            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 55            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 56            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 57            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 58            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 59            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 60            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 61            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 62            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 63            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 64            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 65            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 66            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 67            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 68            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 69            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 70            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 71            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 72            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 73            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 74            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 75            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 76            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 77            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 78            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 79            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 80            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 81            |            |                                                                                                                                                                                                    |

## No. \_\_\_\_\_

Boring No. P54-2 Date \_\_\_\_\_ Sheet 2 of 2

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datum

Field Party: \_\_\_\_\_

|                     |  |
|---------------------|--|
| Location of Boring: |  |
| Water Level         |  |
| Time                |  |
| Date                |  |

[illegible]



## No. \_\_\_\_\_

|      |  |
|------|--|
| Date |  |
|------|--|

Datum

Field Party: \_\_\_\_\_

[illegible]

## 5 No. \_\_\_\_\_

|                     |          |
|---------------------|----------|
| Location of Boring: |          |
| Water Level         | Below 25 |
| Time                |          |
| Date                |          |

Field Party: Shumale Harris-Eingo Datum

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |             |
|                      |            |                                |                       |                        |                              |                       | 1             |            |             |
|                      |            |                                |                       |                        |                              |                       | 2             |            |             |
|                      |            | 2/4                            |                       |                        |                              |                       | 3             |            | A           |
|                      |            |                                |                       |                        |                              |                       | 4             |            |             |
|                      |            |                                |                       |                        |                              |                       | 5             |            |             |
|                      |            |                                |                       |                        |                              |                       | 6             |            |             |
|                      |            |                                |                       |                        |                              |                       | 7             |            |             |
|                      |            |                                |                       |                        |                              |                       | 8             |            |             |
|                      |            |                                |                       |                        |                              |                       | 9             |            |             |
|                      |            |                                |                       |                        |                              |                       | 10            |            |             |
|                      |            |                                |                       |                        |                              |                       | 11            |            |             |
|                      |            |                                |                       |                        |                              |                       | 12            |            |             |
|                      |            |                                |                       |                        |                              |                       | 13            |            |             |
|                      |            |                                |                       |                        |                              |                       | 14            |            |             |
|                      |            |                                |                       |                        |                              |                       | 15            |            |             |
|                      |            |                                |                       |                        |                              |                       | 16            |            |             |
|                      |            |                                |                       |                        |                              |                       | 17            |            |             |
|                      |            |                                |                       |                        |                              |                       | 18            |            |             |
|                      |            |                                |                       |                        |                              |                       | 19            |            |             |
|                      |            |                                |                       |                        |                              |                       | 20            |            |             |
|                      |            |                                |                       |                        |                              |                       | 21            |            |             |



## No. \_\_\_\_\_

Boring No. \_\_\_\_\_ Date 8-28-84 Sheet 1 of 2

Type of Boring Auger Rig CME 55

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Below 25'

Time

Date \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Datur

Field Party: Shumate Harris Gmel

[illegible]







## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

Job No. TAM-1212CH<sup>2</sup>M HillProject HIGHLANDS COUNTY EDB study

Location of Boring:

Water Level

16

Time

Date

Boring No. HE-1 Date 9-4-84 Sheet 1 of 6Type of Boring SPT Rig CME 55Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used XBoring begun 9:15 am Boring completed 3:30 pm

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum

Field Party: Spumate, Harris, Miller  
E in gold

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                 |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-----------------------------|
|                      |            |                                |                       |                        |                              |                       | 0             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 1             |            | 0-2 Brown f. so             |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                             |
|                      | 1          | 3 1/2 - 5                      | 2-2-1                 | 12"                    |                              |                       | 4             |            | v. loose light yellow f. so |
|                      |            |                                |                       |                        |                              |                       | 5             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                             |
|                      | 2          | 8 1/2 - 10                     | 3-2-4                 | 11"                    |                              |                       | 9             |            | loose light yellow f. so    |
|                      |            |                                |                       |                        |                              |                       | 10            |            |                             |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                             |
|                      | 3          | 13 1/2 - 15                    | 3-5-7                 | 10"                    |                              |                       | 4             |            | firm white f. so            |
|                      |            |                                |                       |                        |                              |                       | 15            |            |                             |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                             |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                             |
|                      | 4          | 18 1/2 - 20                    | 4-4-4                 | 12"                    |                              |                       | 9             |            | loose white f. so           |
|                      |            |                                |                       |                        |                              |                       | 20            |            |                             |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                             |

Engineer

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

TAM-1212

Object \_\_\_\_\_  
 Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. HE-1 Date \_\_\_\_\_ Sheet 2 of 6

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_ Datum \_\_\_\_\_

Field Party: \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION       |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|-------------------|
|                      |            |                                |                       |                        |                              |                       | 20            |            |                   |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                   |
|                      | 5          | 23 1/2<br>25                   | 6-6-6                 | 15"                    |                              |                       | 4             |            | firm white f.s.s. |
|                      |            |                                |                       |                        |                              |                       | 25            |            |                   |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                   |
|                      | 6          | 28 1/2<br>30                   | 7-7-7                 | 15"                    |                              |                       | 9             |            | " " " "           |
|                      |            |                                |                       |                        |                              |                       | 30            |            |                   |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                   |
|                      | 7          | 33 1/2<br>35                   | 6-7-8                 | 15"                    |                              |                       | 35            |            | " " " "           |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                   |
|                      |            |                                |                       |                        |                              |                       | 9             |            | " " " "           |
|                      | 8          | 38 1/2<br>40                   | 7-8-9                 | 14"                    |                              |                       | 40            |            |                   |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                   |

Engineer

## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

TAM-1212

 Object \_\_\_\_\_  
 Location of Boring: \_\_\_\_\_

Water Level \_\_\_\_\_

Time \_\_\_\_\_

Date \_\_\_\_\_

Boring No. HE-1 Date \_\_\_\_\_ Sheet 3 of 6

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_ Datur \_\_\_\_\_

| Depth of Casing, ft. | Sample No. | Sample depth from to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION<br>Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc. |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            |                                |                       |                        |                              |                       |               |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 40            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 4             |            | firm white fi sd                                                                                                                                                                                   |
|                      | 9          | 43 1/2 - 45                    | 6-8-9                 | 15"                    |                              |                       | 45            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      | 10         | 48 1/2 - 50                    | 9-15-13               | 13"                    |                              |                       | 50            |            | VERY Firm white fi sd                                                                                                                                                                              |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 4             |            | " " " " "                                                                                                                                                                                          |
|                      | 11         | 53 1/2 - 55                    | 12-12-16              | 12"                    |                              |                       | 55            |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                                                                                                                                                                                    |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                                                                                                                                                                                    |
|                      | 12         | 58 1/2 - 60                    | 12-13-19              | 12"                    |                              |                       | 60            |            | Dense white fi sd                                                                                                                                                                                  |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                                                                                                                                                                                    |



## PITTSBURGH TESTING LABORATORY

## LOG OF BORING

TAM-1212

Boring No. HE-1 Date \_\_\_\_\_ Sheet 4 of 6

Type of Boring \_\_\_\_\_ Rig \_\_\_\_\_

Casing used \_\_\_\_\_ Size \_\_\_\_\_ Drilling mud used \_\_\_\_\_

Boring begun \_\_\_\_\_ Boring completed \_\_\_\_\_

Ground Elevation \_\_\_\_\_ referred to \_\_\_\_\_

Field Party: \_\_\_\_\_ Datum \_\_\_\_\_

|                           |       |
|---------------------------|-------|
| Object _____              |       |
| Location of Boring: _____ |       |
| Water Level               | _____ |
| Time                      | _____ |
| Date                      | _____ |

| Depth of Casing, ft. | Sample No. | Sample depth from-to (in feet) | Blows/foot on Sampler | ID of Sampler (inches) | Tot. length of recov. sample | Length of Lab. sample | DEPTH IN FEET | SOIL GRAPH | DESCRIPTION                                |
|----------------------|------------|--------------------------------|-----------------------|------------------------|------------------------------|-----------------------|---------------|------------|--------------------------------------------|
|                      |            |                                |                       |                        |                              |                       | 60            |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                            |
|                      | 13         | 63 1/2 - 65                    | 15-18-20              | 13"                    |                              |                       | 65            |            | Dense white fi. so                         |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                            |
|                      | 14         | 68 1/2 - 70                    | 15-20-21              | 12"                    |                              |                       | 70            |            | Dense light Brown fi. to med. so           |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 2             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 3             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 4             |            |                                            |
|                      | 15         | 73 1/2 - 75                    | 14-15-17              | 16"                    |                              |                       | 75            |            | Dense Brown and light Brown fi. to med. so |
|                      |            |                                |                       |                        |                              |                       | 6             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 7             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 8             |            |                                            |
|                      |            |                                |                       |                        |                              |                       | 9             |            |                                            |
|                      | 16         | 78 1/2 - 80                    | 18-21-26              | 14"                    |                              |                       | 80            |            | Dense light brown fi. to med. so           |
|                      |            |                                |                       |                        |                              |                       | 1             |            |                                            |



PTL - TAMPA

S. C. KNAUSS, P.E.  
Manager



**Pittsburgh  
Testing  
Laboratory**

Nov. 5, 1984

PTL Ref: TAM-1212

CH2M Hill  
1408 N. Westshore Blvd.  
Suite 900  
Tampa, Fla. 33607

Attn: John Miller

Ref: Permeability and Grain Size Tests  
EDB Sites

Dear John:

Attached are the results of the laboratory tests of the undisturbed samples. Permeability and grain size tests were conducted on the undisturbed samples. Where possible portions of the samples were retained for use by the University of Florida laboratory to replace destroyed samples.

Attached to this letter is a summary of the permeability tests and grain size distribution curves for all tested samples.

Should you have any questions, please contact us.

Respectfully submitted,

PITTSBURGH TESTING LABORATORY

Stephen C. Knauss, P.E.  
Tampa District Manager

SCK/lr





**Pittsburgh  
Testing  
Laboratory**

**PTL-TAMPA**

512 N DELAWARE AVENUE  
TAMPA, FLORIDA 33606  
813/253-3485

## REPORT

ORDER NO. TAM-1212

DATE 11-02-84  
Page 1 of 2

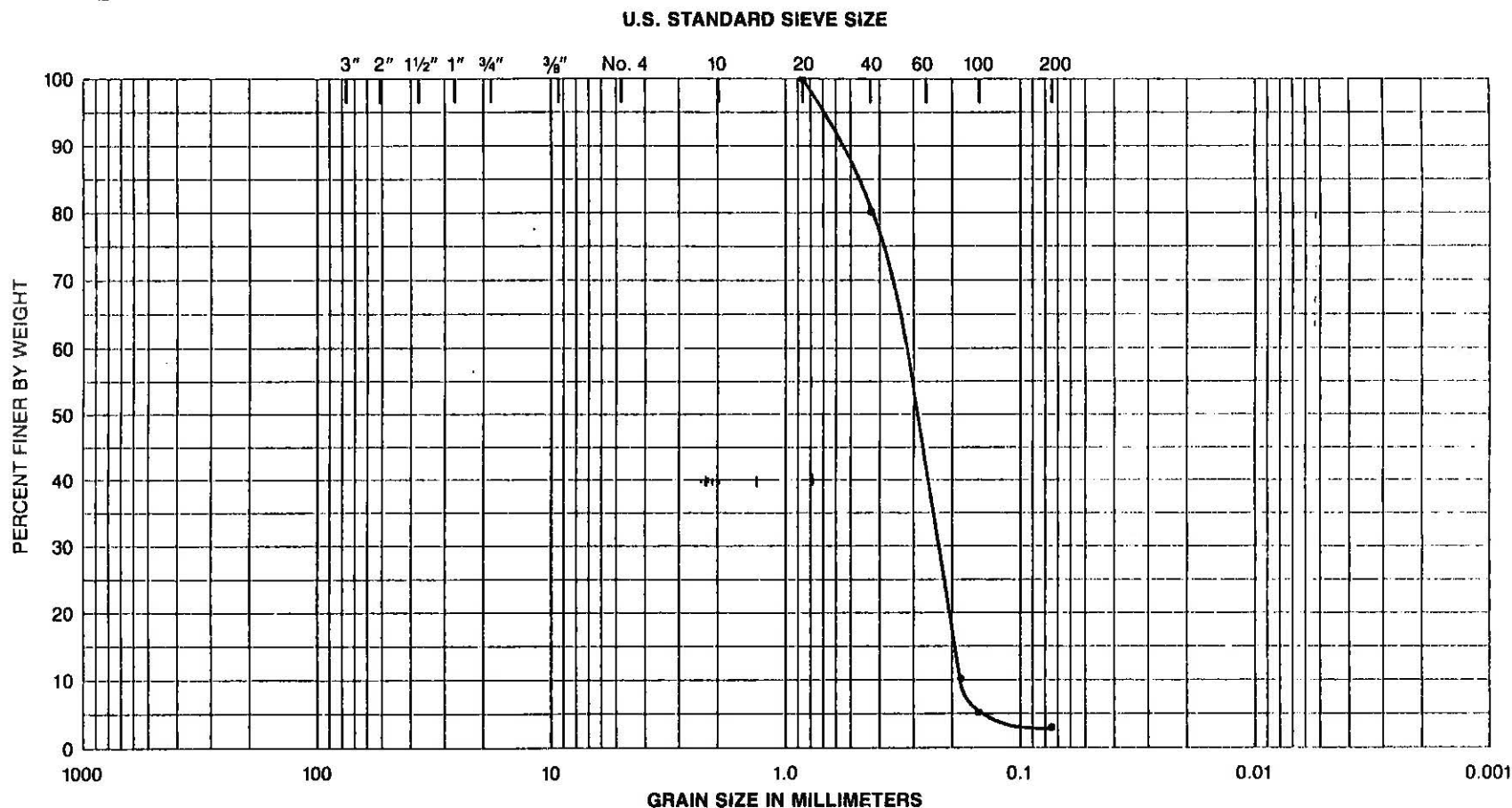
### CH2M HILL PERMEABILITY RESULTS

| <u>SAMPLE NUMBER</u> | <u>COUNTY</u> | <u>PERMEABILITY (CM/SEC)</u> | <u>SOIL DESCRIPTION</u>                  |
|----------------------|---------------|------------------------------|------------------------------------------|
| P-SH-1A              | Polk          | $K = 1.00 \times 10^{-1}$    | Yellow - Brown Fine SAND                 |
| P-SH-1B              | Polk          | $K = 2.53 \times 10^{-3}$    | Yellow Fine SAND                         |
| P-SH-2A              | Polk          | $K = 2.28 \times 10^{-2}$    | Light Brown Slightly Clayey<br>Fine SAND |
| P-SH-2B              | Polk          | $K = 9.03 \times 10^{-4}$    | Orange Slightly Clayey<br>Fine SAND      |
| P-SH-3A              | Polk          | $K = 1.71 \times 10^{-2}$    | Light Brown to Tan Fine<br>SAND          |
| P-SH-3B              | Polk          | $K = 7.78 \times 10^{-4}$    | Orange Slightly Clayey<br>Fine SAND      |
| P-SH-4A              | Polk          | $K = 1.65 \times 10^{-4}$    | Light Tan to Orange Fine<br>SAND         |
| P-SH-4B              | Polk          | $K = 4.88 \times 10^{-4}$    | Orange Clayey Fine SAND                  |
| P-SH-5A              | Polk          | $K = 6.47 \times 10^{-2}$    | Light Brown Fine SAND                    |
| P-SH-5B              | Polk          | $K = 6.29 \times 10^{-4}$    | Orange Fine SAND                         |
| P-SH-6A              | Polk          | $K = 1.08 \times 10^{-2}$    | Dark Brown to Black<br>Organic SAND      |
| P-SH-6B              | Polk          | $K = 2.54 \times 10^{-2}$    | Light Brown Fine SAND                    |
| H-SH-1A              | Highlands     | $K = 7.00 \times 10^{-2}$    | Light Brown Fine SAND                    |
| H-SH-1B              | Highlands     | $K = 1.52 \times 10^{-2}$    | Very Light Gray Fine<br>SAND             |
| H-SH-2A              | Highlands     | $K = 4.16 \times 10^{-2}$    | Tan Fine SAND                            |
| H-SH-2B              | Highlands     | $K = 6.22 \times 10^{-3}$    | Very Light Yellow Fine<br>SAND           |
| H-SH-3A              | Highlands     | $K = 3.08 \times 10^{-2}$    | Tan Fine SAND                            |

| <u>SAMPLE NUMBER</u> | <u>COUNTY</u> | <u>PERMEABILITY (CM/SEC)</u> | <u>SOIL DESCRIPTION</u>                                                                        |
|----------------------|---------------|------------------------------|------------------------------------------------------------------------------------------------|
| H-SH-4A              | Highlands     | $K = 3.20 \times 10^{-2}$    | Light Brown Fine SAND                                                                          |
| H-SH-4B              | Highlands     | $K = 4.07 \times 10^{-3}$    | Very Light Gray to Brown<br>Fine SAND                                                          |
| H-SH-5A              | Highlands     | $K = 8.89 \times 10^{-2}$    | Orange Fine SAND                                                                               |
| H-SH-5B              | Highlands     | $K = 4.53 \times 10^{-3}$    | Very Light Yellow to<br>White Fine SAND                                                        |
| H-SH-6A              | Highlands     | $K = 8.28 \times 10^{-3}$    | Light Brown Fine SAND                                                                          |
| H-SH-6B              | Highlands     | $K = 1.19 \times 10^{-2}$    | Very Light Yellow Fine<br>SAND                                                                 |
| J-SH-1A              | Jackson       | $K = 1.14 \times 10^{-4}$    | Light Brown Clayey Fine<br>SAND                                                                |
| J-SH-1B              | Jackson       | $K = 1.20 \times 10^{-8}$    | Gray and Rust-Brown<br>Mottled SAND and CLAY                                                   |
| J-SH-1C              | Jackson       | $K = 1.80 \times 10^{-8}$    | Gray and Orange Sandy<br>CLAY                                                                  |
| J-SH-2A              | Jackson       | *K = $2.07 \times 10^{-4}$   | Gray and Orange Mottled<br>Sandy CLAY                                                          |
| J-SH-2B1             | Jackson       | $K = 9.02 \times 10^{-4}$    | Light Tan, Brown and<br>Orange Mottled Fine to<br>Medium SAND w/Some CLAY<br>and Trace of Silt |
| J-SH-2C              | Jackson       | $K = 2.00 \times 10^{-9}$    | Light Gray and Tan Mottled<br>Clayey Fine SAND w/Sandy<br>CLAY Seams                           |
| J-SH-3A              | Jackson       | $K = 3.72 \times 10^{-4}$    | Tan Clayey Fine SAND                                                                           |
| J-SH-3B              | Jackson       | $K = 4.24 \times 10^{-5}$    | Gray and Orange Very<br>Clayey Fine SAND                                                       |
| J-SH-3C              | Jackson       | $K = 2.18 \times 10^{-8}$    | Orange Sandy CLAY                                                                              |
| J-SH-4A              | Jackson       | $K = 6.05 \times 10^{-8}$    | Orange Sandy CLAY                                                                              |
| J-SH-4B              | Jackson       | $K = 5.39 \times 10^{-7}$    | Yellow to Dark Brown<br>and Orange Mottled Sandy<br>CLAY                                       |
| J-SH-4C              | Jackson       | $K = 7.00 \times 10^{-9}$    | Rust-Brown Sandy CLAY                                                                          |

\*Fractured Sample - Flowby

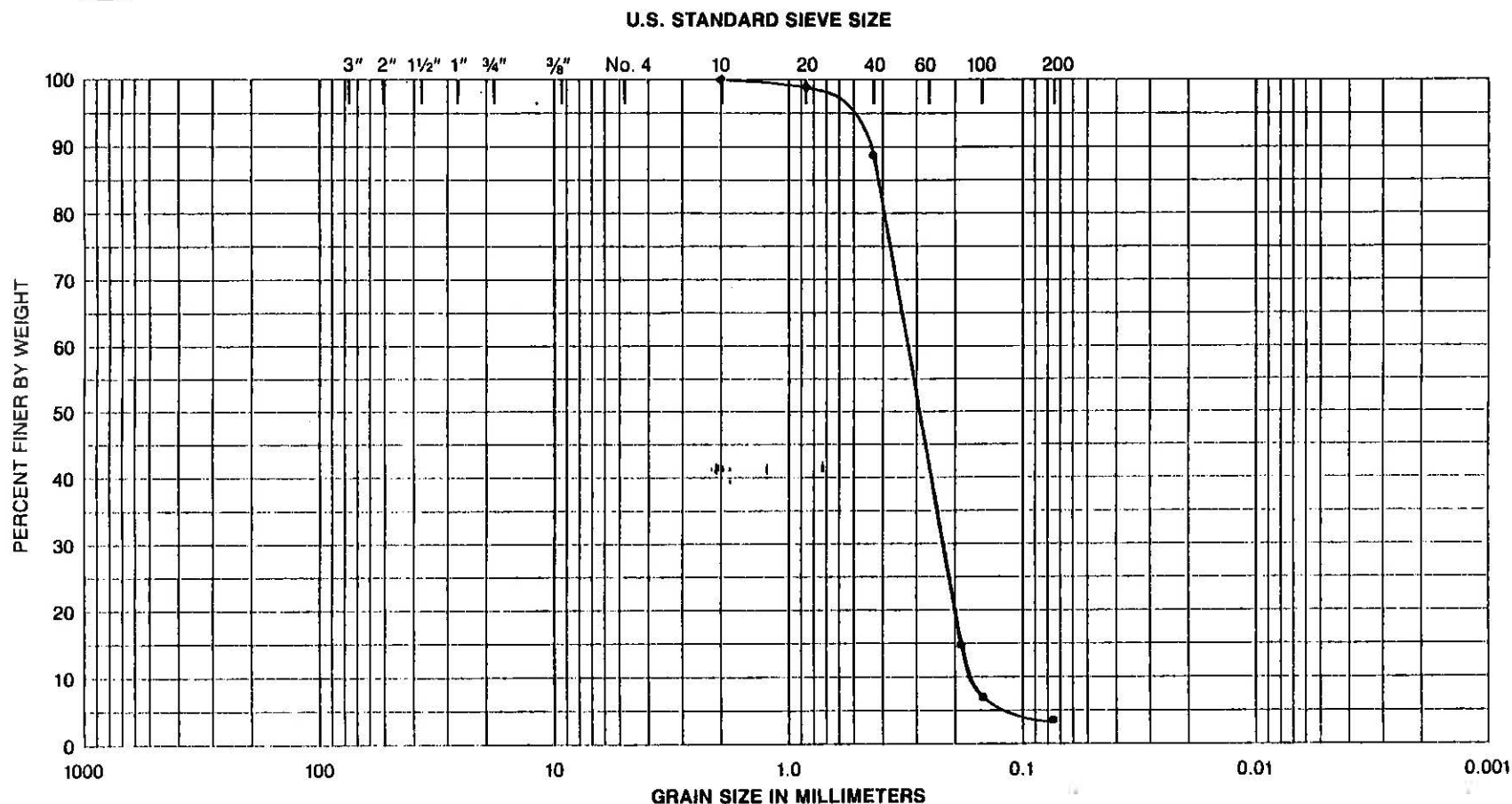
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

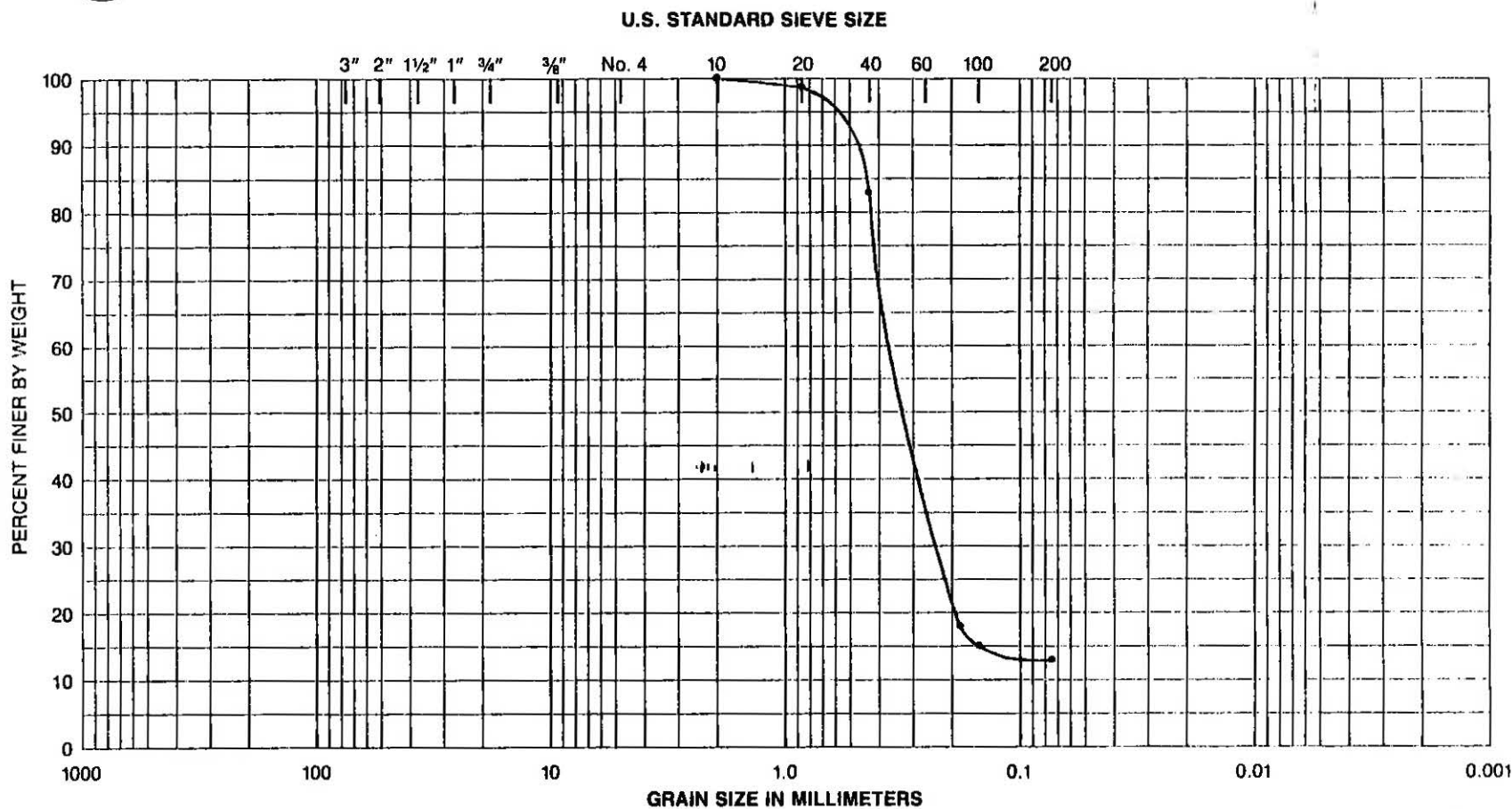
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**Pittsburgh Testing Laboratory**  
**GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

CLIENT: CH2M Hill

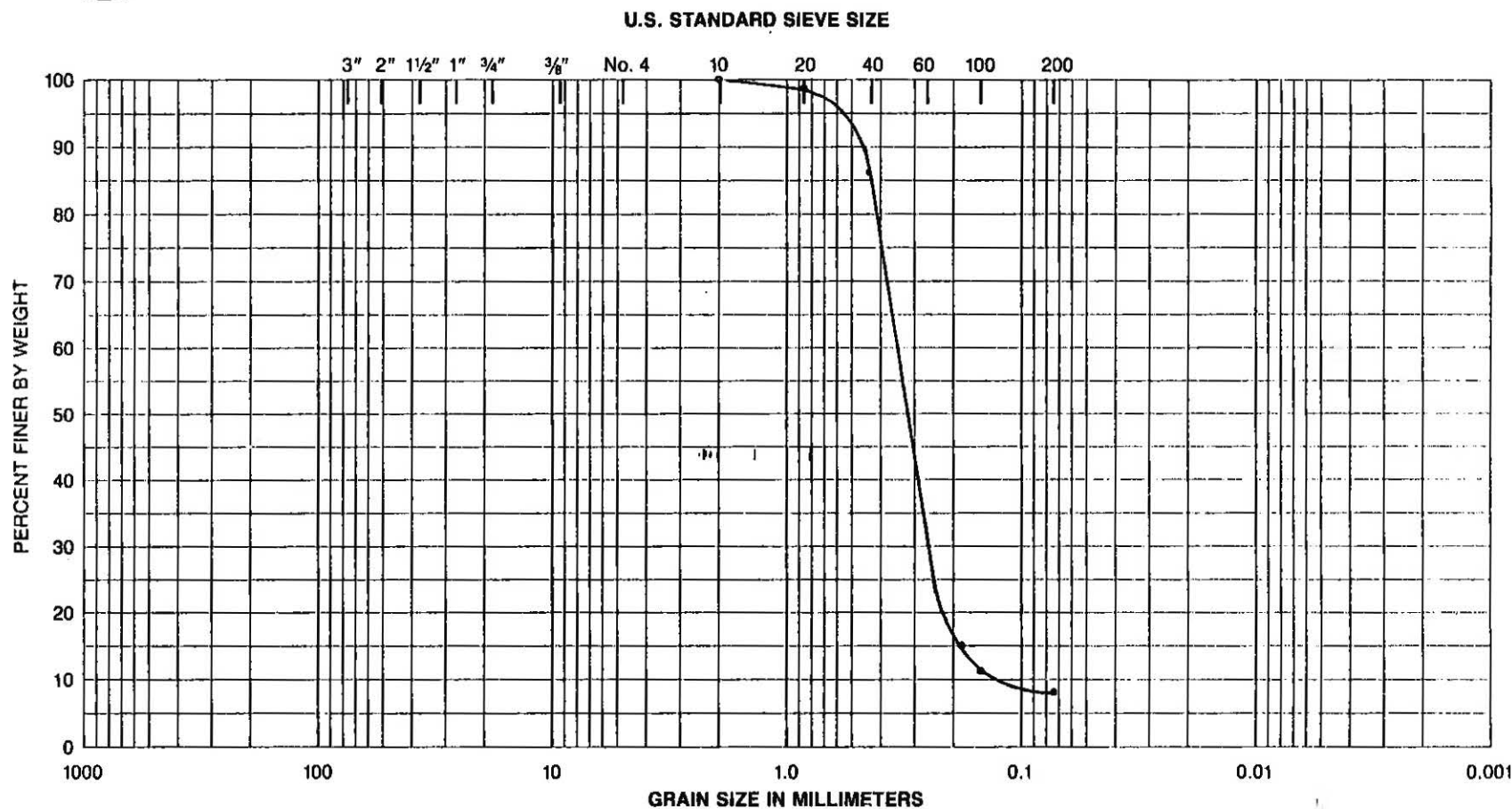


| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

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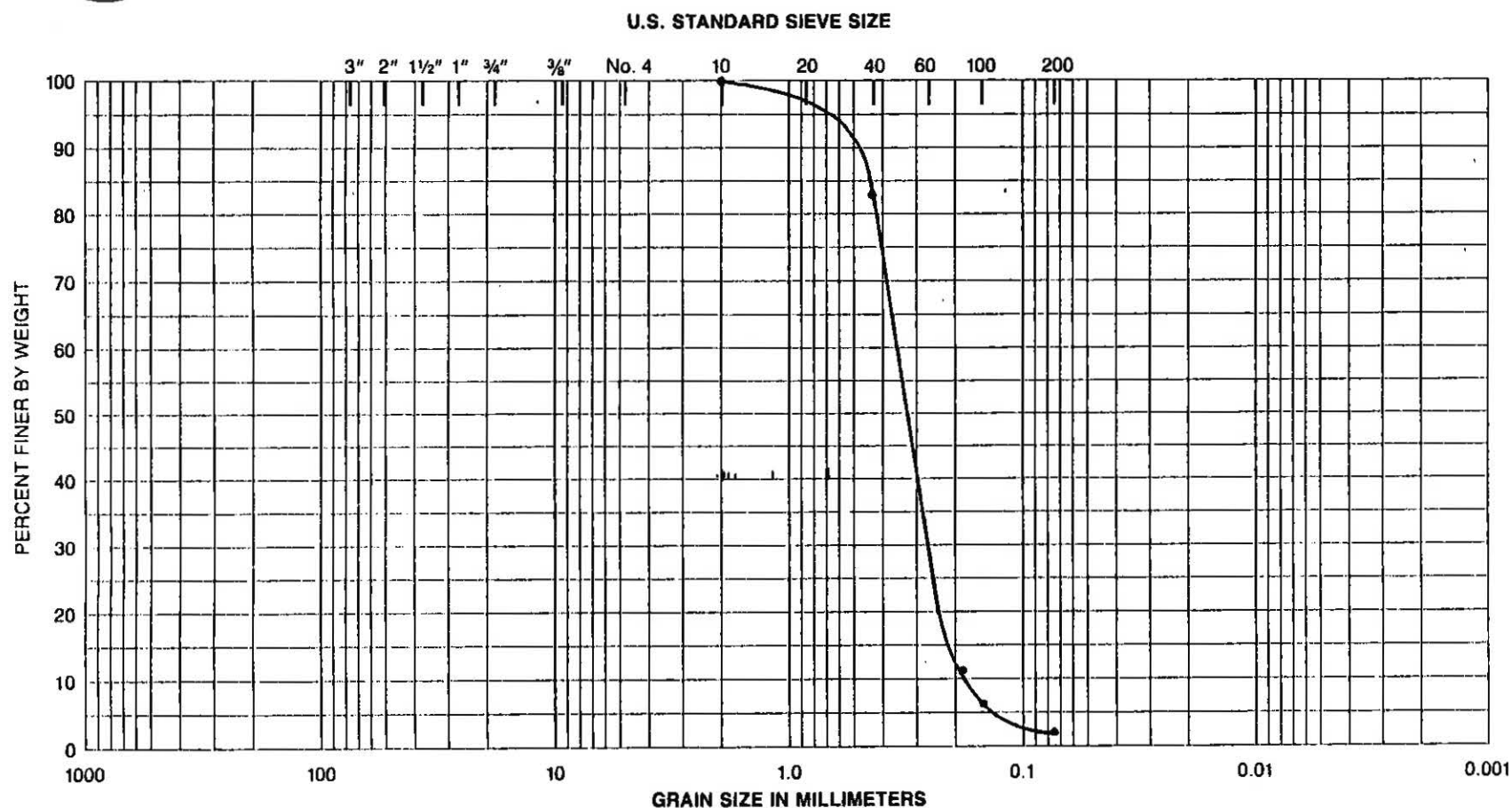


# Pittsburgh Testing Laboratory GRAIN SIZE DISTRIBUTION CURVE

ORDER NO. TAM-1212CLIENT: CH2M Hill

ORDER NO. TAM-1212

CLIENT: CH2M Hill

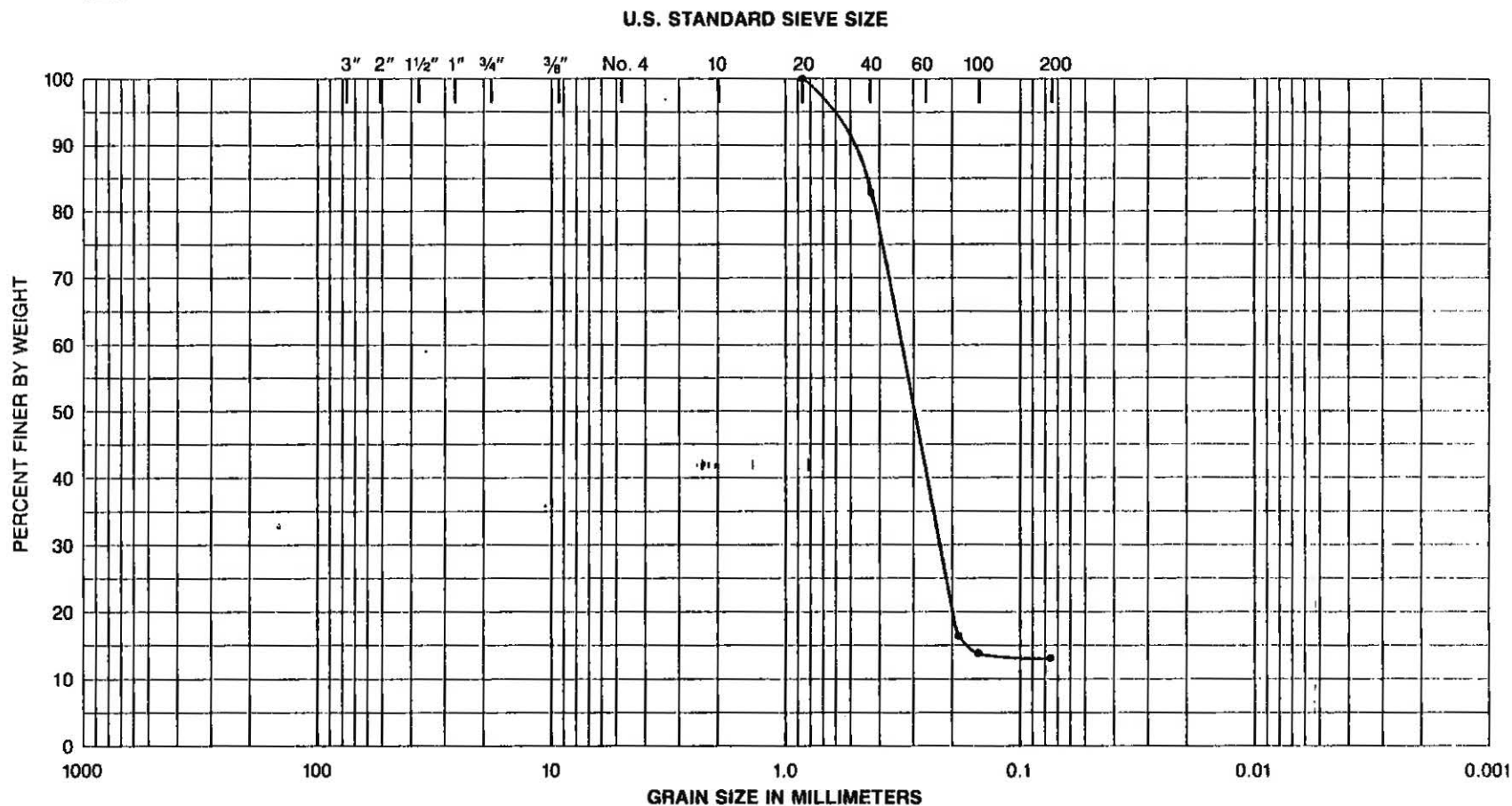


| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]



ORDER NO. TAM-1212  
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]



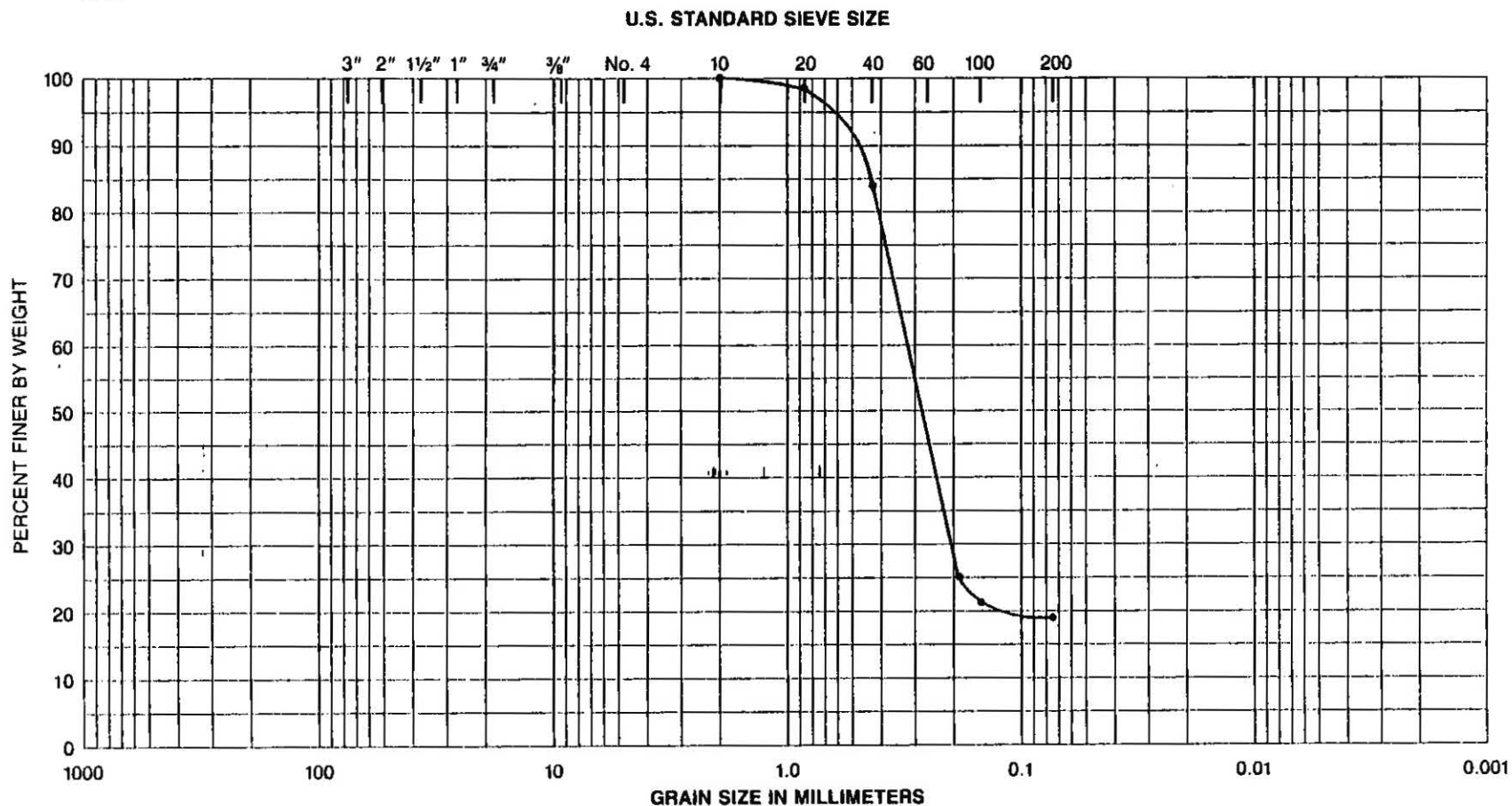
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**Pittsburgh Testing Laboratory**  
**GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

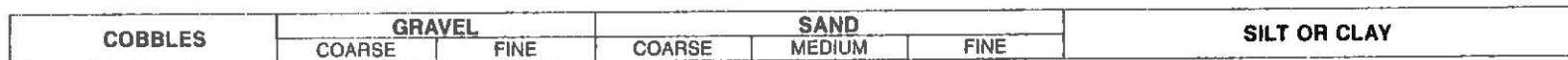
CLIENT: CH2M Hill



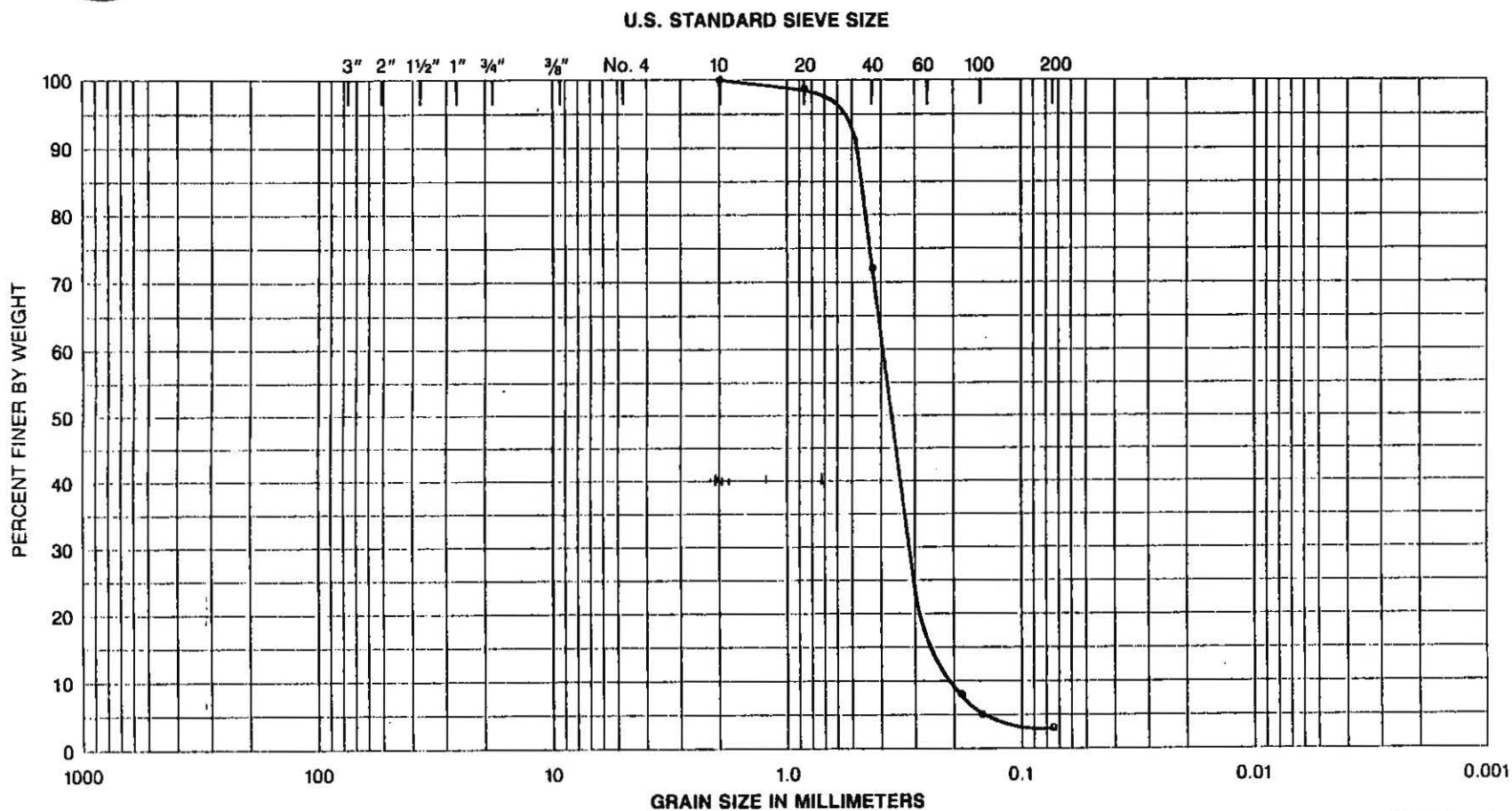
| COBBLES | GRAVEL |      | COARSE | SAND   |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE |        | MEDIUM | FINE |              |

| TEST BORING NO. | SAMPLE NO. | DEPTH FT. | LINE | GROUP SYM. | CLASSIFICATION | IN-SITU WC | LL | PL | PI | Gs | REMARKS                   | PLOTTED BY: |
|-----------------|------------|-----------|------|------------|----------------|------------|----|----|----|----|---------------------------|-------------|
| P-SH-4          | B          | 23'-25'   | ---  | SC         | Orange Clayey  |            |    |    |    |    | $K = 4.88 \times 10^{-4}$ | JFE         |
|                 |            |           | ---  |            | Fine SAND      |            |    |    |    |    |                           |             |
|                 |            |           | -.-  |            |                |            |    |    |    |    |                           |             |
|                 |            |           | ---  |            |                |            |    |    |    |    |                           |             |

CLIENT: CH2M Hill

[illegible]

CLIENT: CH2M Hill

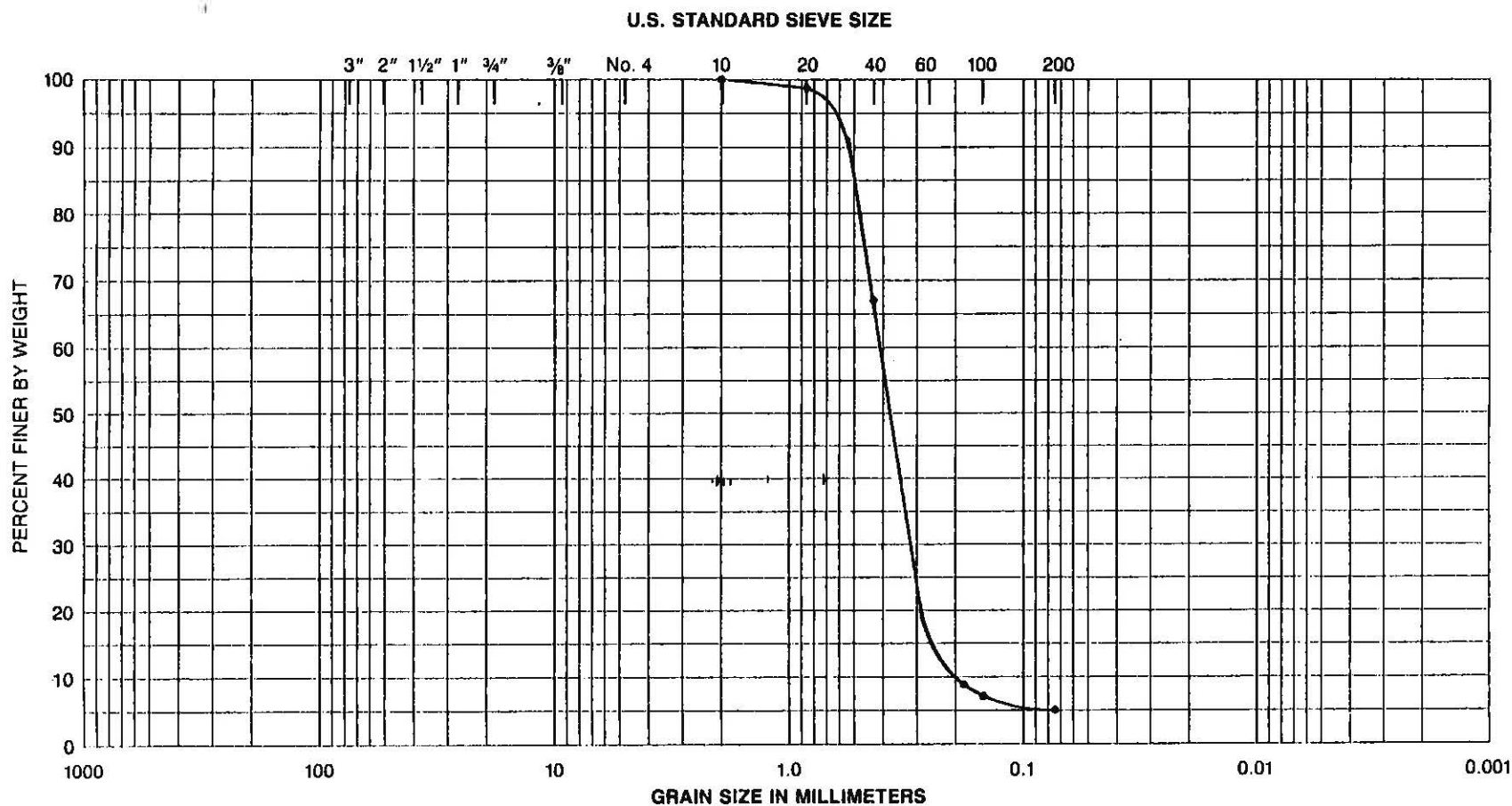


| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

ORDER NO. TAM-1212

CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

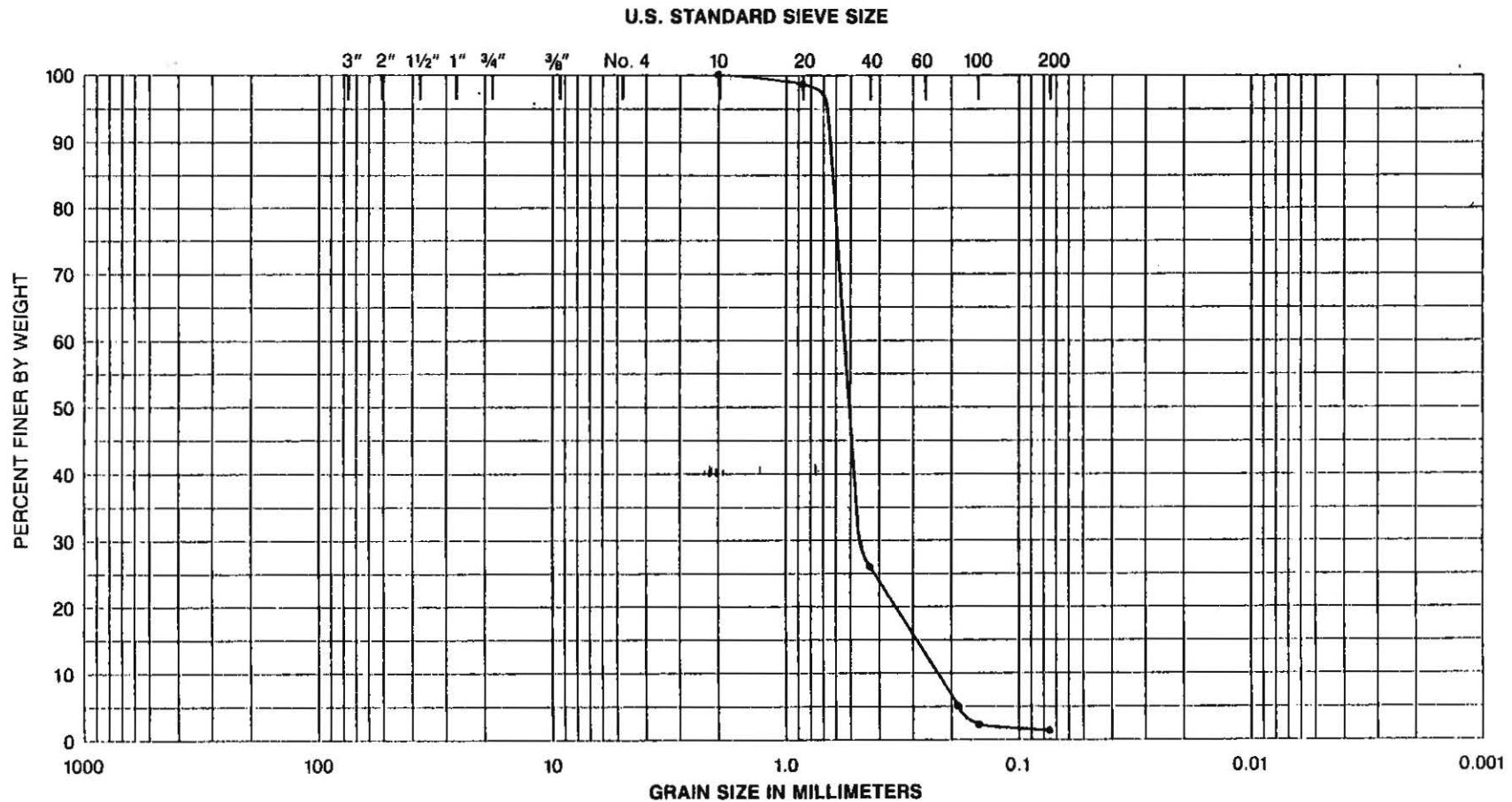
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**Pittsburgh Testing Laboratory**  
**GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

CLIENT: CH2M Hill



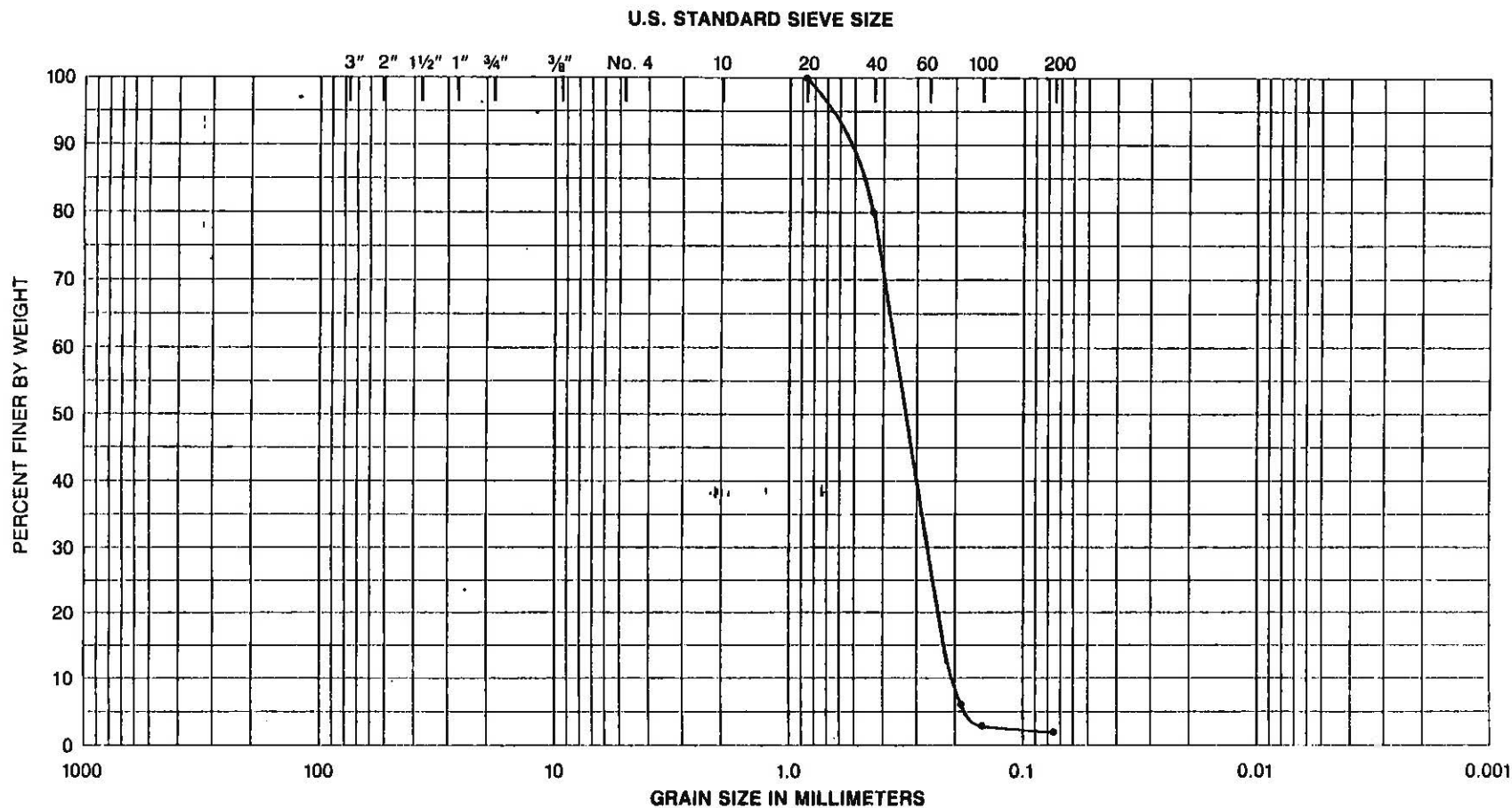




**Pittsburgh Testing Laboratory**  
GRAIN SIZE DISTRIBUTION CURVE

ORDER NO. TAM-1212

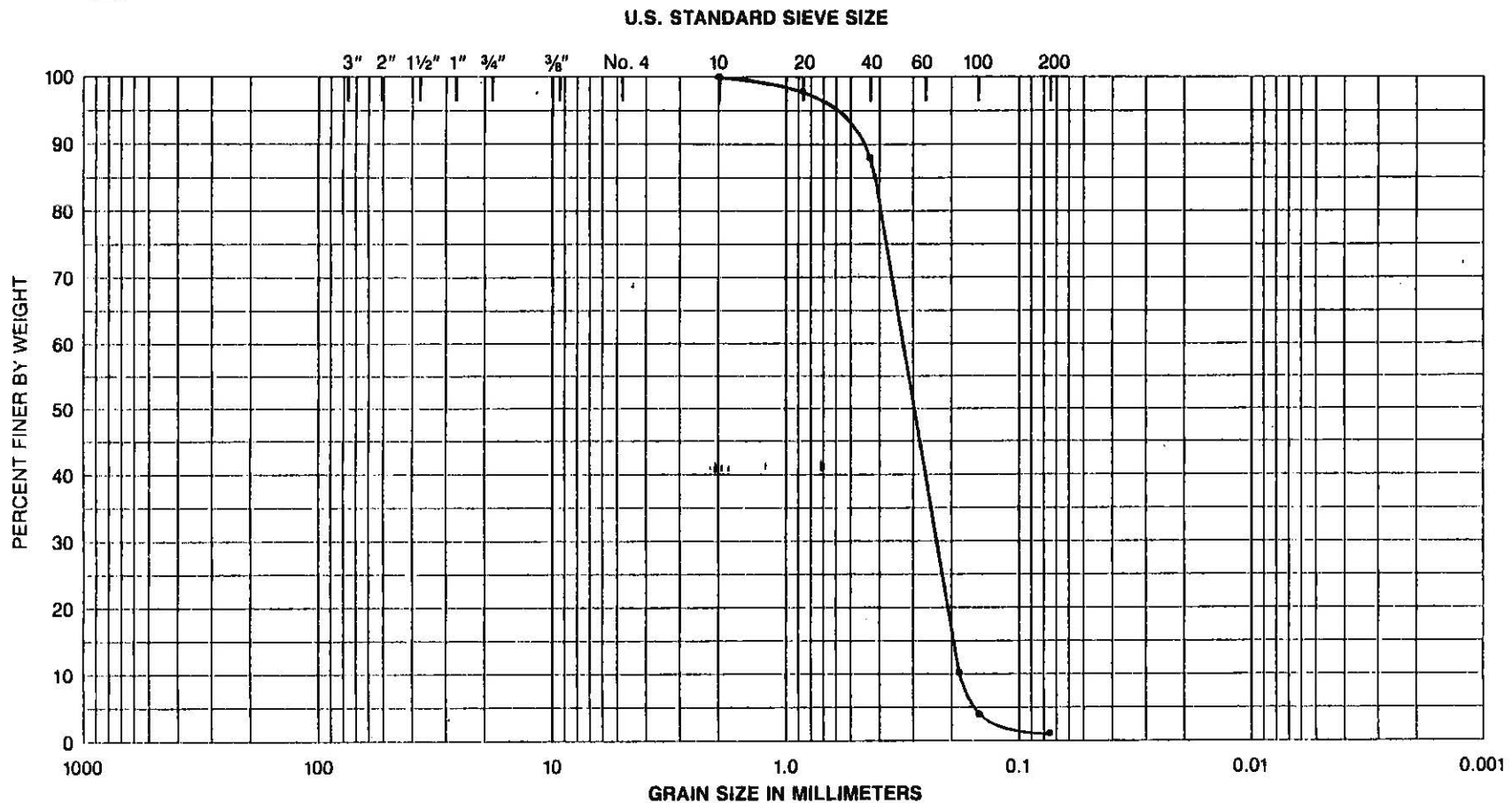
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

CLIENT: CH2M Hill

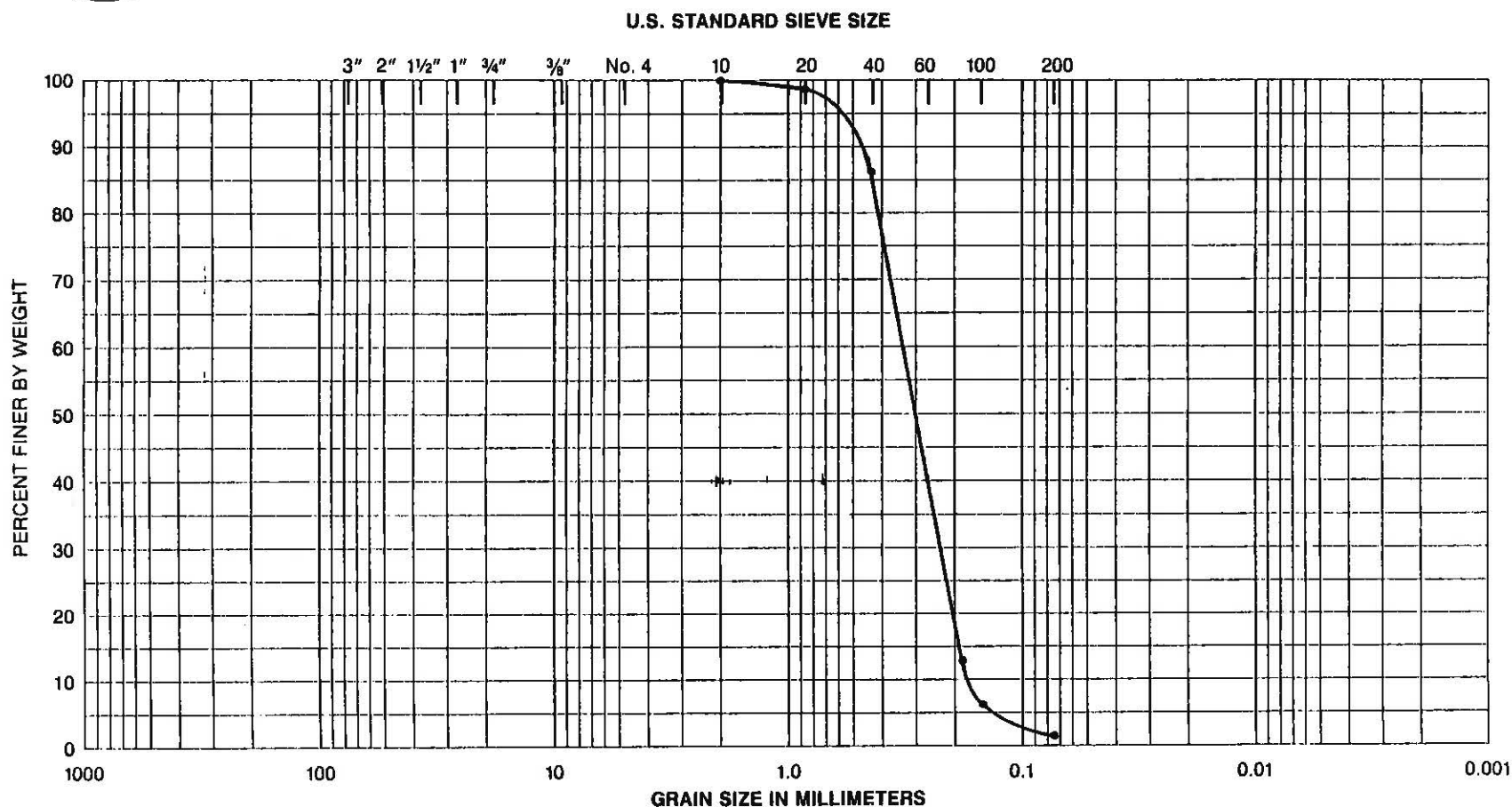


| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]



CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

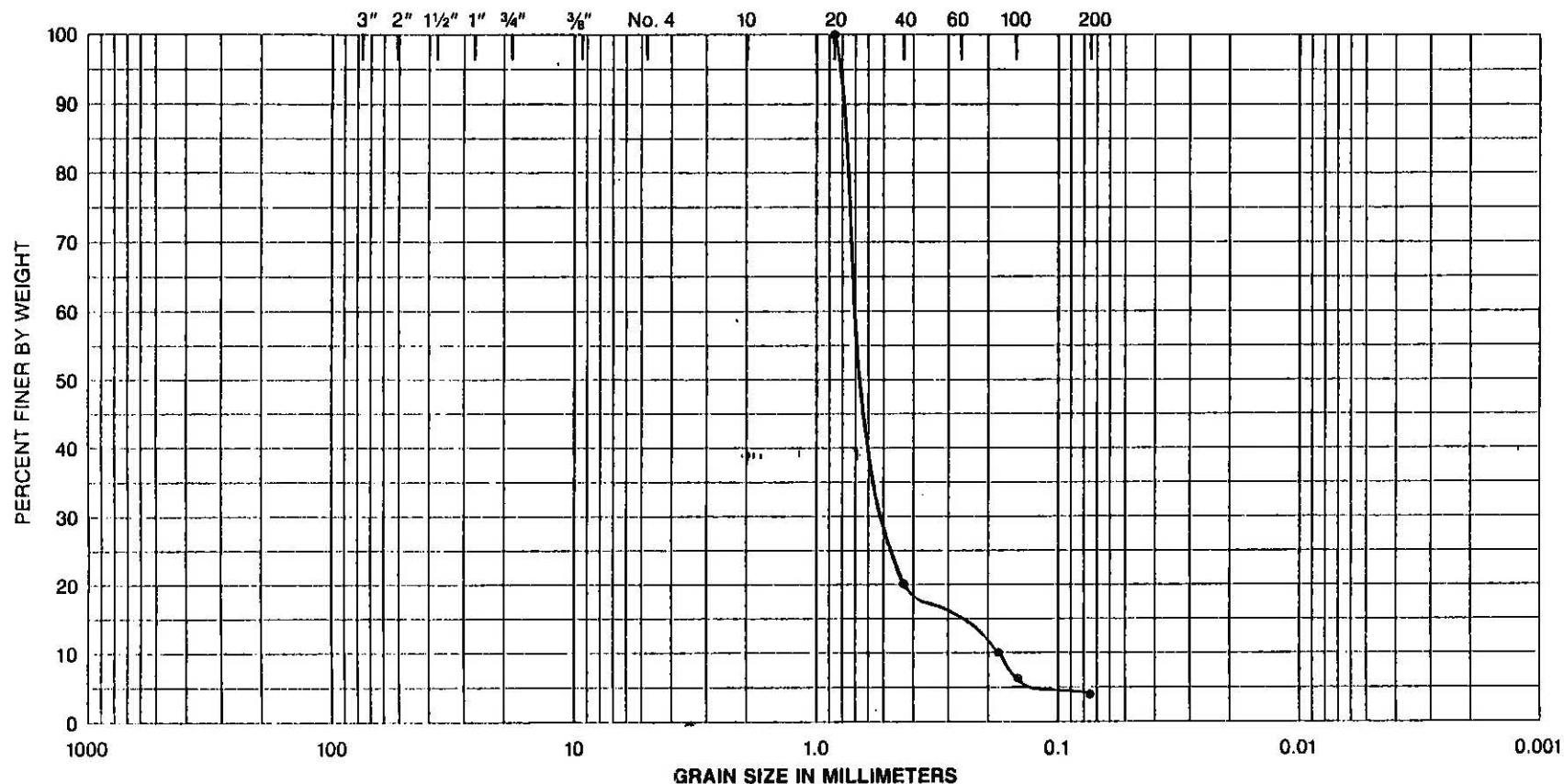


# Pittsburgh Testing Laboratory GRAIN SIZE DISTRIBUTION CURVE

ORDER NO. TAM-1212

CLIENT: CH2M Hill

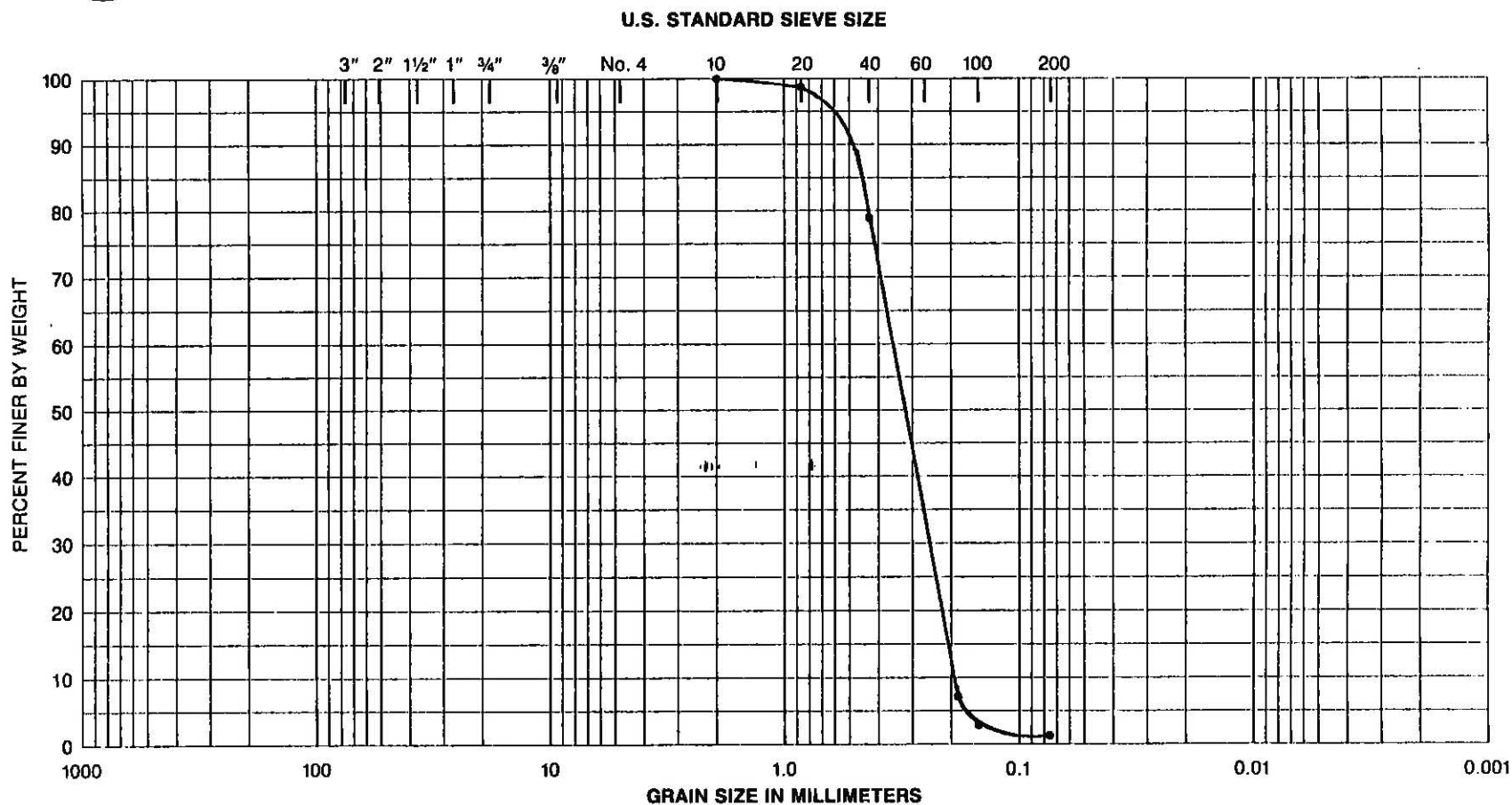
U.S. STANDARD SIEVE SIZE



ORDER NO. TAM-1212  
CLIENT: CH2M Hill

[illegible]

ORDER NO. \_\_\_\_\_ TAM-1212  
CLIENT: \_\_\_\_\_ CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

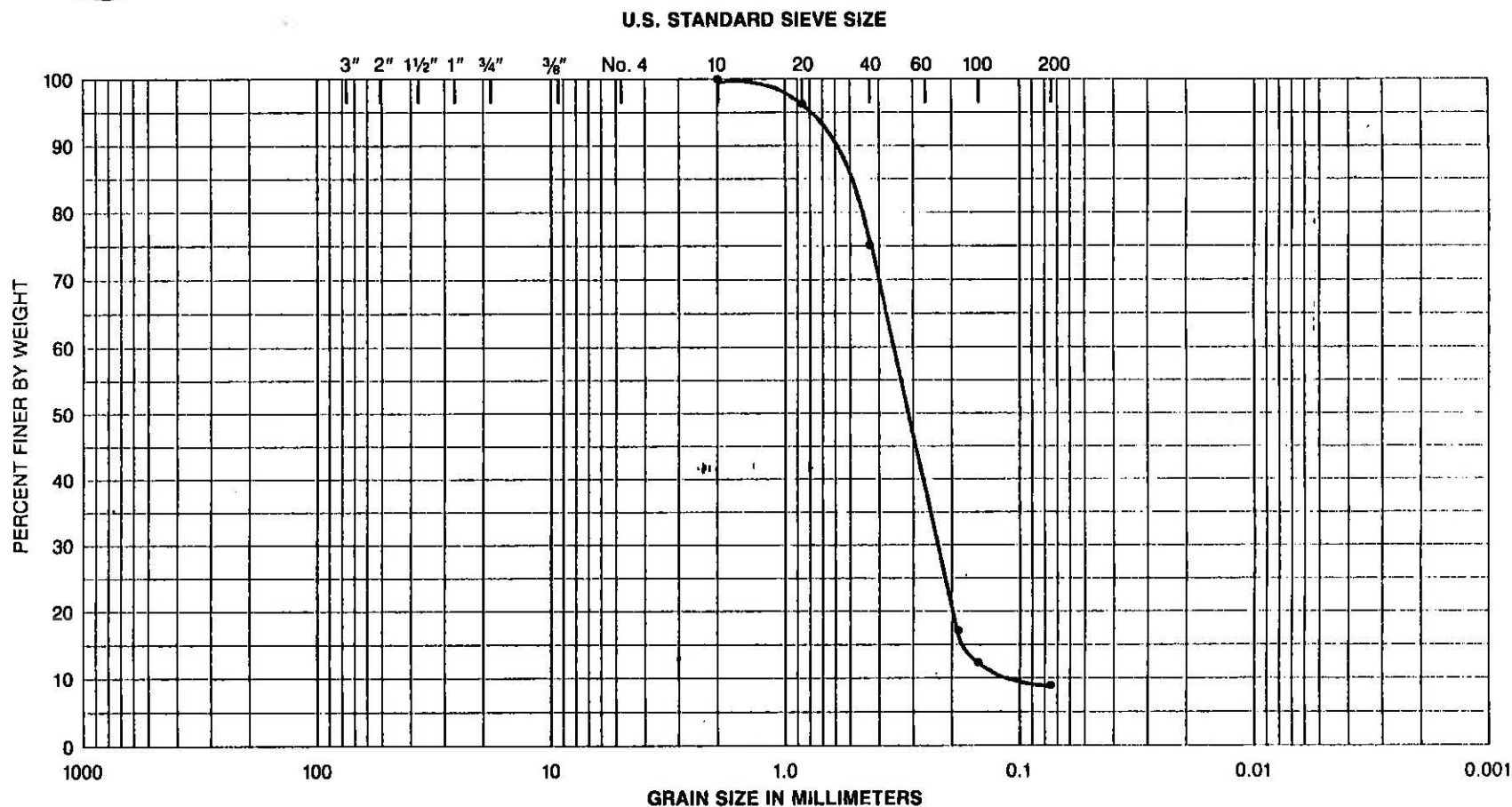
[illegible]



**Pittsburgh Testing Laboratory**  
**GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

CLIENT: CH2M Hill



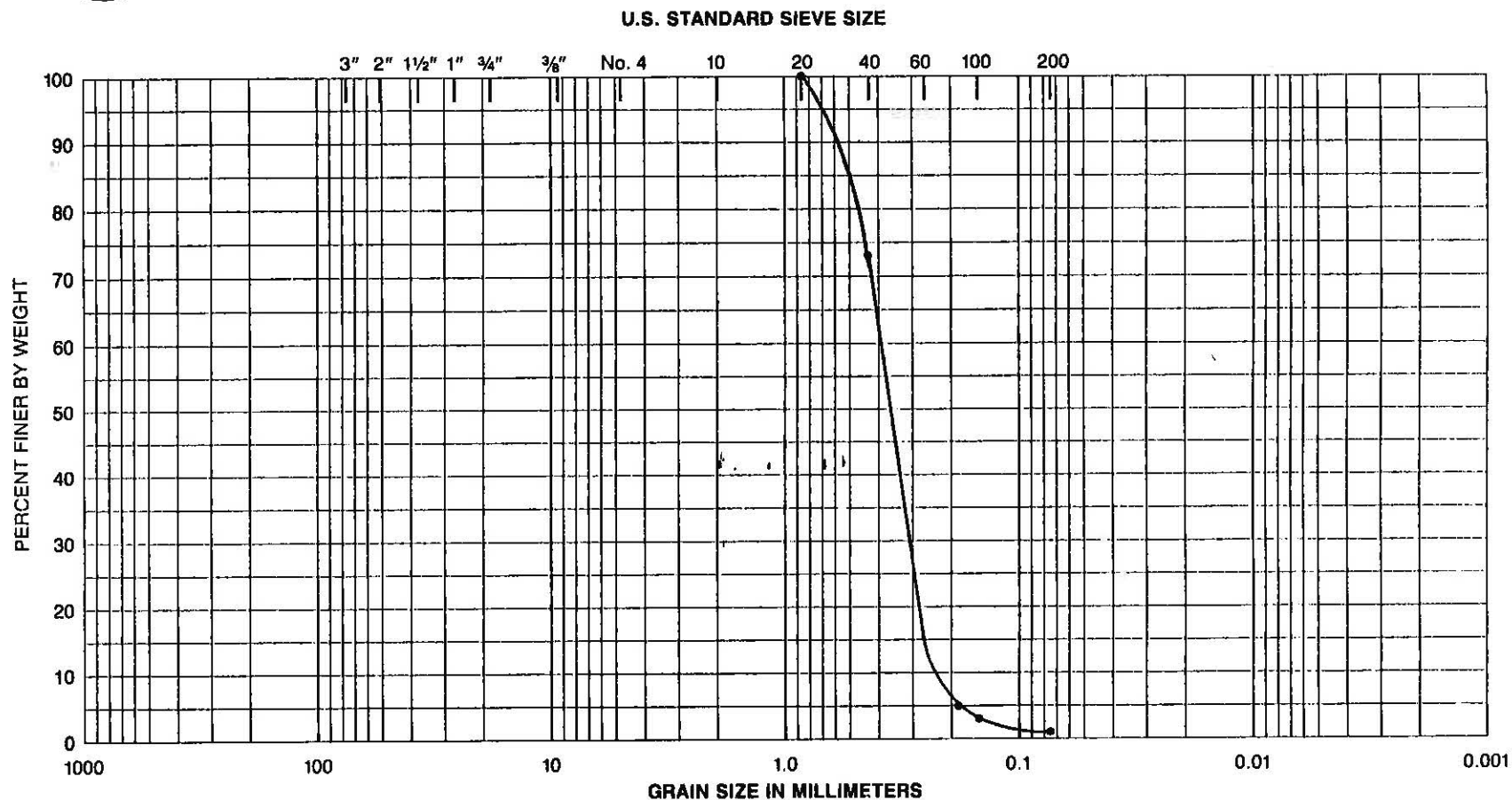
| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

| TEST BORING NO. | SAMPLE NO. | DEPTH FT. | LINE | GROUP SYM. | CLASSIFICATION     | IN-SITU WC | LL | PL | PI | G <sub>s</sub> | REMARKS                     | PLOTTED BY: |
|-----------------|------------|-----------|------|------------|--------------------|------------|----|----|----|----------------|-----------------------------|-------------|
| H-SH-4          | B          | 12'-14.5' | ---  | SP-SM      | Very Light Gray to |            |    |    |    |                | K = 4.07 x 10 <sup>-3</sup> | JFE         |
|                 |            |           | ---  |            | Brown Fine SAND    |            |    |    |    |                |                             |             |
|                 |            |           | ---  |            |                    |            |    |    |    |                |                             |             |
|                 |            |           | ---  |            |                    |            |    |    |    |                |                             |             |



**Pittsburgh Testing Laboratory**  
**GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212  
CLIENT: CH2M Hill

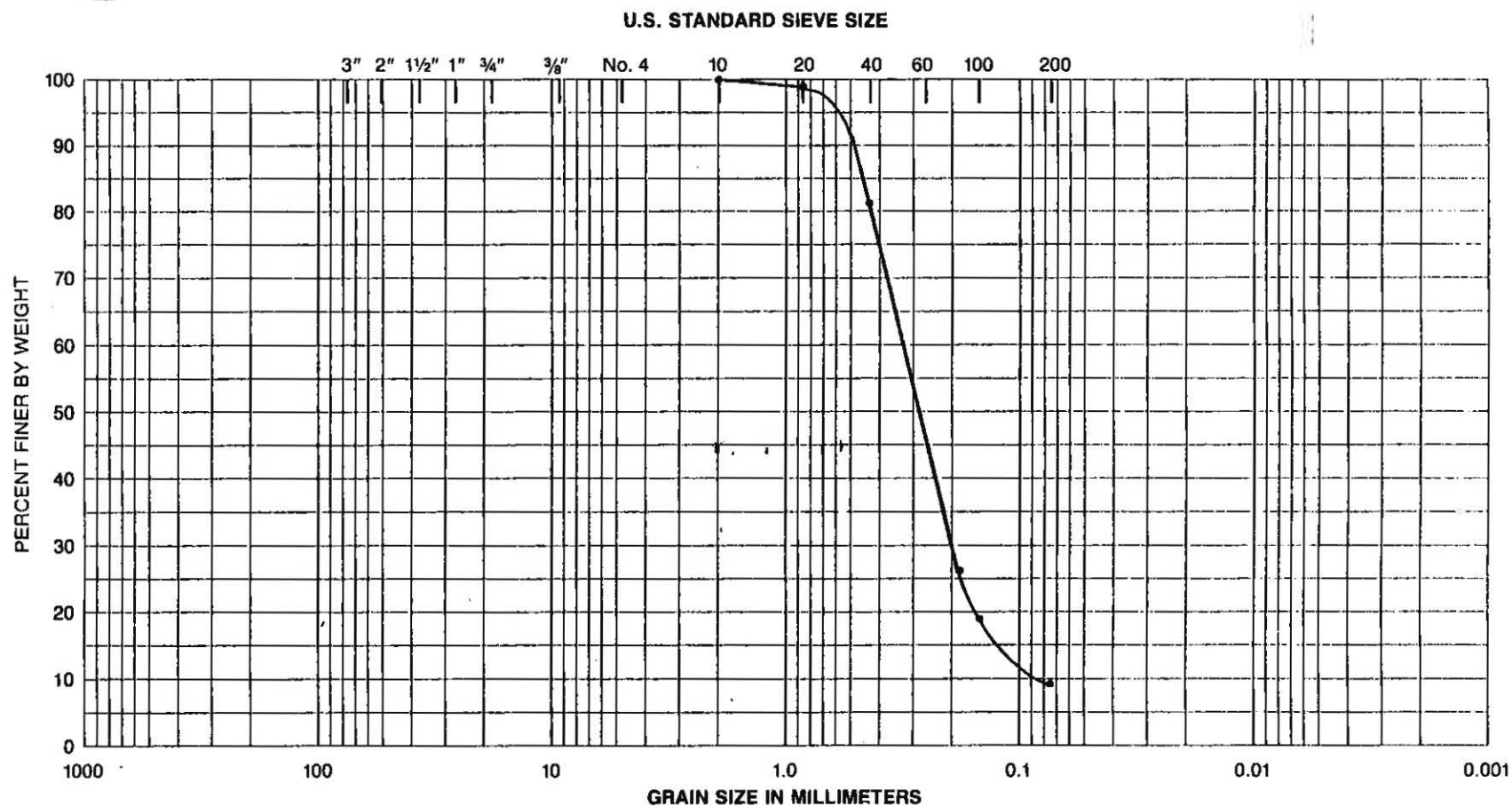




# Pittsburgh Testing Laboratory GRAIN SIZE DISTRIBUTION CURVE

ORDER NO. TAM-1212

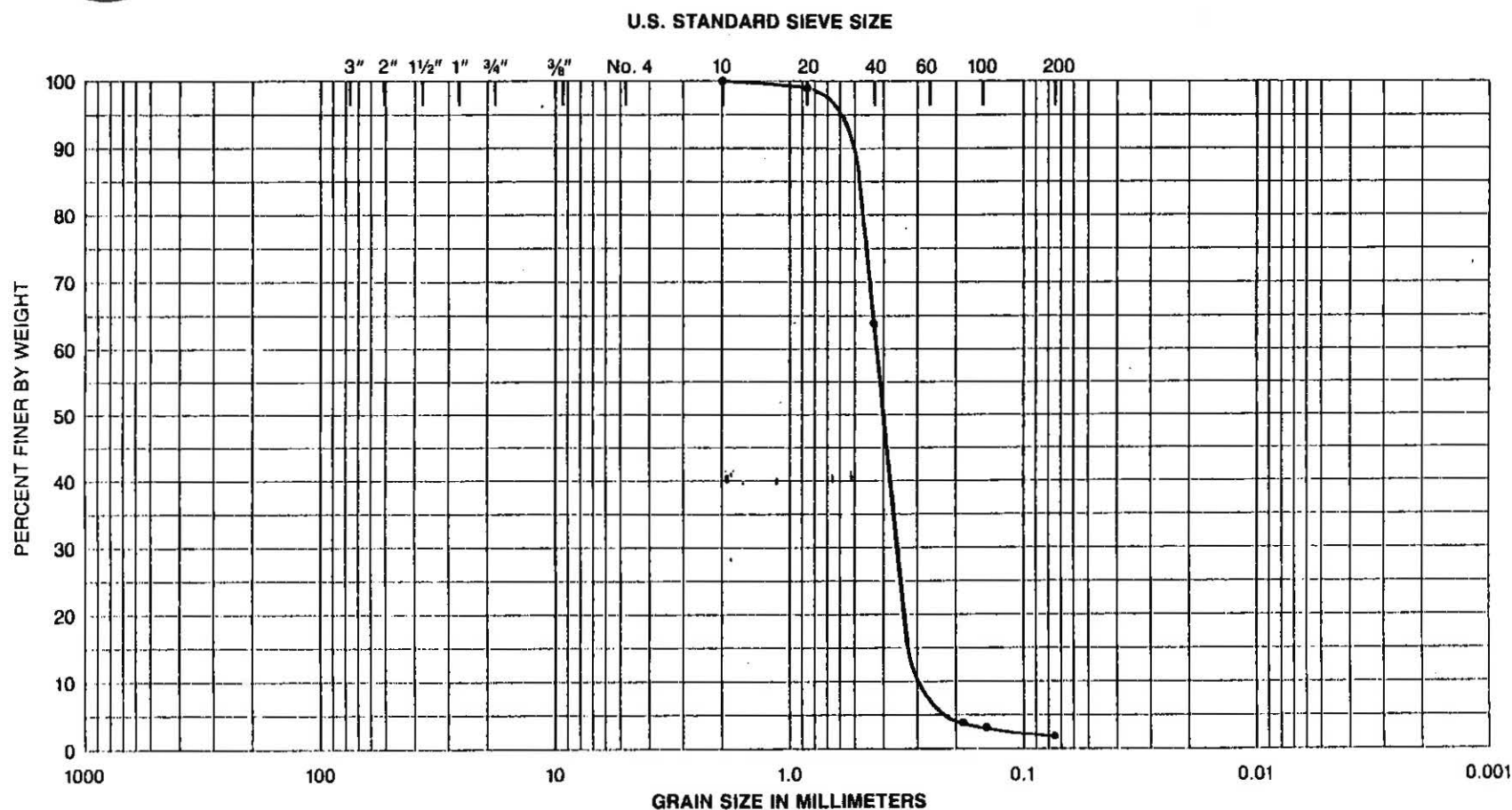
CLIENT: CH2M Hill







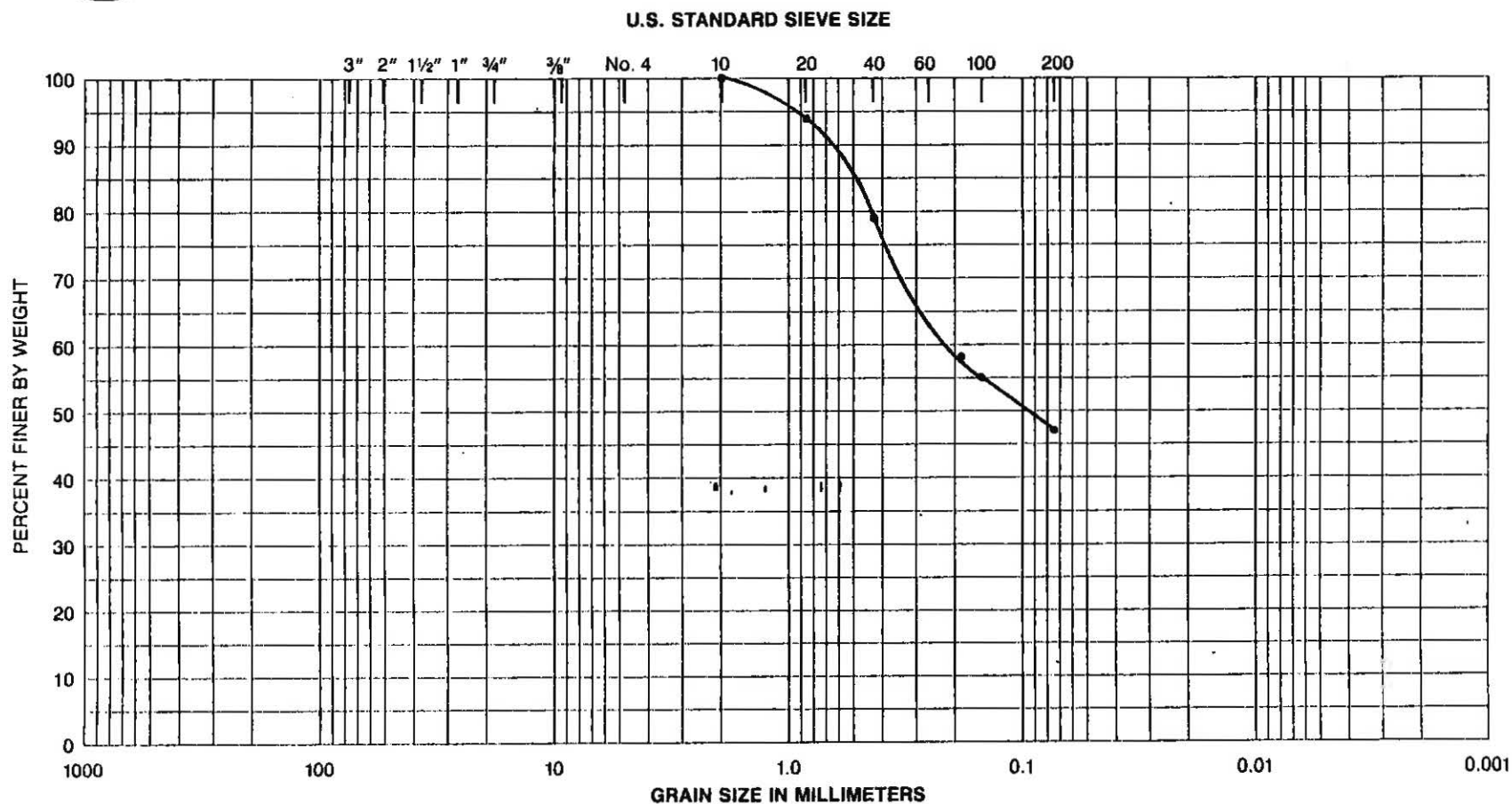
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

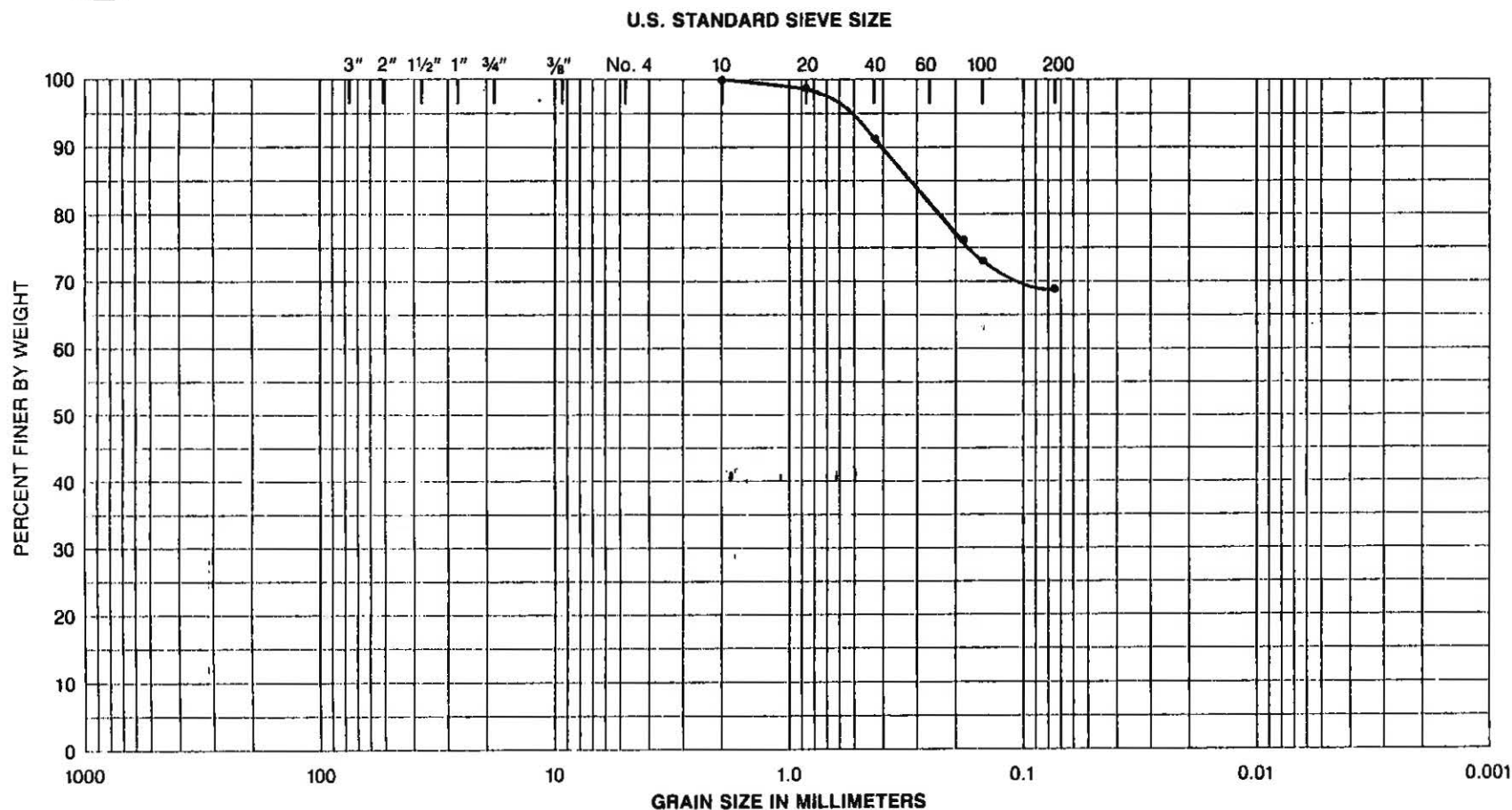
| TEST BORING NO. | SAMPLE NO. | DEPTH FT. | LINE     | GROUP SYM. | CLASSIFICATION   | IN-SITU WC | LL  | PL | PI | G <sub>s</sub> | REMARKS                     | PLOTTED BY: |
|-----------------|------------|-----------|----------|------------|------------------|------------|-----|----|----|----------------|-----------------------------|-------------|
| J-SH-1          | A          | 2'-4'     | —        | SC         | Light Brown      |            |     |    |    |                | K = 1.14 x 10 <sup>-4</sup> | JFE         |
|                 |            |           | ---      |            | Clayey Fine SAND |            |     |    |    |                |                             |             |
|                 |            |           | ---●---  |            |                  |            |     |    |    |                |                             |             |
|                 |            |           | ---●●--- |            |                  |            | 11% | 6% |    |                |                             |             |



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

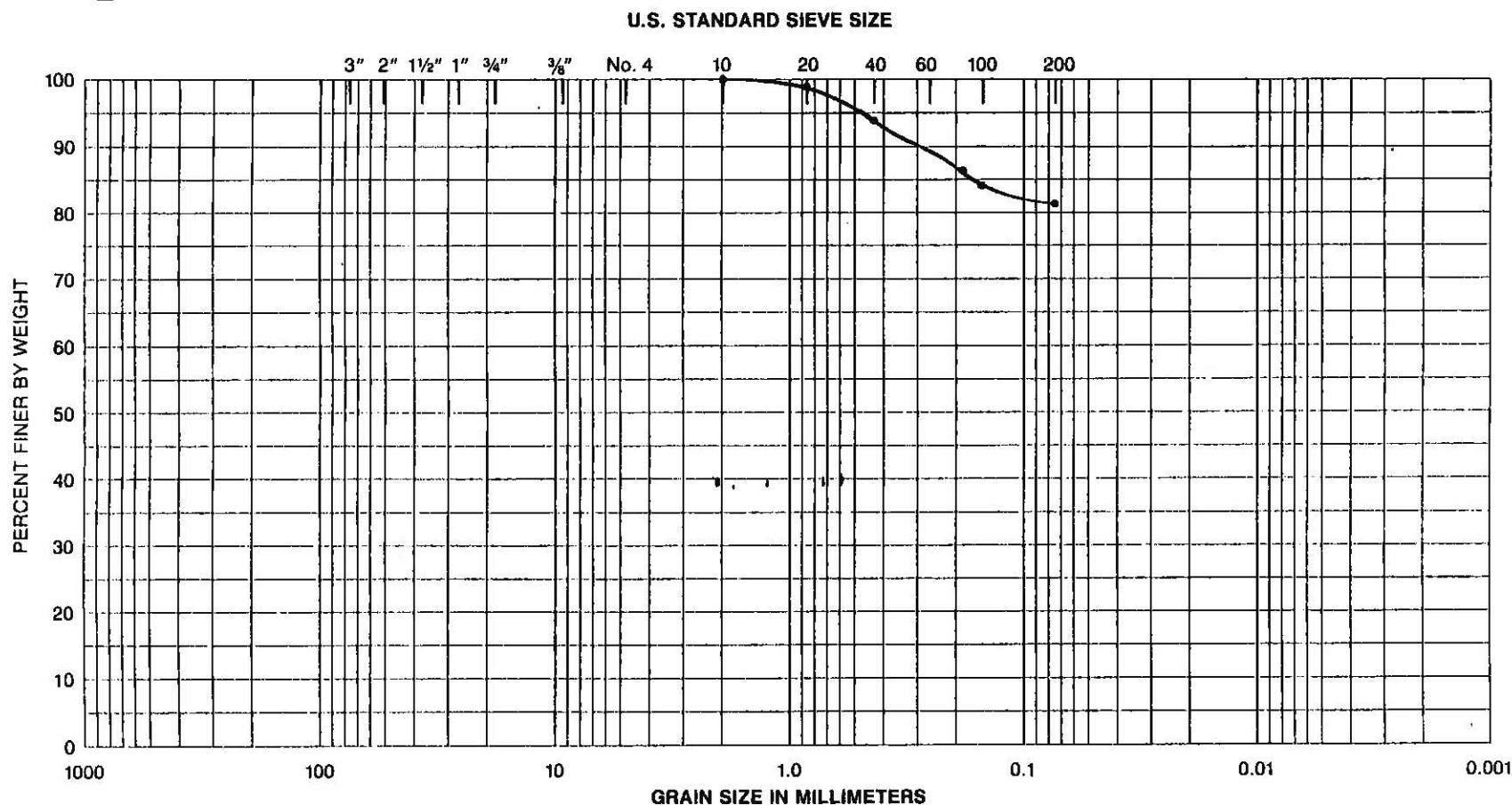
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

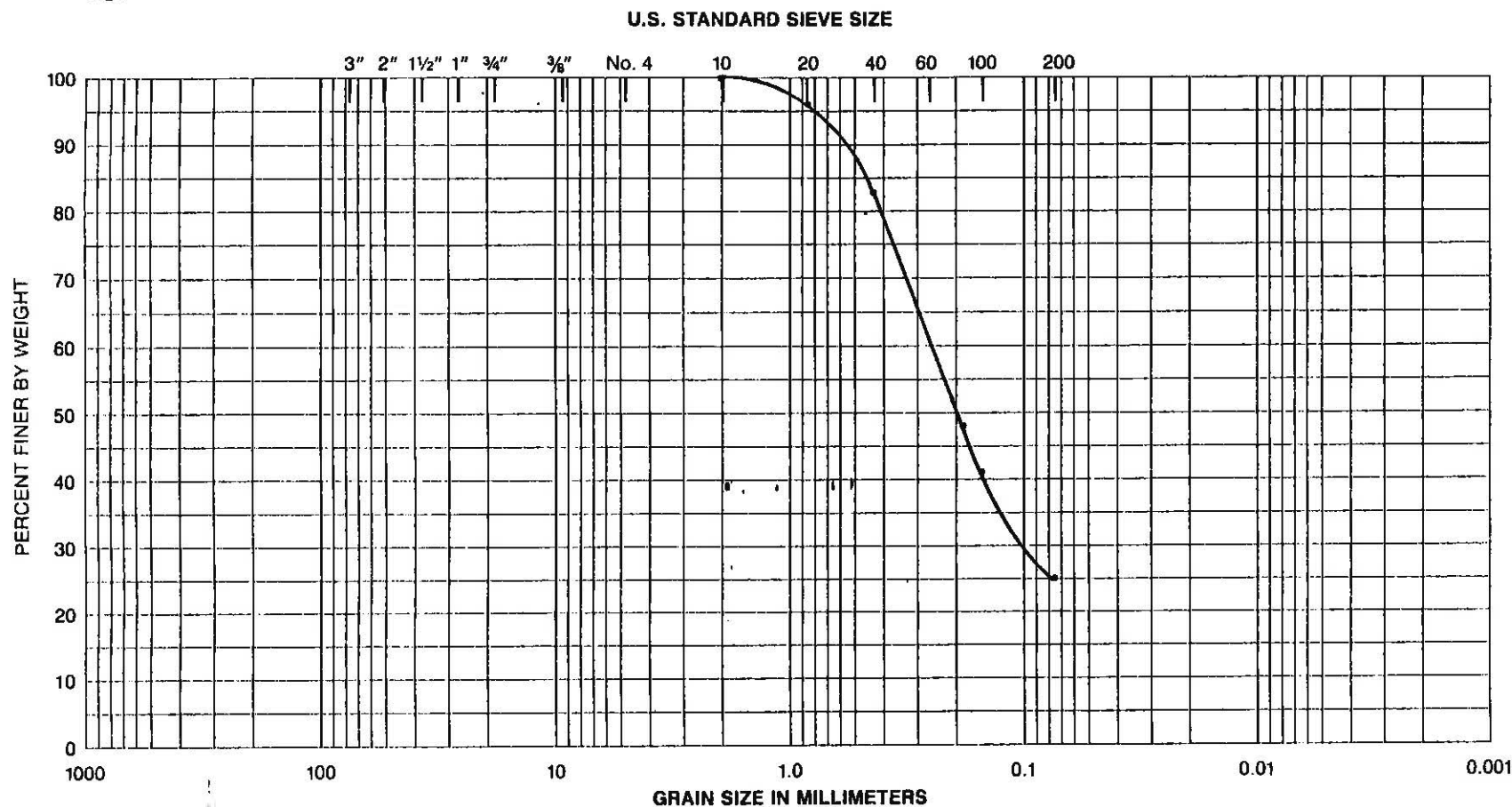




# **Pittsburgh Testing Laboratory** **GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

| TEST BORING NO. | SAMPLE NO. | DEPTH FT. | LINE | GROUP SYM. | CLASSIFICATION         | IN-SITU WC | LL | PL | PI | Gs | REMARKS                   | PLOTTED BY: |
|-----------------|------------|-----------|------|------------|------------------------|------------|----|----|----|----|---------------------------|-------------|
| J-SH-2          | B-1        | 13'-14'   | ---  | SC         | Light Tan Brown        |            |    |    |    |    | $K = 9.02 \times 10^{-4}$ | JFE         |
|                 |            |           | ---  |            | and Orange Mottled     |            |    |    |    |    |                           |             |
|                 |            |           | ---  |            | Fine to Medium SAND    |            |    |    |    |    |                           |             |
|                 |            |           | ---  |            | w/Some CLAY Trace Silt |            |    |    |    |    |                           |             |

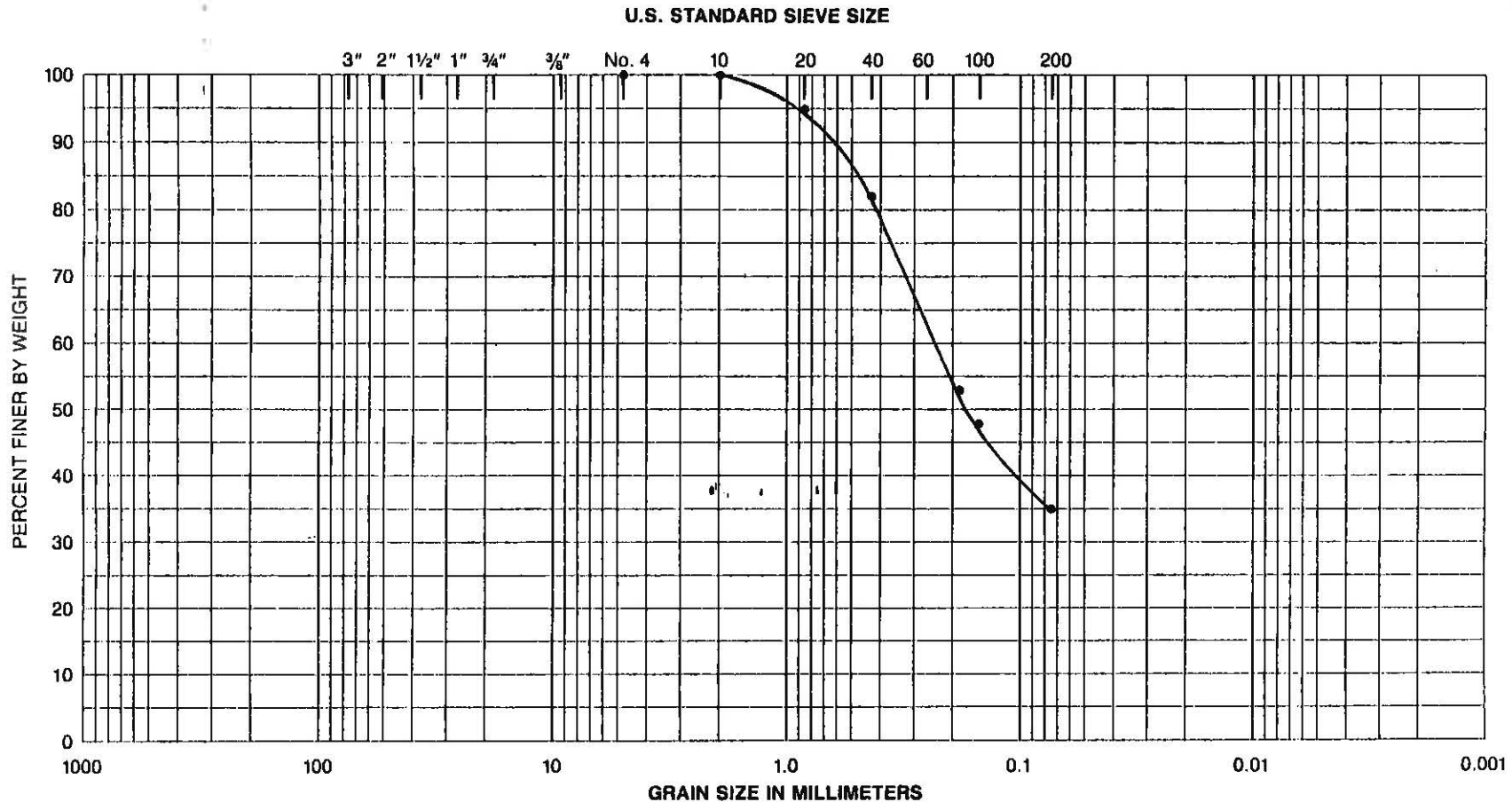




# **Pittsburgh Testing Laboratory** **GRAIN SIZE DISTRIBUTION CURVE**

ORDER NO. TAM-1212

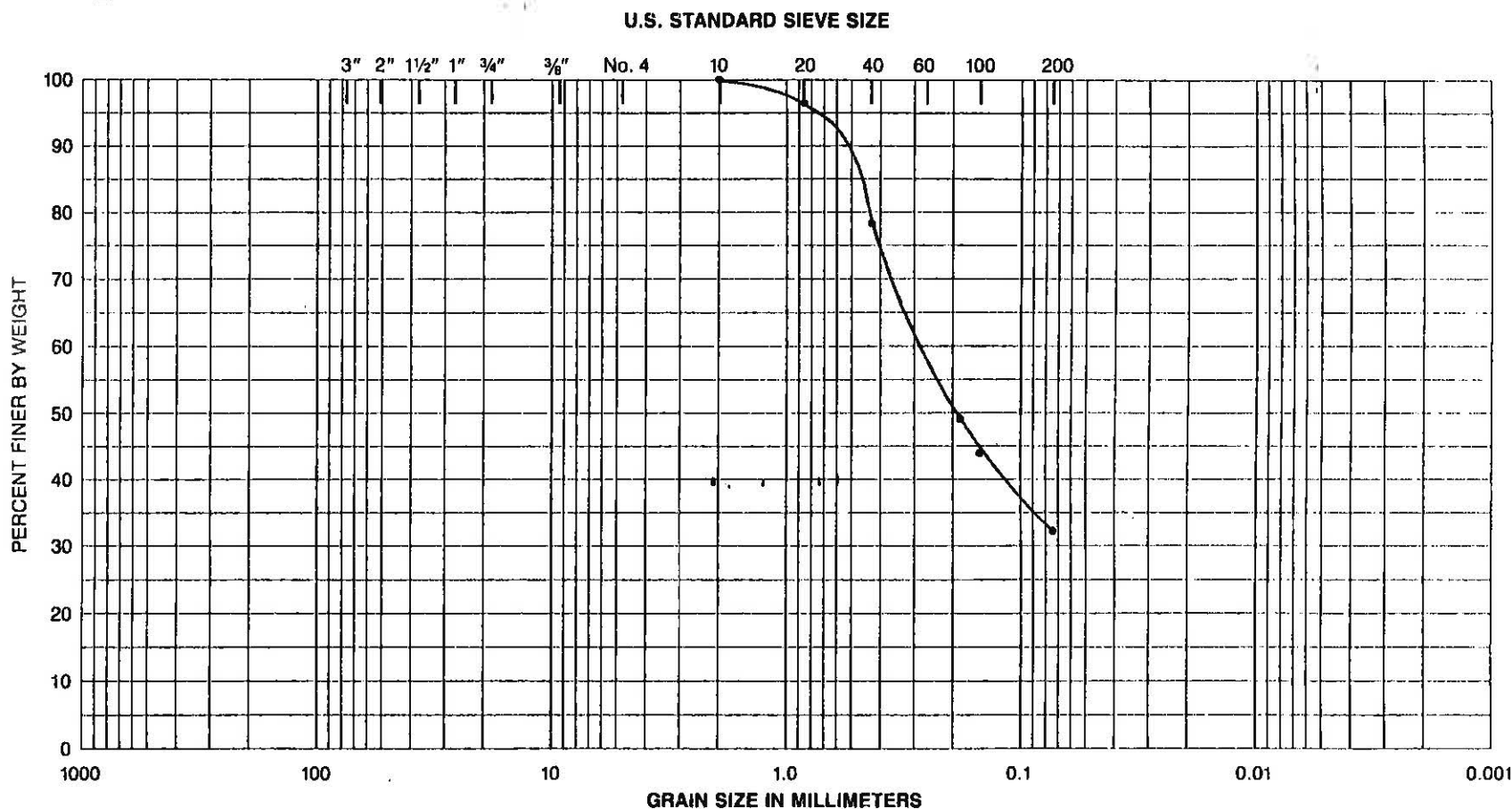
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

| TEST BORING NO. | SAMPLE NO. | DEPTH FT. | LINE | GROUP SYM. | CLASSIFICATION      | IN-SITU WC | LL | PL | PI | Gs | REMARKS                   | PLOTTED BY: |
|-----------------|------------|-----------|------|------------|---------------------|------------|----|----|----|----|---------------------------|-------------|
| J-SII-2         | C          | 22'-24'   | ---  | SC         | Light Gray & Tan    |            |    |    |    |    | $K = 2.00 \times 10^{-9}$ | JFE         |
|                 |            |           | ---  |            | Mottled Clayey Fine |            |    |    |    |    |                           |             |
|                 |            |           | ---  |            | SAND w/Sandy CLAY   |            |    |    |    |    |                           |             |
|                 |            |           | ---  |            | SCENTS              |            |    |    |    |    |                           |             |

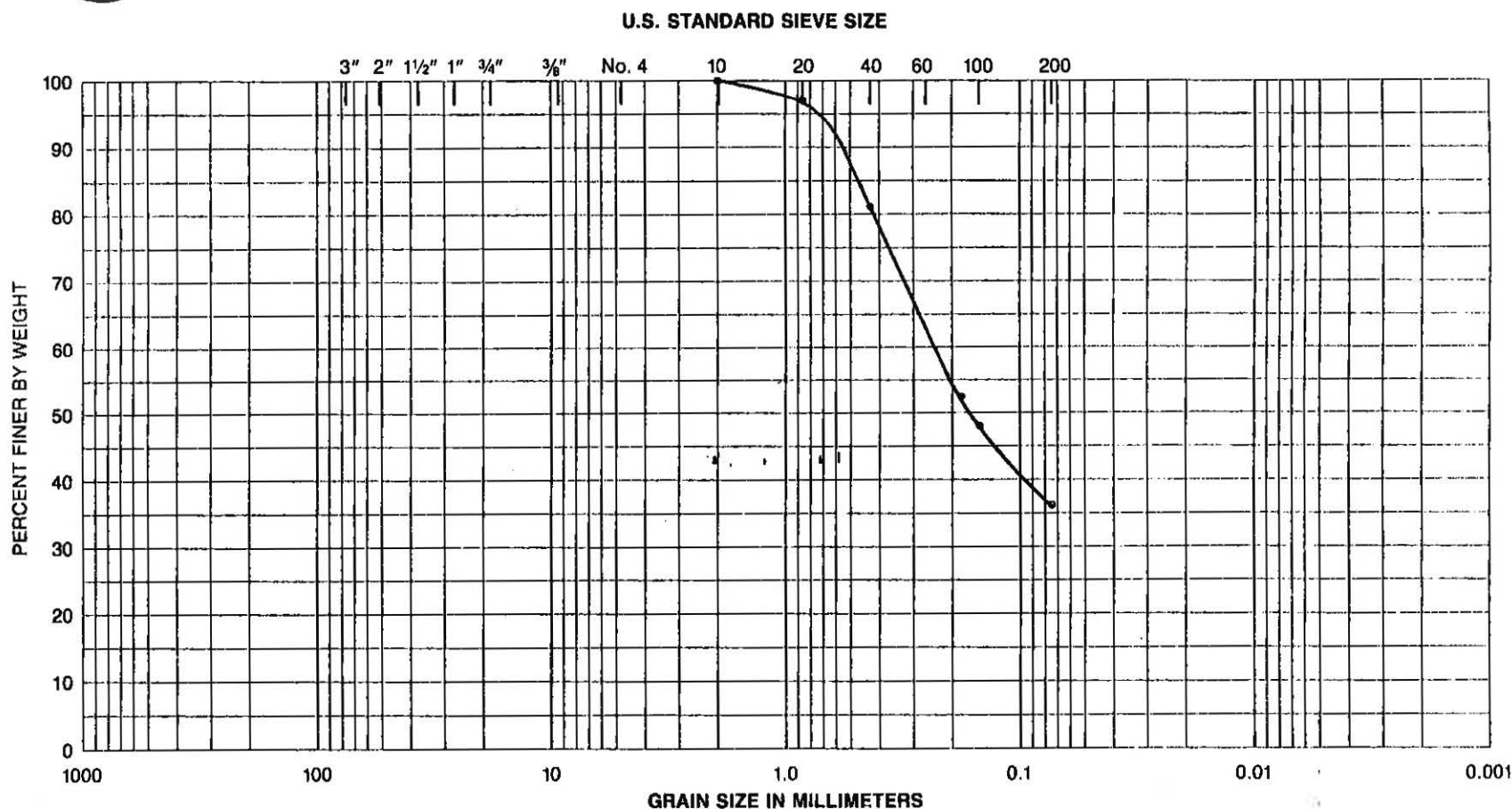
ORDER NO. TAM-1212  
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

CLIENT: CH2M Hill

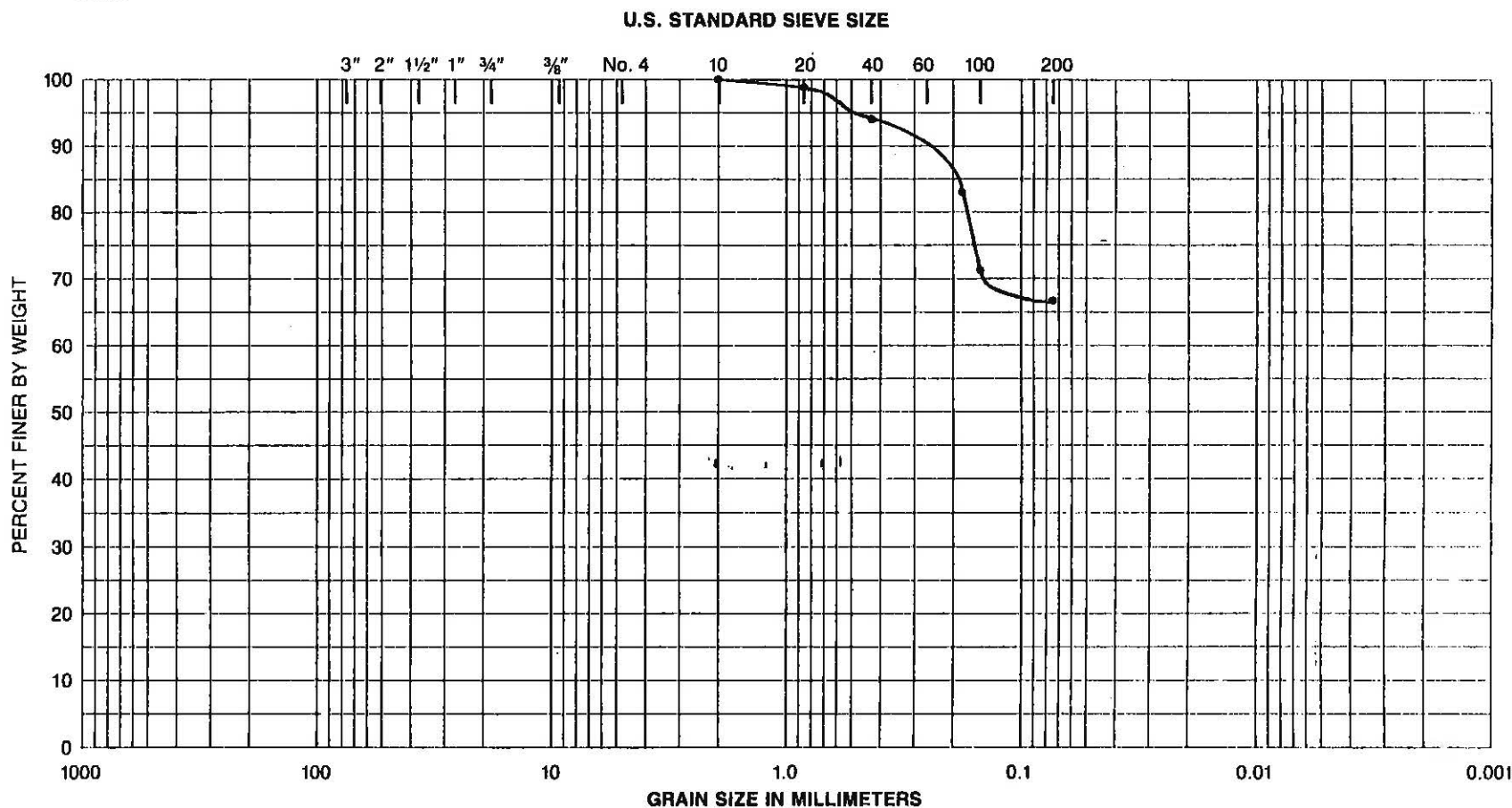


| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

ORDER NO. TAM-1212

CLIENT: CH2M Hill



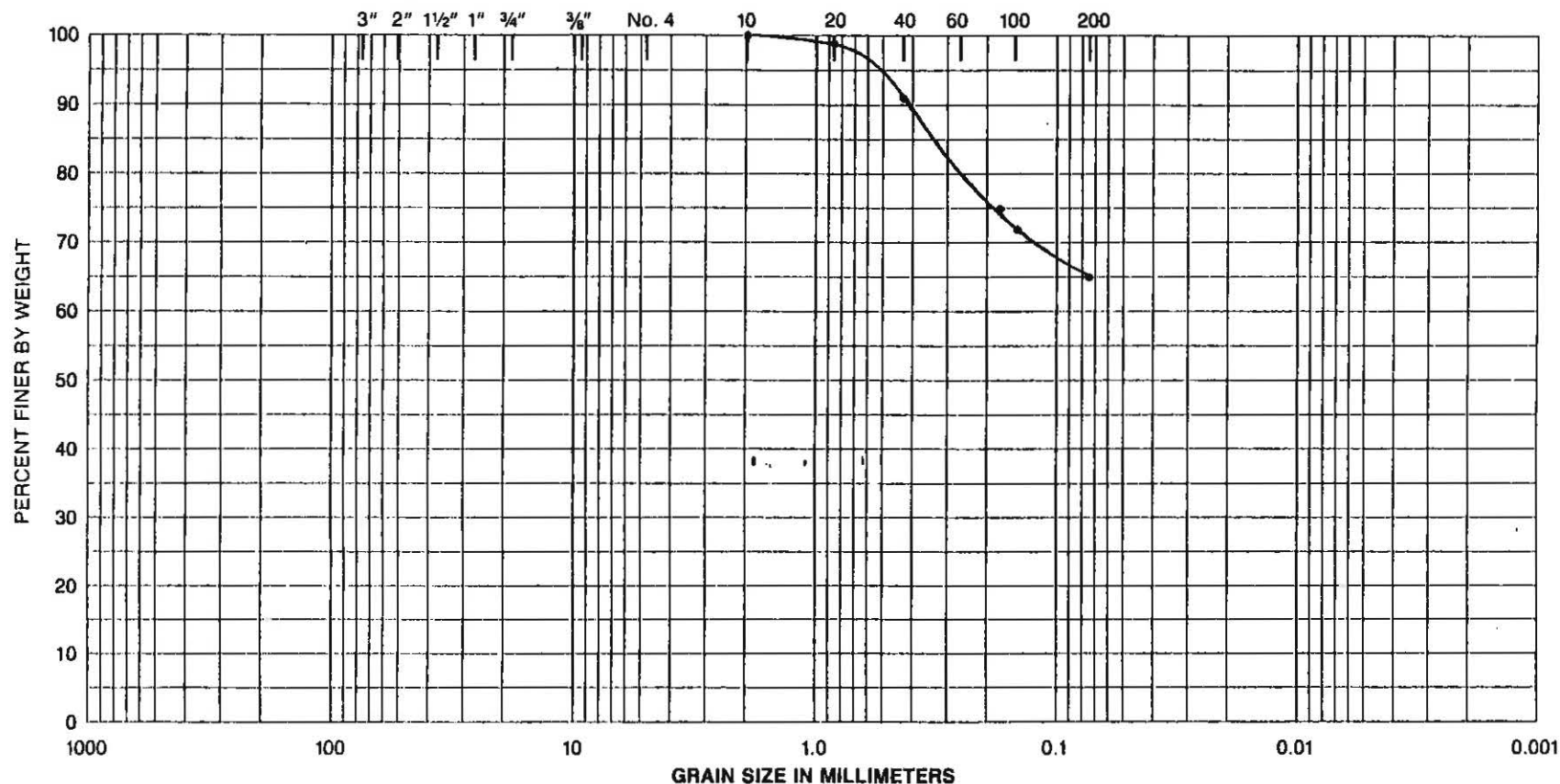
| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

ORDER NO. TAM-1212

CLIENT: CH2M Hill

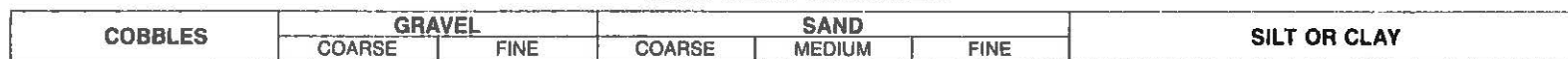
**U.S. STANDARD SIEVE SIZE**



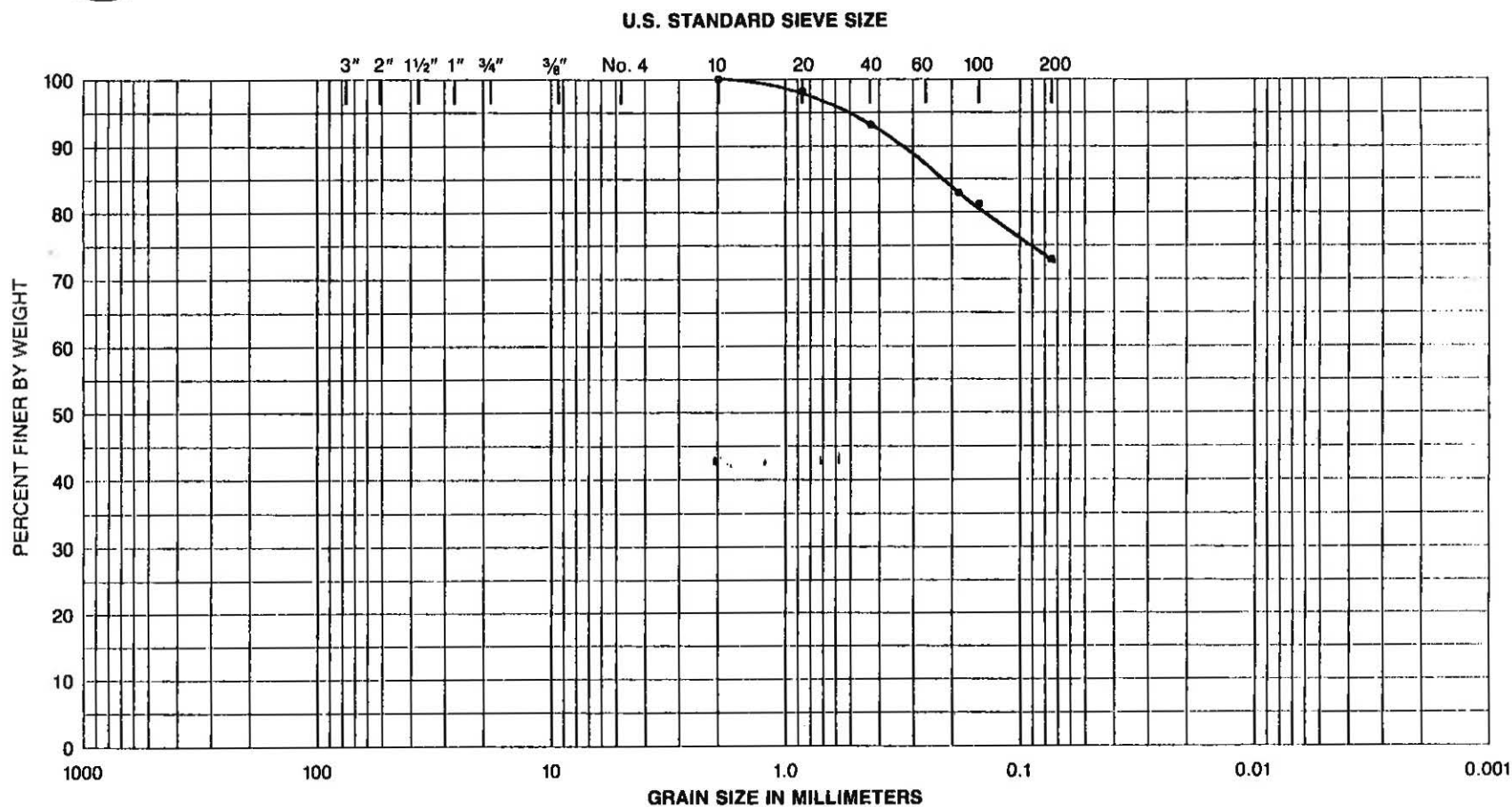
| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]

CLIENT: CH2M Hill

[illegible]

ORDER NO. TAM-1212  
CLIENT: CH2M Hill



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

[illegible]







# ETHYLENE DIBROMIDE

## GC/MS REPORT

CLIENT: CH2M HILL, INC.

LAB NO.: 5234

ADDRESS: ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST  
SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 9/7/84

ANALYST: M. PRICE

ATTENTION: MR. JOHN MILLER

| <u>SAMPLE DESCRIPTION</u> | <u>CONCENTRATION</u><br><u>(ng/kg)</u> | <u>SURROGATE</u><br><u>RECOVERY</u> |
|---------------------------|----------------------------------------|-------------------------------------|
| H-SH-1A                   | <200                                   | 122%                                |
| H-SH-1B                   | <200                                   | 95%                                 |
| H-SH-2A                   | <200                                   | 87%                                 |
| H-SH-2B                   | <200                                   | 115%                                |
| H-SH-3A                   | <200                                   | 99%                                 |
| H-SH-3B                   | <200                                   | 91%                                 |
| H-SH-4A                   | <200                                   | 112%                                |
| H-SH-4B                   | <200                                   | 104%                                |
| H-SH-5A                   | <200                                   | 109%                                |
| H-SH-5B                   | <200                                   | 113%                                |
| H-SH-6A                   | <200                                   | 107%                                |
| H-SH-6B                   | <200                                   | 116%                                |
| BLANK                     | <200                                   | 110%                                |
| EXTRUDER BLANK            | <200                                   | 104%                                |

Reviewed by

*Handwritten signature*

Surrogate = Fluorobenzene

Samples were analyzed by Selected Ion Monitoring Gas Chromatography/  
Mass Spectrometry.

CH2M HILL

5234

REGI

First International Bank, 201 Elm St.

Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

| PROJ. NO.                              |           | PROJECT NAME                 |       |      |                  | NO. OF CONTAINERS | REMARKS |                                         |  |  |  |                |  |                          |  |  |  |
|----------------------------------------|-----------|------------------------------|-------|------|------------------|-------------------|---------|-----------------------------------------|--|--|--|----------------|--|--------------------------|--|--|--|
| FC1804.B0                              |           | FDER / EDB Mobility Dynamics |       |      |                  |                   |         |                                         |  |  |  |                |  |                          |  |  |  |
| SAMPLERS: (Signature)<br>J.C. Eingsold |           |                              |       |      |                  |                   |         |                                         |  |  |  |                |  |                          |  |  |  |
| STA. NO.                               | 1984 DATE | TIME                         | COMP. | GRAB | STATION LOCATION |                   |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-1A                                | 9/5       |                              |       |      | Kuhlman H-SH-1   | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-1B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-2A                                | 9/5       |                              |       |      | " " " 2          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-2B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-3A                                | 9/5       |                              |       |      | " " " 3          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-3B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-4A                                | 9/5       |                              |       |      | " " " 4          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-4B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-5A                                | 9/5       |                              |       |      | " " " 5          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-5B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-6A                                | 9/5       |                              |       |      | " " " 6          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| H-SH-6B                                | 9/5       |                              |       |      | " " " "          | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| Blank                                  | 9/6/84    |                              |       |      |                  | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| Extruder Blank                         | 9/6/84    |                              |       |      |                  | 1                 |         |                                         |  |  |  |                |  |                          |  |  |  |
| Relinquished by: (Signature)           |           |                              |       |      |                  | Date / Time       |         | Received by: (Signature)                |  |  |  | Date / Time    |  | Received by: (Signature) |  |  |  |
| [Signature]                            |           |                              |       |      |                  | 9/6/84 4PM        |         |                                         |  |  |  |                |  |                          |  |  |  |
| Relinquished by: (Signature)           |           |                              |       |      |                  | Date / Time       |         | Received by: (Signature)                |  |  |  | Date / Time    |  | Received by: (Signature) |  |  |  |
| [Signature]                            |           |                              |       |      |                  |                   |         |                                         |  |  |  |                |  |                          |  |  |  |
| Relinquished by: (Signature)           |           |                              |       |      |                  | Date / Time       |         | Received for Laboratory by: (Signature) |  |  |  | Date / Time    |  | Remarks                  |  |  |  |
| [Signature]                            |           |                              |       |      |                  |                   |         | Linda Dee Hall                          |  |  |  | 9/7/84 11:30am |  |                          |  |  |  |



# ETHYLENE DIBROMIDE

## GC/MS REPORT

CLIENT: CH2M HILL, INC.

LAB NO.: 5189

ADDRESS: ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST  
SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 8/27/84

ANALYST: M. PRICE

ATTENTION: MR. JOHN MILLER

| <u>SAMPLE DESCRIPTION</u> | <u>CONCENTRATION</u><br><u>(ng/kg)</u> | <u>SURROGATE</u><br><u>RECOVERY</u> |
|---------------------------|----------------------------------------|-------------------------------------|
| J-SH-1A                   | <200                                   | 101%                                |
| J-SH-1B                   | <200                                   | 98%                                 |
| J-SH-1C                   | <200                                   | 103%                                |
| J-SH-2A                   | <200                                   | 87%                                 |
| J-SH-2B                   | <200                                   | 108%                                |
| J-SH-2C                   | <200                                   | 114%                                |
| J-SH-3A                   | <200                                   | 117%                                |
| J-SH-3B                   | <200                                   | 93%                                 |
| J-SH-3C                   | <200                                   | 96%                                 |
| J-SH-4A                   | <200                                   | 87%                                 |
| J-SH-4B                   | <200                                   | 114%                                |
| J-SH-4C                   | <200                                   | 94%                                 |
| BLANK                     | <200                                   | 67%                                 |
| EXTRUDER BLANK            | <200                                   | 122%                                |

Reviewed by                     

Surrogate = Fluorobenzene

Samples were analyzed by Selected Ion Monitoring Gas Chromatography/  
Mass Spectrometry.

CHAIN OF CUSTODY RECORD

| PROJ. NO.                                       |      | PROJECT NAME                 |       |      |                        | NO.<br>OF<br>CON-<br>TAINERS | REMARKS |                                                            |  |  |  |             |  |                          |  |  |  |
|-------------------------------------------------|------|------------------------------|-------|------|------------------------|------------------------------|---------|------------------------------------------------------------|--|--|--|-------------|--|--------------------------|--|--|--|
| FC18004-B0                                      |      | FDER / EDB Mobility Dynamics |       |      |                        |                              |         |                                                            |  |  |  |             |  |                          |  |  |  |
| SAMPLERS: (Signature) <i>John C. Miller</i>     |      |                              |       |      |                        |                              |         |                                                            |  |  |  |             |  |                          |  |  |  |
| STA. NO.                                        | DATE | TIME                         | COMP. | GRAB | STATION LOCATION       |                              |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-1A                                         | 8/21 | 3PM                          |       |      | Ditty Farm Site J-SH-1 | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-1B                                         | 8/21 | 3:15 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-1C                                         | 8/21 | 4:00 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-2A                                         | 8/22 | 9:00 AM                      |       |      | " " " J-SH-2           | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-2B                                         | 8/22 | 9:30 AM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-2C                                         | 8/22 | 10:30 AM                     |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-3A                                         | 8/22 | 12:30 PM                     |       |      | " " " J-SH-3           | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-3B                                         | 8/22 | 1:00 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-3C                                         | 8/22 | 1:30 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-4A                                         | 8/22 | 3:00 PM                      |       |      | " " " J-SH-4           | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-4B                                         | 8/22 | 3:30 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| J-SH-4C                                         | 8/22 | 4:00 PM                      |       |      | " " " " " "            | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| Blank                                           |      |                              |       |      | 8/24/84                | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| EXTRUDER BLANK                                  |      |                              |       |      | 8/24/84                | 1                            |         |                                                            |  |  |  |             |  |                          |  |  |  |
| Relinquished by: (Signature) <i>[Signature]</i> |      |                              |       |      |                        | Date / Time                  |         | Received by: (Signature)                                   |  |  |  | Date / Time |  | Received by: (Signature) |  |  |  |
| Relinquished by: (Signature) <i>[Signature]</i> |      |                              |       |      |                        | 8/24/84 5PM                  |         | Relinquished by: (Signature)                               |  |  |  | Date / Time |  | Received by: (Signature) |  |  |  |
| Relinquished by: (Signature)                    |      |                              |       |      |                        | Date / Time                  |         | Received for Laboratory by: (Signature) <i>[Signature]</i> |  |  |  | Date / Time |  | Remarks                  |  |  |  |
|                                                 |      |                              |       |      |                        |                              |         |                                                            |  |  |  | 12:40pm     |  |                          |  |  |  |



# ETHYLENE DIBROMIDE

## GC/MS REPORT

CLIENT: CH2M HILL, INC.

LAB NO.: 5207

ADDRESS: ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST  
SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 8/30/84

ANALYST: M. PRICE

ATTENTION: MR. JOHN MILLER

| <u>SAMPLE DESCRIPTION</u> | <u>CONCENTRATION</u><br><u>(ng/kg)</u> | <u>SURROGATE</u><br><u>RECOVERY</u> |
|---------------------------|----------------------------------------|-------------------------------------|
| P-SH-1A                   | <200                                   | 98%                                 |
| P-SH-2A                   | <200                                   | 96%                                 |
| P-SH-3A                   | <200                                   | 82%                                 |
| P-SH-4A                   | <200                                   | 101%                                |
| P-SH-5A                   | <200                                   | 99%                                 |
| P-SH-6A                   | <200                                   | 90%                                 |
| P-SH-1B                   | <200                                   | 90%                                 |
| P-SH-2B                   | <200                                   | 105%                                |
| P-SH-3B                   | <200                                   | 105%                                |
| P-SH-4B                   | <200                                   | 95%                                 |
| P-SH-5B                   | <200                                   | 98%                                 |
| P-SH-6B                   | <200                                   | 104%                                |
| BLANK                     | <200                                   | 104%                                |
| EXTRUDER BLANK            | <200                                   | 106%                                |

Reviewed by David E. ...

Surrogate = Fluorobenzene

Samples were analyzed by Selected Ion Monitoring Gas Chromatography/  
Mass Spectrometry.





## REMARKS

**Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files**

Handwritten: ~







ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER

LAB NO.: 6672

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, W., SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 10/11/85

DATE ANALYZED: 10/29/85

ATTENTION: MR. JOHN MILLER

ANALYST: W. HALL

**SAMPLE DESCRIPTION**

**EDB (ng/L)**

|                         |     |
|-------------------------|-----|
| KUHLMAN WELL, HC-1-WQ1  | <20 |
| KUHLMAN WELL, HC-1-WQ1D | <20 |
| KUHLMAN WELL, HC-2-WQ1  | 48  |
| KUHLMAN WELL, HC-2-WQ1D | 31  |
| KUHLMAN WELL, HC-3-WQ1  | 440 |
| KUHLMAN WELL, HC-4-WQ1  | 440 |
| KUHLMAN WELL, HC-5-WQ1  | <20 |
| KUHLMAN WELL, HC-6-WQ1  | <20 |
| KUHLMAN WELL, HC-7-WQ1  | <20 |
| TRAVEL BLANK            | <20 |

**QUALITY ASSURANCE RESULTS:**

**DUPLICATE RESULTS:**

| <u>SAMPLE DESCRIPTION</u> | <u>SAMPLE RESULT</u> | <u>DUPLICATE SAMPLE RESULT</u> | <u>PRECISION</u> |
|---------------------------|----------------------|--------------------------------|------------------|
| KUHLMAN WELL, HC-2-WQ2    | 48 ng/L              | 54 ng/L                        | 11.8%            |
| KUHLMAN WELL, HC-3-WQ2    | 460 ng/L             | 430 ng/L                       | 6.7%             |

**SPIKE RESULTS:**

| <u>SAMPLE DESCRIPTION</u> | <u>CONC. SPIKED</u> | <u>SAMPLE RESULT</u> | <u>SPIKE RESULT</u> | <u>PERCENT RECOVERY</u> |
|---------------------------|---------------------|----------------------|---------------------|-------------------------|
| KUHLMAN WELL, HC-1-WQ2    | 100 ng/L            | 0 ng/L               | 112 ng/L            | 112%                    |
| KUHLMAN WELL, HC-6-WQ2    | 100 ng/L            | 0 ng/L               | 109 ng/L            | 109%                    |

Comments: The primary data was acquired 10/14/85; the confirmation data was acquired 10/29/85.

Reviewed by 



ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER

LAB NO.: 6695

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, W., SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 10/18/85

DATE ANALYZED: 11/01/85

ATTENTION: MR. JOHN MILLER

ANALYST: W. HALL

SAMPLE DESCRIPTION

EDB (ng/L)

|                                  |      |
|----------------------------------|------|
| DITTY FARM, JC-1-WQ1             | <20  |
| DITTY FARM, JC-2-WQ1             | 520  |
| DITTY FARM, JC-2-WQ1D            | 540  |
| DITTY FARM, JC-3-WQ1             | 250  |
| HICKORY GROVE CHURCH, JC-CH-1    | 470  |
| HICKORY GROVE CHURCH, JC-CH-1D   | 470  |
| VERA MAY TUCKER HOME, JC-VT-1    | 250  |
| DITTY RESIDENTIAL WELL, JC-JD-1  | 1900 |
| HAGLER RESIDENTIAL WELL, JC-GH-1 | <20  |
| TRAVEL BLANK                     | <20  |

QUALITY ASSURANCE RESULTS:

DUPLICATE RESULTS:

| <u>SAMPLE DESCRIPTION</u> | <u>SAMPLE RESULT</u> | <u>DUPLICATE SAMPLE RESULT</u> | <u>PRECISION</u> |
|---------------------------|----------------------|--------------------------------|------------------|
| DITTY FARM, JC-2-WQ2      | 520 ng/L             | 540 ng/L                       | 3.8%             |
| DITTY FARM, JC-3-WQ2      | 250 ng/L             | 250 ng/L                       | 0.0%             |

SPIKE RESULTS:

| <u>SAMPLE DESCRIPTION</u> | <u>CONC. SPIKED</u> | <u>SAMPLE RESULT</u> | <u>SPIKE RESULT</u> | <u>PERCENT RECOVERY</u> |
|---------------------------|---------------------|----------------------|---------------------|-------------------------|
| DITTY FARM, JC-1-WQ2      | 100 ng/L            | 0 ng/L               | 110 ng/L            | 110%                    |

Comments:

Reviewed by J. J. Smith



ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER

LAB NO.: 6682

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, W., SUITE 350  
TAMPA, FLORIDA 33607

DATE RECEIVED: 10/16/85

DATE ANALYZED: 10/29/85

ATTENTION: MR. JOHN MILLER

ANALYST: W. HALL

**SAMPLE DESCRIPTION**

**EDB (ng/L)**

|                        |     |
|------------------------|-----|
| POLK COUNTY, PC-1-WQ1  | <20 |
| POLK COUNTY, PC-1-WQ1D | <20 |
| POLK COUNTY, PC-3-WQ1  | 65  |
| POLK COUNTY, PC-5-WQ1  | <20 |
| POLK COUNTY, PC-6-WQ1  | <20 |
| POLK COUNTY, PC-7-WQ1  | <20 |
| POLK COUNTY, PC-7-WQ1D | <20 |
| TRAVEL BLANK           | <20 |

**QUALITY ASSURANCE RESULTS:**

**DUPLICATE RESULTS:**

| <b>SAMPLE DESCRIPTION</b> | <b>SAMPLE RESULT</b> | <b>DUPLICATE SAMPLE RESULT</b> | <b>PRECISION</b> |
|---------------------------|----------------------|--------------------------------|------------------|
| POLK COUNTY, PC-3-WQ2     | 65 ng/L              | 66 ng/L                        | 1.5%             |

**SPIKE RESULTS:**

| <b>SAMPLE DESCRIPTION</b> | <b>CONC. SPIKED</b> | <b>SAMPLE RESULT</b> | <b>SPIKE RESULT</b> | <b>PERCENT RECOVERY</b> |
|---------------------------|---------------------|----------------------|---------------------|-------------------------|
| POLK COUNTY, PC-1-WQ2D    | 100 ng/L            | 0 ng/L               | 102 ng/L            | 102%                    |

Comments:

Reviewed by 12-7-86



ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS LAB NO.: 6973  
ADDRESS: CH2M HILL, INC., DATE RECEIVED: 1/7/86  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST, SUITE 350 DATE ANALYZED: 1/15/86  
TAMPA, FL 33607  
ATTENTION: MR. JOHN MILLER ANALYST: W. HALL

| <u>SAMPLE DESCRIPTION</u>  | <u>EDB (ng/l)</u> |
|----------------------------|-------------------|
| KUHLMAN WELL, HC-1-WQ1,2   | <20               |
| KUHLMAN WELL, HC-1-WQ1D,2D | <20               |
| KUHLMAN WELL, HC-2-WQ1,2   | 58                |
| KUHLMAN WELL, HC-2-WQ1D,2D | 60                |
| KUHLMAN WELL, HC-3-WQ1,2   | 350               |
| KUHLMAN WELL, HC-4-WQ1,2   | 440               |
| KUHLMAN WELL, HC-5-WQ1,2   | <20               |
| KUHLMAN WELL, HC-6-WQ1,2   | <20               |
| KUHLMAN WELL, HC-7-WQ1,2   | <20               |
| TRAVEL BLANK               | <20               |

QUALITY ASSURANCE RESULTS:

DUPLICATE RESULTS:

| <u>SAMPLE DESCRIPTION</u> | <u>SAMPLE<br/>RESULT</u> | <u>DUPLICATE<br/>SAMPLE RESULT</u> | <u>PRECISION</u> |
|---------------------------|--------------------------|------------------------------------|------------------|
| KUHLMAN WELL, HC-3-WQ1,2  | 350                      | 380                                | 8.2%             |

SPIKE RESULTS:

| <u>SAMPLE DESCRIPTION</u> | <u>CONC.<br/>SPIKED</u> | <u>SAMPLE<br/>RESULT</u> | <u>SPIKE<br/>RESULT</u> | <u>PERCENT<br/>RECOVERY</u> |
|---------------------------|-------------------------|--------------------------|-------------------------|-----------------------------|
| KUHLMAN WELL, HC-1-WQ1,2  | 1000                    | 0                        | 1000                    | 100%                        |
| KUHLMAN WELL, HC-6-WQ1,2  | 100                     | 0                        | 96                      | 96%                         |

Comments:

Reviewed by *J. Smith*





ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS LAB NO.: 6992  
ADDRESS: CH2M HILL, INC., DATE RECEIVED: 1/14/86  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST, SUITE 350 DATE ANALYZED: 1/16/86  
TAMPA, FL 33607  
ATTENTION: MR. JOHN MILLER ANALYST: W. HALL

| <u>SAMPLE DESCRIPTION</u>            | <u>EDB (ng/l)</u> |
|--------------------------------------|-------------------|
| JACKSON CO. WELL, JC-1-WQ1,2         | 29                |
| JACKSON CO. WELL, JC-2-WQ1,2         | 880               |
| JACKSON CO. WELL, JC-2-WQ1D,2D       | 820               |
| JACKSON CO. WELL, JC-3-WQ1,2         | 250               |
| HICKORY GROVE CHURCH, JC-CH-1,2      | 1400              |
| HICKORY GROVE CHURCH, JC-CH-1D,2D    | 1300              |
| VERA MAY TUCKER, JC-VT-1,2           | *                 |
| JIMMY DITTY RESIDENTIAL, JC-JD-1,2   | 3400**            |
| GEORGE HAGLER RESIDENTIAL, JC-GH-1,2 | <20               |
| TRAVEL BLANK                         | <20               |

QUALITY ASSURANCE RESULTS:

DUPLICATE RESULTS:

| <u>SAMPLE DESCRIPTION</u>      | <u>SAMPLE RESULT</u> | <u>DUPLICATE SAMPLE RESULT</u> | <u>PRECISION</u> |
|--------------------------------|----------------------|--------------------------------|------------------|
| JACKSON CO. WELL, JC-2-WQ1D,2D | 810                  | 820                            | 1.2%             |

SPIKE RESULTS:

| <u>SAMPLE DESCRIPTION</u>    | <u>CONC. SPIKED</u> | <u>SAMPLE RESULT</u> | <u>SPIKE RESULT</u> | <u>PERCENT RECOVERY</u> |
|------------------------------|---------------------|----------------------|---------------------|-------------------------|
| JACKSON CO. WELL, JC-1-WQ1,2 | 100                 | 29                   | 110                 | 81%                     |
| JACKSON CO. WELL, JC-3-WQ1,2 | 1000                | 250                  | 1200                | 95%                     |

Comments: \* Not analyzed because site was not sampled.  
\*\* The level of EDB was confirmed using GC/MS.

Reviewed by W. HALL



ETHYLENE DIBROMIDE (EDB)  
GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS LAB NO.: 6987  
ADDRESS: CH2M HILL, INC., DATE RECEIVED: 1/10/86  
ROCKY POINT CENTRE  
3030 NORTH ROCKY POINT DRIVE, WEST, SUITE 350 DATE ANALYZED: 1/16/86  
TAMPA, FL 33607  
ATTENTION: MR. JOHN MILLER ANALYST: W. HALL

| <u>SAMPLE DESCRIPTION</u>     | <u>EDB (ng/l)</u> |
|-------------------------------|-------------------|
| LAKE WALES WELL, PC-1-WQ1,2   | <20               |
| LAKE WALES WELL, PC-1-WQ1D,2D | <20               |
| LAKE WALES WELL, PC-3-WQ1,2   | 40                |
| LAKE WALES WELL, PC-5-WQ1,2   | <20               |
| LAKE WALES WELL, PC-6-WQ1,2   | <20               |
| LAKE WALES WELL, PC-7-WQ1,2   | <20               |
| LAKE WALES WELL, PC-7-WQ1D,2D | <20               |
| TRAVEL BLANK                  | <20               |

QUALITY ASSURANCE RESULTS:

DUPLICATE RESULTS:

| <u>SAMPLE DESCRIPTION</u>   | <u>SAMPLE RESULT</u> | <u>DUPLICATE SAMPLE RESULT</u> | <u>PRECISION</u> |
|-----------------------------|----------------------|--------------------------------|------------------|
| LAKE WALES WELL, PC-3-WQ1,2 | 40                   | 45                             | 11.8%            |

SPIKE RESULTS:

| <u>SAMPLE DESCRIPTION</u>     | <u>CONC. SPIKED</u> | <u>SAMPLE RESULT</u> | <u>SPIKE RESULT</u> | <u>PERCENT RECOVERY</u> |
|-------------------------------|---------------------|----------------------|---------------------|-------------------------|
| LAKE WALES WELL, PC-1-WQ1D,2D | 100                 | 0                    | 98                  | 98%                     |
| LAKE WALES WELL, PC-7-WQ1,2   | 1000                | 0                    | 980                 | 98%                     |

Comments:

Reviewed by *J. Miller*



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS

LAB REFERENCE NO.: 7422

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 N. ROCKY POINT DR., WEST, SUITE 350  
TAMPA, FL 33607

DATE RECEIVED: 04/10/86

DATE ANALYZED: 04/17/86

ATTENTION: MR. JOHN MILLER

ANALYST: J. SMILEY

| SAMPLE DESCRIPTION                 | EDB (ng/L) |
|------------------------------------|------------|
| DEEP WELL HC-1, 04/09/86, 1252     | <20        |
| DEEP WELL HC-1D, 04/09/86, 1303    | <20        |
| SHALLOW WELL HC-2, 04/09/86, 1345  | 56         |
| SHALLOW WELL HC-2D, 04/09/86, 1347 | 53         |
| SHALLOW WELL HC-3, 04/08/86, 1310  | 190        |
| SHALLOW WELL HC-4, 04/08/86, 1155  | 280        |
| SHALLOW WELL HC-5, 04/08/86, 1630  | <20        |
| SHALLOW WELL HC-6, 04/08/86, 1525  | <20        |
| SHALLOW WELL HC-7, 04/08/86, 1434  | <20        |
| TRAVEL BLANK                       | <20        |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION          | SAMPLE RESULT | DUPLICATE SAMPLE RESULT | PRECISION |
|-----------------------------|---------------|-------------------------|-----------|
| SHALLOW WELL HC-4, 04/08/86 | 280           | 300                     | 6.9 %     |

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION        | CONC. SPIKED | SAMPLE RESULT | SPIKE RESULT | PERCENT RECOVERY |
|---------------------------|--------------|---------------|--------------|------------------|
| DEEP WELL HC-1, 04/09/86  | 160          | 0             | 150          | 94 %             |
| DEEP WELL HC-1D, 04/09/86 | 160          | 0             | 160          | 100 %            |

Comments:

All results expressed as nanograms per liter (ng/L).

Reviewed by *J. Smiley*



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS

LAB REFERENCE NO.: 7443

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 N. ROCKY POINT DR., WEST, SUITE 350  
TAMPA, FL 33607

DATE RECEIVED: 04/17/86

DATE ANALYZED: 04/25/86

ATTENTION: MR. JOHN MILLER

ANALYST: WANDA HALL

### SAMPLE DESCRIPTION

EDB (ng/L)

|                                              |      |
|----------------------------------------------|------|
| SHALLOW WELL JC-1, 04/14/86, 1110            | <20  |
| SHALLOW WELL JC-2, 04/15/86, 1100            | 650  |
| SHALLOW WELL JC-2D, 04/15/86, 1102           | 560  |
| SHALLOW WELL JC-3, 04/14/86, 1540            | 220  |
| HICKORY GROVE CHURCH, JC-CH, 04/15/86, 1140  | 990  |
| HICKORY GROVE CHURCH, JC-CHD, 04/15/86, 1142 | 990  |
| VERA TUCKER RESID., JC-VT, 04/15/86, 1250    | 110  |
| JIMMY DITTY RESID., JC-JD, 04/15/86, 1205    | 2000 |
| GEORGE HAGLER RESID., JC-GH, 04/14/86, 1635  | <20  |
| DITTY IRRIG. WELL, JC-IRR, 04/15/86, 1315    | <20  |
| TRAVEL BLANK                                 | <20  |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION                        | SAMPLE<br>RESULT | DUPLICATE<br>SAMPLE RESULT | PRECISION |
|-------------------------------------------|------------------|----------------------------|-----------|
| SHALLOW WELL JC-2, 04/15/86               | 650              | 580                        | 11 %      |
| HICKORY GROVE CHURCH, JC-CHD,<br>04/15/86 | 990              | 960                        | 3.1 %     |

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION                     | CONC.<br>SPIKED | SAMPLE<br>RESULT | SPIKE<br>RESULT | PERCENT<br>RECOVERY |
|----------------------------------------|-----------------|------------------|-----------------|---------------------|
| SHALLOW WELL JC-1, 04/14/86            | 100             | 0                | 113             | 113 %               |
| DITTY IRRIG. WELL, JC-IRR,<br>04/15/86 | 100             | 0                | 100             | 100 %               |

#### Comments:

All results expressed as nanograms per liter (ng/L).

Reviewed by *J. Smiley*



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB MOBILITY DYNAMICS

LAB REFERENCE NO.: 7430

ADDRESS: CH2M HILL, INC.  
ROCKY POINT CENTRE  
3030 N. ROCKY POINT DR., WEST, SUITE 350  
TAMPA, FL 33607

DATE RECEIVED: 04/14/86

DATE ANALYZED: 04/23/86

ATTENTION: MR. JOHN MILLER

ANALYST: WANDA HALL

| SAMPLE DESCRIPTION                | EDB (ng/L) |
|-----------------------------------|------------|
| DEEP WELL PC-1, 04/10/86, 1245    | <20        |
| SHALLOW WELL PC-3, 04/11/86, 0750 | *          |
| SHALLOW WELL PC-5, 04/10/86, 1450 | <20        |
| SHALLOW WELL PC-6, 04/10/86, 1620 | <20        |
| SHALLOW WELL PC-7, 04/11/86, 0840 | <20        |
| TRAVEL BLANK                      | <20        |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION | SAMPLE<br>RESULT | DUPLICATE<br>SAMPLE RESULT | PRECISION |
|--------------------|------------------|----------------------------|-----------|
|--------------------|------------------|----------------------------|-----------|

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION          | CONC.<br>SPIKED | SAMPLE<br>RESULT | SPIKE<br>RESULT | PERCENT<br>RECOVERY |
|-----------------------------|-----------------|------------------|-----------------|---------------------|
| SHALLOW WELL PC-6, 04/10/86 | 100             | 0                | 98              | 98 %                |

Comments: \* Presence indicated at a level below the stated detection limit.  
Duplicate analysis gave similar results.

All results expressed as nanograms per liter (ng/L).

Reviewed by *J. Smiley*



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB Mobility Dynamics  
ADDRESS: CH2M Hill, Inc.  
3030 North Rocky Point Dr., West  
Suite 350  
Tampa, FL 33607  
ATTENTION: Mr. John Miller

LAB REFERENCE NO.: 7807  
DATE RECEIVED: 07/10/86  
DATE ANALYZED: 07/23/86  
ANALYST: Wanda Hall

| SAMPLE DESCRIPTION                                       | EDB (ng/l) |
|----------------------------------------------------------|------------|
| Highlands Co. Well #1, HC-1, 7/9/86, 1200, Deep Well     | <20        |
| Highlands Co. Well #1, HC-1D, 7/9/86, 1200, Deep Well    | <20        |
| Highlands Co. Well #2, HC-2, 7/9/86, 1225, Shallow Well  | 200        |
| Highlands Co. Well #2, HC-2D, 7/9/86, 1225, Shallow Well | 220        |
| Highlands Co. Well #3, HC-3, 7/8/86, 1008, Shallow Well  | 180        |
| Highlands Co. Well #4, HC-4, 7/8/86, 0750, Shallow Well  | 170        |
| Highlands Co. Well #5, HC-5, 7/8/86, 0833, Shallow Well  | <20        |
| Highlands Co. Well #6, HC-6, 7/8/86, 0920, Shallow Well  | <20        |
| Highlands Co. Well #7, HC-7, 7/8/86, 1055, Shallow Well  | <20        |
| Travel Blank                                             | <20        |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION    | SAMPLE<br>RESULT | DUPLICATE<br>SAMPLE RESULT | PRECISION |
|-----------------------|------------------|----------------------------|-----------|
| Well #4, HC-4, 7/8/86 | 164              | 177                        | 7.6 %     |

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION    | CONC.<br>SPIKED | SAMPLE<br>RESULT | SPIKE<br>RESULT | PERCENT<br>RECOVERY |
|-----------------------|-----------------|------------------|-----------------|---------------------|
| Well #6, HC-6, 7/8/86 | 200             | 0                | 189             | 94.5 %              |

Comments:

Reviewed by W. Hall



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB Mobility Dynamics  
ADDRESS: CH2M Hill, Inc.  
3030 North Rocky Point Dr., West  
Suite 350  
Tampa, FL 33607  
ATTENTION: Mr. John Miller

LAB REFERENCE NO.: 7840  
DATE RECEIVED: 07/18/86  
DATE ANALYZED: 07/23/86  
ANALYST: Wanda Hall

| SAMPLE DESCRIPTION                          | EDB (ng/l) |
|---------------------------------------------|------------|
| Jackson County #1, JC-1, 7/14/86, 1110      | <20        |
| Jackson County #2, JC-2, 7/15/86, 1049      | 1200       |
| Jackson County #2, JC-2D, 7/15/86, 1120     | 1300       |
| Jackson County #3, JC-3, 7/14/86, 1440      | 240        |
| Hickory Grove Church, JC-CH, 7/15/86, 1140  | 1200       |
| Hickory Grove Church, JC-CHD, 7/15/86, 1145 | 1200       |
| George Hagler Resid., JC-GH, 7/14/86, 1525  | <20        |
| Vera Tucker Resid., JC-VT, 7/14/86, 1615    | 160        |
| Jimmy Ditty Resid., JC-JD, 7/15/86, 1215    | 8000       |
| Travel Blank                                | <20        |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION                    | SAMPLE<br>RESULT | DUPLICATE<br>SAMPLE RESULT | PRECISION |
|---------------------------------------|------------------|----------------------------|-----------|
| Jimmy Ditty Resid., JC-JD,<br>7/15/86 | 7875             | 8023                       | 1.9 %     |

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION                      | CONC.<br>SPIKED | SAMPLE<br>RESULT | SPIKE<br>RESULT | PERCENT<br>RECOVERY |
|-----------------------------------------|-----------------|------------------|-----------------|---------------------|
| George Hagler Resid., JC-GH,<br>7/14/86 | 200             | 0                | 187             | 93 %                |

Comments:

Reviewed by W. Hall



# ETHYLENE DIBROMIDE

## GC REPORT

CLIENT: FDER/EDB Mobility Dynamics  
ADDRESS: CH2M Hill, Inc.  
3030 North Rocky Point Dr., West  
Suite 350  
Tampa, FL 33607  
ATTENTION: Mr. John Miller

LAB REFERENCE NO.: 7824  
DATE RECEIVED: 07/14/86  
DATE ANALYZED: 07/23/86  
ANALYST: Wanda Hall

| SAMPLE DESCRIPTION                                  | EDB (ng/l) |
|-----------------------------------------------------|------------|
| Polk Co. Well #1, PC-1, 7/10/86, 1035, Deep Well    | <20        |
| Polk Co. Well #7, PC-7, 7/10/86, 1150, Shallow Well | <20        |
| Polk Co. Well #3, PC-3, 7/10/86, 1300, Shallow Well | *          |
| Polk Co. Well #5, PC-5, 7/10/86, 1350, Shallow Well | <20        |
| Polk Co. Well #6, PC-6, 7/10/86, 1510, Shallow Well | <20        |
| Travel Blank                                        | <20        |

### QUALITY ASSURANCE RESULTS:

#### DUPLICATE RESULTS:

| SAMPLE DESCRIPTION                                                                                 | SAMPLE RESULT | DUPLICATE SAMPLE RESULT | PRECISION |
|----------------------------------------------------------------------------------------------------|---------------|-------------------------|-----------|
| No samples contained more than 20 ng/l EDB; therefore, no duplicate analyses could be quantitated. |               |                         |           |

#### SPIKE RESULTS:

| SAMPLE DESCRIPTION     | CONC. SPIKED | SAMPLE RESULT | SPIKE RESULT | PERCENT RECOVERY |
|------------------------|--------------|---------------|--------------|------------------|
| Well #1, PC-1, 7/10/86 | 200          | 0             | 200          | 100 %            |

Comments: \* Present at a level below the stated detection limit. Duplicate analyses gave similar results.

Reviewed by W. Hall





FDER HC-1  
EDB MONITOR WELL  
GEOLOGIC LOG

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                            |
|--------------|-------------------------------------------------------------------------------------------------------------------------------|
| 0-20'        | Sand, medium to coarse grained, subrounded, unconsolidated, grayish orange (10 YR 7/4). Sparse organics.                      |
| 20-30'       | Sand, medium to fine grained, subrounded, unconsolidated, pale yellowish brown (10 YR 6/2). Trace of black accessory mineral. |
| 30-40'       | As above.                                                                                                                     |
| 40-50'       | As above.                                                                                                                     |
| 50-60'       | As above.                                                                                                                     |
| 60-70'       | As above, fine to coarse grained.                                                                                             |
| 70-80'       | As above, fine to medium grained.                                                                                             |
| 80-90'       | As above.                                                                                                                     |
| 90-100'      | As above.                                                                                                                     |
| 100-110'     | As above, fine to coarse grained.                                                                                             |
| 110-120'     | As above, coarse to medium grained                                                                                            |
| 120-130'     | As above.                                                                                                                     |
| 130-140'     | As above.                                                                                                                     |
| 140-150'     | Clay, arenaceous, yellowish gray (5 Y 7/2), nonplastic.                                                                       |
| 150-160'     | Clay, silty to arenaceous, yellowish gray to pale olive (10 Y 6/2), slightly plastic.                                         |
| 160-170'     | Sand, argillaceous, fine to medium grained, yellowish gray to pale olive. Trace of poorly consolidated sandstone.             |
| 170-180'     | As above.                                                                                                                     |
| 180-190'     | As above, with trace of moderately soft, white micritic limestone.                                                            |

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                                                                                                                                                     |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 190-200'     | Clay, arenaceous, pale olive, slightly plastic. Micritic limestone (5%), moderately soft, white.                                                                                                                                                       |
| 200-210'     | Limestone, granular to biomicritic, white, moderately soft to moderately hard. Sand (15%), medium to very coarse grained, clear, colorless. Sandstone (15%), grayish green (5 G 5/2), moderately well indurated. Phosphate (5%), hard, black, rounded. |
| 210-220'     | As above, less sandstone, more phosphates.                                                                                                                                                                                                             |
| 220-230'     | Limestone, arenaceous to biomicritic, pale greenish yellow (10 Y 8/2), moderately soft. Sandstone (40%), moderately indurated, yellowish gray (5 Y 7/2). Clay (5%), hard, grayish green (5 G 5/2).                                                     |
| 230-240'     | Limestone, arenaceous to biomicritic, pale greenish yellow (10 Y 8/2), moderately soft. Sandstone (40%), moderately indurated, yellowish gray (5 Y 7/2). Clay (5%), hard, grayish green (5 G 5/2).                                                     |
| 240-250'     | Sandstone, limy to argillaceous, dusky yellowish green (5 GY 5/2) to grayish yellowish green (5 GY 7/2), moderately poorly indurated, medium to coarse grained. Phosphate pebbles (5%), subrounded, black, hard. Clay (5%), grayish green, hard.       |
| 250-260'     | As above, more limy.                                                                                                                                                                                                                                   |
| 260-270'     | Clay, limy to arenaceous, slightly plastic, phosphatic, dusky yellowish green to grayish yellowish green. Sandstone (5%) as above.                                                                                                                     |
| 270-280'     | Same as 240-250.                                                                                                                                                                                                                                       |
| 280-290'     | Clay, slightly limy to arenaceous, plastic, grayish olive green (5 GY 3/2). Trace of phosphatic minerals.                                                                                                                                              |
| 290-300'     | Clay, limy, yellowish gray (5 Y 8/1), slightly plastic. Phosphate grains comprise up to 20% of sample.                                                                                                                                                 |
| 300-310'     | As above.                                                                                                                                                                                                                                              |

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                                                                                                                                                         |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 310-320'     | As above, trace of poorly indurated sandstone.                                                                                                                                                                                                             |
| 320-330'     | As above.                                                                                                                                                                                                                                                  |
| 330-340'     | As above.                                                                                                                                                                                                                                                  |
| 340-370'     | No samples.                                                                                                                                                                                                                                                |
| 370-380'     | Micritic limestone, very pale orange to light olive gray (5 Y 6/1), moderately soft. Phosphate (5%), black.                                                                                                                                                |
| 380-390'     | As above.                                                                                                                                                                                                                                                  |
| 390-400'     | As above, phosphate sparse.                                                                                                                                                                                                                                |
| 400-410'     | Micritic to dolomitic limestone, very pale orange to dark yellowish brown (10 YR 4/2), moderately soft to moderately hard. Mudstone (40%), medium light gray, moderately hard. Trace of phosphate. Fossils (sparse): echinoid spines, pelecypod fragments. |
| 410-420'     | As above, mudstone comprises 75% of sample.                                                                                                                                                                                                                |
| 420-430'     | As above, mudstone 50% of sample. Clay, nonplastic, greenish gray (5 GY 6/1).                                                                                                                                                                              |
| 430-440'     | Clay, moderately high plasticity, dusky yellow green (5 GY 5/2). Minor amounts of mudstone and limestone as above.                                                                                                                                         |
| 440-450'     | Micritic limestone, very pale orange, moderately soft. Mudstone (45%), medium gray, moderately soft. Clay (10%) as above.                                                                                                                                  |
| 450-460'     | As above, trace of phosphate.                                                                                                                                                                                                                              |
| 460-470'     | Sand, fine to very fine grained, medium light gray to colorless. Trace of micritic limestone, phosphate.                                                                                                                                                   |
| 470-480'     | As above.                                                                                                                                                                                                                                                  |
| 480-490'     | As above, micritic limestone more abundant.                                                                                                                                                                                                                |
| 490-500'     | As above, micritic limestone (20%), slightly argillaceous.                                                                                                                                                                                                 |

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                                                                 |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 500-510'     | Micritic limestone, extremely arenaceous, light olive gray to very pale orange, moderately soft.                                                                   |
| 510-520'     | As above, slightly arenaceous. Trace of soft mudstone and phosphate.                                                                                               |
| 520-530'     | As above. Fossils: forams, pelecypod and gastropod shell fragments, echinoid spines.                                                                               |
| 530-540'     | As above.                                                                                                                                                          |
| 540-550'     | As above.                                                                                                                                                          |
| 550-560'     | Micritic limestone as above. Mudstone (20%), medium gray, moderately soft.                                                                                         |
| 560-570'     | Micritic limestone, very pale orange, slightly arenaceous, moderately soft. Trace of mudstone as above. Fossils: pelecypod and gastropod. Shell fragments, forams. |
| 570-580'     | As above.                                                                                                                                                          |
| 580-590'     | As above, no mudstone.                                                                                                                                             |
| 590-605'     | As above.                                                                                                                                                          |

FDER JC-1  
EDB MONITOR WELL  
GEOLOGIC LOG

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                          |
|--------------|-------------------------------------------------------------------------------------------------------------|
| 0-3'         | Sand, fine grained, yellowish gray (5Y 8/1), unconsolidated.                                                |
| 3-5'         | Clay, plastic, very pale orange (10YR 8/2) to dark yellowish orange (10YR 6/6), sandy.                      |
| 5-10'        | Clay, very plastic grayish orange pink (5YR 7/2) to light red (5R 6/6) to dark yellowish orange, varigated. |
| 10-15'       | Clay, plastic, white to dark yellowish orange.                                                              |
| 15-20'       | Clay, plastic, dark yellowish orange to pale reddish brown (1DR 5/4).                                       |
| 20-25'       | Clay, nonplastic, dark yellowish brown to pale reddish brown.                                               |
| 25-30'       | Same as above, slightly plastic.                                                                            |
| 30-35'       | Same as above with black ironstone.                                                                         |
| 35-40'       | Same as above.                                                                                              |
| 40-45'       | Same as above, Harder at 42 feet.                                                                           |
| 45-50'       | Clay, plastic, dark yellowish orange, to pale reddish brown. Black, well indurated ironstone.               |
| 50-55'       | Same as above.                                                                                              |
| 55-60'       | Clay, limy, plastic, white. Minor amounts of white, micritic limestone after 57 feet.                       |
| 60-70'       | No sample. Well indurated at 61 feet.                                                                       |
| 70-75'       | Limestone, argillaceous, very pale orange.                                                                  |
| 75-80'       | ?                                                                                                           |
| 80-82'       | Same as above, more fossiliferous.                                                                          |
| 82-86'       | Same as above.                                                                                              |
| 86-90'       | Same as above, poorly indurated, very porous                                                                |

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                     |
|--------------|--------------------------------------------------------------------------------------------------------|
| 90-97        | Same as above.                                                                                         |
| 97-98'       | Same as above, well indurated.                                                                         |
| 98-115'      | Micritic limestone, argillaceous to arenaceous, very pale orange, fossiliferous; moderately indurated. |
| 115-121'     | Same as above, well indurated.                                                                         |
| 121-123'     | Same as above, poorly indurated.                                                                       |

FDER JC-2  
EDB MONITOR WELL  
GEOLOGIC LOG

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                            |
|--------------|-----------------------------------------------------------------------------------------------|
| 0-3'         | Sand, medium to fine grained, yellowish gray (5Y 8/1) unconsolidated.                         |
| 3-5'         | Clay, sandy, slightly plastic, moderate yellowish brown (10YR 5/4).                           |
| 5-10'        | Clay, minor amounts of sand, plastic, grayish orange (10 YR 7/4).                             |
| 10-15'       | Clay, variegated, extremely plastic, grayish orange to white to moderate red (5R 4/6).        |
| 15-20'       | Same as above.                                                                                |
| 20-25'       | Clay, slightly plastic, dark yellowish orange (10YR 6/6).                                     |
| 25-30'       | Same as above.                                                                                |
| 30-35'       | Clay, plastic, dark yellowish orange.                                                         |
| 35-40'       | Micritic limestone, fossiliferous, white. Ironstone begins at 38 feet, well indurated, black. |
| 40-50'       | Micritic limestone, well indurated, very pale orange (10YR 8/2). Slightly fossiliferous.      |
| 50-63'       | No sample. Interpreted to be same as above.                                                   |
| 63-70'       | Micritic limestone, same as above. More fossiliferous.                                        |
| 73-80'       | Limestone, moderately indurated.                                                              |
| 80-87'       | Limestone, moderately well indurated.                                                         |
| 87-92'       | Limestone, well indurated.                                                                    |
| 92-94'       | Cavity in strata.                                                                             |
| 94-105'      | Limestone, moderately poorly indurated.                                                       |
| 105-114'     | Limestone, moderately well indurated.                                                         |
| 114-117'     | Limestone, poorly indurated.                                                                  |
| 117-123'     | Limestone, moderately well indurated.                                                         |



FDER JC-3  
EDB MONITOR WELL  
GEOLOGIC LOG

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                                                 |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 0-3'         | Sand, medium to fine grained, yellowish gray (5Y8/1), unconsolidated.                                                                              |
| 3-5'         | Clay, variegated, very plastic, white to dark yellowish orange (10 YR 6/6) to moderate red (5R 5/4).                                               |
| 5-10'        | Same as above.                                                                                                                                     |
| 10-15'       | Same as above to moderate reddish brown (10R 4/6).                                                                                                 |
| 15-20'       | Same as above.                                                                                                                                     |
| 20-25'       | Clay, slightly plastic, white to pale reddish brown (10R 5/4).                                                                                     |
| 25-30'       | Same as above.                                                                                                                                     |
| 30-35'       | Same as above.                                                                                                                                     |
| 35--40'      | Same as above.                                                                                                                                     |
| 40-45'       | Clay, slightly plastic, white to pale reddish brown to light brown (5YR 5/6), Ironstone, black, well indurated, at 40 feet.                        |
| 45-50'       | Same as above.                                                                                                                                     |
| 50-55'       | Micritic limestone, moderately indurated.                                                                                                          |
| 55-60'       | Micritic limestone, moderately well indurated.                                                                                                     |
| 60-82'       | No samples. Well indurated limestone at 68 and 77 feet.                                                                                            |
| 83-90'       | Micritic limestone, white, moderate well indurated, slightly fossiliferous.                                                                        |
| 90-100'      | Same as above, more fossiliferous.                                                                                                                 |
| 100-110'     | Biomicritic limestone, very pale orange (10YR 8-2), moderately well indurated. Fossils: shell casts and molds, echinoid spines, bryozoans, forams. |
| 110-114'     | Same as above.                                                                                                                                     |
| 114-116'     | Cavity in limestone.                                                                                                                               |
| 116-123'     | Same as 100-110, moderately well indurated.                                                                                                        |

FDER PC-1  
EDB MONITOR WELL  
GEOLOGIC LOG

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                              |
|--------------|-----------------------------------------------------------------------------------------------------------------|
| 0-5'         | Sand, light to dark brown, medium grained, some organics.                                                       |
| 5-10'        | Sand, light brown, fine to medium grained.                                                                      |
| 10-15'       | Same as above, minor amount of clay.                                                                            |
| 15-20'       | Sand, argillaceous, fine to medium grained, moderate orange.                                                    |
| 20-25'       | Same as above.                                                                                                  |
| 25-30'       | Same as above.                                                                                                  |
| 30-35'       | Sand, tan, fine to medium gray, unconsolidated.                                                                 |
| 35-40'       | Same as above.                                                                                                  |
| 40-45'       | Same as above. -                                                                                                |
| 45-50'       | Sand, tan, fine to medium grained, unconsolidated. Minor amount of sandstone, poorly indurated, tan.            |
| 50-55'       | Same as above with nonplastic, red clay.                                                                        |
| 55-60'       | Same as above.                                                                                                  |
| 60-70'       | Sand, tan, medium grained, unconsolidated. Minor amounts of poorly indurated tan sandstone and white limestone. |
| 70-80'       | Same as above.                                                                                                  |
| 80-90'       | Sand, medium to coarse grained, subrounded to rounded, unconsolidated.                                          |
| 90-100'      | Same as above.                                                                                                  |
| 100-100'     | Same as above, with thin chert flakes (up to 2mm).                                                              |
| 110-120'     | Same as above.                                                                                                  |
| 120-130'     | Same as above.                                                                                                  |

| <u>DEPTH</u> | <u>DESCRIPTION</u>                                                                                                  |
|--------------|---------------------------------------------------------------------------------------------------------------------|
| 130-140'     | Clay, arenaceous, tan to orange, nonplastic. Minor amount of poorly indurated sandstone.                            |
| 140-150'     | Same as above.                                                                                                      |
| 150-160'     | Clay, arenaceous, white to tan, slightly plastic. Minor amount of poorly indurated sandstone.                       |
| 160-170'     | Same as above.                                                                                                      |
| 170-180'     | Same as above, more plastic, pale green.                                                                            |
| 180-190'     | Same as above.                                                                                                      |
| 190-192'     | Mudstone, dark green, well indurated.                                                                               |
| 192-194'     | Shell fragments, unconsolidated.                                                                                    |
| 194-200'     | Clay, dark green, stiff, plastic. Black phosphatic minerals present.                                                |
| 200-205'     | Mudstone, grayish green, phosphatic, shell fragments, hard.                                                         |
| 205-210'     | Clay, grayish green, phosphatic, shell fragments. Chert gravel, gray-to black, translucent.                         |
| 210-220'     | Same as above, clay becoming more plastic.                                                                          |
| 220-230'     | Same as above.                                                                                                      |
| 230-240'     | Clay, phosphatic to cherty, tan. Limestone, white, micritic.                                                        |
| 240-250'     | Limestone, micritic to argillaceous, white to brown. Chert and phosphate pebbles to 4mm.                            |
| 250-260'     | Limestone, micritic to dolomite, white to grayish green, slightly fossiliferous. Chert and phosphate less abundant. |
| 260-270'     | Dolomite, crystalline, brown to grayish green, hard. Minor amounts of micritic limestone, chert, and phosphate.     |
| 273-292'     | Biomicritic limestone, soft tan, forams.                                                                            |
| 294-296'     | Biomicritic limestone, light olive gray, hard.                                                                      |
| 303-304'     | Clay, soft green.                                                                                                   |

DEPTHDESCRIPTION

|          |                                                  |
|----------|--------------------------------------------------|
| 304-311' | Micritic limestone as above.                     |
| 311-312' | Micritic limestone, tan, moderately soft.        |
| 312-314' | Cavity, filled with dark green, sticky clay.     |
| 314-322' | Clay, dark green, plastic.                       |
| 322-323' | Micritic limestone, dark green; moderately hard. |
| 322-323' | Clay, plastic, dark green.                       |
| 324-333' | Micritic limestone, soft, tan.                   |